

EMpower System Troubleshooting Guide



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Equipment Is Not Starting Up

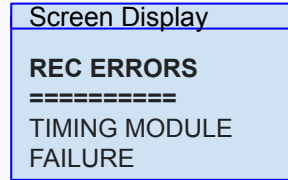
Warning:

1. Power button blinks Red in a fast sequence
(*Severe problem*)
2. Power button blinks Red in a slow sequence, never gets out of that state, the display does not come up and the SD button stays off, the receiver stays like this for more that 10 minutes

Solution:


The receiver needs to be repaired. Please contact Phoenix Geophysics technical support, see the last page

Warning ①



Warning ②



 Use the SD button to navigate in the on-screen display

Equipment Turns Off

Warning:

Receiver powers on briefly, and powers off right away, or when returning to site the equipment is off

Solution:

1. Check that the **Battery** measures 12V with a voltmeter after powering on
 - *Check the recording details of the last recording to see if the battery voltage reached low levels and turned off the receiver*
2. Check if the battery cable is still attached
 - *Animals might have cut it or disconnected it*
 - *A damaged cable (internally broken or old) can cause power failure intermittent during recording*
3. The instrument might have gotten too hot and entered protection mode
 - *Check the recording details of the last recording to see if the temperature reached invalid levels*
4. The instrument might have received a momentary spike of high current through the sensor or ground post
 - *Check if the **SD Card** is still healthy, and check the last part of the last recording for saturation*

Warning



No SD Card

Warning:

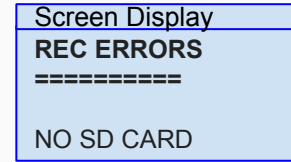
When the SD card is not detected


Solution:

1. Turn off the receiver by pressing the Power button for a few seconds
 - Eject the SD card
 - Clean the SD card / SD card slot of dust or grit if necessary
 - Check the capacity (64GB - 256GB)
 - Ensure that is formatted as exFat
 - Re-insert the card
2. Turn on the receiver, pressing the Power button

Warning

SD 



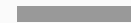
 Use the SD button to navigate in the on-screen display

1



Press button for >3sec and release

Shutdown Off



SD



2

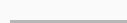


Press Power button briefly and release

Starting Acquiring GPS Ready



SD



SD Card Read Only

Warning:

When the SD card is read-only

Solution:

1. Turn off the receiver by pressing the Power button for a few seconds
 - Eject the SD card
 - Move the tab slider up
 - Check that the SD card is not corrupted by running a Card diagnostic in Windows
 - Re-insert the card



2. Turn on the receiver by pressing the Power button, and review the SD card status on the display

Warning

SD ■■■■■■

```
Screen Display
REC ERRORS
=====
SD READ ONLY
```



If the problem persists, the card might be damaged and might need to be re-formatted as exFat or replaced



Use the SD button to navigate in the on-screen display

1



Press button for >3sec and release

Shutdown Off



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SD

■■■■■■

■■■■■■

2



Press Power button briefly and release

Starting Acquiring GPS Ready



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SD

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GPS Not Detected

Warning:

In most cases, the Receiver takes only a few minutes to synchronize the GPS. However, under certain conditions, the synchronization could take longer (*see info note below*) while the warning "No satellites found/waiting for the signal", appears on the receiver display.

Solution:

1. Reposition the antenna for a clear view of the sky
 - o Check GPS antenna-cable condition, and replace the if damaged
 - o Ensure clear line-of-sight between the GPS antenna and the sky
 - o Test with an antenna and cable from another receiver
2. Wait until the Power button turns blue



This could happen when the receiver is off for several days. In this case, the GPS needs to re-acquire satellite information, and may take up to 12 minutes.

