

Pre-Amplifier

APS01-System

Manual of Operation



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Pre-Amplifier System

The pre-amplification system provides a high input impedance, allowing to perform recordings in places where the contact resistance is really high (in the order of megohms). Equipped with a high voltage arrester to prevent damage due to static discharges or other high voltage transients.

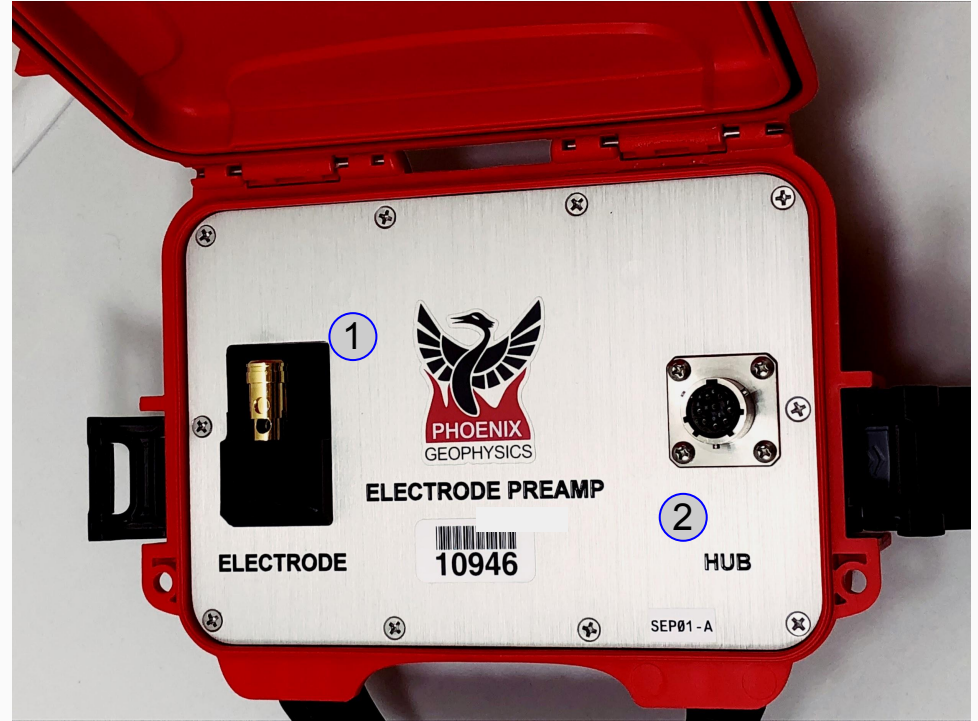
The system is designed to couple with high impedance electrodes. In this case, electrodes and electric lines act as ultra-broadband sensors of external noise. For this reason the system also comes equipped with low pass filters at each pre-amplification box, preventing noise - which can enter the system due to high contact resistance - from saturating the inputs of the receiver.



Electrode Preamp

The Electrode Preamplifier is designed to connect the electrodes to the Receiver through a Pre-Amplified, electrically protected interface.

1. **Electrode** connector
2. Ex / Ey, **Hub** connector (8-pin cable)



Electrode Preamp Hub

The Electrode Preamp Hub concentrates the signals from the preamplifiers and interconnects them to the Receiver

1. Ex / Ey **Receiver** connector
2. Ground Electrode connector
3. 12VDC power input
4. E1 (Ex) **North** and **South** Preamplifier connectors (8-pin cables)
5. E2 (Ey) **East** and **West** Preamplifier connectors (8-pin cables)



Model	APS01- System
Dimensions	9.1" x 6.8" x 9.8"
Preamplifier weight	1 kg
Hub weight	1 kg
Input impedance	500 M Ω
Suggested operating frequency range	1000 Hz - 1000s
Suggested contact resistance range	10 Ω - 5 M Ω
Signal voltage range	+/- 10 V
Power voltage range (centralized, 4 electrodes powered from the hub)	10.5 - 13.8 V
Operating temperature range	-25 °C to +70 °C
Approximate cut off frequency of the low pass filter (factory calibrated)	12.5 kHz (2-pole)

System Components

In addition to the configuration layout (see [Guide for field operations](#)), the following is required:

1. 5x Electrodes (*optionally titanium plates*)
2. 1 Electrode Preamp Hub (blue box)
3. 4x Electrode Preamp (red boxes)
4. Battery cable
5. 5x interconnect wires (Hub-Receiver)
6. 4x Telluric preamp cables (8 pin)



