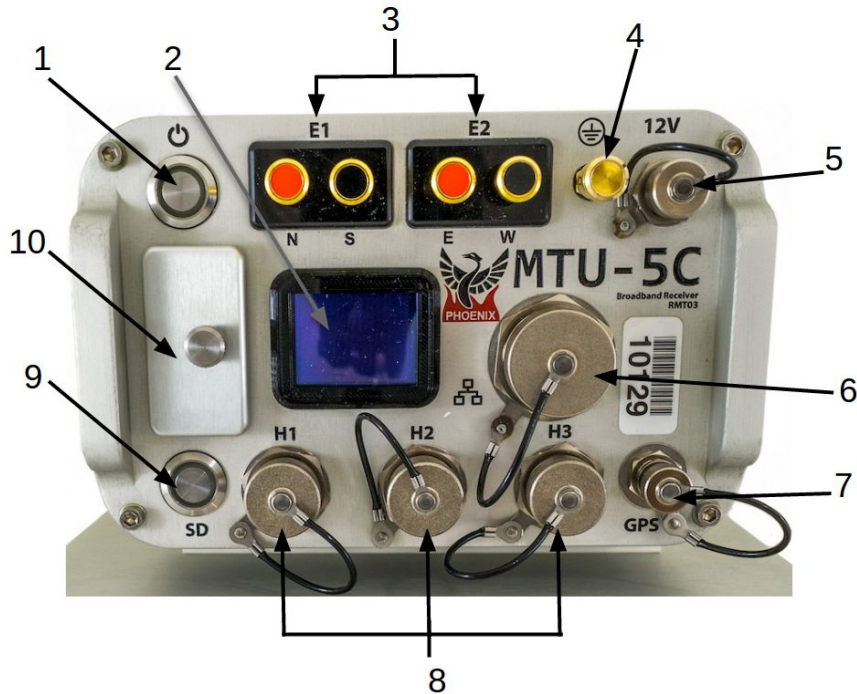


# MTU-5C Quick Start User



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

1. Open **EMpower**
2. Click **Prepare** to display the **Configuration Parameters** window
3. Fill in the required information then click **OK**

The screenshot displays the EMpower software interface. The main window is titled "EMpower" and "EMpower Geophysical Software by Phoenix Geophysics". It features a sidebar with buttons: "Prepare", "Evaluate", "Manage", and "Exit". The "Prepare" button is highlighted with a blue border and a red circle labeled "1". An arrow points from the "Prepare" button to the "Configuration Parameters - EMpower" dialog box. The dialog box contains the following fields: "Survey Name" (text input with "Example 1"), "Survey Type" (dropdown menu with "MT"), "Receiver Type" (dropdown menu with "MTU-5C"), "Timezone" (dropdown menu with "UTC-07:00 (GMT-07:00)"), "Calibration Type" (dropdown menu with "None"), and "Schedule Type" (dropdown menu with "Manual Button Press"). The "OK" button is highlighted with a blue border and a red circle labeled "3". The "Cancel" button is also visible. At the bottom of the main window, it says "Licensed until 2037-12-30".

# 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 Survey Type Timezone

1 2

Schedule Survey Type Timezone

Schedule	Survey Type	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

Attenuator Preamplifier (x4)  
x1

Low Pass Filter 10 kHz

Positive Electrode Distance 50.00 m

Negative Electrode Distance 50.00 m

3

Receiver Settings

Sampling Mode  Continuous sampling  Sparse high frequency sampling

Data Density 24ksps High

4

Configuration layout

Layout Geometry Orthogonal

Survey Name Example 1

Site Name

Operator(s)

