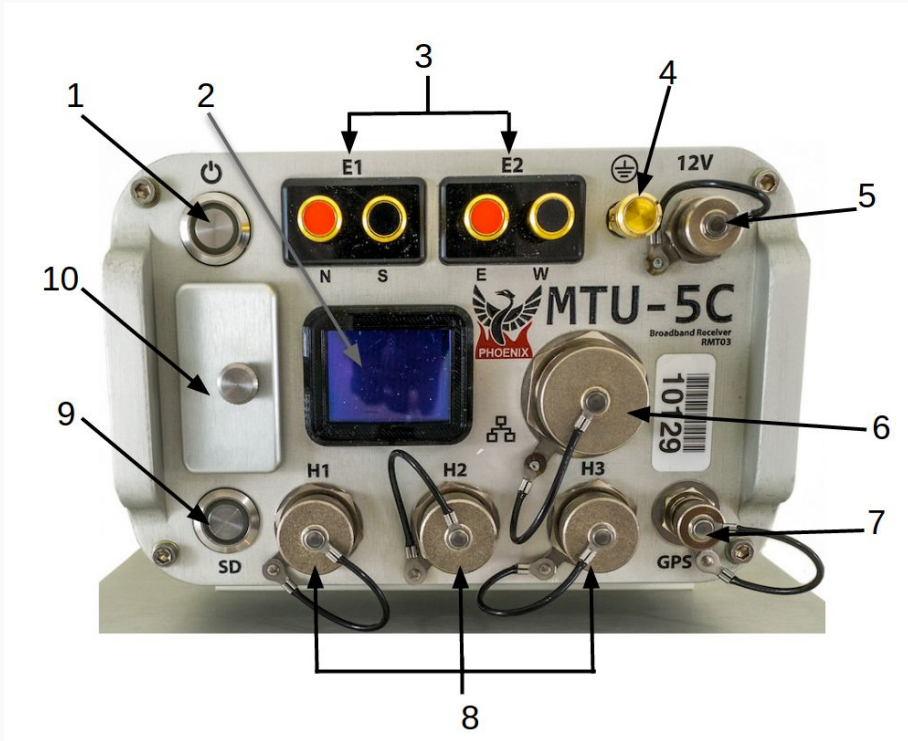


# MTU-5C Quick Start Guide for MT



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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	12VDC power input
6	LAN connector
7	GPS antenna connector
8	H1 (Hx) magnetic sensor connector H2 (Hy) magnetic sensor connector H3 (Hz) magnetic sensor connector
9	SD card button and indicator
10	SD card slot and cover

# Creating a MT - Configuration File

Open **EMpower**, click the **Prepare** button and complete the required information

