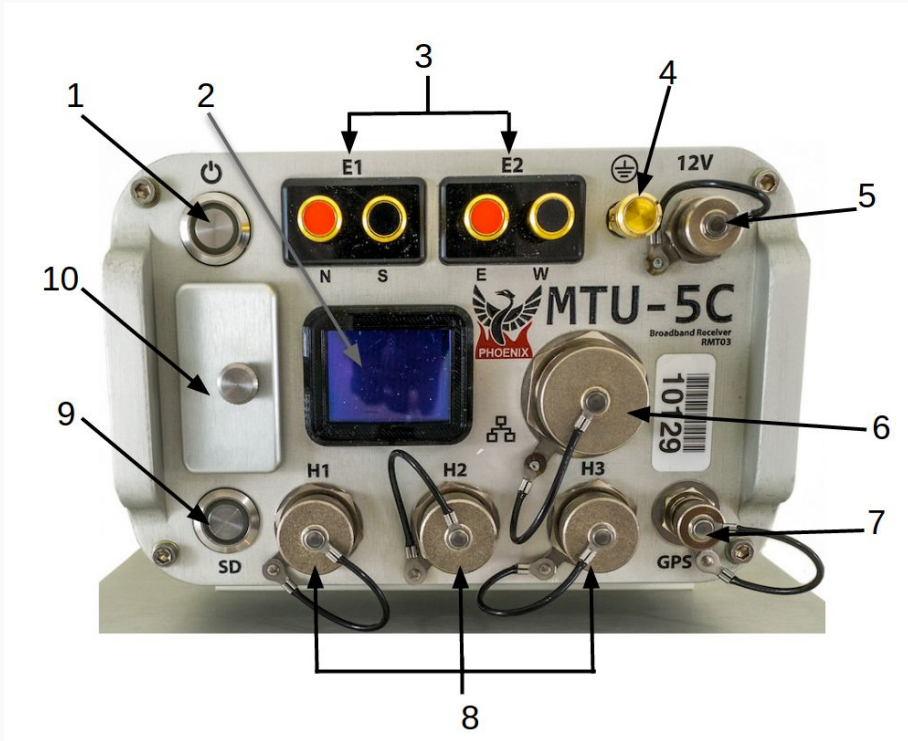


MTU-5C Quick Start Guide



2. MTU-5C (components)
3. Creating a Configuration File
4. Configuration Creator
5. Electric Channel Settings
6. Magnetic Channel Settings
7. Remote Control - Configuration file
8. Using Remote Control Client
9. Saving a Configuration File
10. MTU-5C Connections
11. SD Card - Recording Data
12. Stopping a recording
13. Importing and Evaluating Data
14. Evaluate
15. View Recording Details
16. 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