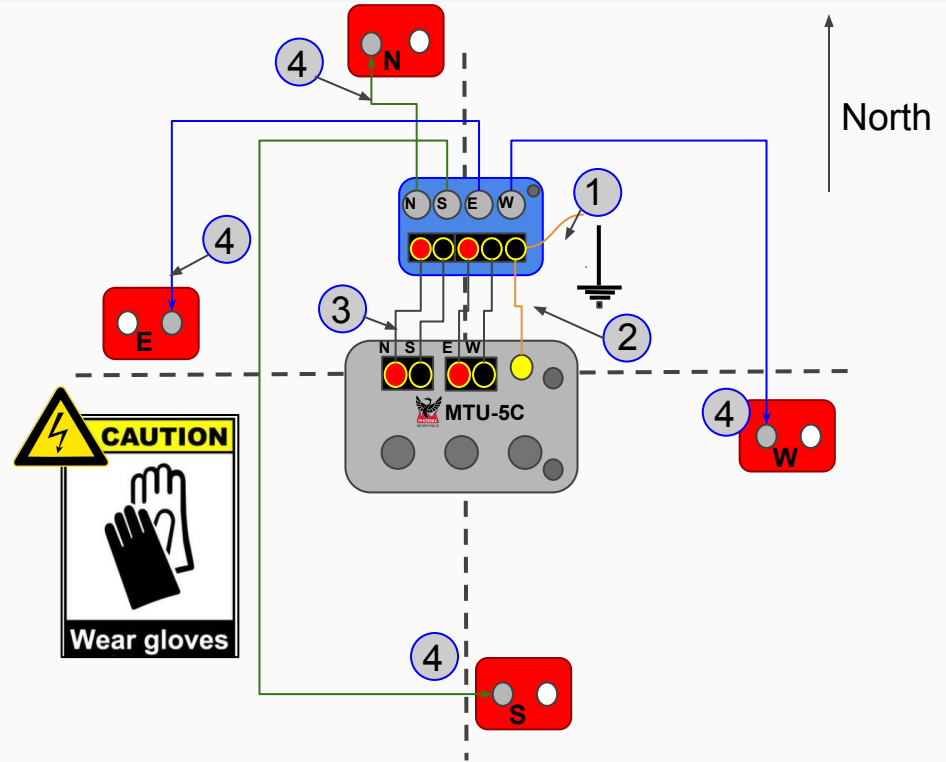
Keep note of the preamplifier serial numbers used for each recording in the Layout sheet and in the 'Notes' field in the configuration file.



Connection Sequence

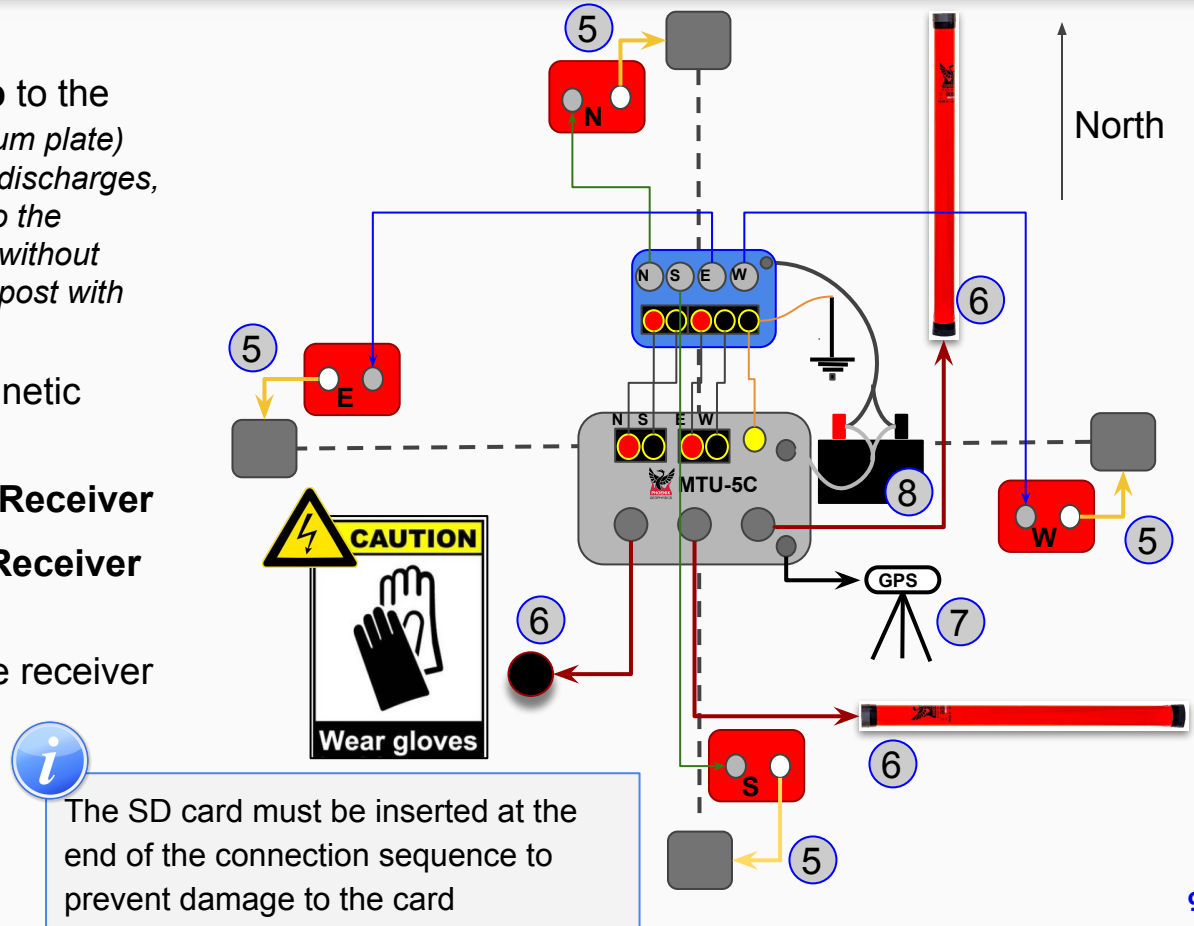
In order to avoid risk of shock or equipment damage, use the following connection sequence:

