ASM001

User manual V3.0 ©2019

WHAT IS THE ASM001 EQUIPMENT?

El ASM001 es un conmutador automático que se conecta con el equipo GeoAmp303 para realizar tomografías eléctricas 2D.

Puede conmutar entre pares de hasta 32 electrodos distribuidos en una línea de máximo 310 m de longitud.

En conjunto con el GeoAmp303 permite obtener imágenes del subsuelo para aplicaciones como: (1) Exploración de aguas subterráneas; (2) Detección de plumas de contaminación; (3) Detección de cavernas y oquedades; (4) Estudios geotécnicos; (5) Estudios de identificación de sedimentos y rocas en el subsuelo.

WHAT IS THE ASM001 EQUIPMENT?

Technical specifications:

• Power source: 12 VDC @ 5 A / h dry battery. (Battery not included)
• Main Console Dimensions: 47.0 cm x 35.8 cm x
17.5 cm (18.5 "x 14.1" x 6.9 ")
• Weight of the main console: 8 kg approx.
• Electrode capacity: 32
• Maximum electrode spacing: 10 m
• Minimum spacing between electrodes: 50 cm
• Total length of the multi-electrode cable: 310 m (including connectors
towards the console)
• Weight of the multi-electrode cable: Two strings of 16 electrodes and 15 kg approx. weight each (30 kg in total approx.)
• Operating temperature: 0 ° C to 60 ° C
• Storage temperature -40 ° C to 85 ° C
• USB connection with Windows laptop for data acquisition and visualization (PC not included)
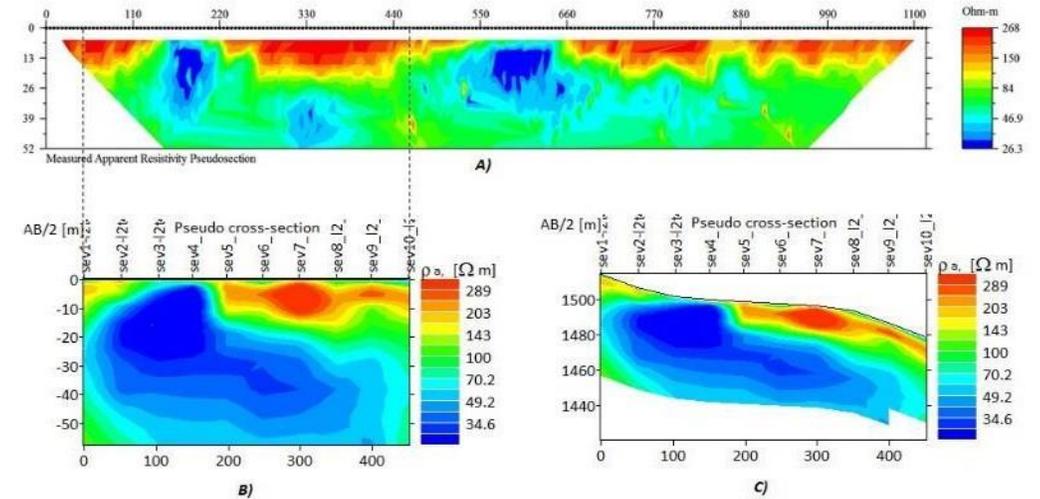
Important safety information

The ASM001 switch must be used together with the GeoAmp303.

The GeoAmp 303 is a device designed to emit and receive high electrical currents. Improper use or handling of this equipment or the ASM001 switch can result in death or serious injury.

Do not operate the equipment if you have not been properly trained to do so, or if you have doubts regarding its proper handling.

Equipment components

1. Main console
2. USB 2.0 type B cable for connection with the computer
3. Two strings with 16 alligators each and 150 m long approx. (Each alligator is numbered).
4. 32 electrodes 30 cm long in stainless steel
5. Cables for battery (a) and cables for connection A, B, M, N with the GeoAmp303 console (b)
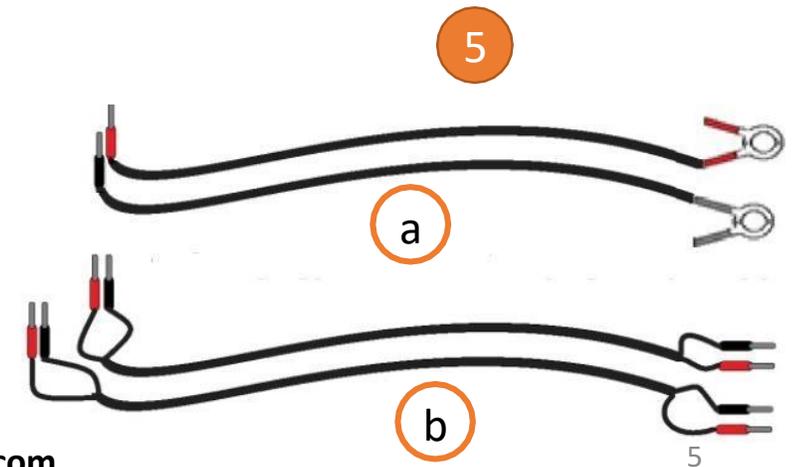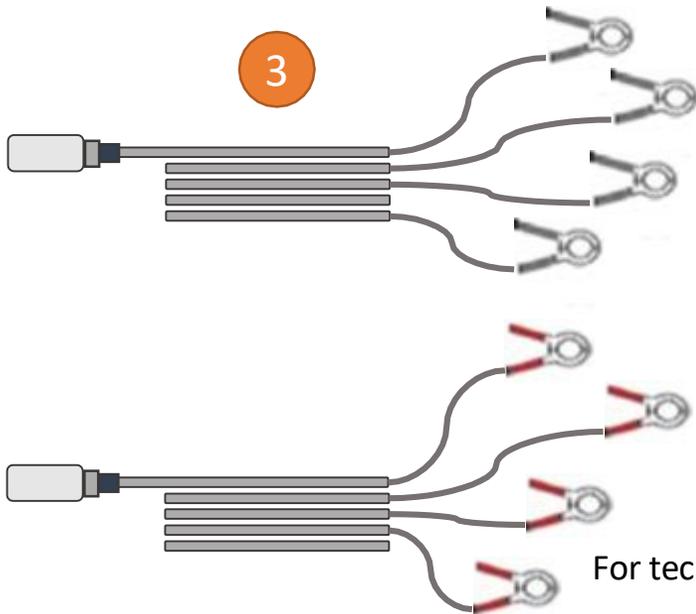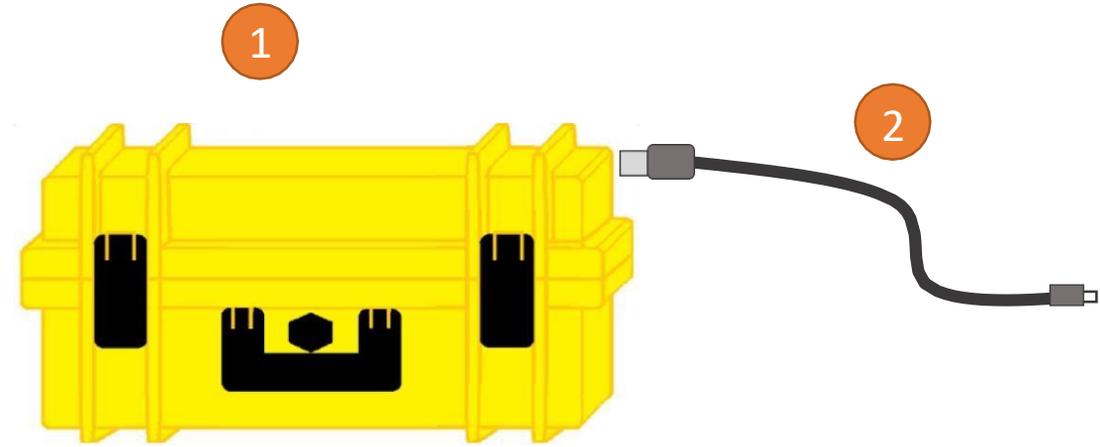
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Front panel

