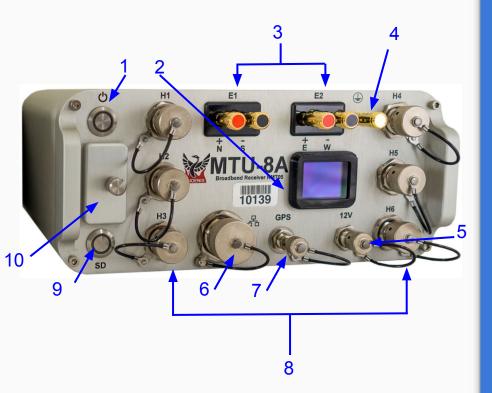
MTU-8A Quick Start Guide for MT



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Version: 250107 ID: DAA34



Components

1	Power/Record button and indicator
2	Display
	E1 (Ex) electrode connectors
3	E2 (Ey) electrode connectors
4	Ground electrode connector
5	12V DC power input
6	LAN connector
7	GPS antenna connector
	H1 - H4 (Hx) magnetic sensor connector
	H2 - H5 (Hy) magnetic sensor connector
8	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 <u>CSAMT Operation manual</u> (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.

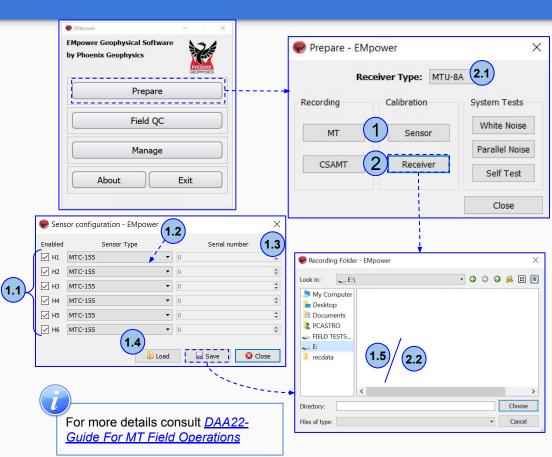
Open EMpower and select the Prepare module

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)

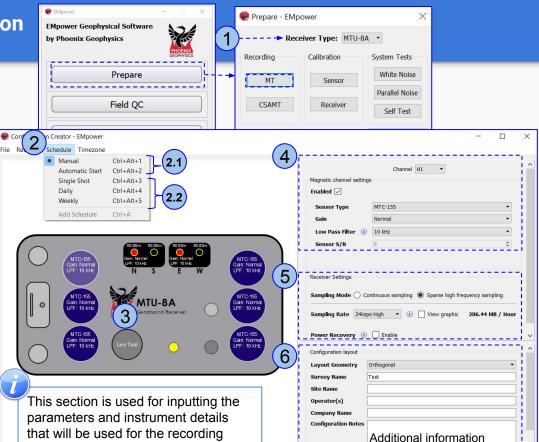
2. Receiver

- 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*)



Creating a Configuration file - MT acquisition

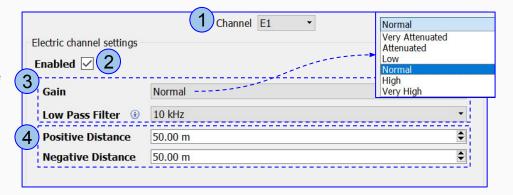
- 1. Click **Prepare** and select the **Receiver type** as **MTU-8A** and click the **MT** button
- 2. Select the Schedule
- 2.1. Manual or Automatic Start
- 2.2. For a specific schedule, select Single Shot, Daily or Weekly, and set the desired time and date, and Save
- To add additional schedules, select Add Schedule and define the additional times and/or dates
- 3. Ethernet port (consult the <u>Remote Networking</u> manuals)
- 4. Define the Channel Settings (See pages 6 to 8)
- 5. Define the Receiver Settings
 - $\circ\,$ Sampling Mode
 - Continuous Sampling (Applicable to research studies)
 - Sparse high frequency sampling (See <u>Sparse high</u> <u>frequency sampling page</u>)
 - Sampling Rate
 - **Power Recovery**(consult the <u>Power Recovery</u> manuals)
- 6. Configuration Layout

