Three-Phase Medium and High Voltage Breaker Analyzer

User Guide

PME-700-TR
PME-600-T

Reference: HAGMU02

Edition: September 25, 2023

Version: 2

Quality is the central focus of EuroSMC, S.A.'s activities, aimed at fully satisfying the expectations and needs of its customers.

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LIMITED WARRANTY

This product is warranted against defects in materials and workmanship for a period of 12 months from the date of product registration. If registration does not occur within 30 days from the date of shipment, the latter will be considered as the start of the warranty period.

Our commitment is limited to the replacement and/or repair of materials and components proven to be defective during the warranty period.

This warranty does not cover defects caused by the operator outside the product specifications established in the user guide.

EuroSMC, S.A. shall not be held responsible for any direct or indirect damages accidentally caused by the product..

TRANSPORTATION CONDITIONS

This warranty covers transportation expenses exclusively under the following conditions and with the specified limitations:

1. If the equipment experiences a failure that requires transportation to the factory within TWO MONTHS after the warranty takes effect, the transportation costs will be fully covered by EuroSMC S.A.

2. If the equipment experiences a failure that requires transportation to the factory after TWO MONTHS and up to the end of the first year, the customer will be responsible for shipping the equipment to the factory, and the return transportation will be covered by EuroSMC S.A.

3. The customer must not send the equipment to the factory without a Service Ticket issued by EuroSMC S.A. Otherwise, EuroSMC S.A. will not cover any transportation costs.

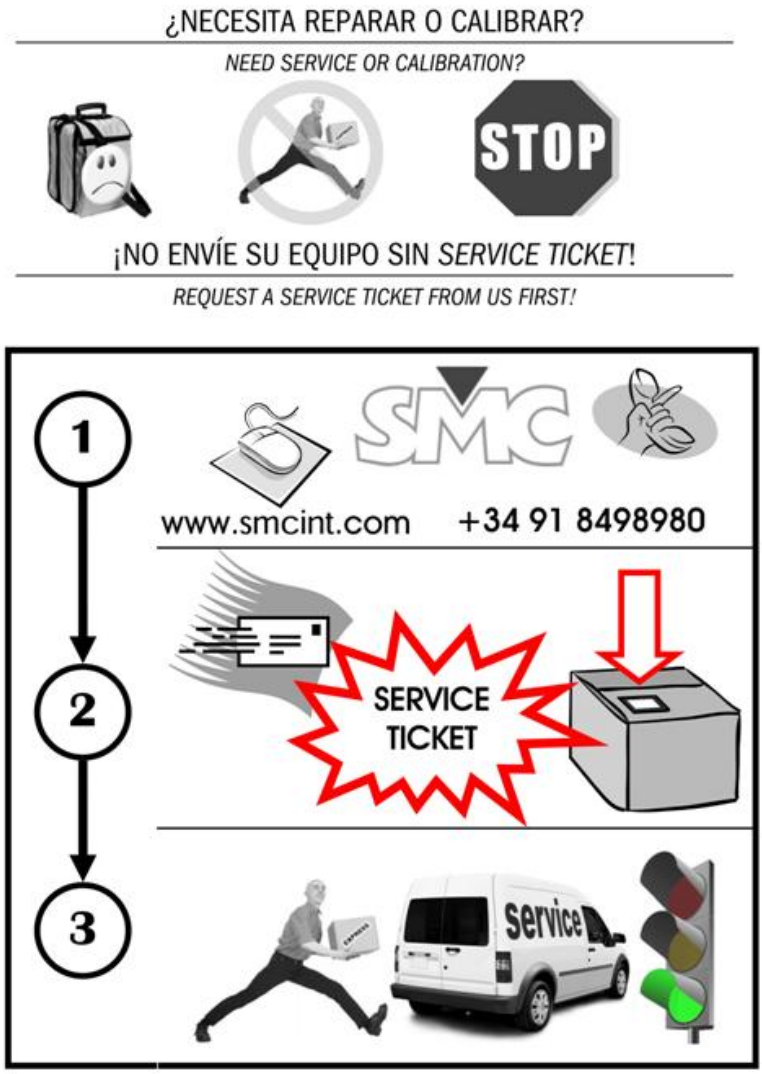
4. If the diagnosed failure of the equipment is not covered by the warranty terms, EuroSMC S.A. will not cover any transportation costs.

ACTIVATING THE WARRANTY

It is essential to register your product as soon as possible on our website. This registration is absolutely necessary for your warranty to take effect properly.

To do so, please visit our website (*www.smcint.com*), select the "Support & Training" option, and click on "Customer Registration and Product Registration." Answer the questionnaire's questions and click on submit.

If the product is not registered, EuroSMC S.A. reserves the right to grant or deny the warranty during the one-year period.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CONTENT

DECLARATION OF CONFORMITY

For the PME-700-TR and PME-600-T Breaker analyzers, applicable to all their components.

Manufacturer

EuroSMC, S.A.

Pol. Industrial P-29 C/Buril, 69.