When you open the box, you will find the front panel of the ASM001 switch, which contains: terminals for connecting cables A, B, M, N to the GeoAmp303 console; two (2) industrial connectors for 16 electrodes each; a USB 2.0 type B port for connection to the computer; a green power indicator LED along with a red fault indicator LED; an on / off switch for the equipment; two connection terminals for the battery *.

The panel also contains two vents.

* You should always make sure that the battery is connected with the correct polarity before turning on the equipment.

connectors for multi-electrode

Connectors A, B, M, N

battery connectors

USB Port

Ignition switch
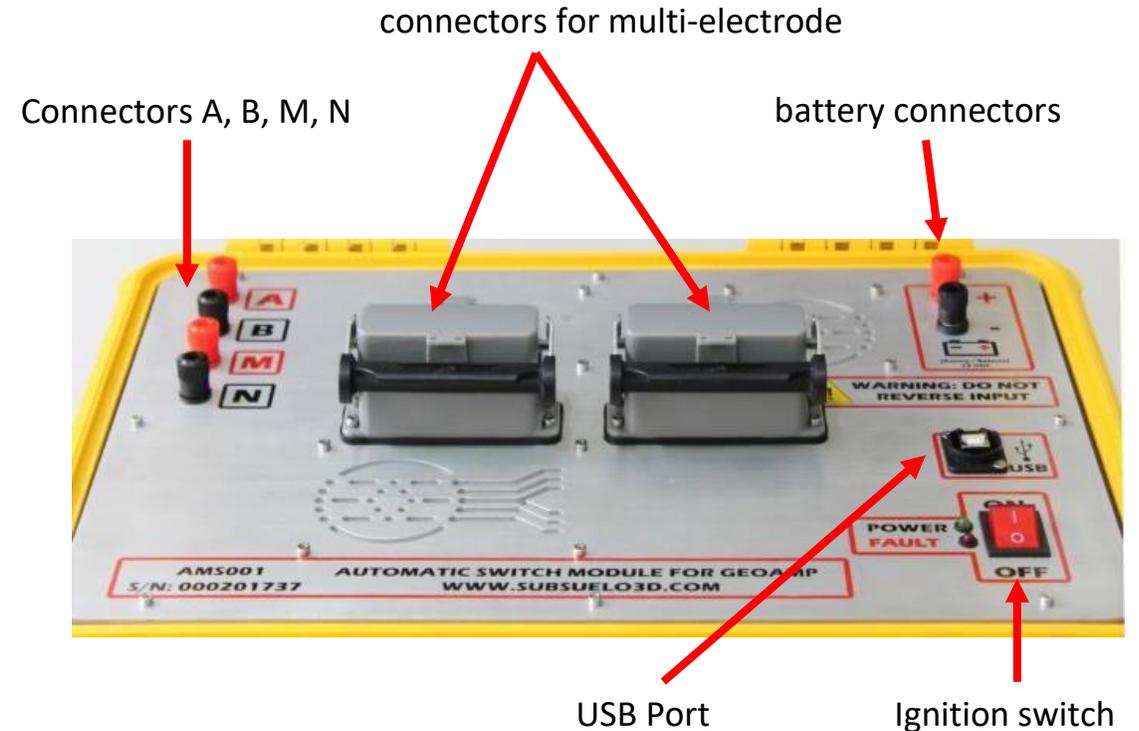
Procedure to start the acquisition of an electrical tomography

| Define the length of the line (use the tape measure to mark the locations of the 32 electrodes) | → | Place the GeoAmp303 and ASM001 consoles in the center of the line | → | Nail the electrodes in their positions and connect them with the strings (in order) | → | Connect the two strings to the ASM001 and connect the ASM001 with the GeoAmp303 (cables A, B, M, N) |

| INJECT | ← | You are now ready to acquire data | ← | Connect the consoles to the PC and start the acquisition software in Tomography mode | ← | Connect the batteries * and turn on the equipment |

*You should always make sure that the batteries are fully charged and that they are connected with the correct polarity before turning on the equipment. In addition, the battery cables must first be connected to the console and then to the battery (negative terminal first, then positive terminal).

Connection of the two consoles (GeoAmp303 and AMS001)