## 1. Select the Receiver Type

## 2. Recording

### 2.1. MT - Configuration Creator

Use the Calibration and System Test options as needed

## 3. Calibration

### 3.1. Sensor Calibration

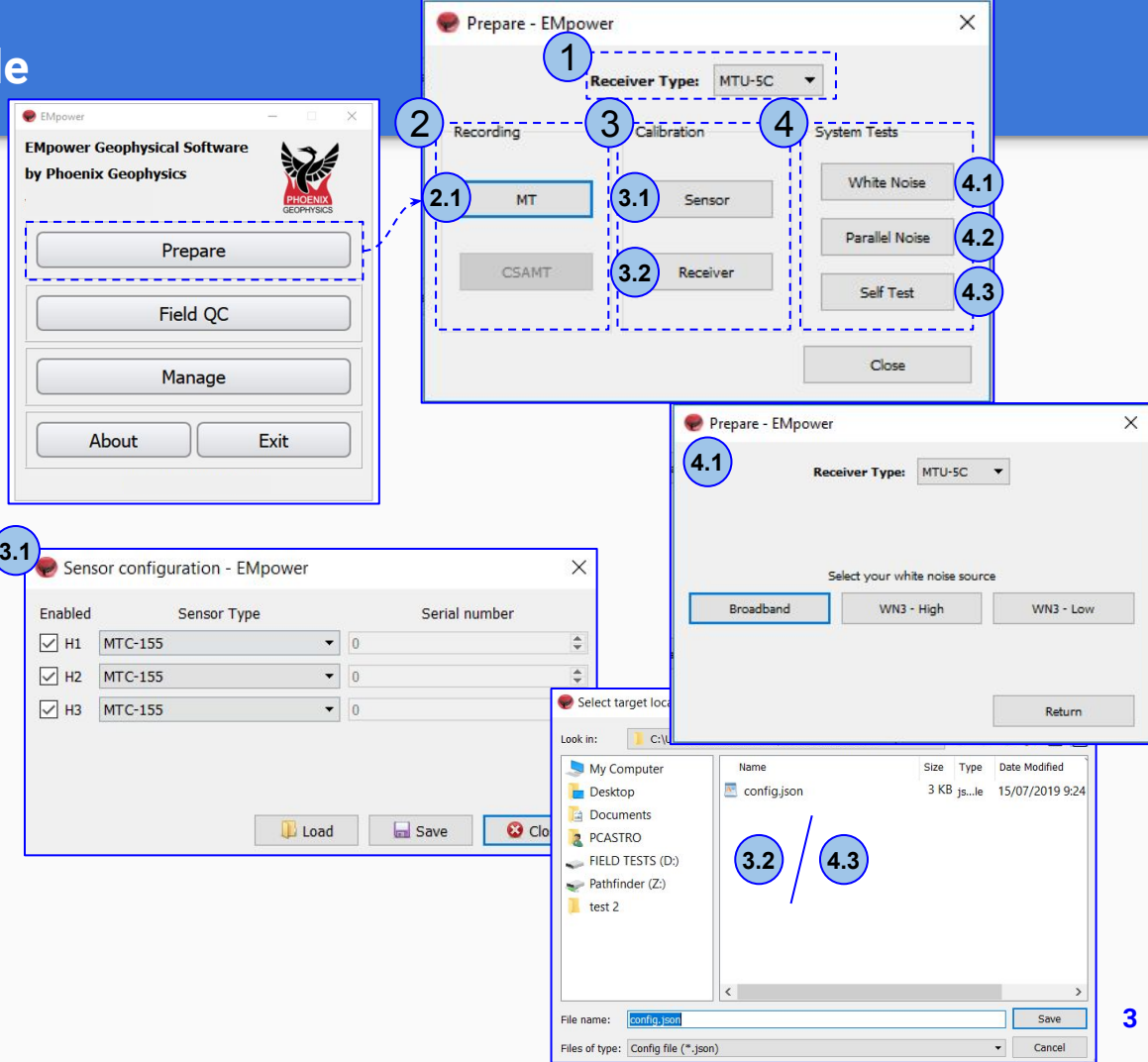
### 3.2. Receiver Calibration *(No additional configuration needed)*

## 4. System tests

### 4.1. White Noise

### 4.2. Parallel Noise - Configuration Creator

### 4.3. Self Test *(No additional configuration needed)*



# Configuration Creator

1. Check that the **Receiver type is MTU-5C**

2. Select the **Schedule**

2.1. **Manual or Automatic Start**

2.2. Or for a specific schedule use, **Single Shot, Daily or Weekly** and click **Add Schedule** to define the time and date

3. **Channels Settings**

4. Define the Receiver Settings

- Sampling Mode
- Sampling Rate

5. **Live tool** (see the [Networking Settings](#) manual)

6. **Configuration Layout**

! 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 data using borrowed channels or remote reference

Configuration Creator - EMpower

File Receiver Schedule Zone

- 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

Channel H2

Magnetic channel settings

Enabled

Sensor Type MTC-155

Gain Normal

Low Pass Filter 10 kHz

Sensor S/N 0

Receiver Settings

Sampling Mode  Continuous sampling  Sparse high frequency sampling

Sampling Rate 24kps High  View graphic 103.22 MB / Hour

Configuration layout

Layout Geometry Orthogonal

Survey Name

Site Name

Operator(s)