Configuration Notes

The Notes is useful for documenting any additional information

MTU-5C Broadband Receiver

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

PHOENIX TECHNOLOGIES

N S E W

50.00m 50.00m 50.00m 50.00m

Gain: 4 x 1 = 4 LPF: 10 kHz

Gain: 4 x 1 = 4 LPF: 10 kHz

Gain: 4 x 1 = 4 LPF: 10 kHz

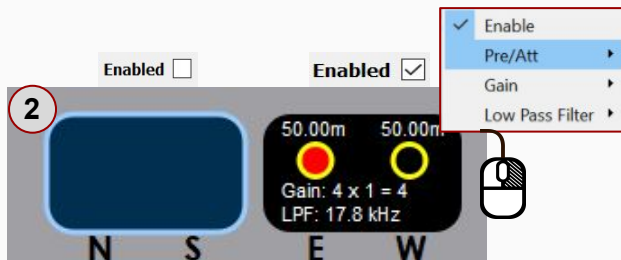
Gain: 4 x 1 = 4 LPF: 10 kHz


5

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**

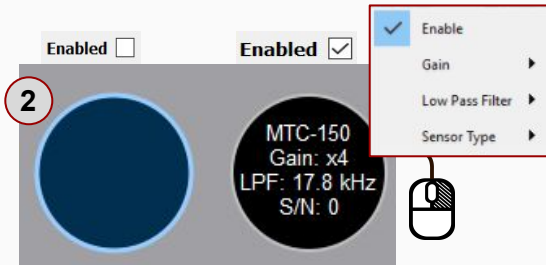



 Channel settings can be configured using right click or filling out the Electric channel settings section

A screenshot of the software interface for Electric channel settings. The 'Channel' dropdown is set to 'E1' (circled with '1'). The 'Electric channel settings' section is expanded, showing 'Enabled' checked (circled with '2'). The 'Preamp / Attenuator' is set to 'Preamplifier (x4)', 'Gain' is 'x1' (circled with '3'), and 'Low Pass Filter' is '10 kHz'. Below these are 'Positive Electrode Distance' and 'Negative Electrode Distance', both set to '50.00 m'. The 'Receiver Settings' section shows 'Sampling Mode' with 'Sparse high frequency sampling' selected. 'Data Density' is '24kps High' with a green progress bar. The 'Configuration layout' section shows 'Layout Geometry' set to 'Orthogonal', 'Survey Name' as 'NVFeb2018', and empty fields for 'Site Name' and 'Operator(s)'. A 'Configuration Notes' text area is at the bottom.

# 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

Channel H1 **1**

Magnetic channel settings

**2** Enabled

Sensor Type MTC-150

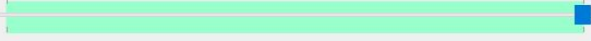
Gain x4 **3**

Low Pass Filter ⓘ 10 kHz

Sensor S/N 0

Receiver Settings

Sampling Mode  Continuous sampling  Sparse high frequency sampling

Data Density 24ksps Higl ⓘ 

Configuration layout

Layout Geometry Orthogonal

Survey Name NVFeb2018

Site Name

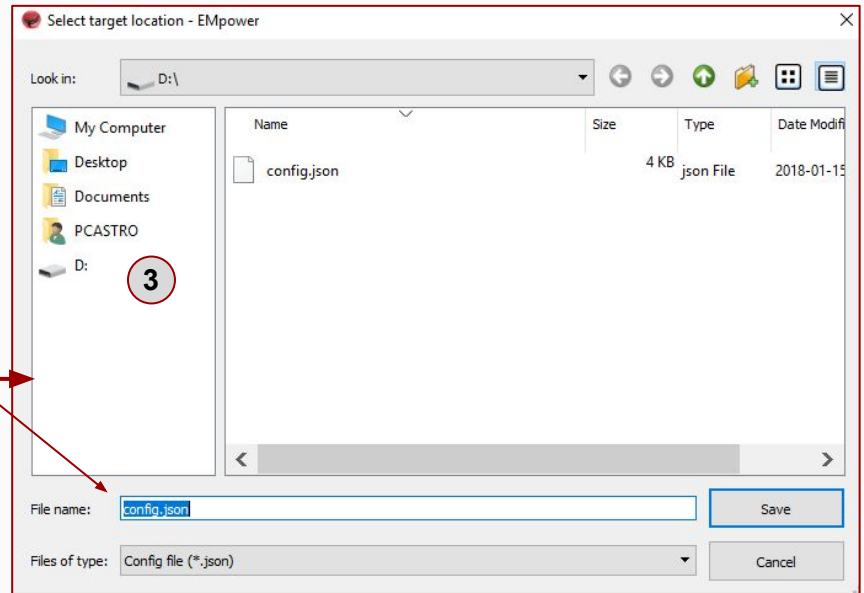
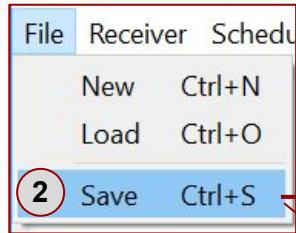
Operator(s)