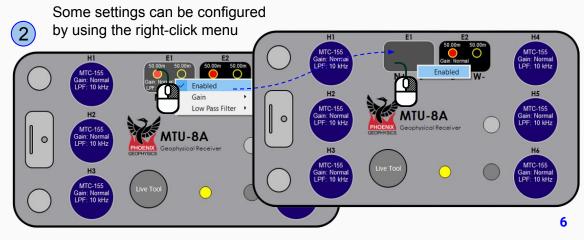


To use the magnetic sensor data from a different recording or use a remote reference, all recordings **must** have a matching Sampling Mode and Sampling Rates. Otherwise, EMpower will not allow to process the data using borrowed channels or remote reference

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
- $\circ\,$ For most applications, Normal Gain and 10 kHz LPF are best
- 4. Type distances to the electrodes of this channel if known
- $\circ\,$ If not, they will need to be corrected later before data processing





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

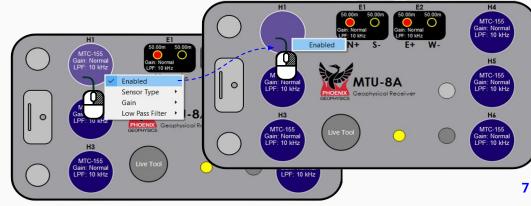
 For most broadband applications with MTC-100 series sensors, Normal Gain and 10 kHz LPF are best

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 EMpower

Magnetic channel settin	gs	
Enabled 🖂	3)	
Sensor Type	MTC-155	· ·
Gain	Normal Normal High	· · · · · · · · · · · · · · · · · · ·
Low Pass Filter 🧃	10 kHz	•
5 Sensor S/N	0	

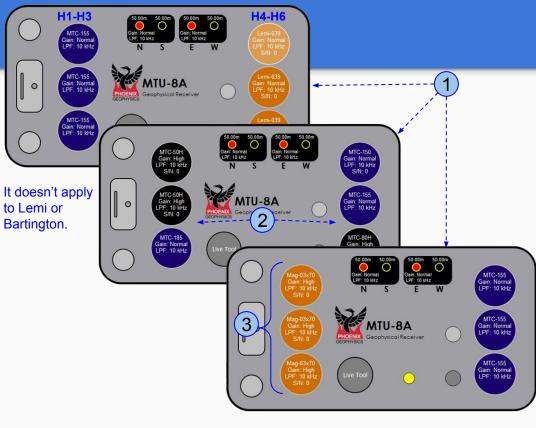
Some settings can be configured by using the right-click menu



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.

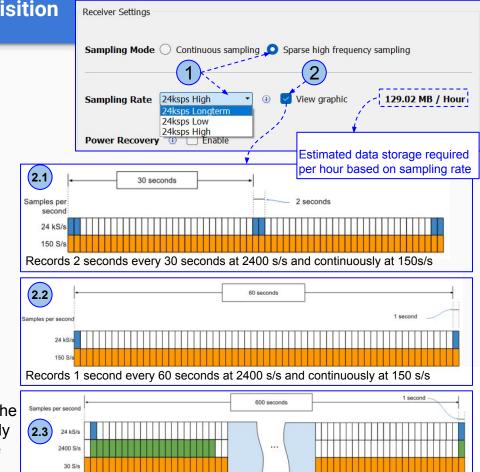
- 1. Select the sensor type for H1-H3 and H4-H6
- 2. It is possible to work with a combination of Phoenix's new generation and legacy for *Example H1-H3 MTC-50H+MTC-50H+MTC-185 H4-H6 MTC-150+MTC-155+MTC-80H*
- **3.** Lemi and Bartington works in groups of three sensors at the time, can't be mixed within 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.

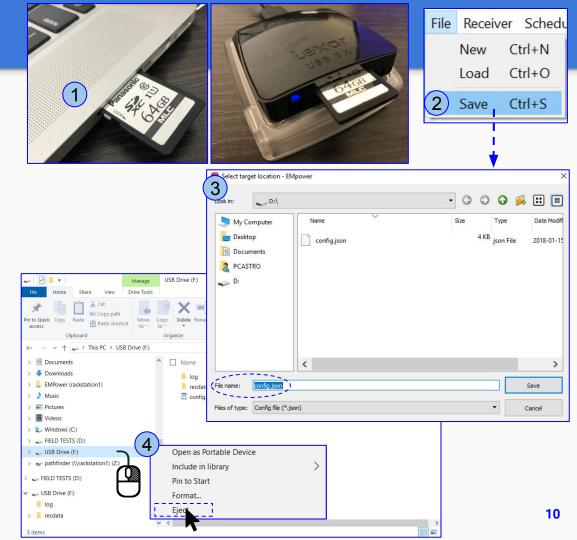
- 1. Select Sparse high frequency sampling and choose the Sampling Rate
- 2. Enable the View graphic to visualize on the left side how the Sampling Rate options work
- 2.1. 24 ksps High, use this option for environments with varying or moderate noise levels (overnight recordings)
- 2.2. 24 ksps Low, 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.