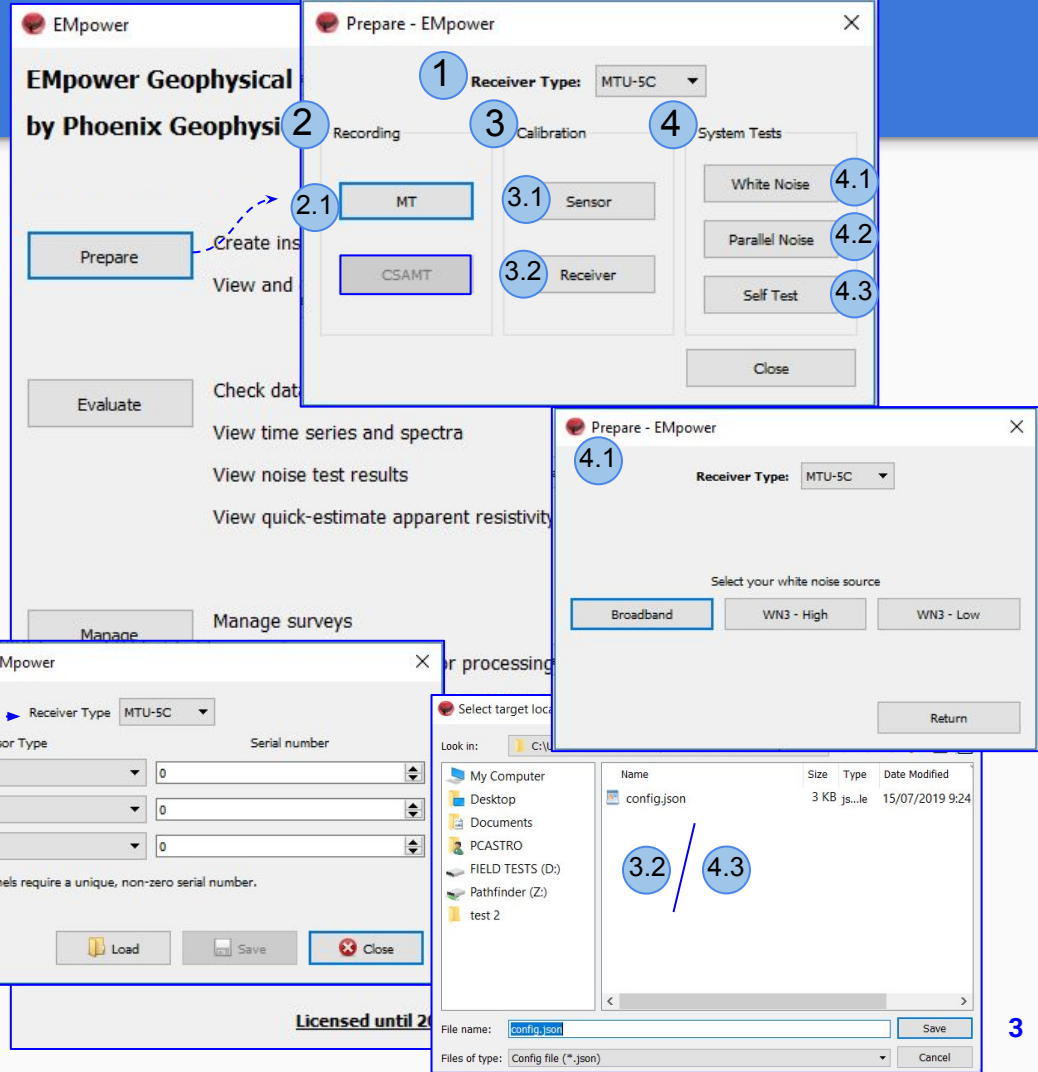
4. **System tests**

4.1. **White Noise**

4.2. **Parallel Noise - Configuration Creator**

4.3. **Self Test**

- No additional configuration needed



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. **Live tool** (see the [Networking Settings manual](#))
4. **Channels Settings**
5. Define the Receiver Settings **Sampling Mode and/or Sampling Rate**
6. **Configuration Layout**

Configuration Creator - EMPOWER

File Receiver Schedule Tools

1

2

2.1

2.2

3

4

5

6

Information icon (i)

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

Channel H2

Magnetic channel settings

Enabled

Sensor Type MTC-150

Gain Normal

Low Pass Filter 10 kHz

Sensor S/N 0

Receiver Settings

Sampling Mode Continuous sampling Sparse high frequency sampling

Sampling Rate 24000 s/s View graphic 1.38 GB / Hour

Enhanced Sensor Stabilization Enable

Configuration layout

Layout Geometry Orthogonal

Survey Name

Site Name

Operator(s)

