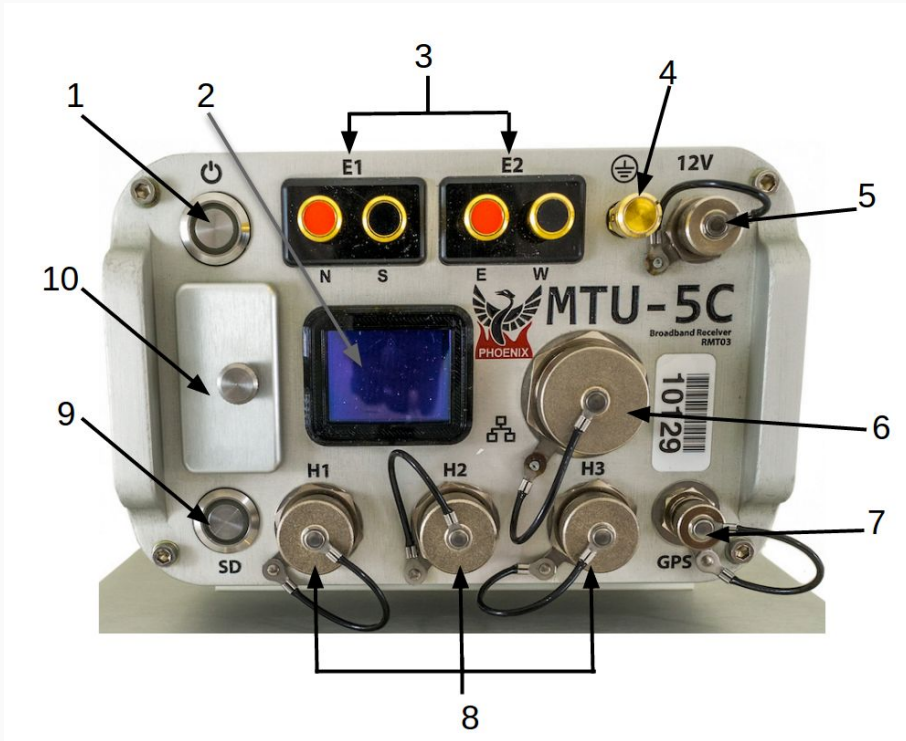


# MTU-5C Quick Start Guide



- MTU-5C (components)
- Creating a Configuration File
  - Configuration Creator
  - Electric Channel Settings
  - Magnetic Channel Settings
- Saving a Configuration File
- MTU-5C Connections
- SD Card - Recording Data
  - Stopping a recording
  - Importing and Evaluating Data
- Evaluate
  - View Recording Details
- Process Data



## 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 Configuration File

Open **EMpower** and click the **Prepare** button

Complete the required information

## 1. Select the **Receiver Type**

## 2. **Recording**

### 2.1. **MT - Configuration Creator**

## 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

**EMpower**  
**EMpower Geophysical**  
**by Phoenix Geophysical**

Prepare

Evaluate

Manage

Recording

Calibration

System Tests

White Noise

Parallel Noise

Self Test

Close

Receiver Type: MTU-SC

1

2

3

4

2.1

3.1

3.2

4.1

4.2

4.3

Sensor configuration - EMpower

Receiver Type: MTU-SC

Sensor Type

Serial number

Enabled

H1 MTC-150 0

H2 MTC-150 0

H3 MTC-150 0

All enabled magnetic channels require a unique, non-zero serial number.

Load Save Close

Prepare - EMpower

Receiver Type: MTU-SC

Select your white noise source

Broadband WN3 - High WN3 - Low

Return

4.1

Select target location

Look in: C:\

Name	Size	Type	Date Modified
config.json	3 KB	js...le	15/07/2019 9:24

3.2 / 4.3

File name: config.json Save

Files of type: Config file (\*.json) Cancel

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# Configuration Creator - Proposal