Warning

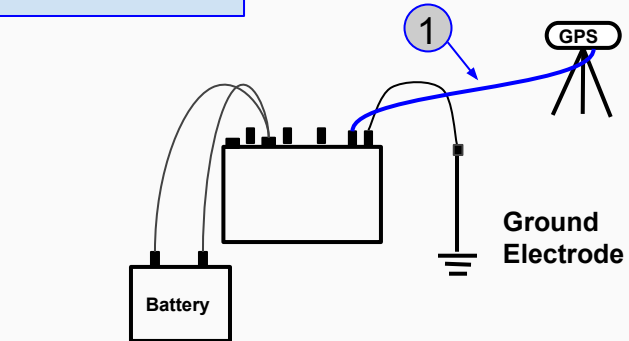


Screen Display

GPS: N [--] - no satellites found / waiting for signal



Use the SD button to navigate in the on-screen display



2



Starting

Acquiring GPS

Ready



SD



Equipment Is Not Recording

Warning:

When returning to pick up the site the receiver is on, but not recording

Solution:

1. Review the display
 - Make sure that a calibration config was not used by mistake
2. Check if the SD card ran out of space
 - See LED indicators for this condition (*see SD Card Full*)
3. Check your configuration file and ensure that there were no schedules that could have stopped the recording



SD Card Full

Warning:

When the SD card is full

Solution:

1. Turn off the receiver
 - Eject the SD card
 - Open the configuration file in the config creator to review the amount of space that your recording will need
 - If necessary, archive old data to a computer or an external device and delete the copy in the card
 - Re-insert the card
2. Turn on the receiver



This warning is a protection buffer, the receiver needs space to document some files on the configuration file.

Warning

SD 

```
Screen Display
REC ERRORS
=====
SD CARD FULL
```



Use the SD button to navigate in the on-screen display

1



Press button for >3sec and release

Shutdown **Off**

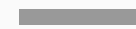






SD





2



Press Power button briefly and release

Starting **Acquiring GPS** **Ready**









SD







Configuration File Issues

Warning:

A valid configuration file is not found, or the information is incorrect

Solution:

1. Turn off the receiver by pressing the Power button for a few seconds
 - o Eject the SD card
 - o Review the configuration file in EMpower ensure that the receiver type matches the receiver where the card is being inserted.
 - o Verify the SD card health by running a card diagnostic/repair tool in Windows.
 - o Re-insert the card
2. Turn on the receiver by pressing the Power button

Warning



Use the SD button to navigate in the on-screen display

Screen Display
REC ERRORS =====
RECEIVER TYPE IN CONFIG FILE IS INCOMPATIBLE

Screen Display
REC ERRORS =====
CONFIG FILE IS CORRUPTED

Screen Display
REC ERRORS =====
NO CONFIG FILE IN THE SD CARD

1

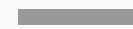


Press button for >3sec and release

Shutdown **Off**



SD



2



Press power button briefly and release

Starting **Acquiring GPS** **Ready**



SD



License Activation



Warning:

Activation code field has a red cross at the end

Solution 1:

Check that the code entered matches the code on the license card and try again.



Warning:

Another problem could be when the activation requested cannot connect to the server to complete the process

Solution 2:

Review the internet connection and try again, if the problem persists contact our technical support. (see last page)

The screenshot displays the EMpower activation interface. At the top, a title bar reads "Activation Required - EMpower". The main content area shows the message "EMpower has not been activated." followed by instructions: "To activate EMpower: 1. Enter your first and last names in their respective fields below, along with your email address, company name and country. 2. Enter the Activation Code found on the license card provided by Phoenix. 3. Click the License button and if successful a confirmation message will be displayed." Below these instructions is a form with fields for "First name", "Last name", "E-mail address", "Company name", and "Country" (set to "Canada"). A red cross icon is visible in the top right corner of the form area. A yellow warning icon with a red exclamation mark is overlaid on the form, with a circled "1" next to it, indicating a specific error. Below the form, a separate error dialog box titled "Error - EMpower" is shown, containing the text "Something went wrong during licensing. Please try again or contact Phoenix support" and an "OK" button. A circled "2" is placed next to this dialog box. A dashed blue arrow points from the error dialog box back to the form area.