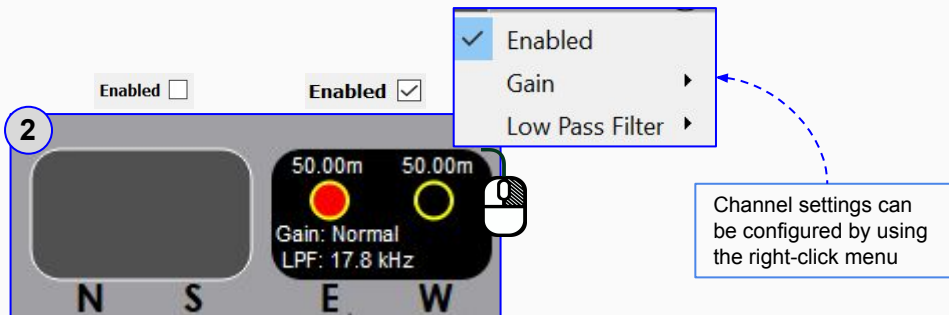
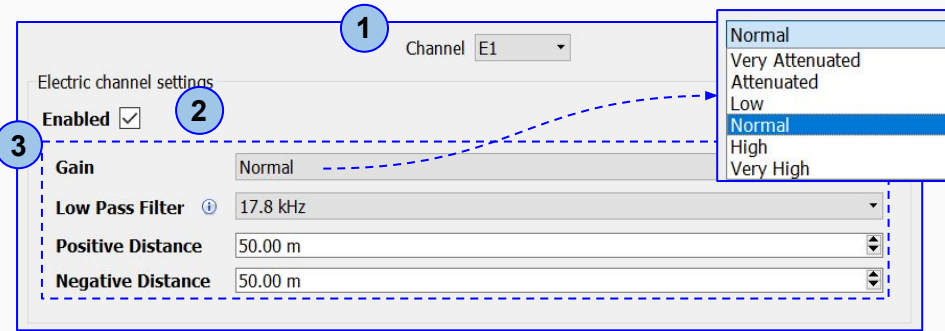
Company Name

Configuration Notes

Additional information

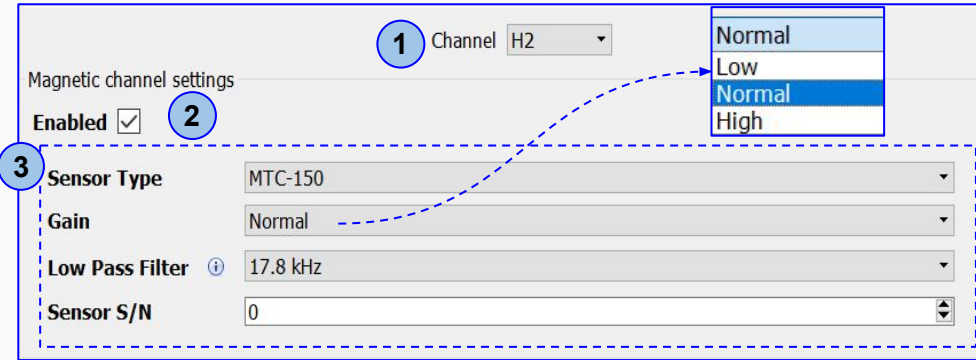
Electric Channel Settings

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**

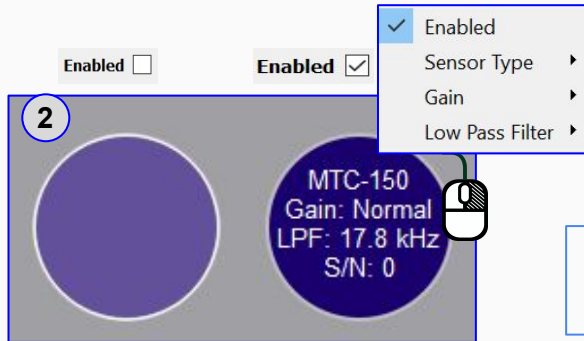


Magnetic Channel Settings

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**



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



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

Remote Control

1. Select **Channel NET** or click the **Live Tool** channel
2. Define the **Mode**
 - Auto (DHCP)
 - Static
3. Enable **Remote Control Server**
 - Server URL or IP
 - User Name
 - Password

Configuration Creator - EMpower
File Receiver Schedule Timezone

1 Channel NET

2 Mode Auto (DHCP)

3 Remote Control Server

MTU-5C
Broadband Receiver

Auto (DHCP)

MTC-150
Gain: Normal
LFP: 10 kHz
S/N: 0

MTC-150
Gain: Normal
LFP: 10 kHz
S/N: 0

MTC-150
Gain: Normal
LFP: 10 kHz
S/N: 0

Network Settings

Mode Auto (DHCP)