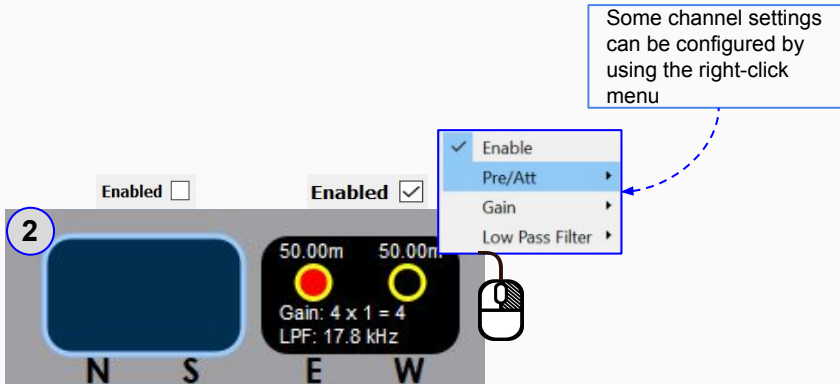
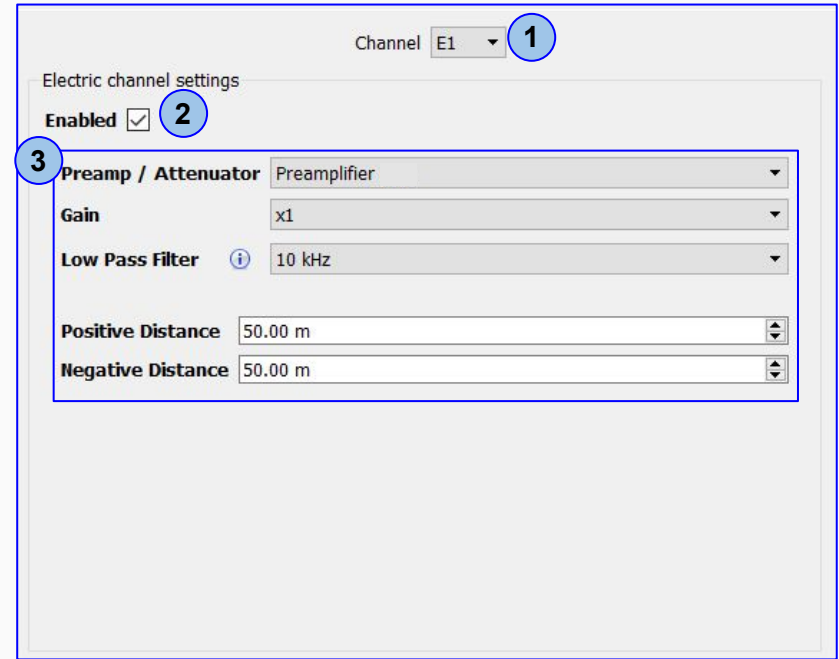
1. Check that the **Receiver type is MTU-5C**
2. Select the **Schedule**
  - 2.1. For a specific schedule use, **Single Shot, Daily** or **Weekly** schedule and click **Add Schedule** to define the time and/or date
3. **Live tool** (see the [Networking Settings](#) manual)
4. **Channels Settings** (slide 6-7)
5. **Receiver Settings**
  - Define the **Sampling Mode** and/or **Sampling Rate**
6. **Configuration Layout**

The screenshot shows the Configuration Creator - EMpower software interface. The main window is titled "Configuration Creator - EMpower" and has a menu bar with "File", "Receiver", "Schedule", and "Timezone". The "Schedule" menu is open, showing options: "Manual" (Ctrl+Alt+1), "Automatic Start" (Ctrl+Alt+2), "Single Shot" (Ctrl+Alt+3), "Daily" (Ctrl+Alt+4), "Weekly" (Ctrl+Alt+5), and "Add Schedule" (Ctrl+A). A callout "1" points to the "Receiver" menu, and "2" points to the "Schedule" menu. "2.1" is a bracket grouping the schedule options. Below the menu is a central panel showing a top-down view of the MTU-5C Broadband Receiver. It features four channels labeled N, S, E, and W, each with a 50.00m range and Gain: Preamp x 1, 10 kHz. The receiver is labeled "MTU-5C Broadband Receiver" and "PHOENIX GEOPHYSICS". A "Live Tool" button is highlighted with callout "3". Below the receiver are three MTC-150 units, each with Gain: x4, LPF: 10 kHz, and S/N: 0. Callout "4" points to the "Channels Settings" panel on the right, which includes "Electric channel settings" for Channel E1, with options for "Enabled", "Preamp / Attenuator" (Preamplifier), "Gain" (x1), "Low Pass Filter" (10 kHz), "Positive Distance" (50.00 m), and "Negative Distance" (50.00 m). Callout "5" points to the "Receiver Settings" panel, which includes "Sampling Mode" (Continuous sampling, Sparse high frequency sampling) and "Sampling Rate" (24kps High, View graphic, 0.13 GB / Hour). Callout "6" points to the "Configuration layout" panel, which includes "Layout Geometry" (Parallel, Orthogonal, Parallel), "Survey Name", "Site Name", "Operator(s)", "Company Name", and "Configuration Notes" (Additional information).