Using cables A, B, M, N, the GeoAmp303 and ASM001 consoles must be connected. In this way, the current is passed from the GeoAmp303 to the ASM001 switch, so that the latter switches it to the different pairs of electrodes during the electrical tomography acquisition process.
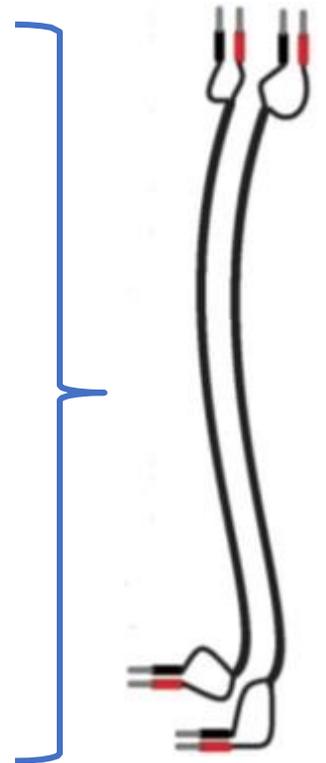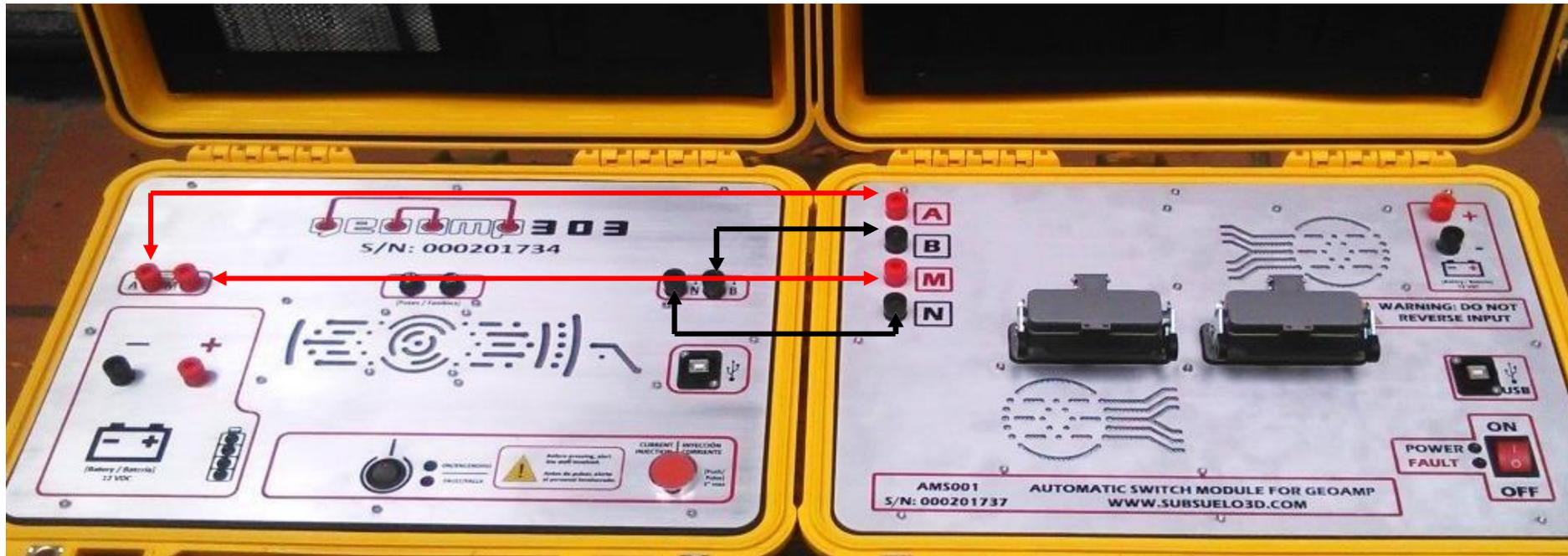
Unfolding the electrodes and connecting the multi-electrode strings

The electrodes should be nailed in equidistant positions * along the line of work.

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firmly nail the electrodes to the ground to achieve a good electrical coupling
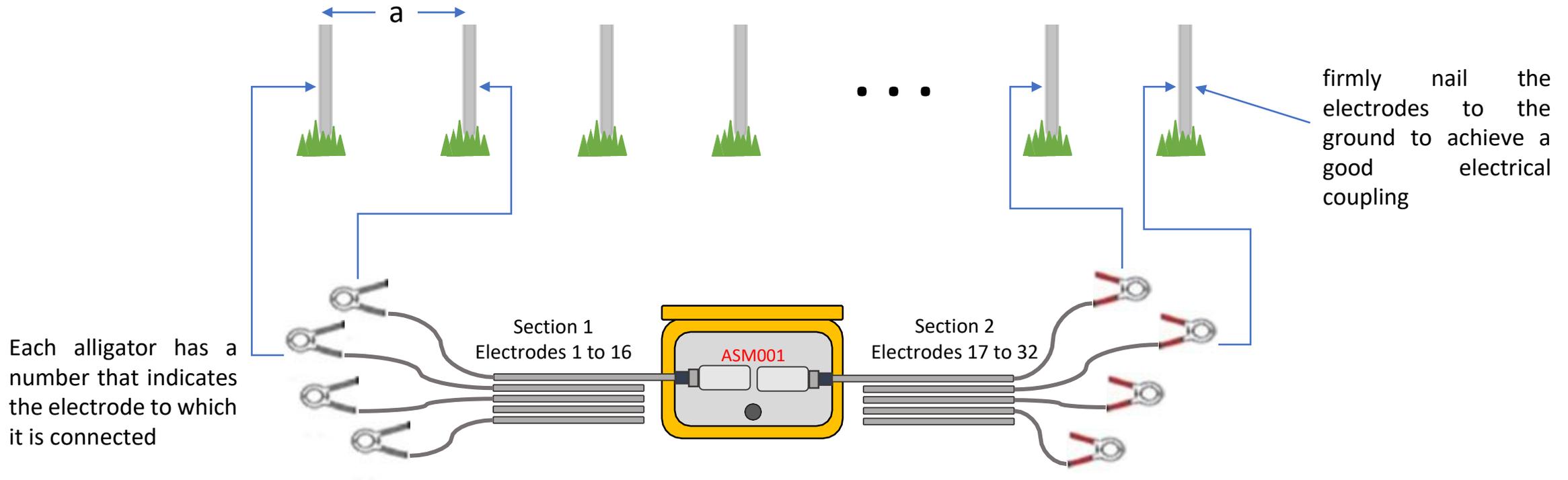
Each alligator has a number that indicates the electrode to which it is connected

Section 1
Electrodes 1 to 16

ASM001

Section 2
Electrodes 17 to 32

*To avoid saturated readings and protect the measurement system of the equipment from the high voltages generated by the GeoAmp303, it is recommended that the distance between electrodes (a) is not less than 50 cm.