Configuration Notes

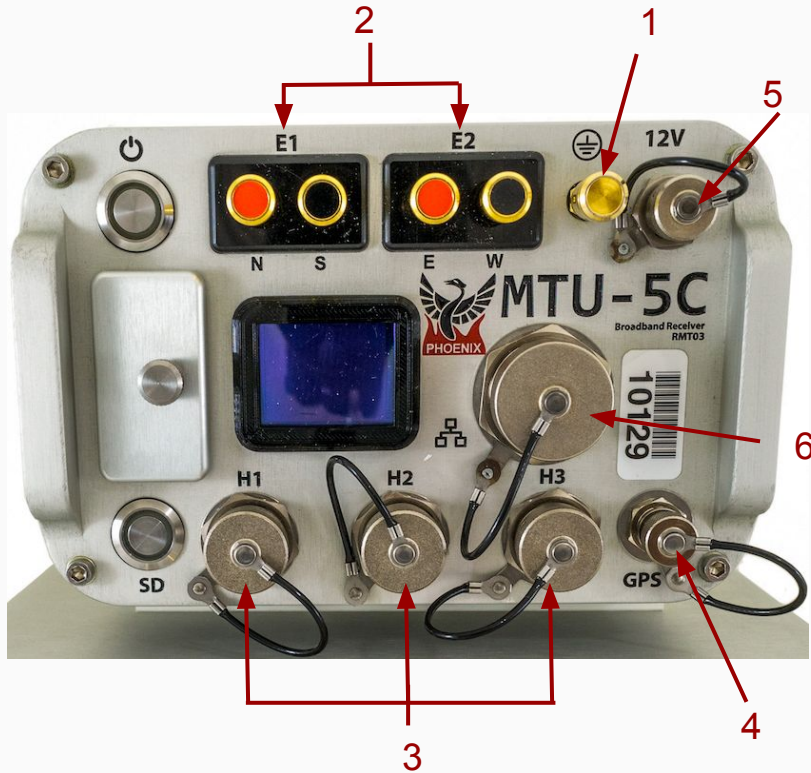
# Saving a Configuration File

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**.

1



# MTU-5C Connections



Start by connecting:

1. Ground electrode
2. Electrodes to channel **E1**<sub>(Ex)</sub> (N+, S-) and channel **E2**<sub>(Ey)</sub> (E+, W-)
3. Magnetic sensors to channels **H1**<sub>(Hx)</sub>, **H2**<sub>(Hy)</sub> and **H3**<sub>(Hz)</sub>
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

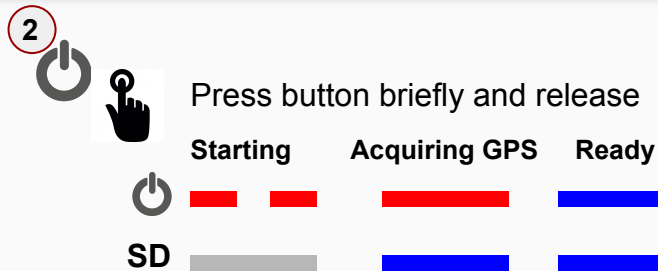


# SD Card - Recording Data



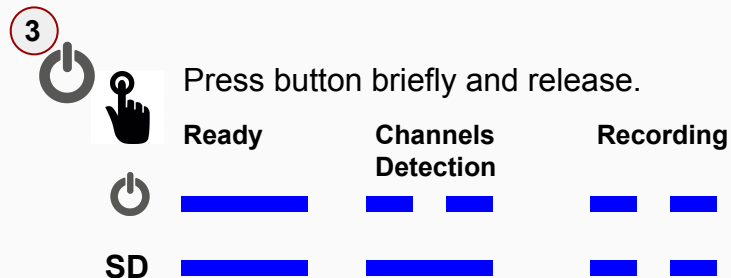
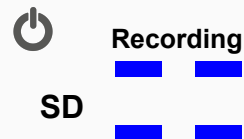
## Recording