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

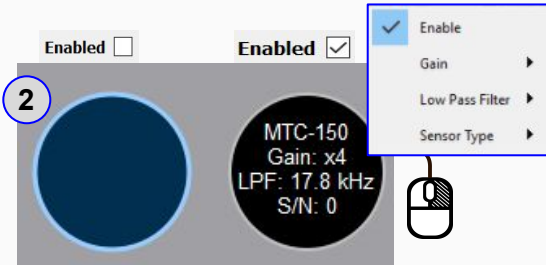
# Electric Channel Settings

1. Select the **Electric** channel
2. **Enable** or **Disable** the channel(s)
  - Disable the channel(s) if you do not plan to use them during the recording (*This will save space on the SD card*)
3. Complete the information in the **Electric channel settings**

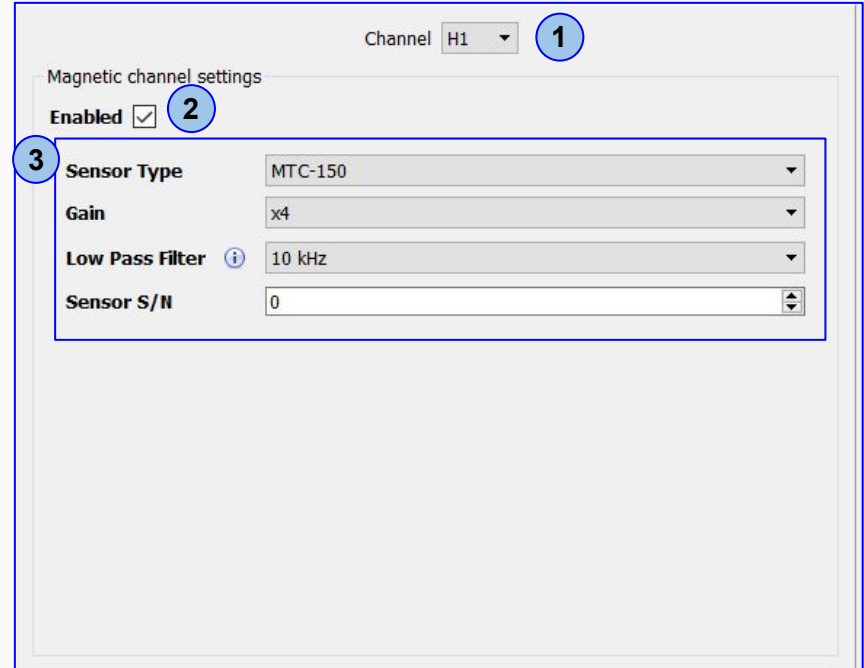


# Magnetic Channel Settings

1. Select the **Magnetic** channel
2. **Enable** or **Disable** the channel(s)
  - Disable the channel(s) if you do not plan to use them during the recording (*This will save space on the SD card*)
3. Fill in the required information on the **Magnetic channel settings**