Acquisition of tomography with the GeoAmp303 and ASM001
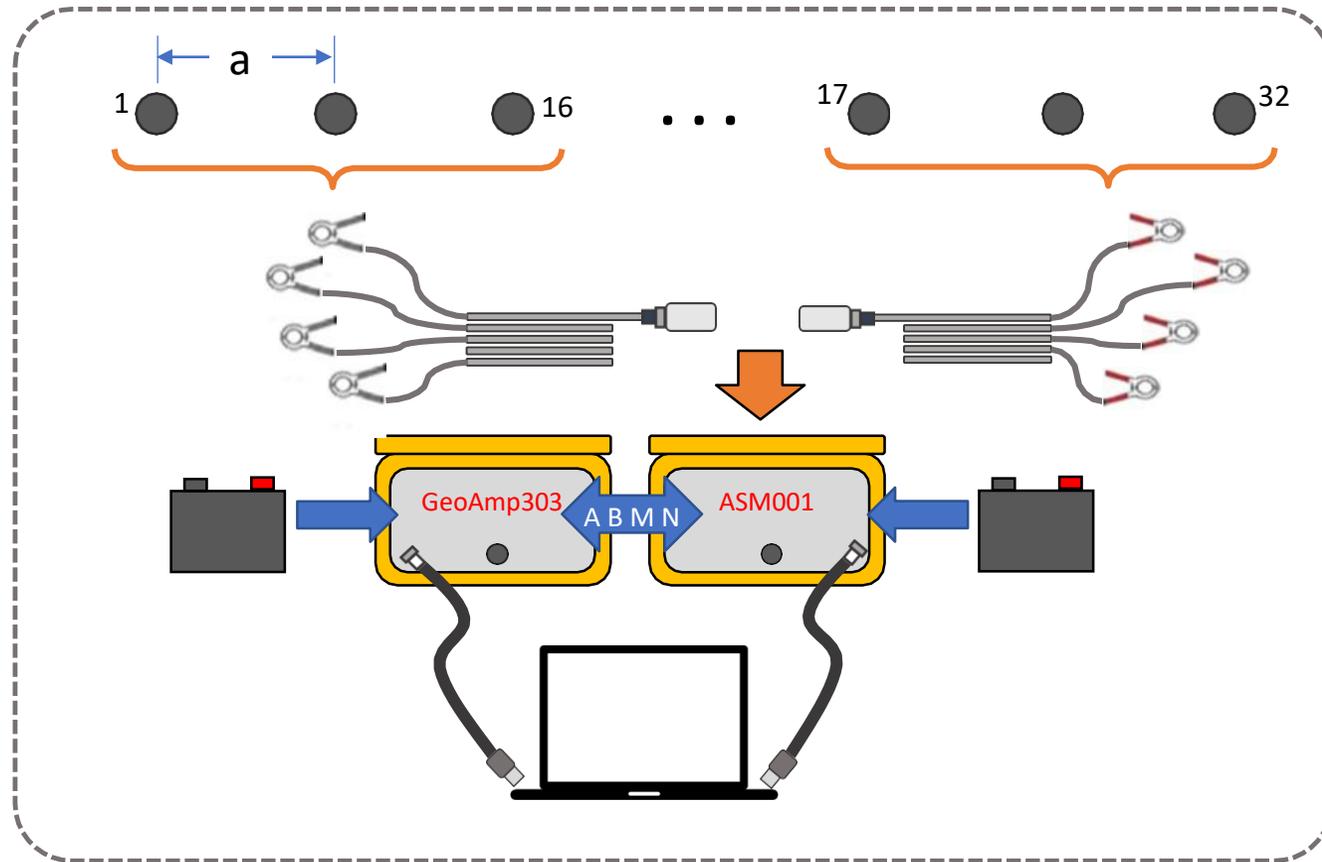
1. Place the 32 electrodes, deploy and connect the equipment and start the acquisition software in Tomography mode.

2. Press "Inject" to start the process *. The software will carry out the process autonomously and will indicate its current status with graphics. Periodically check the voltage, current and resistivity data (If required, you can pause the measurement and resume at another time **).

3. When you want, press "Finish" and wait for the equipment to stop the acquisition.

* Before injecting current, verify that no person or animal is in contact with the electrodes.
** Below is the step-by-step use of the acquisition software PowerDAQ en modo de tomografía eléctrica.

Installing PowerDAQ software on Windows

1.

• Navigate to the My Installer \ Volume folder, found in the installation files
• Double click on "setup.exe"
• Accept the terms when prompted
• The installation wizard will show you when the process is finished

Installing PowerDAQ software on Windows

2.

- Navigate to the PowerDAQ_2_0 \ data folder, found in the installation files
- Copy the file "configGeoamp.json"
- Navigate to the folder where the PowerDAQ software was installed, which by default is: C: \ Program Files (x86) \ PowerDAQ_2_0
- Paste the copied file, replacing the existing onePegue el archivo copiado, reemplazando el existente

Copy and replace
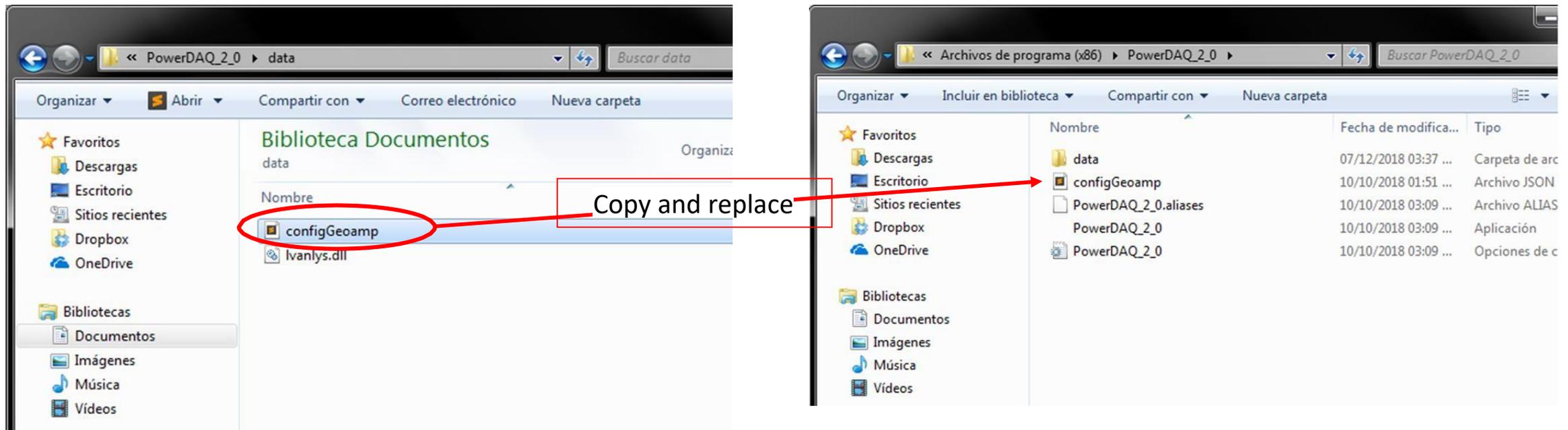
Installing ASM001 Switch Drivers on Windows

- It is likely that when connecting the ASM001 to the computer, Windows will not install its USB drivers. So you must follow the steps in the file called "Tutorial_Drivers_SuperOne _ & _ ASM001_Es_V2.pdf" for proper installation. This file is part of the package delivered with this manual and the PowerDAQ data acquisition software.