IP Address

Network Mask

Default Gateway

Nameservers

Type your nameserver here

File Transfer Server

Method RSync

Server URL

User Name

SSH Key

SSH Key Here

Remote Control Server

Server URL

User Name

Password

Configuration layout

Layout Geometry Orthogonal

Survey Name

Site Name

Operator(s)

Company Name

Configuration Notes

Using Remote Control Client

1. Use **Remote Control Client** from Tools menu
2. Provide a valid **hostname**, **username** and **password**
3. Then click on **Connect** button to establish a connection
4. **Choose Receiver Type**
5. **Enter the instrument ID**
6. Configure **Electric and Magnetic channels** as needed
7. Click on the **Send Configuration** button

Note :

Once the receiver has received the new configuration and started the new recording, screen will be inactive for at least 3 minutes.

The screenshot shows the 'Remote Control Client - EMpower' window. The 'Tools' menu is open, highlighting 'Remote Control Client' (1). The 'Connect' button is visible (3). The 'Choose Receiver Type' dropdown is set to 'MTU-5C' (4). The 'Enter Instrument ID' field contains '0' (5). The 'Electric Channels' and 'Magnetic Channels' configuration tables are shown (6). The 'Send Configuration' button is highlighted (7). A warning message is displayed: 'Attenuator turned on for one of electric channels. Receiver firmware v1.54.1 or later is required for attenuator support.' (8). A success dialog box is also visible: 'Success - Remote Control Client Configuration was successfully transmitted'.

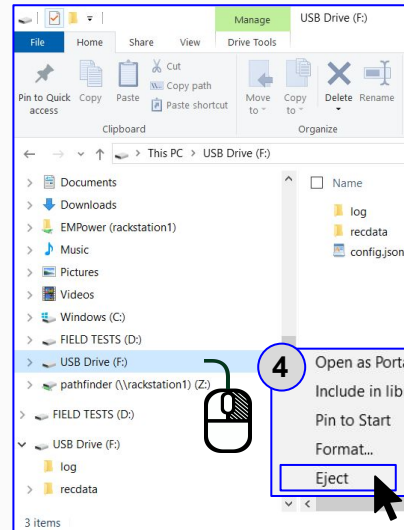
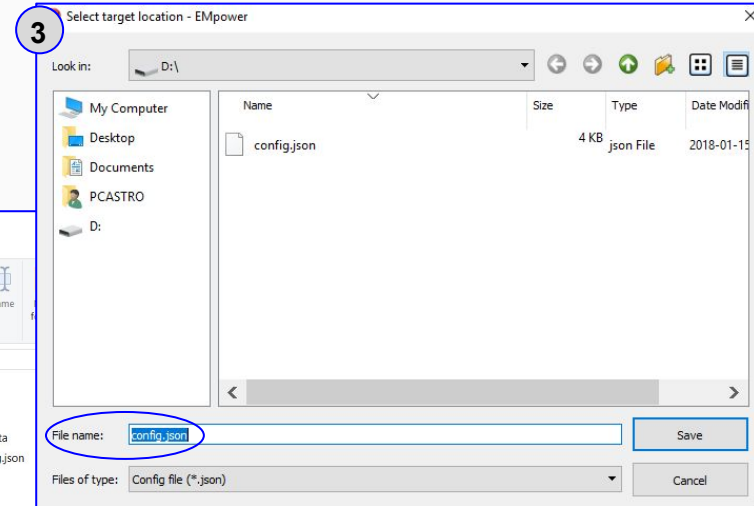
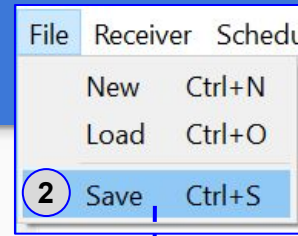
Channel	Enabled	Gain	LPF [Hz]
E1	<input checked="" type="checkbox"/>	Normal	10 kHz
E2	<input checked="" type="checkbox"/>	Normal	10 kHz

Channel	Enabled	Gain	LPF [Hz]
H1	<input checked="" type="checkbox"/>	Normal	10 kHz
H2	<input checked="" type="checkbox"/>	Normal	10 kHz
H3	<input checked="" type="checkbox"/>	Normal	10 kHz