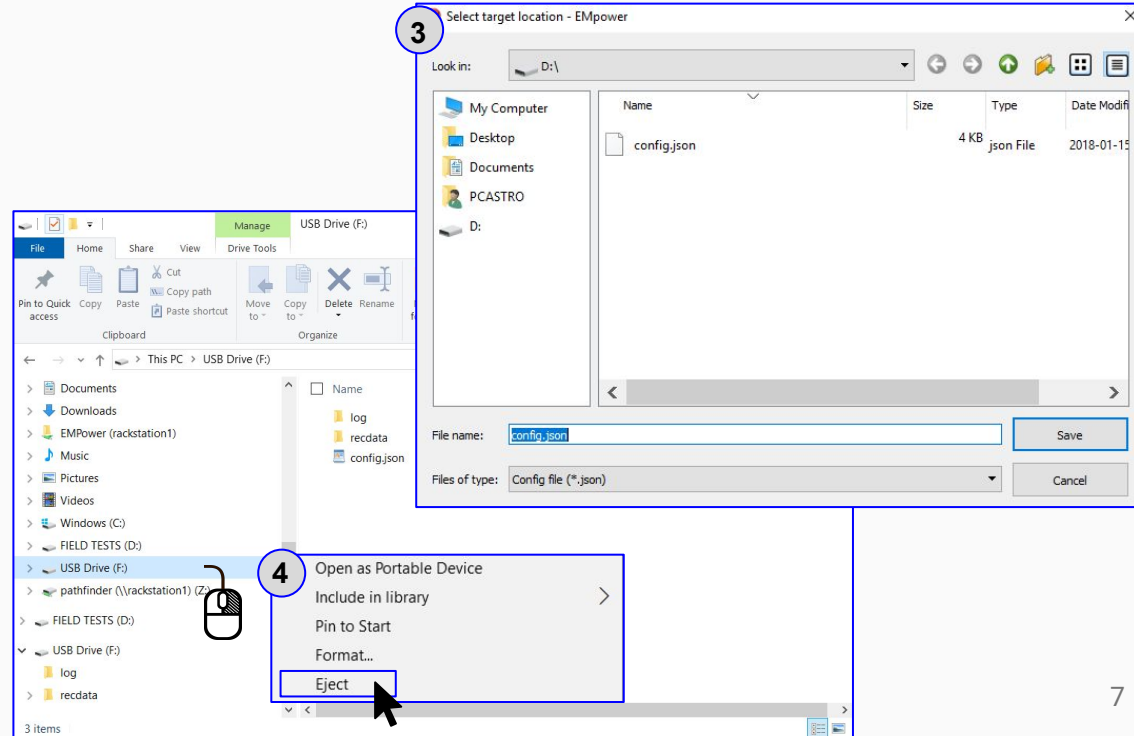
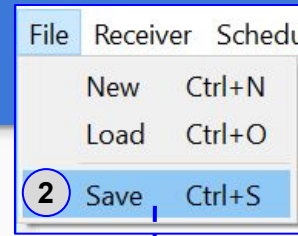
Some channel settings can be configured by using the right-click menu



**i** Channel settings can be configured by using the right-click menu or by using the Magnetic channel settings section

# Saving a Configuration File

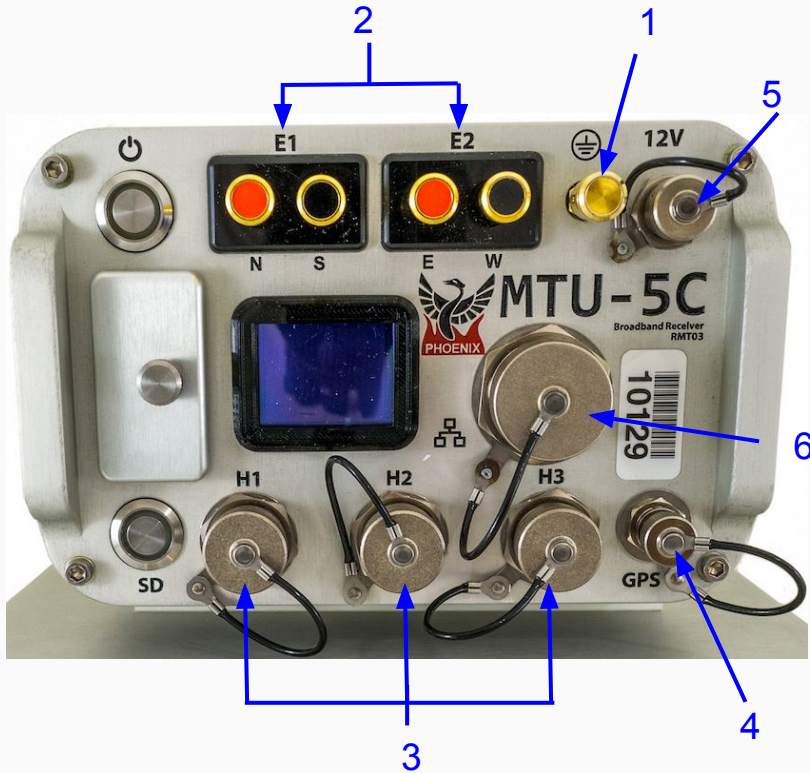
1. Insert the SD Card
  - The computer must be equipped with an SD card slot or use a USB card reader
2. Click the **File** menu
  - **Save or Ctrl+S**
  - **Select the SD card**
  - **EMpower** will automatically create the file "**config.json**"
3. Save the configuration file (**config.json**) in the 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