Unusual Contact Resistance

! Warning:

The Electric channels show a warning icon when the contact Resistance is out of the range

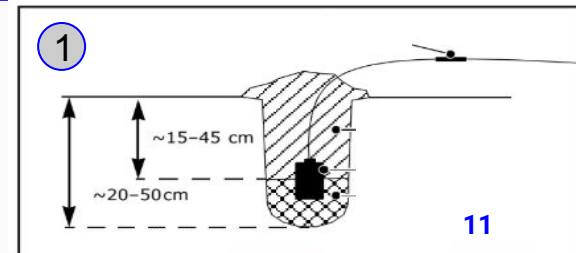
Review:

This might be normal depending on field conditions. If not, look for broken, frayed, or exposed wires or connections, and any evidence of damage in general

1. Verify the setup
 - Make sure electrode is sitting on a good conductive surface (remove rocks)
2. If the problem persists
 - Set the electrodes upright in a container with a few centimeters of salt water or another ion-rich solution and measure the resistance between any pair
 - Resistance should be $<100 \Omega$
 - Measure the DC potential between each pair
 - Self-potential should be $<10 \text{ mV}$ ($<2 \text{ mV}$)
 - If the last two points are not in this range the electrodes could be damaged

The screenshot shows the 'Evaluate - EMpower' software window. At the top, it displays the recording ID 'PHX (19 h 49 m 34 s)' and the status 'Unapproved'. Below this, there are 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)', 'Layout Geometry', 'Declination', and 'Notes'. The 'Electric Channels' section contains a table with columns for 'Channel', 'Distance (m) to GND', 'Polarity', and 'Resistance (Ω)'. Two channels, E1 and E2, are shown with warning icons and high resistance values (175831 and 175634 Ω respectively).

Channel	Distance (m) to GND	Polarity	Resistance (Ω)
E1	50.00	Inverted	175831
E2	50.00	Inverted	175634



Magnetic Sensor Detection

Warning

1. **Sensor Detected Unknown**, this recording might still be useful, but there was a source of noise near the sensor while the instrument was trying to detect the signature of the sensor

Solution

- Check the configuration file, ensure the sensor type and serial number are correct
- Move the sensor to a quieter area

Warning

2. **Sensor Detected Not Present**, this problem could be caused by a bad connection, damaged cable and/or sensor.

Solution

- Connect a sensor that was successfully detected by another instrument to the channel that did not correctly detect the first sensor
- If the fault condition persists in the same receiver channel, please contact our technical support
- If the channel detects the new sensor correctly, and the problem follows the coil lead or the sensor, replace them

NV03 (58 m 27 s)

Status
 Approved Unapproved Rejected

Tools
Time Series Spectra Process (Orthogonal)

Recording Information
Recording ID: 10125_2018-02-23-191543
Start time: Feb 23 2018 11:15:43 (Local) America/Los_Angeles (GMT-08:00)
Duration: 58 m 27 s
Survey name: NVFeb2018
Station name: NV03
Operator(s): TH+GB+DF
Layout Geometry: Orthogonal
Declination: 0.00°
Notes: full-rate daytime "AMT"

Electric Channels

Channel	Distance (m) to GND		Polarity	Resistance (Ω)		Gain	LPF [Hz]
	(+) N / E	(-) S / W		(+) N / E	(-) S / W		
E1	50.00	50.00	<input type="checkbox"/> Inverted	442.951	979.298	4 x 1 = x4	10000
E2	50.00	50.00	<input type="checkbox"/> Inverted	899.293	634.689	4 x 1 = x4	10000

E Azimuth: 0°

Magnetic Channels

Channel	Sensor	Detected	Serial #	Polarity	Gain	LPF [Hz]	DC [V]
H1	AMTC-30	AMTC-30	2686	<input type="checkbox"/> Inverted	x4	10000	0
H2	AMTC-30	AMTC-30	2862	<input type="checkbox"/> Inverted	x4	10000	0
H3	MTC-150	Unknown	2861	<input type="checkbox"/> Inverted	x4	10000	0