Company Name

Configuration Notes

Additional information

MTU-5C Broadband Receiver

PHOENIX GEOPHYSICS

Live Tool

MTC-155 Gain: Normal LPF: 10 kHz

MTC-155 Gain: Normal LPF: 10 kHz

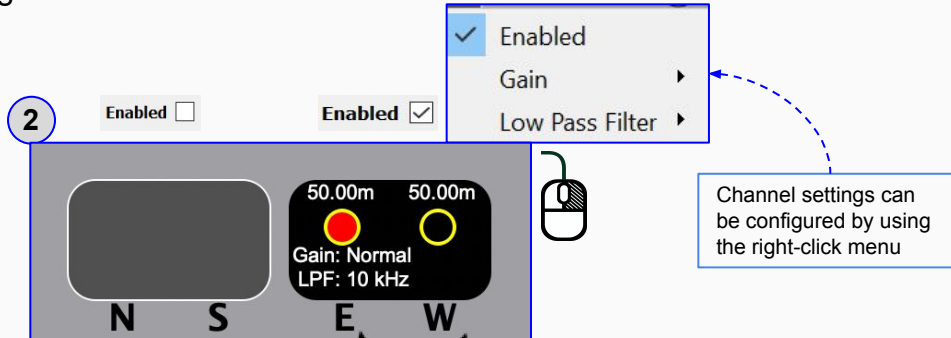
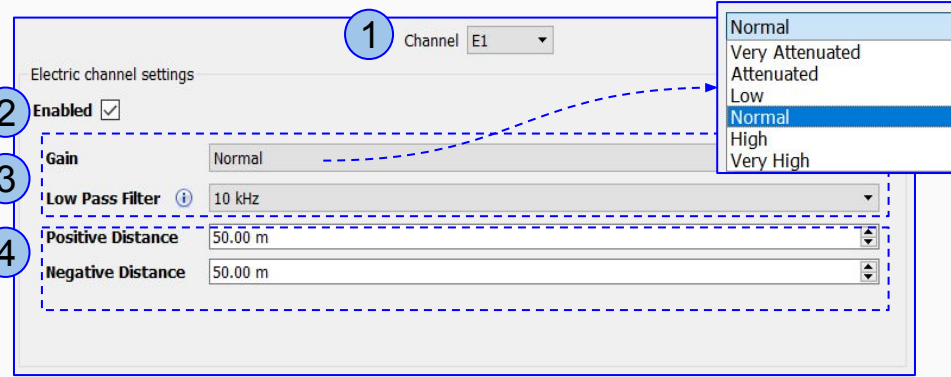
50.00m Gain: Normal LPF: 10 kHz N S

50.00m Gain: Normal LPF: 10 kHz E W

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

# 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



# 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**

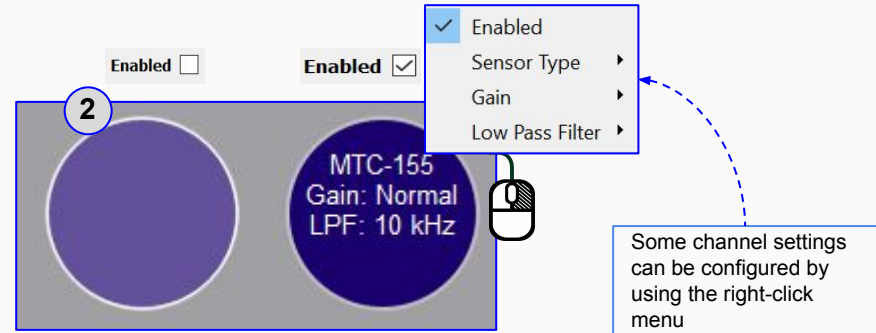
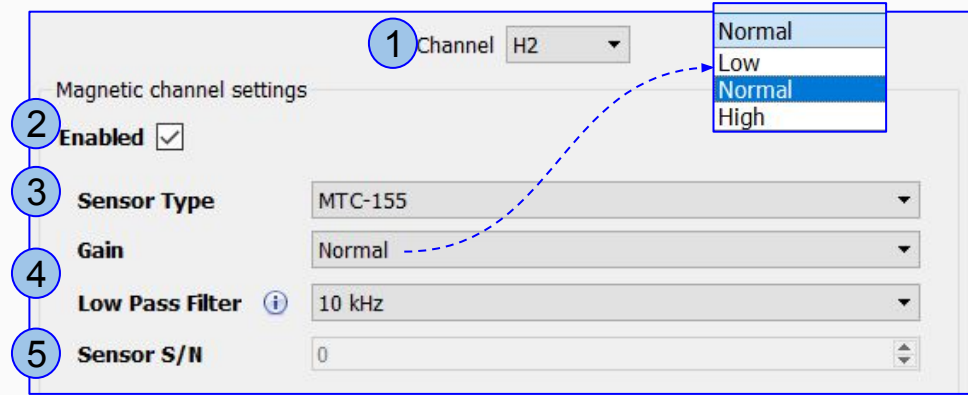
- If the sensor type is incorrect in the configuration file, the receiver will display a warning message. However, the recording will not be interrupted