Records 1 second every 600 seconds at 2400 s/s, 20 seconds every 600 seconds at 2400 s/s, and continuously at 30 s/s

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
 - \circ Save or Ctrl+S
 - \circ 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
 - \circ Right click SD card drive
 - Select Eject option
 - Pull out the SD Card





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

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-)
- 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

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 <u>DAA22- Guide For MT</u> <u>Field Operations</u>

- 1. Insert the SD card and close the cap
- 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 <u>DAA24 System</u> <u>Troubleshooting manual</u>

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)	Priofly prov	o and release t	he power button
			-
Ċ	Starting	Acquiring GPS	S Ready
SD			
	2.1 Auton	natic Start	
		cording starts	•
	accord	ding to the sch	edule
1 ,		Sensor Detection F	Recording
	Ċ		
	SD	_	
3	Briefly pres	ss and release tl	he power button
	Ready	Channels	Recording
Ċ		Detection	_
SD			_
In	dicators]
		v, equal pulses d 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 P	ower button	briefly and release
SD Recording	Saving	Completed
2 Keep press release	sing the powe	er button 3 sec and
SD Ready	Shutdown	Off
3		Indicators Rapid, equal pulses Solid color / Off
		13

Importing - Field QC

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

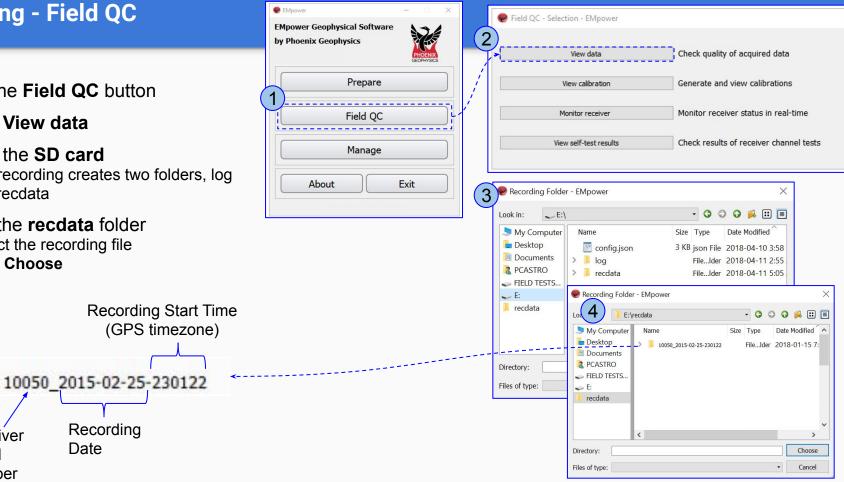
Date

- 4. Open the recdata folder
 - Select the recording file
 - Click Choose

Receiver

Number

Serial



X

Field QC

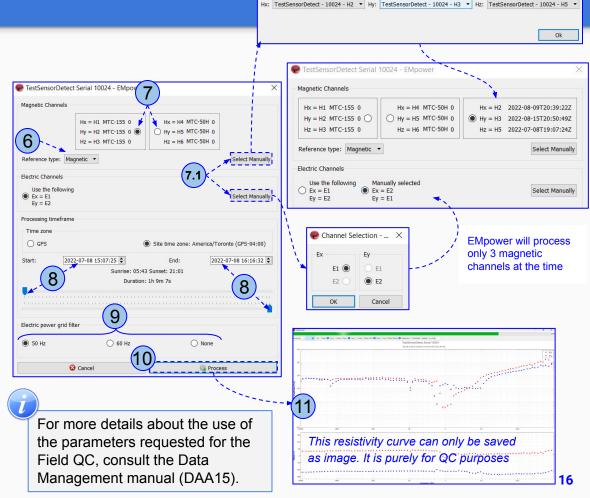
- 1. Review the **Recording Information**
- 2. Review the Electrode **Resistance** values and make the necessary corrections
 - Electrode Distance (m) to GND
 - Polarity
 - E Azimuth
 - External Filter
- **3.** Ensure that the magnetic sensors were detected and make the necessary corrections
 - Serial #
 - Polarity
 - H1-H3 Azimuth
 - H4-H6 Azimuth
- 4. View Recording Details (see page 16)
- **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.