Receiver with firmware newer than v1.54.1 will ignore the configuration about the Attenuator

Saving a Configuration File

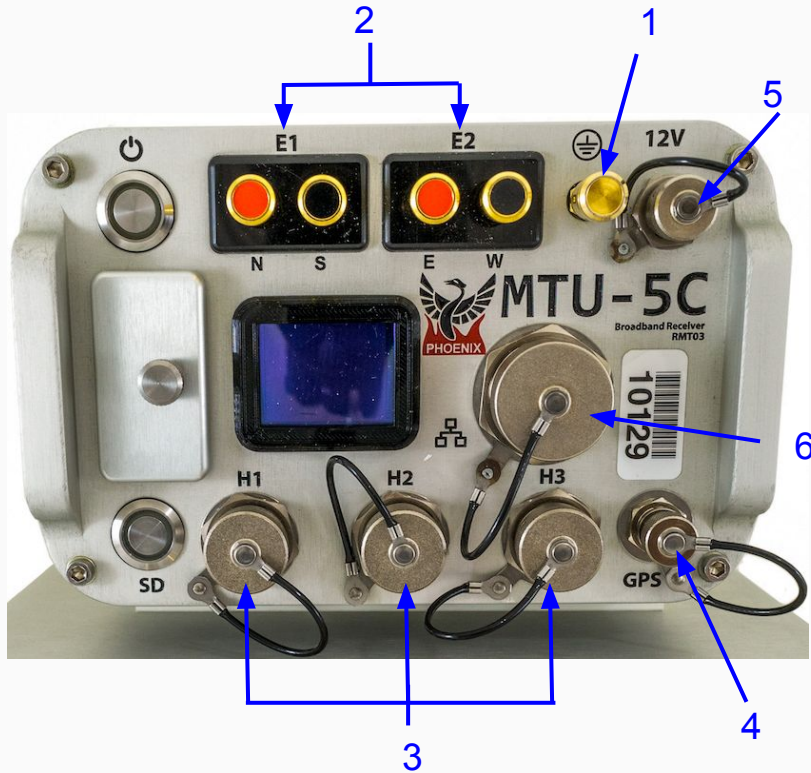
1. Insert the SD Card
 - The computer must be equipped with an SD card slot or use a USB card reader
2. Click the **File** menu
 - **Save or Ctrl+S**
 - **Select the SD card**
 - **EMpower** will automatically create the file "**config.json**"
3. Save the configuration file (**config.json**) in the root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

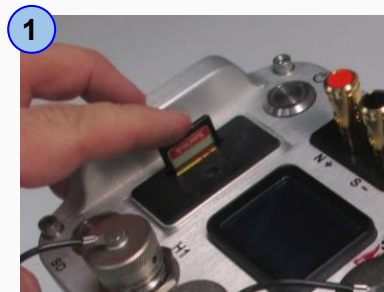


i In the field, it is often most efficient to connect the components to the receiver following the order on the right

SD Card - Recording Data

Recording

1. Insert the **SD card**
2. To turn on the receiver, press the **Power** button briefly
 - 2.1. Wait until both **LEDs** are solid blue
 - 2.2. **Automatic Start** recording
**For any problem with the SD Card, check the Troubleshooting manual*
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			

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

- 2.2

	Recording
Power	
SD	

- 3 Press the power button briefly and release

	Ready	Channels Detection	Recording
Power			
SD			



Indicators

- Rapid, equal pulses
- Solid color / Off

Stopping a recording

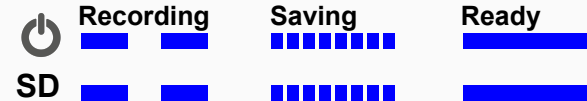
1. Press the **Power** button briefly and release to stop recording
 - Wait until both LEDs are steady blue
2. Turn off the receiver, pressing the **Power** button for a few seconds the **LEDs** will flash red
 - Wait until both **LEDs** turn off
3. Eject the **SD card**
 - Press the **SD card** and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