1. Connect the **Ground Electrode** to the **Hub**
2. Connect the Ground interconnect wire from the **Hub** to the **Receiver**
3. Connect the other 4 interconnect wires between the **Hub** and **Receiver**
4. Use **8-pin cables** to connect the **Hub** with each **Electrode Preamp**



Connection Sequence

5. Connect each **Electrode Preamp** to the corresponding **Electrode** (or titanium plate)
 - To avoid electric shock or static discharges, touch the wire of the electrode to the binding post of the preamplifier, without touching the wire or the binding post with hands.
6. Connect the **Receiver** to the Magnetic Sensors
7. Connect the **GPS** antenna to the **Receiver**
8. Connect the **Battery** to both the **Receiver** and the **Hub**
9. Insert the SD card and turn on the receiver



Special Steps For Processing Data With Preamps

Once the recording is imported into a project (see [Data Manage](#)), is possible to apply calibration to compensate for the filter effect of the preamplifiers

1. Selecting the Recording
2. Starting the **Process data wizard**
3. When selecting the electric channels, click **Edit** to open the dialog that allows applying a special calibration
 - Type the Calibration serial for **Ex** and **Ey** (These calibrations should already be imported)
 - EMpower will show a green icon if the calibration is found

The screenshot displays the EMpower software interface. At the top, a dropdown menu shows 'Remote (15 h 36 m 50 s)'. Below it, the 'Status' section has three radio buttons: 'Approved' (checked with a green checkmark), 'Unapproved' (with a gear icon), and 'Rejected' (with a red X). A blue circle with the number '1' is around the 'Approved' button. The 'Tools' section has three buttons: 'Time Series', 'Spectra', and 'Process (Orthogonal)'. A blue circle with the number '2' is around the 'Process (Orthogonal)' button. Below this is the 'Recording Information' section with fields for 'Recording ID: 10125_2017-08-23-234742', 'Start time: Aug 23 2017 17:47:43 (Local) America/Edmonton (GMT-06:00)', 'Duration: 15 h 36 m 50 s', 'Survey name: Kimberly, BC : Aug 2017', and 'Station name: Remote'. A blue box highlights the 'Process (Orthogonal)' button and the 'Recording Information' section. Below this, a dialog box titled 'Select a recording to use for the electric components' is shown. It has a dropdown menu with 'S-5 5C - 10125 - Dec 01 15:07:12 - Dec 02 09:34:58'. Below the dropdown is 'E-Channel details' with two columns: 'Ex' and 'Ey'. The 'Ex' column has a dropdown menu with '10996' and a green checkmark icon. The 'Ey' column has a dropdown menu with '0' and a red X icon. A blue box highlights the 'Ex' and 'Ey' fields. Below the fields are 'Save' and 'Cancel' buttons. A blue circle with the number '3' is around the 'Edit' button in the bottom right corner of the dialog box. A dashed blue arrow points from the 'Edit' button to the 'Ex' field.



Calibration files and a table of serial numbers will be provided by Phoenix Geophysics.

Practical usage

1. Always ensure that the hub is connected to the battery
2. When pre-amplifiers are connected, the contact resistance measured by the receiver is invalid (it measures the resistance of the preamplifier instead)
3. To measure contact resistance of your high impedance electrodes, temporarily install a wire alongside your preamplifier leads, and measure the contact resistance with an analog multimeter.
 - Remove the temporary wire when recording to prevent it from acting as an external noise source





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