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

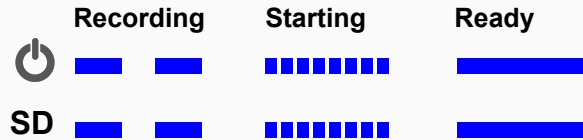
Slow, equal pulses


Solid color / Off

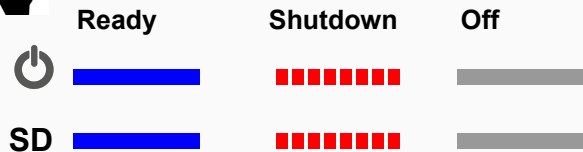


# SD Card - Stopping record

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



- 2  Keep press button 3sec and release




## Indicators

 *Rapid, equal pulses*

 *Solid color / Off*

## Stopping record

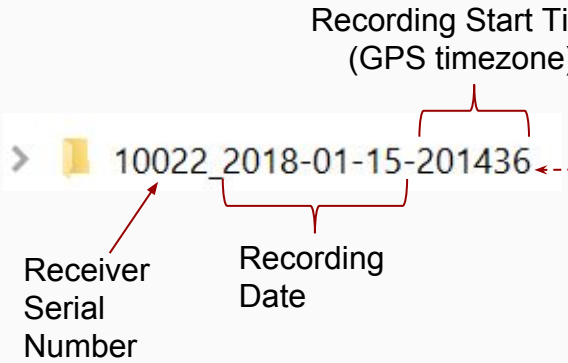
1. Press the **Power** button briefly and release to stop recording
2. Turn off the receiver, pressing the **Power** button for a few seconds the **LEDs** will flash red
  - Wait until both **LEDs** turn off
3. Eject the **SD card**

- 3  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 reodata
4. Open **reodata** folder and select the recording file and click **Choose**



**EMpower Geophysical Software by Phoenix Geophysics**  
v1.26.0 : v1.

Buttons: Prepare, Evaluate (1), View data (2), View calibration, Monitor receiver, View self-test results, Manage, Exit

Menu items: Manage surveys, Import data and prepare for..., View recording sites on a ma..., View time series and spectr..., Process data with local or remote referenc..., Edit processed data and export for interpr...

License: Licensed until 2037-12-30

**Evaluate - Selection - EMpower**  
Buttons: View data (2), Check quality of acquired data

**Recording Folder - EMpower**  
Look in: E:\ (3)  
Files: config.json (3 KB json File), log (File..llder), reodata (File..llder)

**Recording Folder - EMpower**  
Look in: E:\reodata (4)  
Files: 10022\_20...5-201436 (File..llder)

# Evaluate

## 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	Sensor	Detected
H1	MTC-50H	Not Present



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



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

The screenshot shows the EMpower software interface. At the top, the recording ID is MB 8 (23 h 48 m 14 s). The status is 'Approved'. The recording information includes: Recording ID: 10128\_2017-08-27-171052, Start time: Aug 27 2017 11:10:53 (Local) America/Edmonton (GMT-06:00), Duration: 23 h 48 m 14 s, Survey name: Kimberley, BC : Aug 2017, Station name: MB 8, Operator(s): WH+SC+MU, Layout Geometry: Orthogonal, Declination: 0.005. Notes: High contact resistance, +40 azimuth, +15 declination.

The Electrodes section shows a table with columns for Channel, Distance (m) to GND, Polarity, and Resistance (Ω). The Resistance column is circled in red. A red circle with the number '1' is next to the Polarity column header.

Channel	(+) N / E	(-) S / W	Polarity	(+) N / E	(-) S / W	Gain	LPF [Hz]	DC [V]
E1	32.8	30.8	<input type="checkbox"/> Inverted	2639.58	3565.26	4 x 1 = x4	10000	0.0082
E2	29	26	<input type="checkbox"/> Inverted	2651.17	3302.63	4 x 1 = x4	10000	-0.0063

The Magnetic Sensors section shows a table with columns for Channel, Sensor, Detected, Serial #, Polarity, Gain, LPF [Hz], and DC [V]. The entire table is circled in red. A red circle with the number '2' is next to the Detected column header.

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

At the bottom, there is a 'View Recording Details' button circled in red with the number '3'. The page number '11' is in the bottom right corner.

# 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: 10127\_2017-01-14-221940 - EMpower

Recording ID: 10127\_2017-01-14-221940  
Survey Name: Jan 14 5c rot  
Station Name:  
Receiver Type: MTU-5C  
Instrument Serial: 10127  
Operator: Yann  
Start Time: Sat Jan 14 22:19:40 2017 GMT(-00:00)  
Stop Time: Sun Jan 15 19:32:23 2017 GMT(-00:00)  
Duration: 21 h 12 m 43 s  
Latitude: 37.204°N  
Longitude: 114.690°W  
Altitude: 1049.76 m  
OS Version: v1.12.0  
Motherboard Model: BMB01-F  
Motherboard Serial: 030FC2