## 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

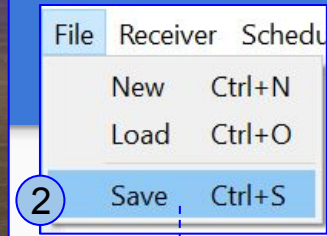
- There is no need to type serial number for sensors MTC-155/MTC-185, since it will be automatically detected by the receiver.
- For older sensors, type the serial number of each sensor. If you don't know this information in advance, keep field notes to add this information later, after the recording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



# Saving a Configuration File

## 1. Insert the SD Card

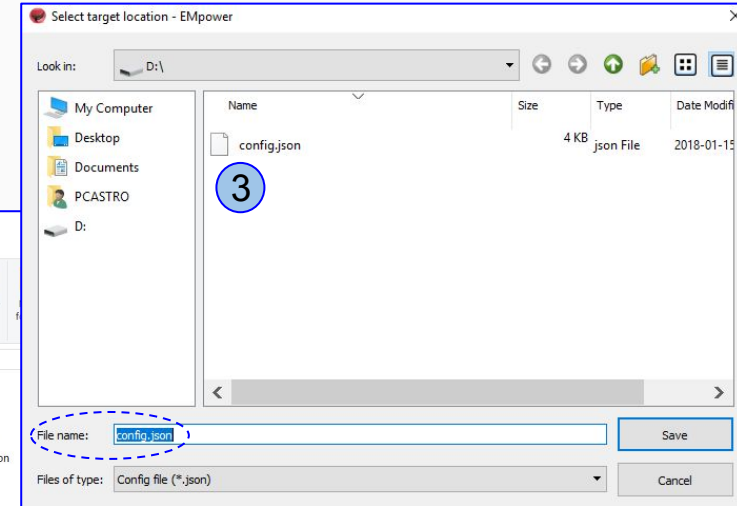
- The computer must be equipped with an SD card slot or use a USB card reader



## 2. Click the **File** menu

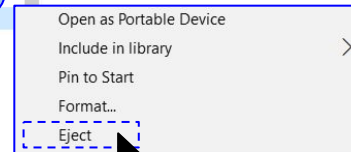
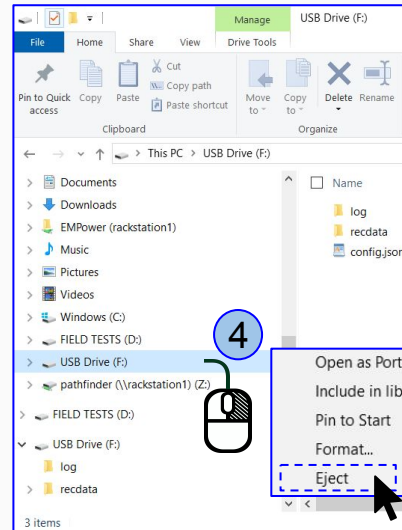
- Save or **Ctrl+S**
- Select the SD card
- **EMpower** will automatically create the file "**config.json**"