H1-H3 Azimuth: 0° External Filter: None

View Recording Details Export Time Series

1

2

12

This recording might not contain valid data

Saturated Frames

! Warning:

This critical warning could be caused by a bad connection to the Electrode posts to the receiver, high contact resistance of an electrode, noise, or excessive gain

Solution:

Check the installation of the electrode on the field (See *Unusual Contact Resistance*)

- A very small amount of saturations could have been caused by a transient

1. When E-channel gain is required, use Preamplifier(X4) If there is external noise at specific frequencies, turning off the preamplifier or reducing channel gain may produce better results

Recording Details: 10125_2018-10-23-154952 - EMpower

Recording ID: 10125_2018-10-23-154952
Survey Name: Test Rack
Station Name:
Receiver Type: MTU-5C

Timing Details
Start Time: Tue Oct 23 15:49:53 2018 GMT(-00:00)
Stop Time: Tue Oct 23 15:49:56 2018 GMT(-00:00)
Duration: 3 s
Latitude: 43.809°N

Channel: E1

Electric channel settings

Enabled

1 Preamp / Attenuator: Preamplifier (x4)

Gain: x1

Low Pass Filter: 17.8 kHz

Positive Distance: 50.00 m

Negative Distance: 50.00 m

Channels Details

	Tag	Board S/N	Model	Firmware	Sat	Signal Ranges
1	E1	200084	BCM01-J	1001d	50.972 % - View	View Levels
2	E2	200062	BCM01-J	1001d	51.472 % - View	View Levels
3	H1	200042	BCM01-J	1001d	0 %	View Levels
4	H2	200073	BCM01-J	1001d	0 %	View Levels
5	H3	200063	BCM01-J	1001d	0 %	View Levels

