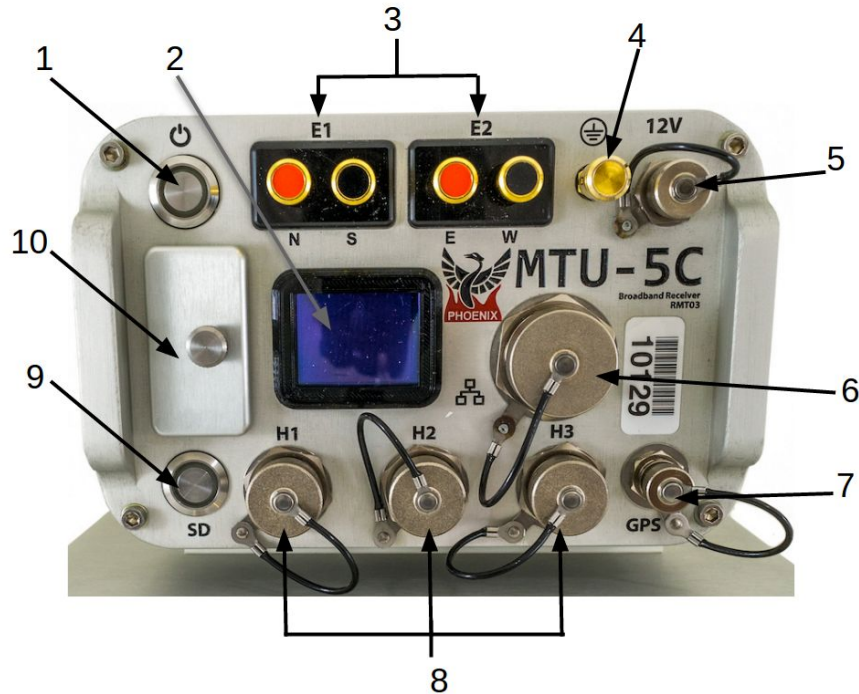


MTU-5C Quick Start User



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 select the Prepare Module to display the **Prepare** window

Complete the required information

1. Recording
 - 1.1. MT - Configuration Creator (*next slide*)
 - 1.2. Available for RXU-A8
2. Calibration
 - 2.1. Sensor configuration
- Default config.json
 - 2.2. Receiver Calibration
3. System tests
 - 3.1. White Noise
 - 3.2. Parallel Noise - Configuration Creator (*next slide*)
 - 3.3. Self Test
- Default config.json

The image displays several overlapping screenshots from the EMpower software interface, illustrating the steps to create a configuration file. The windows shown are:

- EMpower Geophysical by Phoenix Geophysical**: The main application window. The 'Prepare' button is highlighted with a blue box and labeled '1'. A dashed arrow points from 'Prepare' to 'Create instance' and 'View and edit' options.
- Prepare - EMpower**: A window with three tabs: 'Recording' (labeled '1.1'), 'Calibration' (labeled '2'), and 'System Tests' (labeled '3'). Under 'Recording', 'MT' and 'CSAMT' buttons are highlighted with blue boxes and labeled '1.1' and '1.2' respectively. Under 'Calibration', 'Sensor' and 'Receiver' buttons are highlighted with blue boxes and labeled '2.1' and '2.2' respectively. Under 'System Tests', 'White Noise', 'Parallel Noise', and 'Self Test' buttons are highlighted with blue boxes and labeled '3.1', '3.2', and '3.3' respectively.
- Prepare CSAMT - EMpower**: A window for CSAMT configuration. It has input fields for 'Increase' (0.00 m) and 'North' (North), and another for 'Increase' (0.00 m) and 'East' (East). Below these are fields for 'From E1(-) to E5(+), starting at position' with values '0.00 m' and 'East'. 'OK' and 'Cancel' buttons are at the bottom. A blue circle labeled '1.2' is next to the title bar.
- Sensor configuration -**: A window for sensor configuration. It has a 'Receiver Type' dropdown (MTU-SC) and a 'Sensor Type' dropdown (MTC-150). Below are three rows for channels H1, H2, and H3, each with a 'Serial number' field (0). A warning message states: 'All enabled magnetic channels require a unique, non-zero serial number.' 'Load', 'Save', and 'Close' buttons are at the bottom. A blue circle labeled '2.1' is next to the title bar.
- Prepare - EMpower**: A window for selecting a white noise source. It has a 'Receiver Type' dropdown (MTU-SC) and a 'Select your white noise source' section with 'Broadband', 'WN3 - High', and 'WN3 - Low' buttons. A 'Return' button is at the bottom right. A blue circle labeled '3.1' is next to the title bar.
- Select target location - EMpower**: A file explorer window showing the file system. The 'Look in:' path is 'C:\Users\PCASTRO\Desktop\VL42.2\Test\test 2'. The file 'config.json' is selected. A blue circle labeled '2.2' is next to the file name, and a blue circle labeled '3.3' is next to the file size. 'File name:' and 'Files of type:' fields are at the bottom.
- Quit EMpower**: A dialog box with 'Exit' and 'Quit EMpower' buttons. A 'Licensed until 2024' watermark is visible at the bottom.