## 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**

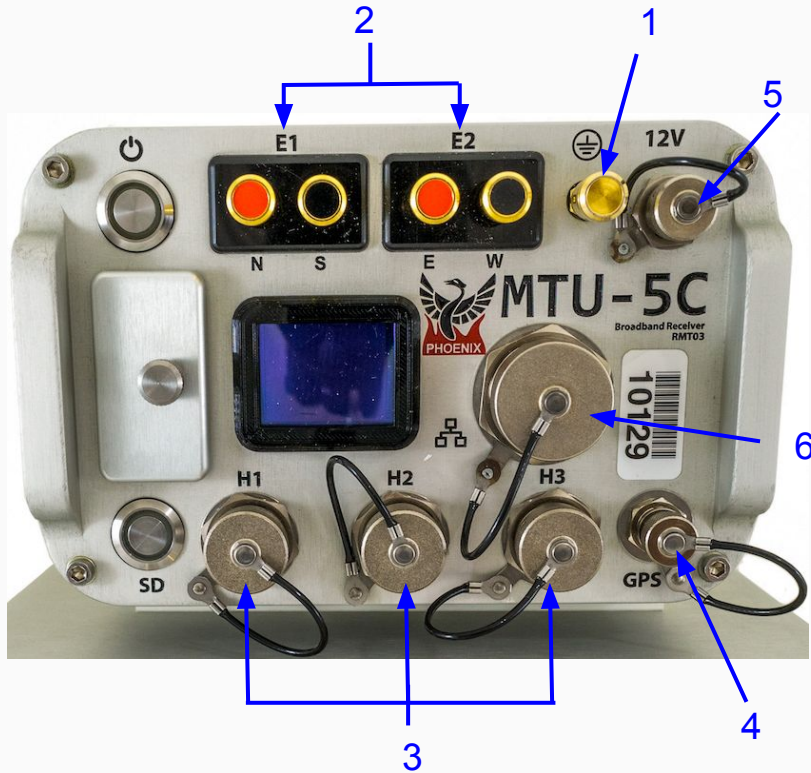




# MTU-5C Connections

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) and H3(Hz)
4. GPS antenna
5. 12V DC Power Source
6. Network connector



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



# SD Card - Recording Data





## Recording


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 Troubleshooting manual*

### Indicators

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

 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
			
SD			

- 2.1 **Automatic Start**  
*The recording starts automatically according to the schedule*

	Channel Detection	Recording
		
SD		

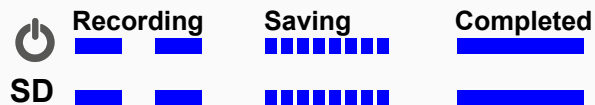
- 3 Briefly press and release the power button

	Ready	Channels Detection	Recording
			
SD			

# 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

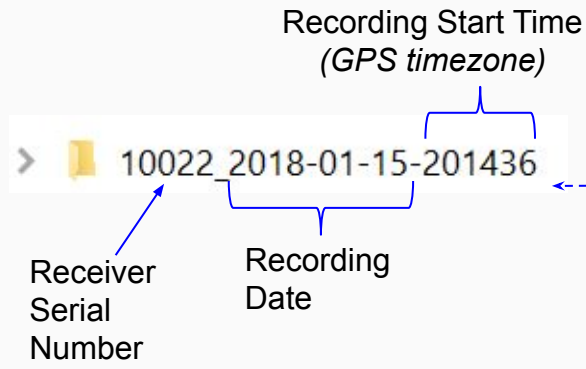
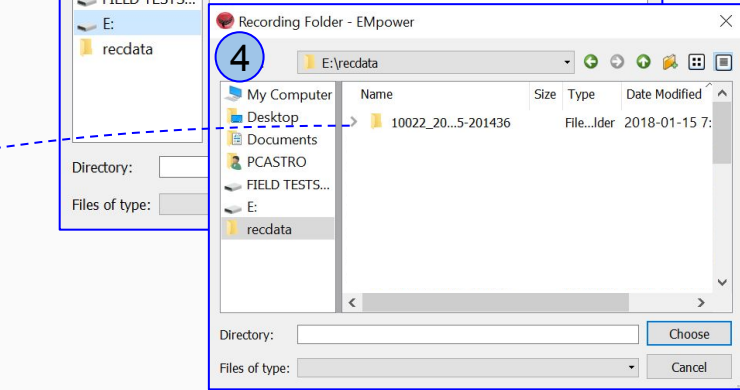
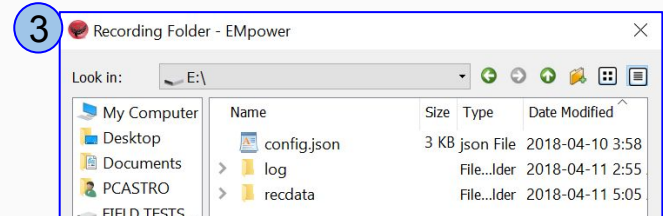
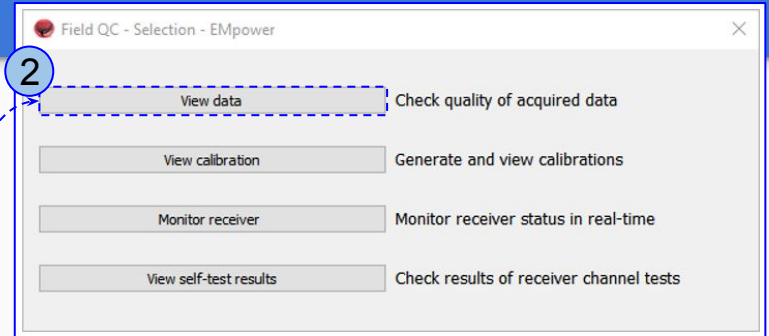
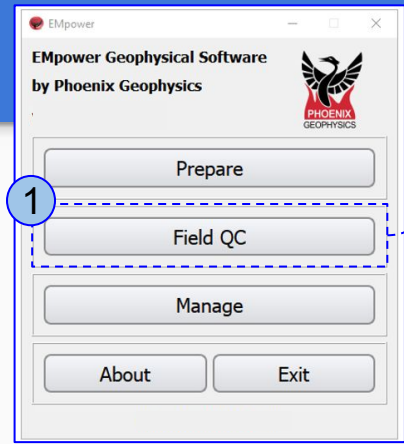