- Remember to connect the ASM001 to the battery and turn it on before connecting it to the USB port, so that the computer to recognize it correctly.
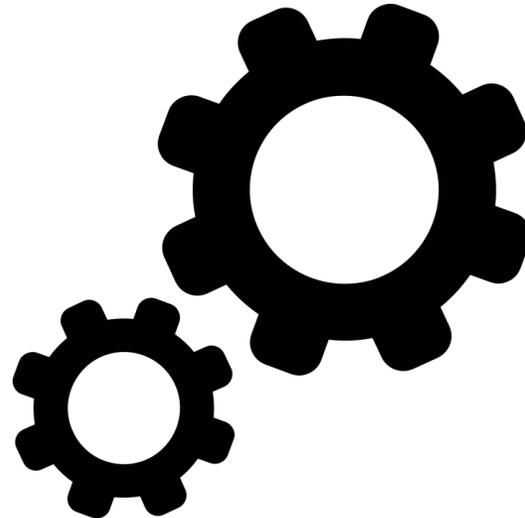
Using PowerDAQ Acquisition Software to Take Electrical Tomography (Once the equipr̶ deployed and the consoles are connected to the PC by USB)

1. When opening the acquisition software, the first thing that is requested is a folder in which to store the measurement file and a name for the file (in the example it was called "TOMO")
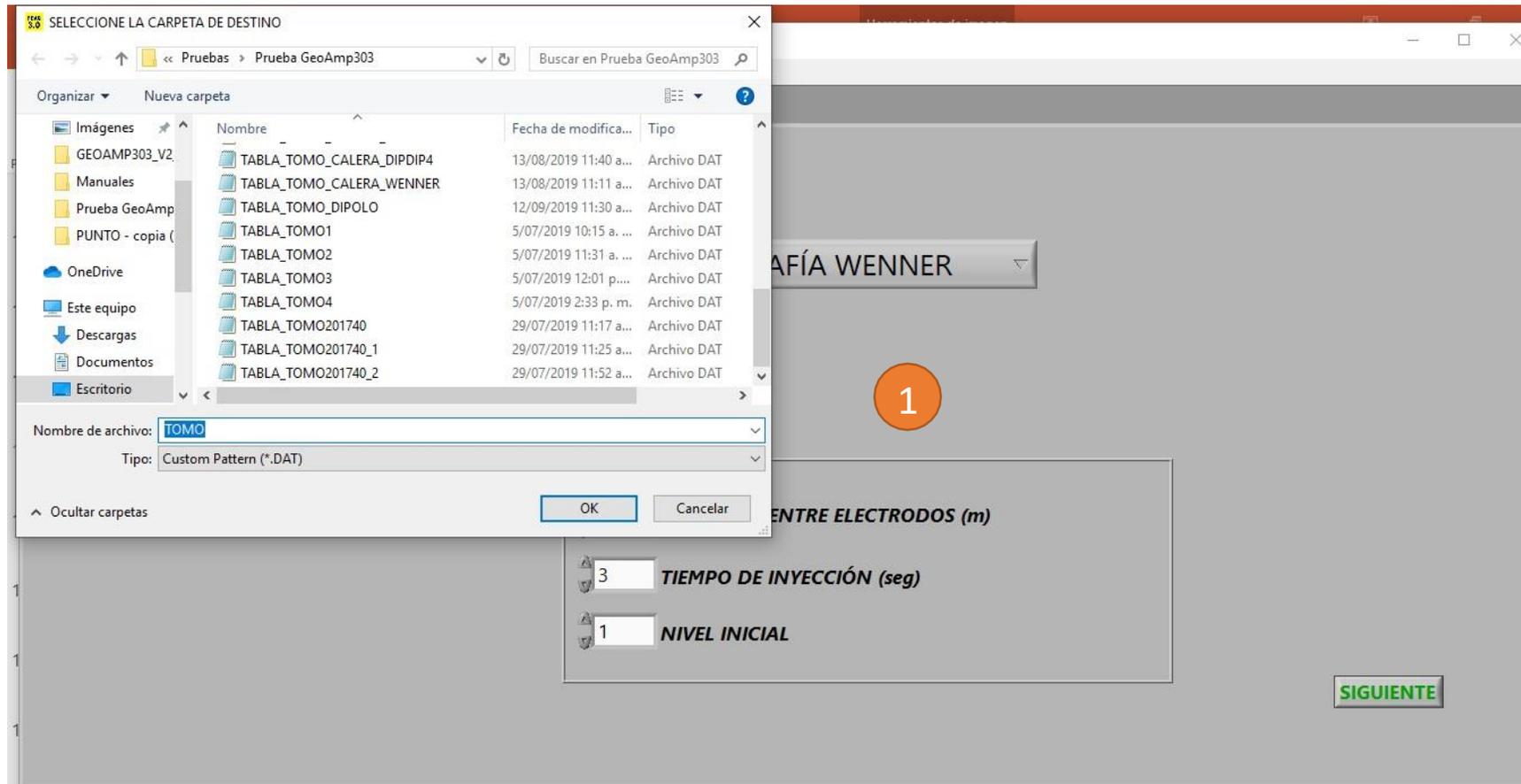
2. In the configuration tab, choose "WENNER TOMOGRAPHY" in the "STUDY TYPE" selection menu (this is the most commonly used arrangement for electrical tomography) and wait for the consoles to be detected.

3. Indicate the first distance between electrodes (in meters), if the value is not an integer, use the point as a decimal point, for example: 0.5. Select the injection time and the level at which you want to start. Then press "NEXT" to go to the acquisition tab.

4. On the left side of the interface there is a USB connection indicator with the GeoAmp303 console, when it is when disconnected, the indicator appears in red and when connected it will change to green *.

5. On the left side of the interface there is a USB connection indicator with the AM001 switch console, when it is disconnected the indicator appears in red and when it is connected it will change to green *.

* You will not be able to go to the acquisition tab ("NEXT" button) if any of the consoles is disconnected.

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6. In the electrode test tab, you can perform a previous review of the connection of each electrode, once you have the equipment deployed and properly connected, proceed to press the test electrode button, these will be shown in green when they have a good connection lead-electrode, otherwise they will be shown in red. This pre-check will allow the user to correct a poor electrode connection before starting the acquisition.