Configuration Creator

Complete the information:

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

2. Select the **Schedule**

3. **Receiver Settings**

- Define the **Sampling Mode and Rate**

4. **Configuration Layout**

**This information will be displayed on each channel*

Configuration Creator - EMpower

File Receiver Schedule Timezone

Schedule Timezone

- 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

Receiver Settings

Channel: ...

Sampling Mode: Continuous sampling Sparse high frequency sampling

Sampling Rate: 24ksps High View graphic 0.13 GB / Hour

Configuration layout

Layout Geometry: Orthogonal

Survey Name: _____

Site Name: _____

Operator(s): _____

Configuration Notes: The Notes is useful for documenting any additional information

50.00m 50.00m 50.00m 50.00m

Gain: 4 x 1 = 4 10 kHz

N S E W

PHOENIX GEOPHYSICS

MTU-5C Broadband Receiver

Live Tool

MTC-150 Gain: x4 LPF: 10 kHz S/N: 0

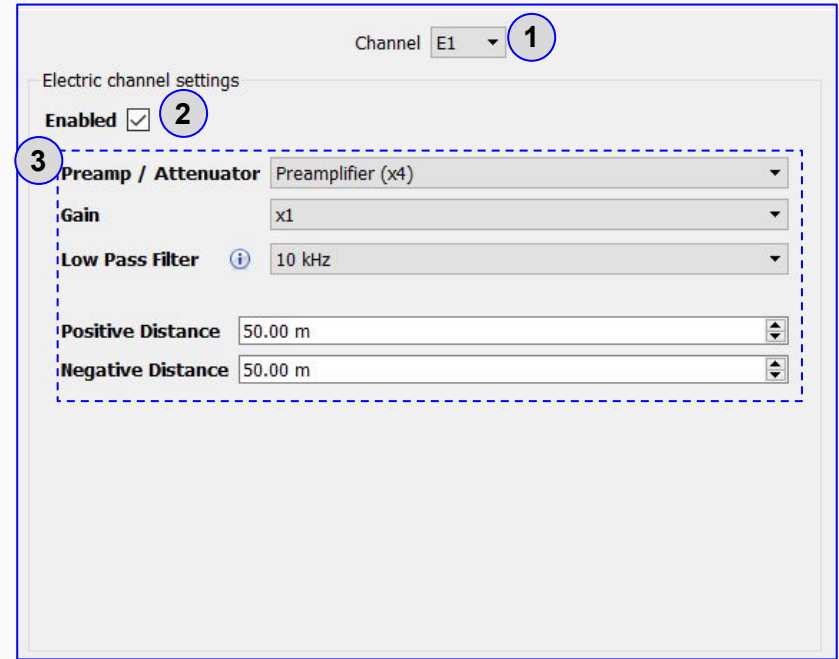
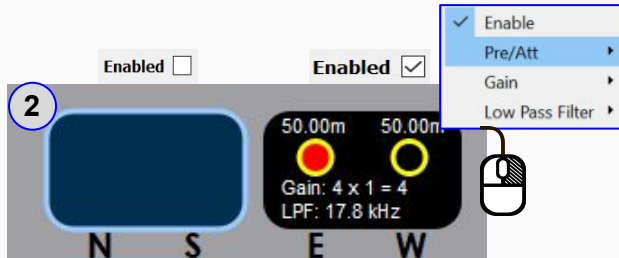
MTC-150 Gain: x4 LPF: 10 kHz S/N: 0