13 Close

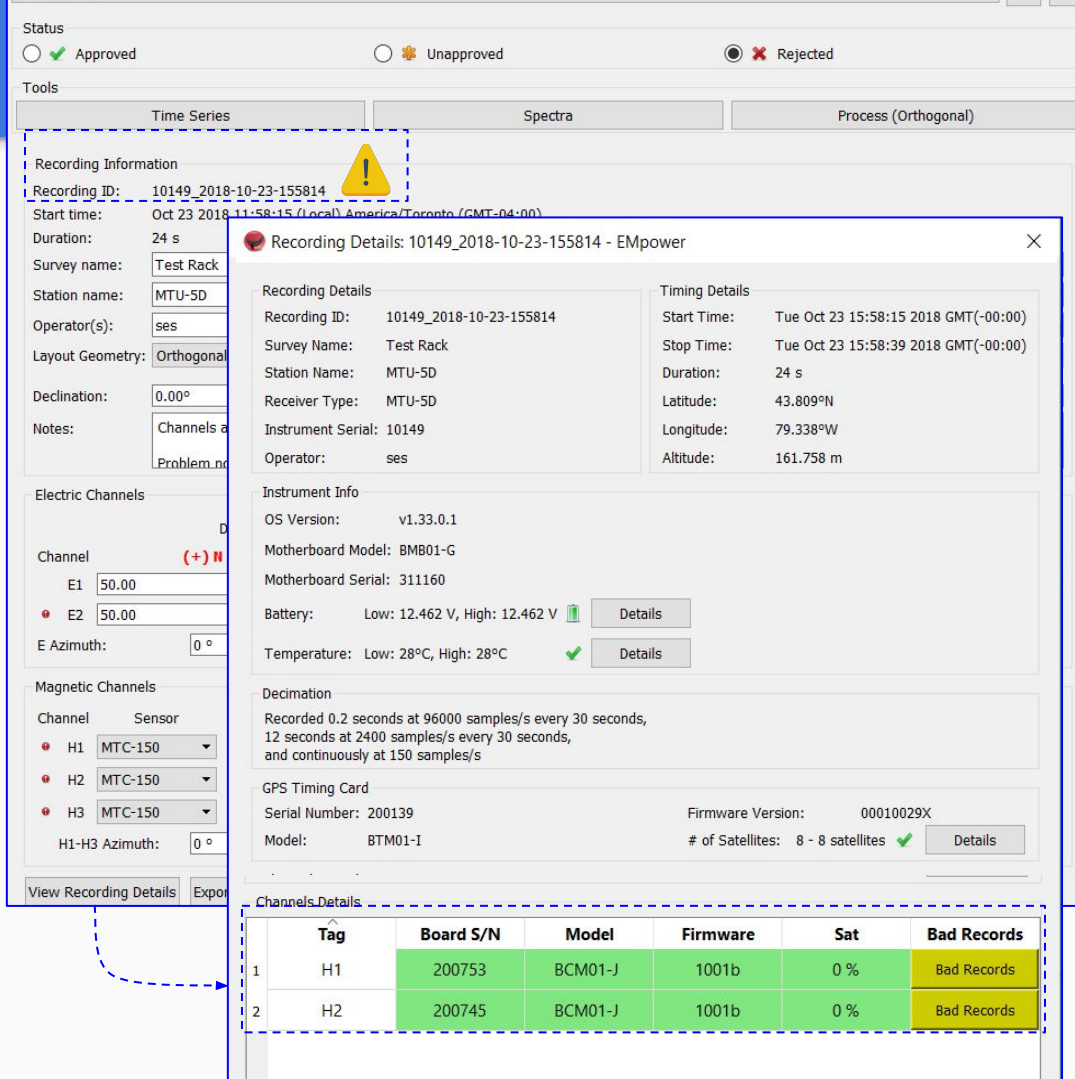
Bad Records

Warning:

The **Recording Information** shows a warning icon by the side of Recording ID (*There's not a solution for this warning*)

Could be caused by:


- Check if the failure was while the data was transferring to the card
- The instrument could lost data, if the receiver repeats this often, they should contact Phoenix geophysics for support (*see the last page*)



Status: Approved Unapproved Rejected

Tools: Time Series Spectra Process (Orthogonal)

Recording Information

Recording ID: 10149_2018-10-23-155814 

Start time: Oct 23 2018 11:58:15 (Local America/Toronto (GMT-04:00))

Duration: 24 s

Survey name: Test Rack

Station name: MTU-5D

Operator(s): ses

Layout Geometry: Orthogonal

Declination: 0.00°

Notes: Channels a Problem n

Electric Channels

Channel (+) H

E1 50.00

E2 50.00

E Azimuth: 0°

Magnetic Channels

Channel Sensor

H1 MTC-150

H2 MTC-150

H3 MTC-150

H1-H3 Azimuth: 0°

View Recording Details Export

Recording Details: 10149_2018-10-23-155814 - EPower

Recording Details

Recording ID: 10149_2018-10-23-155814

Survey Name: Test Rack

Station Name: MTU-5D

Receiver Type: MTU-5D

Instrument Serial: 10149

Operator: ses

Timing Details

Start Time: Tue Oct 23 15:58:15 2018 GMT(-00:00)

Stop Time: Tue Oct 23 15:58:39 2018 GMT(-00:00)

Duration: 24 s

Latitude: 43.809°N

Longitude: 79.338°W


Altitude: 161.758 m


Instrument Info

OS Version: v1.33.0.1

Motherboard Model: BMB01-G

Motherboard Serial: 311160

Battery: Low: 12.462 V, High: 12.462 V  Details

Temperature: Low: 28°C, High: 28°C  Details

Decimation


Recorded 0.2 seconds at 96000 samples/s every 30 seconds,
12 seconds at 2400 samples/s every 30 seconds,
and continuously at 150 samples/s

GPS Timing Card

Serial Number: 200139

Firmware Version: 00010029X

Model: BTM01-I

of Satellites: 8 - 8 satellites  Details

Channels Details

	Tag	Board S/N	Model	Firmware	Sat	Bad Records
1	H1	200753	BCM01-J	1001b	0 %	Bad Records
2	H2	200745	BCM01-J	1001b	0 %	Bad Records