## Indicators

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

# Importing and 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**



## Review and Process the recorded information

1. Review the Electrode **Resistance** values and make the necessary corrections
  - Electrode **Distance (m) to GND**
  - **E-Azimuth**
  - **External Filter**
2. Ensure that the magnetic sensors were detected correctly and make the necessary corrections
  - **Serial #**
  - **Polarity**
  - **H1-H3 Azimuth**
3. View Recording Details (see page 14)
4. After reviewing the information, **Process** the data (see next page)



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.

The screenshot shows the 'Field QC - EMpower' software window. At the top, the status is 'Unapproved'. Below that are 'Tools' for 'Time Series', 'Spectra', and 'Process (Orthogonal)'. The 'Recording Information' section includes fields for Recording ID, Start time, Duration, Survey name, Station name, Operator(s), Company name, Layout Geometry, Declination, and Notes. A blue circle with the number '4' points to the 'Recording ID' field, and a text box explains that this section can be used to input additional field information. Below this is the 'Electric Channels' section, which contains a table with columns for Channel, Distance (m) to GND, Resistance (Ω), Polarity, Gain, LPF [Hz], and DC [V]. A blue circle with the number '1' points to the 'Distance (m) to GND' column. Below the table is the 'Magnetic Channels' section, which contains a table with columns for Channel, Sensor, Detected, Serial #, Polarity, Gain, LPF [Hz], and DC [V]. A red dashed circle with a warning icon and a blue circle with the number '2' points to the 'Detected' column for channel H1. A blue circle with the number '3' points to the 'View Recording Details' button at the bottom.

**Recording Information**

Recording ID: 10125\_2017-12-03-203322

Start time: Dec 03 2017 12:33:24 (Local) Eastern Standard Time (GPS -08:00)

Duration: 21h 32m 56s

Survey name: Don Campbell

Station name: S7\_1 5C

Operator(s): CF MU and GB

Company name:

Layout Geometry: Orthogonal

Declination: 13.00°

Notes:

**Electric Channels**

Channel	Distance (m) to GND	Resistance (Ω)	Polarity	Gain	LPF [Hz]	DC [V]
	(+) N / E	(-) S / W		(+) N / E (-) S / W		
E1	50.00	50.00	<input type="checkbox"/> Inverted	4 x 4 = x16	10000	-0.011
E2	50.00	50.00	<input type="checkbox"/> Inverted	4 x 4 = x16	10000	-0.014

E Azimuth: 40.00° External Filter: None

**Magnetic Channels**

Channel	Sensor	Detected	Serial #	Polarity	Gain	LPF [Hz]	DC [V]
H1	MTC-155	Not Present		<input type="checkbox"/> Inverted	x4	10000	0.074
H2	MTC-155	MTC-155	53918	<input type="checkbox"/> Inverted	x4	10000	0.032
H3	MTC-155	MTC-155	53195	<input type="checkbox"/> Inverted	x4	10000	-0.078