To continue press the NEXT button.
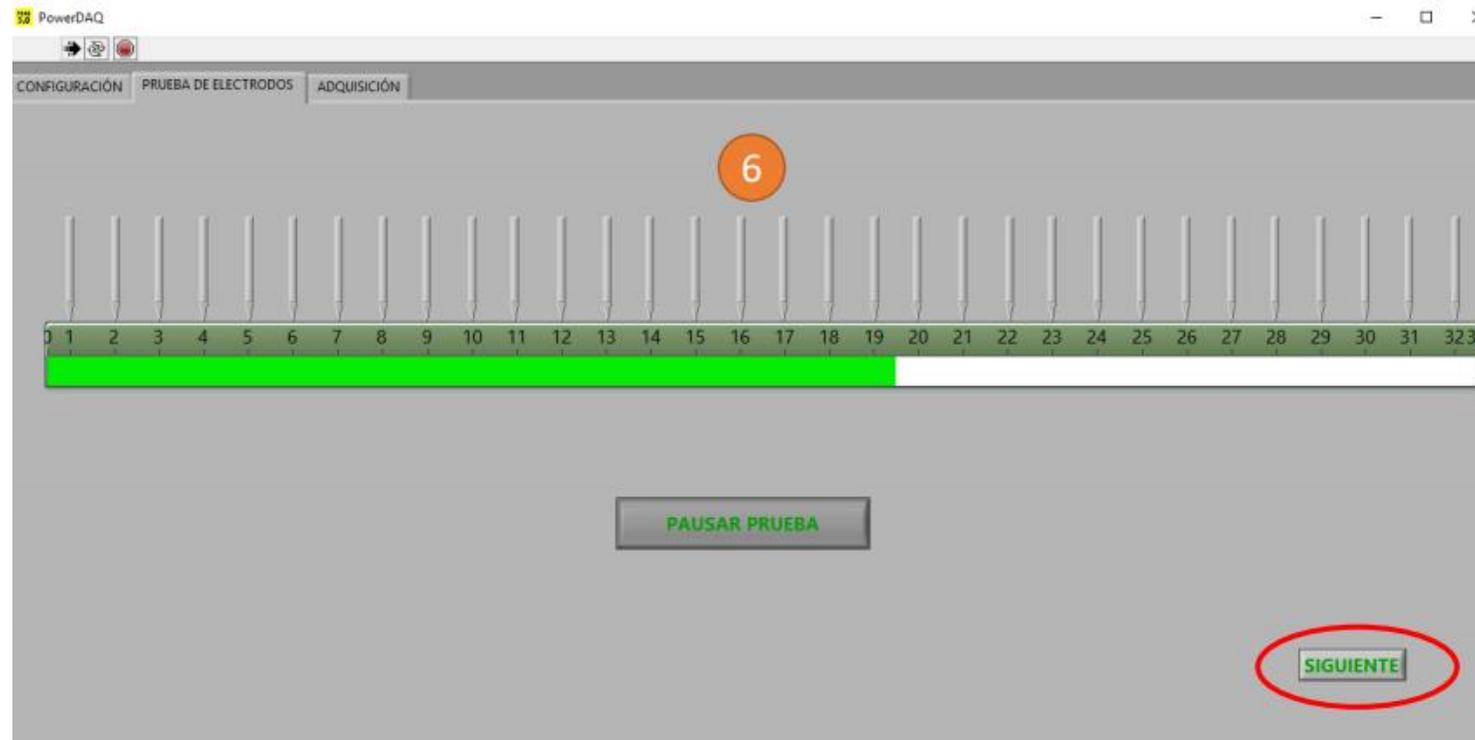
7. En In the acquisition tab, the acquired data can be viewed in real time, in two formats: table (left figure) and graph (right figure). The table presents each measurement made with its corresponding data of: voltage (V) with spontaneous potential compensation (SP), current (I), geometric constant (K) and apparent resistivity (Ro_a) *. The 2D graph will present, through a color intensity scale, the apparent resistivity in ohms per meter with respect to each measurement point (on the 'y' axis the level and on the 'x' axis the location of the point in relation to the electrodes) .

8. To start the tomography, press the "INJECT" button.
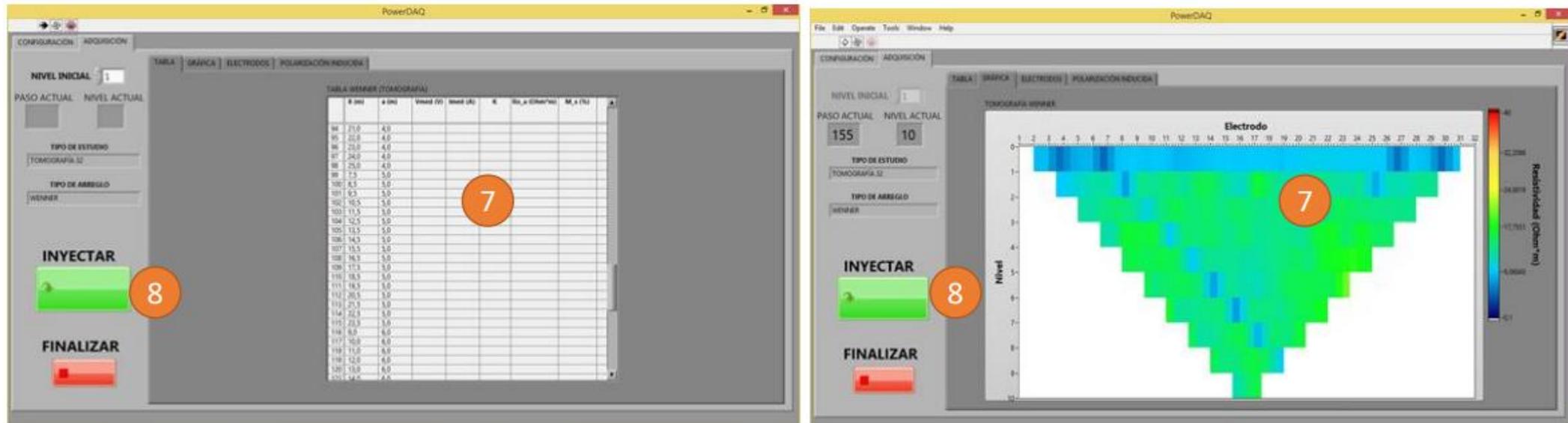
* Voltages are presented in Volts and currents in Amps.

9. By pressing the "INJECT" button, the software will start the process and perform the complete tomography autonomously, switching between pairs of current injection and voltage measurement electrodes. In the tab "ELECTRODES" you can see the current position of the measurement. You can also see the current step and the current level.