Battery: Low: 12.003 V, High: 12.506 V  Details

Temperature: Low: 16°C, High: 27°C  Details

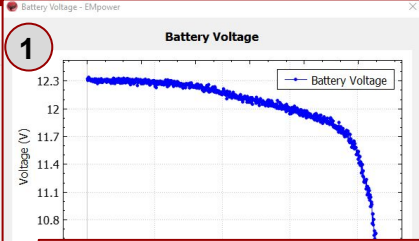
Decimation  
Sampled continuously at 24000 samples per second

GPS Timing Card  
Serial Number: 200125  
Model: BTM01-I  
Firmware Version: 00010028X  
# of Satellites: 9 - 14 satellites  Details

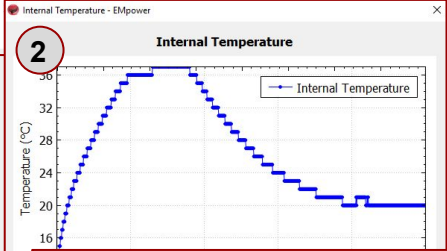
Channels Details

	Tag	Board S/N	Model	Firmware	Sat
2	E2	200222	BCM01-J	1001a	~0 % - View
3	H1	200547	BCM01-I	1001a	0 %

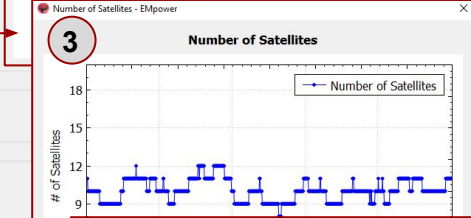
Battery Voltage - EMpower



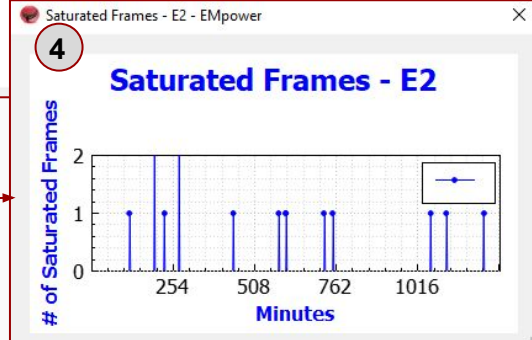
Internal Temperature - EMpower



Number of Satellites - EMpower



Saturated Frames - E2 - EMpower



Close

Verify that there was not warning display 

# Process Data

S1 MTU-5C Serial 10125 - EMpower

Channels

H1	MTC-150	53917
H2	MTC-150	53918
H3	MTC-150	53191

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: 2017-11-30 16:11:38 End: 2017-12-01 11:33:43

Sunrise: 06:51 Sunset: 16:32  
Duration: 19 h 22 m 5 s

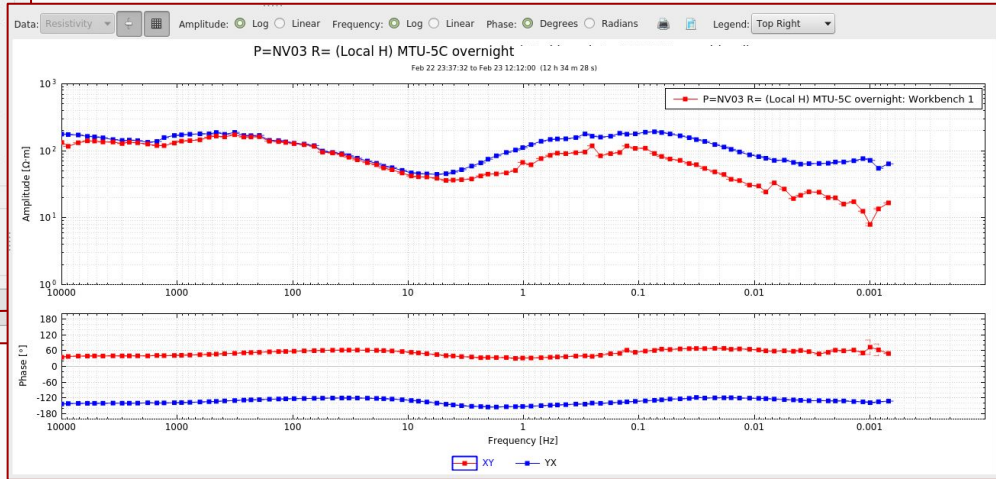
Electric power grid filter

50 Hz  60 Hz  None

Cancel Process

## Setting up the processing parameters:

1. Verify that the channels and references selected are as 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.