Instrument Health

Warning:

This warning symbol may indicate other problems with the instrument's health

Solution:

1. Battery

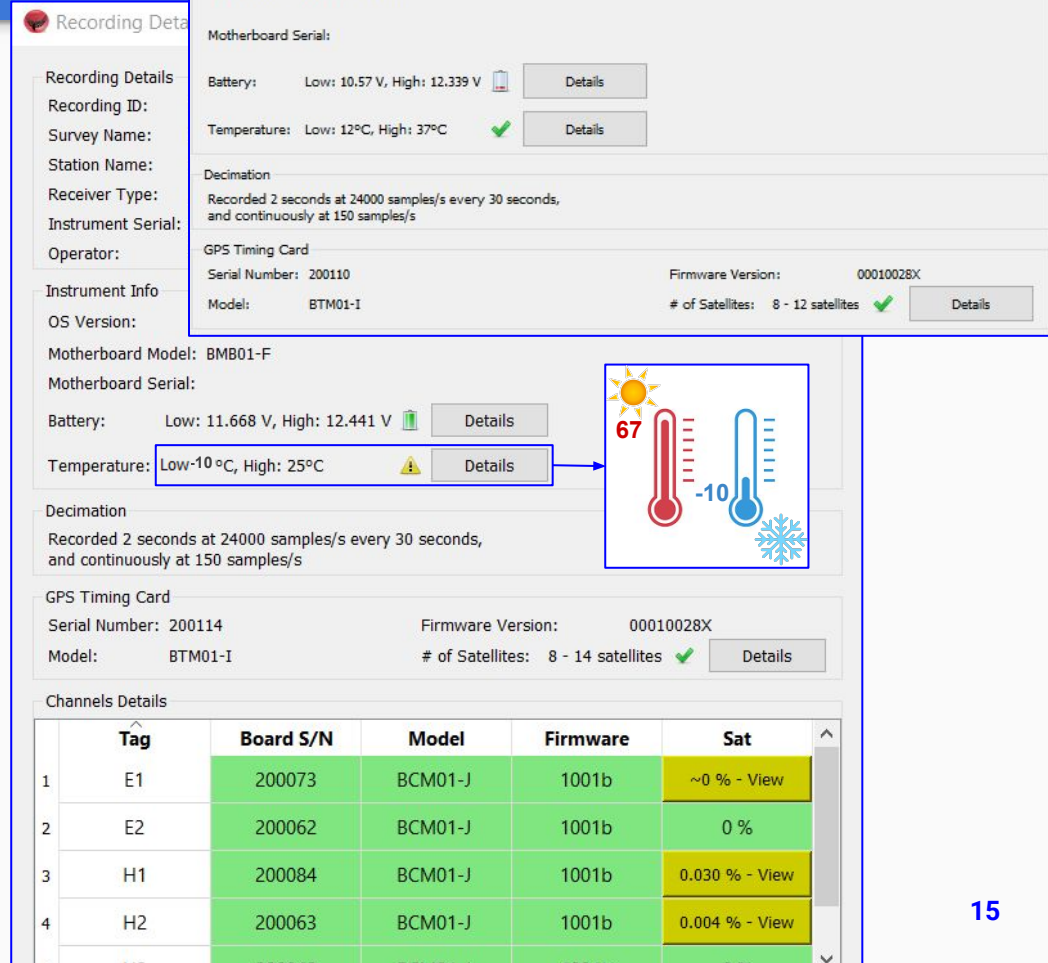
- Measure the battery voltage before connecting it to the receiver, and again when the equipment is turned on (both measurements should be 12V minimum)
- Check the battery and add liquid to it if needed

2. Temperature

- In hot places, protect the receiver with an umbrella and provide good ventilation

3. # of Satellites

- Ensure clear line-of-sight between the GPS antenna and the sky
- Check for damaged GPS cable or antenna
- Test with antenna and cable from another receiver (*See GPS Not Detected*)