10. In the "GRAPHICS" tab, the maximum value and the minimum value of the color scale can be modified manually at any time, to better visualize the differences in apparent resistivity throughout the tomography. Values close to red are high resistivities (low conductivity) and values close to blue are low resistivities (high conductivity) (11).
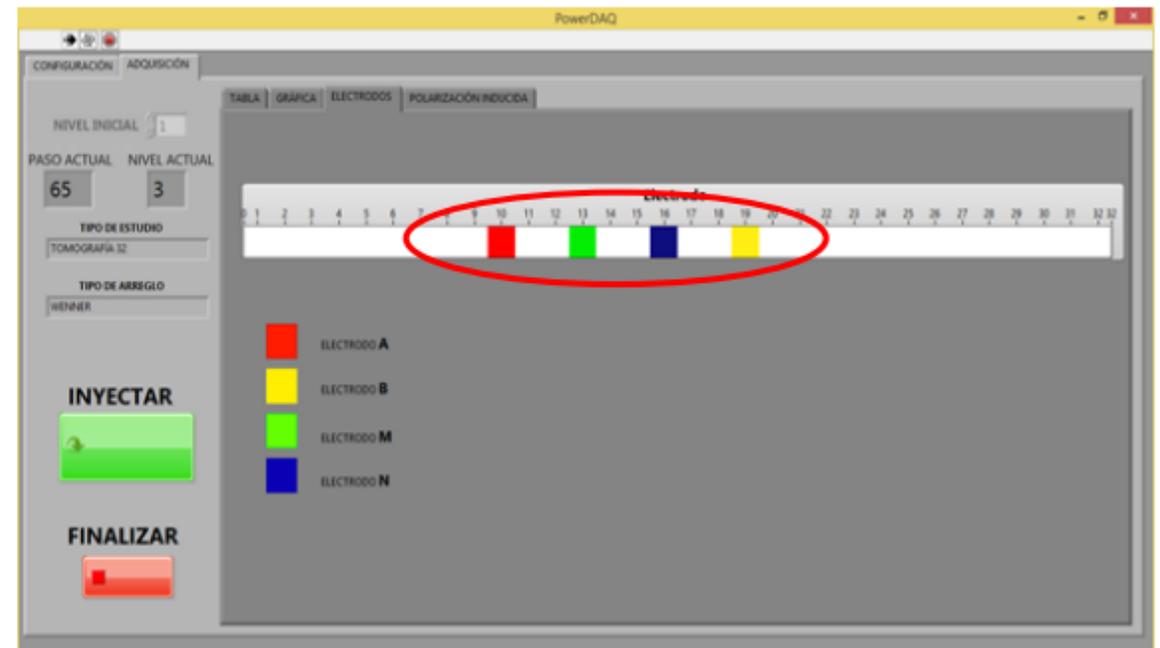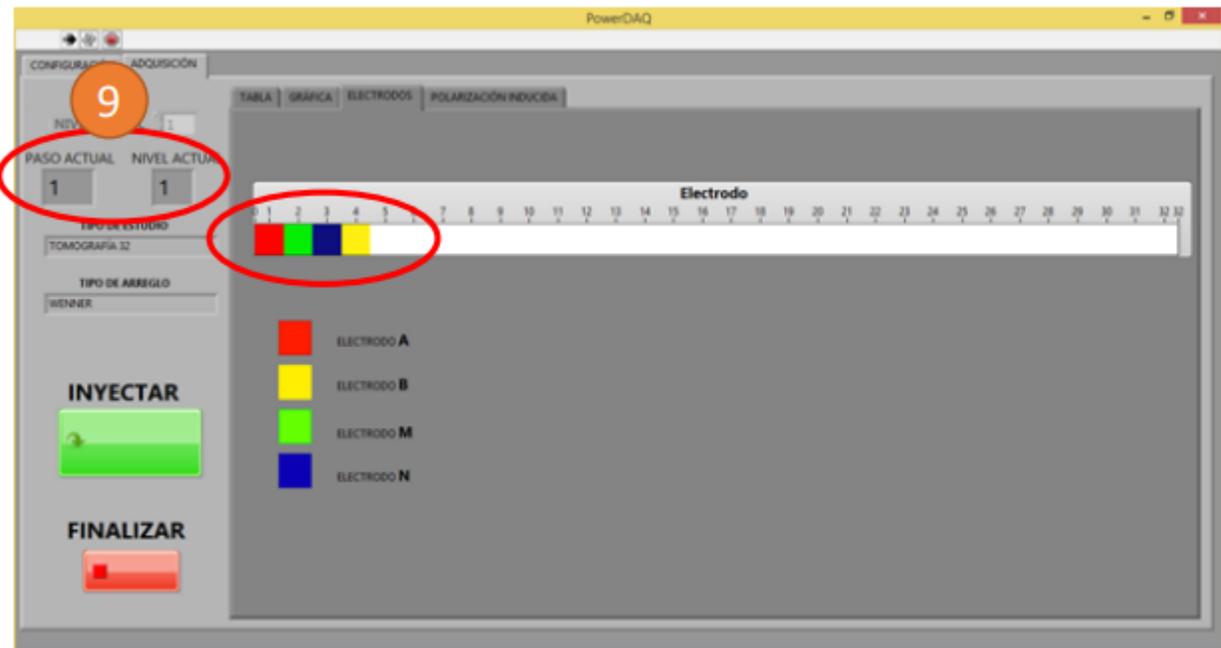
11. The scan ends when all measurement points have been covered or when the button "PAUSE" and then "END" is pressed. Normally it takes 6 to 7 seconds for the console to acquire each point, so it is likely that clicking the "PAUSE" button will not immediately stop the power injection process. Be careful and wait for the switch to stop and for the software to finish (arrow in the upper left turns from black to white when you press "FINISH").
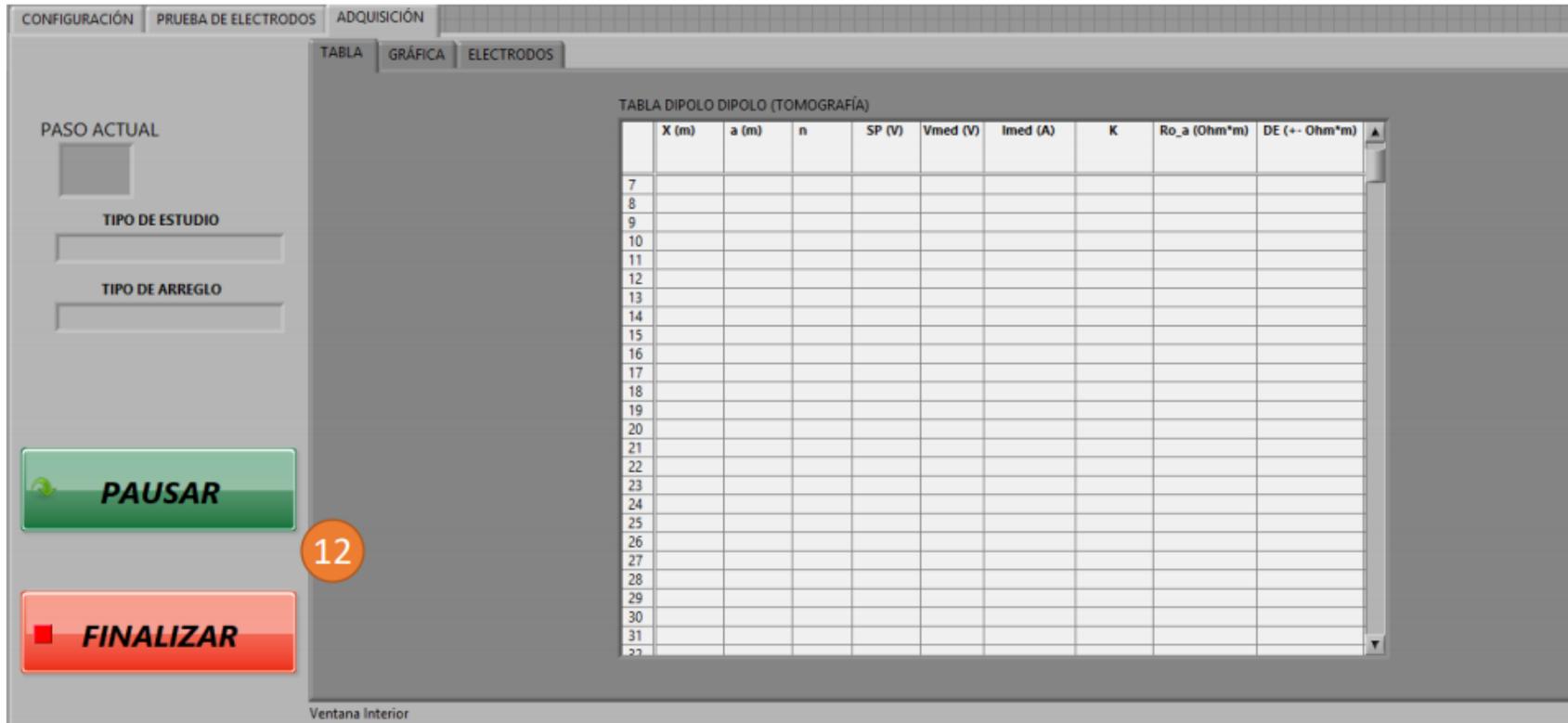
Tomography file management