MTC-150 Gain: x4 LPF: 10 kHz S/N: 0

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

Electric Channel Settings

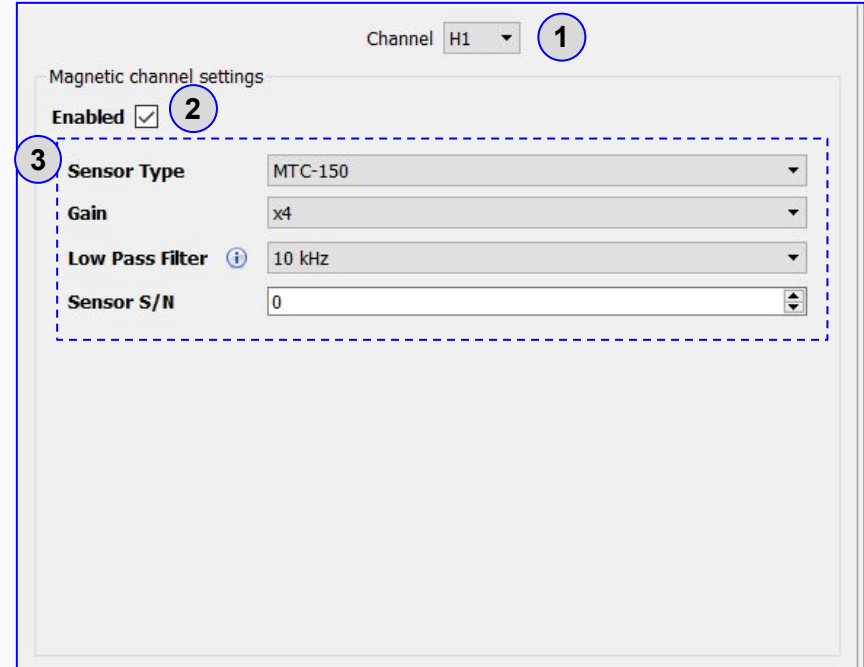
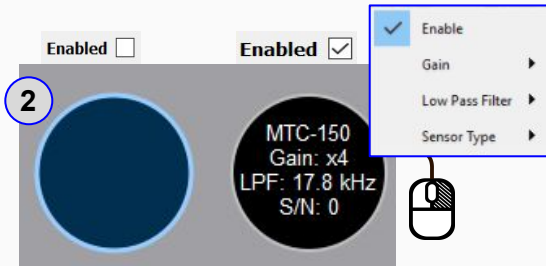
1. Select the **Electric** channel
2. **Enable** or **Disable** the channel(s)
 - **Disable** the channel(s) if you do not plan to use the channel during the recording
3. Fill in the required information on the **Electric channel settings**



Channel settings can be configured using right click or filling out the Electric channel settings section

Magnetic Channel Settings

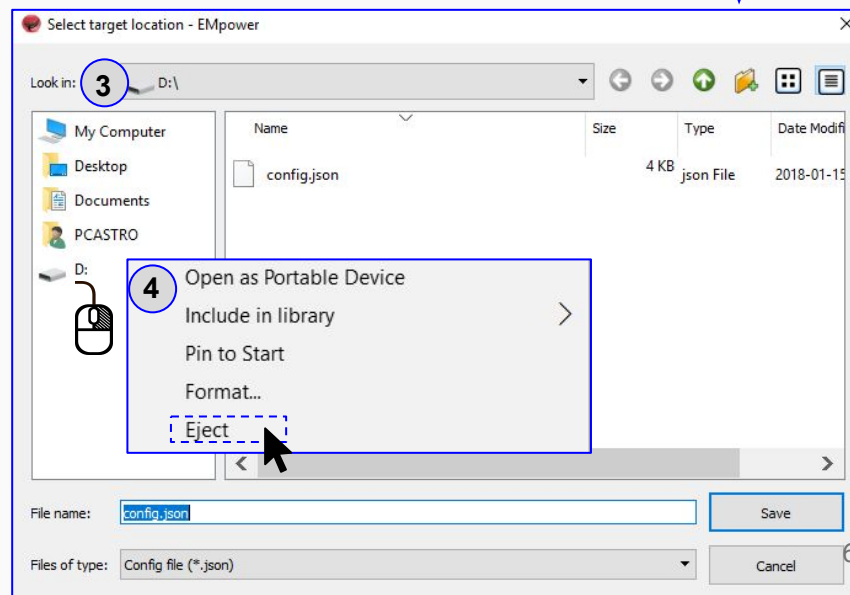
1. Select the **Magnetic** channel
2. **Disable** or **Enabled** the channel(s)
 - *Disable the channel(s) if you do not plan to use during the recording*
3. Fill in the required information on the **Magnetic channel settings**