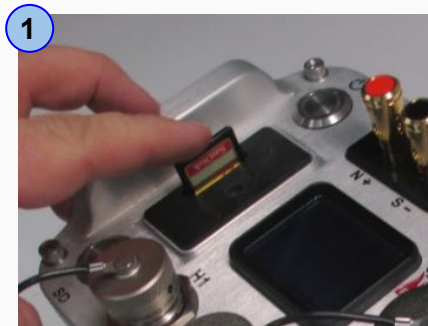
In the field, it is often most efficient to connect the components to the receiver following the order on the right



# SD Card - Recording Data

## Recording

1. Insert the **SD card**
2. To turn on the receiver, press the **Power** button briefly
  - Wait until both **LEDs** are solid blue.
  - **Automatic Start** recording
3. If the schedule type was configured as **Manual**, press the **Power** button to start recording



2. Press the power button briefly and release

	Starting	Acquiring GPS	Ready
Power			
SD			

### Automatic Start

The recording starts automatically according to the schedule

	Recording
Power	
SD	

3. Press the power button briefly and release.

	Ready	Channels Detection	Recording
Power			
SD			



## Indicators

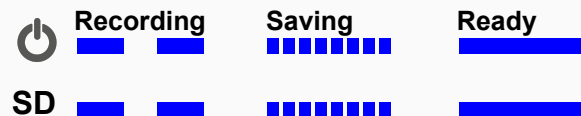
Slow, equal pulses

Solid color / Off

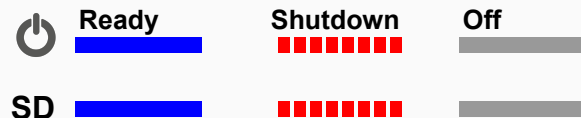
# Stopping a recording

1. Press the **Power** button briefly and release to stop recording
  - Wait until both LEDs are steady blue
2. Turn off the receiver, pressing the **Power** button for a few seconds 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



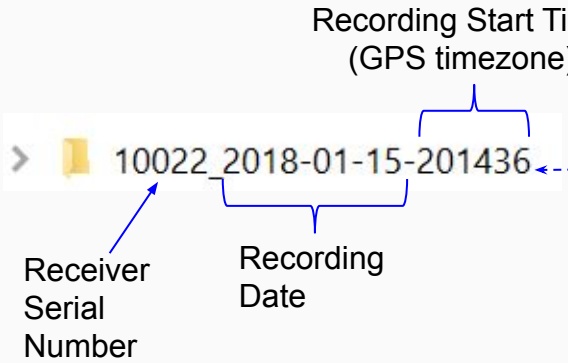
## Indicators

 *Rapid, equal pulses*

 *Solid color / Off*

# Importing and Evaluating Data

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



**EMpower Geophysical Software by Phoenix Geophysics**

Buttons: Prepare, Evaluate, Manage, Exit

Options: View data, View calibration, Monitor receiver, View self-test results, Manage surveys, Import data and prepare for..., View recording sites on a map, View time series and spectra, Process data with local or remote reference, Edit processed data and export for interpretation, Quit EMpower

**1** Evaluate

**2** View data

**3** E:\

Name	Size	Type	Date Modified
config.json	3 KB	json File	2018-04-10 3:58
log		File...lder	2018-04-11 2:55
recdata		File...lder	2018-04-11 5:05

Name	Size	Type	Date Modified
10022_20...5-201436		File...lder	2018-01-15 7:...

**4**

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## Review and Process the recorded information

- Review the Electrode **Resistance** values and make the necessary corrections
  - Electrode **Distance (m) to GND**
  - E-Azimuth**
  - External Filter**
- Ensure that the magnetic sensors were detected and make the necessary corrections
  - Serial #**
  - Polarity**
  - H1-H-3 Azimuth**
- View Recording Details** (see page 14)
- Process** the recorded data after the reviewed the information (see next page)

Channel	Sensor	Detected
H1	MTC-50H	Not Present



The warning icon indicates that something might be wrong with the recording, review the recording information and make necessary changes

Evaluate - EMpower

MB 8 (12 m 23 s)

Status  
 Approved  Unapproved  Rejected

Tools  
 Time Series Spectra Process (Orthogonal)

Recording Information  
 Recording ID: 10125\_2019-01-30-182945  
 Start time: Jan 30 2019 13:29:46 (Local) America/Toronto (GMT-05:00)  
 Duration: 12 m 23 s  
 Survey name:   
 Station name: MB 8  
 Operator(s): WH+SC+MU  
 Company name:   
 Layout Geometry: Orthogonal  
 Declination: 0.00°  
 Notes: High contact resistance  
 +40 azimuth  
 +15 declination