	Decimated + Raw AN	11C-30 + M1C-50F	ic (on 58m 39s)				-	
Status Approved		○ * II	napproved		🔿 🗙 Rejec	tod		
0 11		0	happioved		- Rejec			
Tools	ime Series		Spectr	2		Process (Orthogo	(kan	
	ine Series		Speca			Trocess (orthogo	indij	
Recording Inform	ation							
Recording ID:	10050_2015-02-25-2	30122						
	There were warning		, H4, H5, H6					
Start time:	View warning icons Feb 25 2015 15:01:2		Standard Time (G	PS -08:00)				
Duration:	8h 58m 39s							
Survey name:	Nevada February 20	15 Milestone v0.18						
Station name:	RD2 10050 Schedule	Decimated + Raw	AMTC-30	HL				
Operator(s):	SW							
Company name:							used to i	
Layout Geometry:	Orthogonal			additiona	al field i	nformatio	on if desir	ec
Declination:	0.00°							
Notes:							1	
Electric Channels							1	
Electric Channels	Distance (m) to	GND (-) S / N	N Po	Resistar larity (+) N / E		Gain LPF [I	Hz] DC [V]	
					(-)s/w	Gain LPF [i x 4 = x16 1000		
Channel	(+) N / E 	(-) s / 1	u 🗌 🖨	larity (+) N / E	(-) S / W 224.290 4		00 -0.00023	
Channel E1 50.00 E2 50.00	(+) N / E 	(-) \$ / 1 50.00	u 🗌 🖨	larity (+) N / E werted 229.325	(-) S / W 224.290 4	x 4 = x16 1000	00 -0.00023	
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Channel E1 50.00 E2 50.00 E Azimuth: 0	(+) N / E ↓ 0.00 ° ↓ External F	(-) \$ / N 50.00 50.00 Filter None	u _ \$	larity (+) N / E werted 229.325 werted 219.059	(-) S / W 224.290 4 226.341 4	x 4 = x16 1000 x 4 = x16 1000	00 -0.00023 00 0.019	
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Channel E1 50.00 E 2 50.00 E Azimuth: (0 Magnetic Channel Channel	(+) N / E 0.00 ° ÷ External F Sensor 55 •	(-) S / V 50.00 Filter None Detected Not Present	Serial #	Iarity (+) N / E werted 229.325 werted 219.059 Polarity Inverted	(-) S / W 224.290 4 226.341 4 Gain x4	x 4 = x16 1000 x 4 = x16 1000 LPF [Hz] 10000	00 -0.00023 00 0.019 DC [V] 0.0058	
Channel E1 50.00 E2 50.00 E Azimuth: 0 Channel Channel H1 MTC-15 H2 MTC-15	(+) N / E	(-) S / V 50.00 50.00 ilter None Detected Not Present MTC-155	 If I	larity (+) N / E verted 229.325 verted 219.059 Polarity Dirverted Inverted	(-) S / W 224.290 4 226.341 4 Gain x4 x4	x 4 = x16 1000 x 4 = x16 1000 LPF [Hz] 10000 10000	00 -0.00023 10 0.019 DC[V] 0.0058 0.0043	
Channel E1 50.00 E2 50.00 E Azimuth: 0 Channel H1 MTC-15 H3 MTC-15	(+) N / E	(-) 5 / V 50.00 50.00 	Serial #	Iarity (+) N / E werted 229.325 werted 219.059 Polarity Inverted	(-) S / W 224.290 4 226.341 4 Gain x4	x 4 = x16 1000 x 4 = x16 1000 LPF [Hz] 10000	00 -0.00023 00 0.019 DC [V] 0.0058	
Channel E1 50.00 E2 50.00 E Azimuth: 0 Channel H2 MTC-15 H3 MTC-15 H1-H3 Azimuth	(+) N / E	(-) 5 / V 50.00 50.00 Filter None Detected Not Present MTC-155 Trons [if i	larity (+) N / E verted 229.325 verted 219.059 Polarity Polarity Inverted Inverted Inverted	(-) \$ / W 224.290 4 226.341 4 Gain x4 x4 x4	x 4 = x16 1000 x 4 = x16 1000 LPF [Hz] 10000 10000	00 -0.00023 10 0.019 DC[V] 0.0058 0.0043 0.0079	
Channel E1 50.00 E2 50.00 E Azimuth: 0 Angnetic Channel Channel H2 MTC-15 H3 MTC-15 H1-H3 Azimuth A H4 MTC-51	(+) N / E	(-) 5 / V 50.00 50.00 	 If I	larity (+) N / E verted 229.325 verted 219.059 Polarity Dirverted Inverted	(-) S / W 224.290 4 226.341 4 Gain x4 x4 x4 x4 x4 x4	x 4 = x16 1000 x 4 = x16 1000 LPF [Hz] 10000 10000	00 -0.00023 10 0.019 DC[V] 0.0058 0.0043	
Channel E1 50.00 E2 50.00 E Azimuth: 0 Channel H2 MTC-15 H3 MTC-15 H1-H3 Azimuth	(+) N / E	(-) 5 / V 50.00 50.00 	 if i	larity (+) N / E verted 229.325 verted 219.059 Polarity Polarity Inverted Inverted Inverted	(-) \$ / W 224.290 4 226.341 4 Gain x4 x4 x4	x 4 = x16 1000 x 4 = x16 1000 LPF [Hz] 10000 10000	00 -0.00023 10 0.019 DC[V] 0.0058 0.0043 0.0079	
Channel E1 50.00 E2 50.00 E Azimuth: 0 Magnetic Channel Channel H2 MTC-15 H3 MTC-15 H1-H3 Azimuth A H4 MTC-51	(+) N / E 0.00 ° ♥ External F Sensor 55 55 10.00 ° 0.00 ° 0.00 ° 0.00 ° 0.00 ° 0.00 °	(-) 5 / V 50.00 50.00 Eilter None Detected Not Present MTC-155 MTC-155 MTC-50 MTC-50	 if if if if if if if if if <liif< li<="" td=""><td>larity (+) N / E verted 229.325 verted 219.059 Polarity Polarity Inverted Inverted Inverted Inverted</td><td>(-) S / W 224.290 4 226.341 4 Gain x4 x4 x4 x4 x4 x4</td><td>x 4 = x16 1000 x 4 = x16 1000 LPF [Hz] 10000 10000 10000</td><td>00 -0.00023 10 0.019 DC[V] 0.0058 0.0043 0.0079 -0.0079</td><td></td></liif<>	larity (+) N / E verted 229.325 verted 219.059 Polarity Polarity Inverted Inverted Inverted Inverted	(-) S / W 224.290 4 226.341 4 Gain x4 x4 x4 x4 x4 x4	x 4 = x16 1000 x 4 = x16 1000 LPF [Hz] 10000 10000 10000	00 -0.00023 10 0.019 DC[V] 0.0058 0.0043 0.0079 -0.0079	