The screenshot displays the 'Recording Details' and 'Instrument Info' sections of a monitoring interface. The 'Recording Details' section includes fields for Recording ID, Survey Name, Station Name, Receiver Type, and Instrument Serial. The 'Instrument Info' section shows OS Version (v1.22.0.1), Motherboard Model (BMB01-G), Motherboard Serial, Battery status (Low: 10.57 V, High: 12.339 V), Temperature (Low: 12°C, High: 37°C), Decimation (Recorded 2 seconds at 24000 samples/s every 30 seconds, and continuously at 150 samples/s), GPS Timing Card (Serial Number: 200110, Model: BTM01-I, Firmware Version: 00010028X, # of Satellites: 8 - 12 satellites), and another Instrument Info section (OS Version, Motherboard Model: BMB01-F, Motherboard Serial, Battery: Low: 11.668 V, High: 12.441 V, Temperature: Low: -10°C, High: 25°C, Decimation, GPS Timing Card (Serial Number: 200114, Model: BTM01-I, Firmware Version: 00010028X, # of Satellites: 8 - 14 satellites)). A blue box highlights the temperature field in the second Instrument Info section, which shows a warning icon and a 'Details' button. An arrow points from this box to a larger graphic showing two thermometers: one red with a sun icon and a reading of 67, and one blue with a snowflake icon and a reading of -10.

Tag	Board S/N	Model	Firmware	Sat	
1	E1	200073	BCM01-J	1001b	~0 % - View
2	E2	200062	BCM01-J	1001b	0 %
3	H1	200084	BCM01-J	1001b	0.030 % - View
4	H2	200063	BCM01-J	1001b	0.004 % - View

Missing Sensor Calibrations



Warning:

If a red cross appears in the **Cal** button of a magnetic channel, the calibration file for that sensor serial number has not been found

Solution:

Ensure that the calibration files have been imported into the project

Nov 29 2017

MTU-5C - 10116 ✓ Rem SC 830 Rem SC Dec01 Rem Dec02 5C Rem SC Dec03 Rem SC Dec04 Rem SC 5C
MTU-5C - 10125 ✓ S1 MTU-5C S-5 5C S6 5C S7 1 5C S7 2 5C S4 SC - 2
MTU-5C - 10127 ✓ Continuous Rem MTU-5C 10127 - 2017-11-30 10:37:08

Projection: Web Mercator 50000m

WorldMap

Rem Dec02 5Cn MTU-5C 10127

7.2 5C S1 MTU-5C

Hawthorne

50000

S1 MTU-5C (19 h 22 m 5 s)

Status: Approved Unapproved Rejected

Tools: Time Series Spectra Process (Parallel)

Declination: 0.00°

Notes:

Electric Channels

Channel	(+) N / E	(-) S / W	Polarity	(+) N / E	(-) S / W	Gain	LPF [Hz]	DC [V]
E1	50.00	50.00	<input type="checkbox"/> Inverted	759.165	607.465	4 x 1 = x4	10000	0
E2	50.00	50.00	<input type="checkbox"/> Inverted	546.82	510.804	4 x 1 = x4	10000	0

E Azimuth: 0° External Filter: None

Magnetic Channels

Channel	Sensor	Detected	Serial #	Cal	Polarity	Gain	LPF [Hz]	DC [V]
H1	MTC-150	MTC-150	53917	<input checked="" type="checkbox"/>	<input type="checkbox"/> Inverted	x4	10000	0
H2	MTC-150	MTC-150	53918	<input checked="" type="checkbox"/>	<input type="checkbox"/> Inverted	x4	10000	0
H3	MTC-150	MTC-150	53191	<input checked="" type="checkbox"/>	<input type="checkbox"/> Inverted	x4	10000	0

H1-H3 Azimuth: 0° External Filter: None



Generic calibration of the sensor type selected will be applied in processing when there is no matching calibration found

- *White Noise recordings will not process with any calibration*

No matching calibration found



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