Electric Channels

Channel	Distance (m) to GND		Polarity	Resistance (Ω)		Gain	LPF [Hz]	DC [V]
	(+) N / E	(-) S / W		(+) N / E	(-) S / W			
E1	32.80	30.80	<input type="checkbox"/> Inverted	2639.58	3565.26	4 x 1 = x4	10000	0.0082
E2	29.00	26.00	<input type="checkbox"/> Inverted	2651.17	3302.63	4 x 1 = x4	10000	-0.0063

E Azimuth: 0° External Filter: None

Magnetic Channels

Channel	Sensor	Detected	Serial #	Polarity	Gain	LPF [Hz]	DC [V]
H1	MTC-150	MTC-150	53874	<input type="checkbox"/> Inverted	x4	10000	0.031
H2	MTC-150	MTC-150	53909	<input type="checkbox"/> Inverted	x4	10000	-0.0099
H3				<input type="checkbox"/> Inverted	N/A	N/A	N/A

H1-H3 Azimuth: 0°

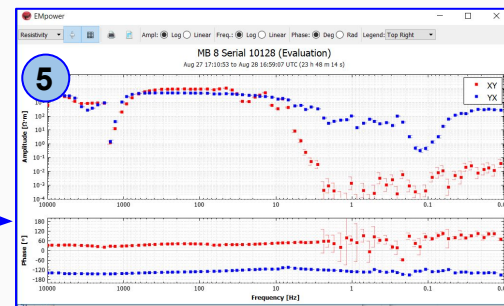
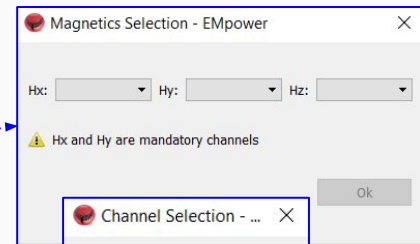
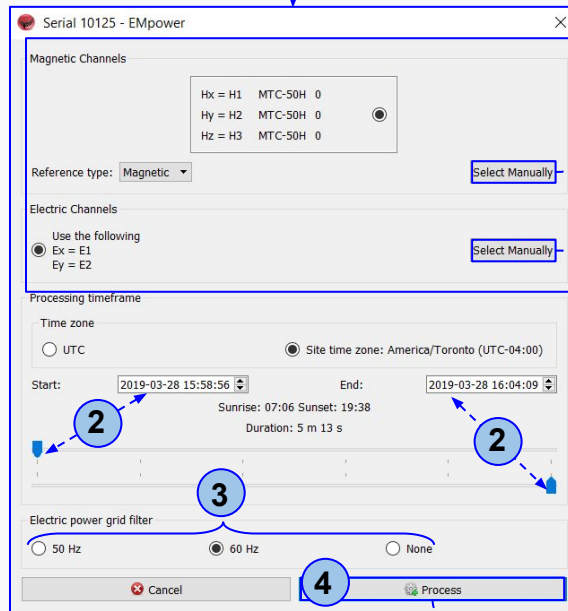
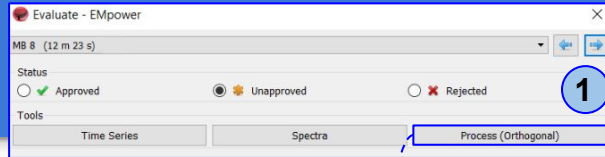
View Recording Details

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

# 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).*



# 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 4 - 6), the channel gain might be too high and/or there is artificial noise on your site
5. Time Series Level

**Recording Details: 10205\_2018-10-04-193809 - EMapower**

<b>Recording Details</b>		<b>Timing Details</b>	
Recording ID:	10205_2018-10-04-193809	Start Time:	Thu Oct 4 19:38:10 2018
Survey Name:	WA	Stop Time:	Sun Oct 7 23:52:14 2018
Station Name:	Remote	Duration:	76 h 14 m 4 s
Company Name:		Latitude:	46.1459°N
Receiver Type:	MTU-SC	Longitude:	122.783°W
Instrument Serial:	10205	Altitude:	1136.11 m
Operator:	EF&YA		

**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      Firmware Version: 00010029X

Model: BTM01-1      # of Satellites: 6 - 15 satellites ✓ Details

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

**1 Battery Voltage**

**2 Internal Temperature**

**3 Number of Satellites**

**4 Saturated Frames - E1**

**5 Time Series Level - E1**