Indicators

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

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



- 2 Keep pressing the power button 3 sec and release

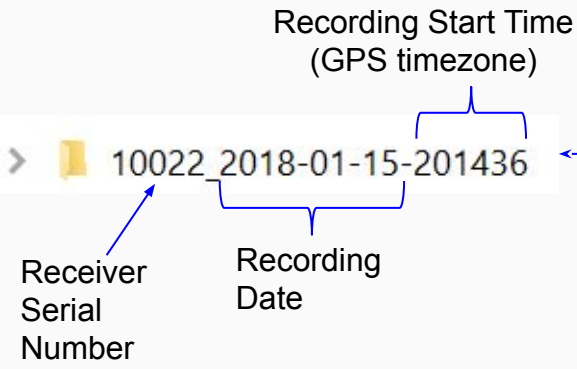


- 3



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

EMpower Geophysical Software by Phoenix Geophysics

Prepare

1 Evaluate

2 View data

Check quality of acquired 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

Manage

Exit

Licensed until 2037-12-30

Evaluate - Selection — EMpower

Recording Folder - EMpower

Look in: 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

Recording Folder - EMpower

Look in: E:\recdata

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

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

The screenshot shows the 'Evaluate - EMpower' software interface. The top section displays recording information for 'MB 8 (12 m 23 s)'. The status is 'Approved'. The 'Tools' section has tabs 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 Information' section, and a callout box indicates it can be used for additional field information.

The 'Electric Channels' section (1) shows a table with columns for Channel, Distance (m) to GND, Resistance (Ω), Polarity, Gain, LPF [Hz], and DC [V].

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

The 'Magnetic Channels' section (2) shows a table with columns for Channel, Sensor, Detected, Serial #, Polarity, Gain, LPF [Hz], and DC [V].

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

The 'View Recording Details' button (3) is located at the bottom of the interface.

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 illustrates the EMpower software interface during the data processing workflow. The main window is titled "Evaluate - EMpower" and shows the "Serial 10125 - EMpower" configuration. The "Status" section has radio buttons for "Approved", "Unapproved", and "Rejected". The "Tools" section includes a "Process (Orthogonal)" button, which is highlighted with a blue box and a circled "1".

The "Serial 10125 - EMpower" window is divided into several sections:

- Magnetic Channels:** A table showing Hx = H1, Hy = H2, and Hz = H3, each with a "MTC-50H 0" option. A "Select Manually" button is present.
- Reference type:** Set to "Magnetic".
- Electric Channels:** Radio buttons for "Ex = E1" and "Ey = E2", with a "Select Manually" button.
- Processing timeframe:** Includes "Time zone" (UTC or Site time zone: America/Toronto), "Start" (2019-03-28 15:58:56), and "End" (2019-03-28 16:04:09) fields. Sunrise and sunset times are also shown.
- Electric power grid filter:** Radio buttons for "50 Hz", "60 Hz" (selected), and "None".
- Buttons:** "Cancel" and "Process" buttons are at the bottom.

Numbered callouts (1-5) indicate the sequence of actions:

- 1:** Points to the "Process (Orthogonal)" button.
- 2:** Points to the "Start" and "End" time fields.
- 3:** Points to the "60 Hz" radio button in the electric power grid filter section.
- 4:** Points to the "Process" button.
- 5:** Points to the "Resistivity" plot in the bottom window.

The "Resistivity" plot shows "Apparent Resistivity [Ohm m]" on the y-axis (log scale from 10⁰ to 10⁴) versus "Frequency [Hz]" on the x-axis (log scale from 10000 to 0.01). It displays two curves: "XY" (red dots) and "YX" (blue dots). Below the resistivity plot, there are two more plots showing "Phase [°]" versus "Frequency [Hz]".

Two dialog boxes are also shown:

- Magnetics Selection - EMpower:** A dialog with "Hx:", "Hy:", and "Hz:" dropdown menus and a warning message: "Hx and Hy are mandatory channels".
- Channel Selection - ...:** A dialog with radio buttons for "Ex" (E1, E2) and "Ey" (E1, E2).

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

Recording Details		Timing Details	
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

4 Saturated Frames - E1

3 Number of Satellites

5 Time Series Level - E1