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

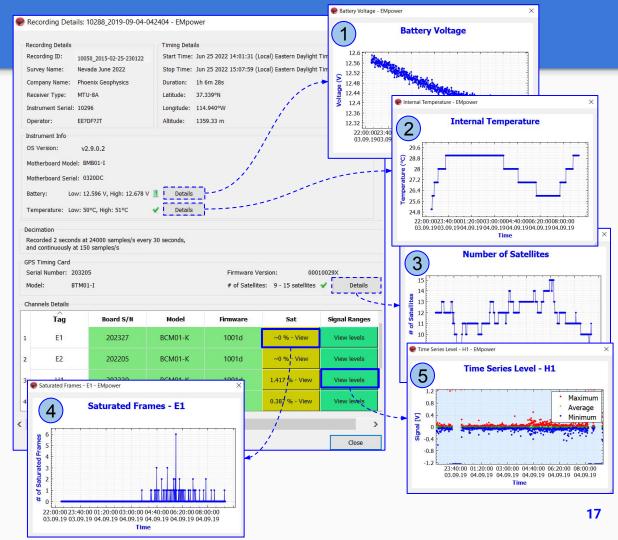


Magenetics Selection - EMpower

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





Please check out the <u>FAQs</u> <u>https://phoenixgeophysics.freshdesk.com/</u> **Or email us at:** support@phoenix-geophysics.com