H1-H3 Azimuth: 40.00°

View Recording Details

# Process Data

1. Click the **Process** button
  - Verify that the channels and references selected are the desired ones
2. Define the time period by entering a start and end date/time
3. Enable the electric power grid filter that corresponds to the frequency carried by the power lines in the survey region (50Hz, 60Hz or None)
4. Click the **Process** button
5. A live display of the resistivity curve will appear after a few seconds

*\*This resistivity curve is not saved.  
It is purely for QC purposes*

The screenshot shows the 'Field QC - EMpower' software interface. The main window displays settings for 'MB 10 Serial 10127 - EMpower'. The 'Magnetic Channels' section shows Hx = H1 MTC-155 53695, Hy = H2 MTC-155 53728, and Hz = H3 N/A N/A. The 'Electric Channels' section shows 'Use the following' with Ex = E1 and Ey = E2. The 'Processing timeframe' section shows a start time of 2017-08-28 12:29:22 and an end time of 2017-08-29 09:55:09, with a duration of 21 h 25 m 47 s. The 'Electric power grid filter' section shows the 60 Hz filter selected. The 'Process' button is highlighted with a blue dashed box and a circled '4'. A 'Process (Orthogonal)' button is also highlighted with a blue dashed box and a circled '1'. A 'Magnetics Selection - EMpower' dialog box is open, showing Hx, Hy, and Hz dropdown menus. A 'Channel Selection - ...' dialog box is also open, showing Ex and Ey radio buttons. A table of resistance data is visible at the bottom right.

Resistance ( $\Omega$ )	N/E (-) S	V
24.435	4915.438	4 x 1 = x4   10000   0.031
392.498	2960.453	4 x 1 = x4   10000   0.018

The bottom part of the screenshot shows a live display of the resistivity curve. The top graph shows Amplitude (mV) vs Frequency (Hz) on a log-log scale. The bottom graph shows Phase (°) vs Frequency (Hz) on a semi-log scale. The data points are color-coded by channel (XY and YX).

Serial #	Polarity	Gain	LPF [Hz]	DC [V]
53695	<input type="checkbox"/> Inverted	x4	10000	-0.012
53728	<input type="checkbox"/> Inverted	x4	10000	0.088
	<input type="checkbox"/> Inverted	N/A	N/A	N/A

# 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
- 5. Time Series Level

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

Recording Details: 10205\_2018-10-04-193809 - EMpower

Recording ID: 10205\_2018-10-04-193809  
Survey Name: WA  
Station Name: Remote  
Company Name:  
Receiver Type: MTU-SC  
Instrument Serial: 10205  
Operator: EF&YA

Timing Details  
Start Time:  
Stop Time:  
Duration:  
Latitude:  
Longitude:  
Altitude:

Instrument Info  
OS Version: v1.27.1  
Motherboard Model: BMB01-G  
Motherboard Serial: 031987  
Battery: Low: 12.192 V, High: 12.88 V [Details]  
Temperature: Low: 17°C, High: 21°C [Details]

Decimation  
Recorded 2 seconds at 24000 samples/s every 30 seconds, and continuously at 150 samples/s

GPS Timing Card  
Serial Number: 201288  
Model: BTM01-1  
Firmware Version: 00010029X  
# of Satellites: 6 - 15 satellites [Details]

Tag	Board S/N	Model	Firmware	Sat	Signal Ranges	
1	E1	201070	BCM01-I	1001c	~0 % - View	View Levels
2	E2	201074	BCM01-I	1001c	0.001 % - View	View Levels
3	H1			0 %	View Levels	
4	H2			0 %	View Levels	

1. Battery Voltage - Line graph showing Voltage (V) over time, decreasing from ~12.8V to ~12.4V.

2. Internal Temperature - Line graph showing Temperature (°C) over time, fluctuating between ~17°C and ~20°C.

3. Number of Satellites - Bar chart showing the number of satellites over time, ranging from ~6 to ~15.

4. Saturated Frames - E1 - Bar chart showing the number of saturated frames over time, with most values at 0 and some spikes up to 3.

5. Time Series Level - E1 - Scatter plot showing signal [V] over time, with Maximum (red), Average (green), and Minimum (blue) values.



*Please check out the [FAQs](#)*

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

*Or email us at: [support@phoenix-geophysics.com](mailto:support@phoenix-geophysics.com)*