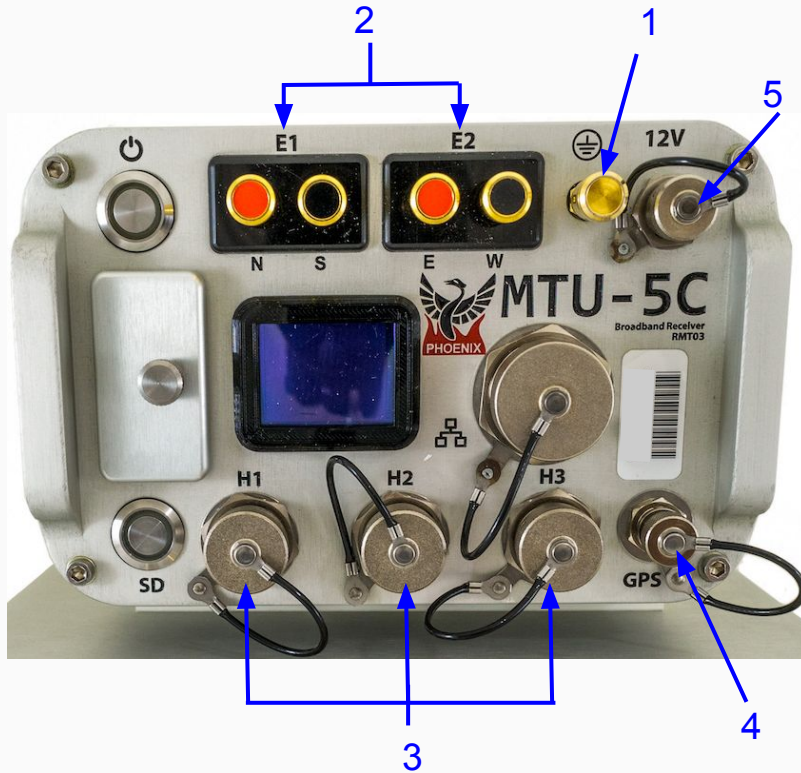
Channel settings can be configured using right click or filling out the Magnetic channel settings section

Saving a Configuration File

1. Insert the **SD card** in the computer slot or use a USB memory card reader.
2. Click **File** menu
 - **Save** or **Ctrl+S**
 - **EMpower** will automatically create the file "**config.json**"
3. Save the configuration file in the root folder of the **SD card**
4. Right click **SD card** drive
 - Select **Eject** option
 - Pull up 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



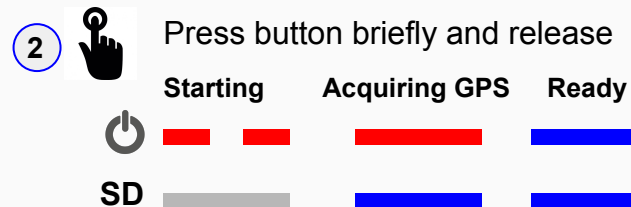
In the field, it is often most efficient to connect the components to the receiver following the order on the right

SD Card - Recording Data



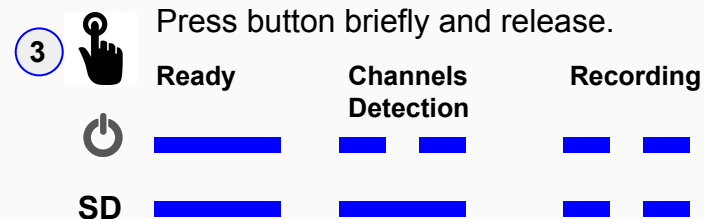
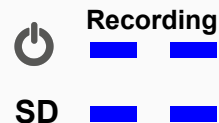
Recording

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



-Automatic Start

The recording starts automatically according to the schedule



Indicators

Slow, equal pulses

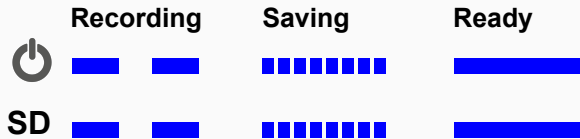
Solid color / Off

SD Card - Stopping record

1



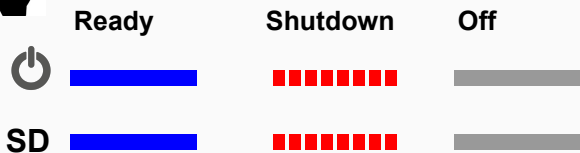
Press **Power** button briefly and release