Once the electrical tomography is finished, the results obtained can be verified in the ".dat" files that the software generates.

As in this example the process file was called "TOMO", the software will create two results files:

1. "TABLE_TOMO.dat": Contains the list of distances AB / 2 and MN, the measured voltages and currents, and the resistivities apparent.
2. "PROCESAMIENTO_TOMO.dat": File organized for import into any electrical tomography data processing software.

Disconnection of the equipment at the end of a scan

To properly shut down, unplug, and store equipment, follow these steps:

1. Press the power switches to turn them OFF. All indicator LEDs on the
panel.
2. Disconnect the USB cables from the consoles and the computer. Locate the cables inside their corresponding console.
3. Disconnect the power (battery) cables, first from the battery and then from the console. Locate these cables on the inside of their corresponding console.
4. Disconnect the cables from A, B, M, N that connect the two consoles. Locate these cables in their corresponding console.
5. Disconnect the strings from the ASM001 switch console and close the connectors properly.
6. Close the consoles.
7. Disconnect the alligators connected to the electrodes and collect the two strings.
8. Pick up the 32 electrodes.
9. Count all the pieces.

External maintenance of the ASM001 equipment

Se recomiendan las siguientes actividades de mantenimiento externo para prevenir fallos en campo:

1. Limpiar periódicamente la consola principal con un paño húmedo para evitar la acumulación de suciedad y polvo.

2. Limpiar periódicamente los electrodos, caimanes y demás conectores para prevenir que haya aislamiento eléctrico por acumulación de suciedad.

3. Verificar la continuidad eléctrica en cada cable A, B, M, N. Esto lo puede realizar un técnico capacitado con un medidor de continuidad. Se recomienda realizar esta operación antes de iniciar un trabajo de campo para detectar rupturas o defectos en los cables o conectores.

4. Verificar visualmente la integridad el aislamiento eléctrico plástico de los cables para cada uno de los 32 caimanes, para encontrar daños que puedan ser fácilmente reparados con cinta aislante.

Mantenimiento interno del equipo ASM001

The internal maintenance of the ASM001 is much less frequent than the external one, because the internal parts of the main console are not exposed. Internal maintenance must be carried out by personnel trained for it and authorized by the equipment supplier.

It is recommended to carry out internal maintenance to the equipment every 12 months. If the equipment is used intensively, maintenance can be carried out every 6 months.

Any internal intervention of the equipment by personnel not authorized by the supplier will immediately void the warranty..

Final Recommendations

1. Remember to use the appropriate safety and personal protection elements.

2. The personnel responsible or who will take part in the acquisition campaign must have full knowledge of this manual and the risks to your physical integrity in the event of mishandling of the GeoAmp303 and ASM001 equipment.

3. Before starting each campaign, check the status of each of the elements of the team.

4. The ASM001 equipment is designed for work in the open field. This implies some resistance to shocks, continuous use and exposure to environmental factors. However, exposing the console to moisture or rain while open should be avoided as this could lead to short circuits or equipment failure.

5. The equipment must be stored in a dry and safe place.

6. Do not tension the alligator cables of the strings, this may cause internal breaks in the cable or it may loosen the cable from its corresponding alligator.

Warranty

The ASM001 has a one (1) year warranty from the date of delivery. This warranty includes damage to the central unit or its accessories due to manufacturing or assembly defects in its internal or external components.

The warranty does not cover internal damage caused by exposure of the main console panel to rain, nor does it cover damage caused to any of the components that make up the equipment due to improper operation, inexperience, accident, abuse, intentional acts of third parties, force majeure situations. such as flooding or fire and in general causes beyond the normal operation of the equipment. The warranty does not cover damage caused by the natural wear of the parts or by an accelerated wear caused by the lack of maintenance of the equipment.

Neither will the repair of damage caused when the equipment is intervened by personnel not authorized by the supplier, or in the event that parts are added or changes or alterations are made to the components that make up the equipment.

The warranty will be invalid if the security seals located on the front panel of the central unit are tampered with or destroyed.

ASM001
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