2



Keep press button 3sec and release



Indicators

■■■■■■■ *Rapid, equal pulses*

■■■■■■■■■ *Solid color / Off*

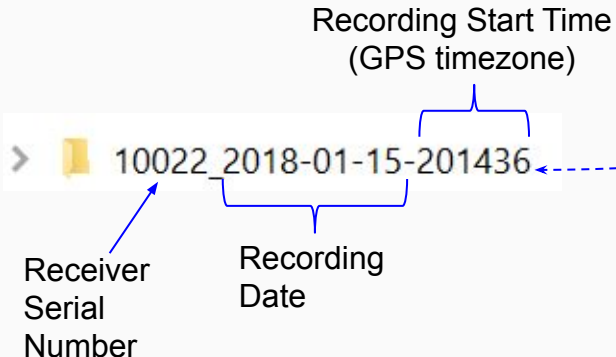
Stopping record

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**



Importing and Evaluating Data

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

Callout 1: Evaluate button

Callout 2: View data button

Callout 3: File Explorer window showing 'E:\recdata' folder

Callout 4: File Explorer window showing file '10022_20...5-201436' selected

Footer: Licensed until 2037-12-30

The screenshot shows the 'Evaluate - EMpower' software interface. At the top, the status is 'Approved'. The 'Tools' section has 'Process (Orthogonal)' selected. The 'Recording Information' section includes details like 'Recording ID: 10125_2019-01-30-182945', 'Start time: Jan 30 2019 13:29:46 (Local) America/Toronto (GMT-05:00)', and 'Duration: 12 m 23 s'. The 'Electric Channels' table shows two channels, E1 and E2, with their respective distances to ground and resistance values. The 'Magnetic Channels' table shows three channels, H1, H2, and H3, with their sensor types, detected status, and serial numbers. A red warning icon is present next to the 'Detected' status for channel H1.

Channel	(+) N / E	(-) S / W	Polarity	(+) N / E	(-) S / W	Gain	LPF [Hz]	DC [V]
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

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

Review and Process the recorded information

1. Review the **Electrode Resistance** and make the necessary corrections to the **Electrode distance** with respect to the ground distance
2. Ensure that the magnetic sensor were detected and if necessary, make corrections to the **Magnetic Sensor** types and serial numbers
3. **View Recording Details**, see the next page
4. **Process** the recorded data after review of information, see page 13

Channel: H1, Sensor: MTC-50H, Detected: **Not Present**

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

i This section is also used to input additional field information if desired

View Recording Details

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

- 1. Battery
- 2. Temperature
- 3. GPS Timing Card Verify
- 4. Channels Details

If saturation is not close to 0%, review the channel configuration (see pages 4,5), the gain might be too high and/or there is artificial noise on your site

Recording Details: 10039_2018-02-23-171514 - EMpower

Recording ID: 10039_2018-02-23-171514

Survey Name: NVFeb2018

Station Name: NV03

Receiver Type: MTU-5D

Instrument Serial: 10039

Operator: TH+GB+DF

Timing Details

Start Time:

Stop Time:

Duration:

Latitude:

Longitude:

Altitude:

Instrument Info

OS Version: v1.25.0

Motherboard Model: BMB01-G

Motherboard Serial:

Battery: Low: 11.879 V, High: 11.948 V Details

Temperature: Low: 14°C, High: 24°C Details

Decimation

Sampled continuously at 96000 samples per second

GPS Timing Card

Serial Number: 200127 Firmware Version: 00010028X

Model: BTM01-1 # of Satellites: 10 - 12 satellites Details

Channels Details

	Tag	Board S/N	Model	Firmware	Sat
1	E1	201271	BCM03-B	10019	0 %
2	E2	201269	BCM03-B	10019	0 %
3	H1	201273	BCM03-B	10019	0 %
4	H2	201274	BCM03-B	10019	0 %
5	H3	201358	BCM03-B	10019	0 %

1. Battery Voltage - EMpower

2. Internal Temperature - EMpower

3. Number of Satellites - EMpower

4. Saturated Frames - E2 - EMpower



Verify that there was not warning display



Process Data

NV03 Serial 10039 - EMpower

Channels

H1	MTC-150
H2	MTC-150
H3	MTC-150

Reference type: Magnetic

Electric Channels

Use the following

Ex = E1

Ey = E2

Select Manually

Processing timeframe

Time zone

UTC

Site time zone: America/Los_Angeles (UTC-08:00)

Start: 2018-02-22 15:17:15

End: 2018-02-23 08:26:57

Sunrise: 06:19 Sunset: 17:25

Duration: 17 h 9 m 42 s

Electric power grid filter

50 Hz

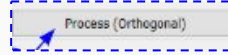
60 Hz

None

Cancel Process

Setting up the processing parameters:

Click Process Button



1. Verify that the channels and references selected are the desired
2. Select the desired length of the recording to be processed by decreasing the time at the beginning and ending of the recording
3. Enable the electric power grid filter that corresponds to the site (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 purpose.