28400 Collado Villalba.

Madrid – España

Declaration of Conformity

Based on the results of tests conducted according to the appropriate standards, the product complies with:

- Directive 2014/30/EU on electromagnetic compatibility.
- Directive 2014/35/EU on low voltage.

Standards used

Generic	
IEC 61010.1 (2010)	Safety requirements for electrical equipment for measurement, control, and laboratory use.
IEC 61000-6-1 (2007)	Electromagnetic compatibility (EMC).Immunity for residential, commercial and light-industrial environments..
IEC 61000-6-2 (2005)	Electromagnetic compatibility (EMC). Immunity for industrial environments.
IEC 61000-6-3 (2007)	Electromagnetic compatibility (EMC). Emission standard for residential, commercial and light-industrial environments
IEC 61000-6-4 (2007)	Electromagnetic compatibility (EMC). Emission standard for industrial environments.

Basic	
IEC 61000-3-2 (2006)	Electromagnetic compatibility (EMC) Limits - Limits for harmonic current emissions .
IEC 61000-3-3 (2009)	Electromagnetic compatibility(EMC). Limits. Limitation of voltage changes, voltage fluctuations and flicker .
IEC 61000-4-2/3/4/5/8/11	Electromagnetic compatibility(EMC). Testing and measurement techniques.

The tests have been performed in a standard configuration. This conformity is indicated with the CE symbol meaning “European Conformity”.

ELEMENTS THAT MAKE UP THE SYSTEM

The PME-700-TR and PME-600-T breaker analyzers are controlled using a computer or tablet that operates on the Android or Windows operating system.

Depending on the system and controller you have acquired, you will find the following elements:

Model PME-700-TR	*Model PME-600-T*	
Nylon carrying case		
2.5 m power cable		
Connection hose for controlling the operating coils (trip/close)		
Connection hose for the two auxiliary inputs (Aux 1, Aux 2)		
Connection hose for the three main poles of the circuit breaker		
Connection hose for measuring contact resistance		
Set of spare fuses		
2 sets of 4mm/flat terminal adapters		
Set of alligator-type clips		
Grounding cable		
Ethernet connection cable for PC		
USB memory stick		
Calibration certificate		
Registration and warranty form		
User guide		

SAFE USE OF EQUIPMENT

Before using the equipment please carefully read this manual, especially this section, referring to safety precautions that must be observed.

Symbols used

	Hazard – *this identifies actions and situations that entail risks for the user.*
	Precaution – *this identifies actions and situations that might cause damage to the equipment.*
	Important – *this identifies actions and situations that attention must be paid to in order to correctly carry out the test or measurement.*

Hazardous situations

	Before proceeding with the power or supply connections change, make sure the system is turned off (by deactivating the power switch of the unit).
	Never operate the system if you observe severe damage or moisture in it.

INTRODUCTION

The PME-700-TR and PME-600-T breaker analyzers have been designed to facilitate contact synchronization testing, coil current analysis, and contact resistance measurement (only in the case of the PME-700-TR model) in medium voltage breakers or breakers with a single contact per pole. Their application for breakers with multiple contacts per pole is not advisable, although it could be done occasionally through a more laborious process. The equipment is easy to handle and intuitive.

The multi-contact connectors have been duplicated in the form of simple 4mm banana jacks to allow for important tests to be conducted in case of loss or deterioration of any of the hoses.

Under full load, the internal battery (only in the case of the PME-700-TR model) provides the equipment with sufficient autonomy for more than a day's work when there is no power supply available, which often occurs at the testing site.

In the PME-700-TR model, the four-wire method is used to measure contact resistance, with an excellent resolution of 0.1 microohms and a 10A injection.

The analog/digital input auxiliary connector captures data from analog or digital transducers. It can also be used as a voltage or current meter for both AC and DC.

The control and operation of the PME-700-TR or PME-600-T take advantage of the latest advances in secure and extremely fast connectivity and communication technology.

The PME-700-TR or PME-600-T is controlled and operated using a tablet or computer running on an Android or Windows operating system. The required application to download and install is called *Breaker Analyzer Control*.

The connection between the PME-700-TR or PME-600-T and its controller (tablet or computer) is immediate and does not require any prior configuration.

The connection between the tablet and the PME-700-TR or PME-600-T can be established via WiFi, access point, or through a network.

The connection between a computer and the PME-700-TR or PME-600-T can be established via WiFi or using an RJ-45 cable.

The use of an independent controller (tablet or computer) allows for software control updates to be downloaded directly from the cloud. It also provides great versatility in the use and management of reports and results. Together with a fast and reliable connection system, the PME-700-TR and PME-600-T become lightweight, autonomous, and functional devices.

The PME-700-TR and PME-600-T feature a USB-A port for connecting a USB disk (memory) and another USB-B port for maintenance functions.

We recommend that you thoroughly read and understand this user guide before using the PME-700-TR or PME-600-T for the first time. EuroSMC's technical support staff is available to answer any questions you may have regarding its operation. Congratulations on making the right choice, and thank you for considering EuroSMC's products and services.

Breaker Analyzer Control for Windows.

https://webmail2.eurosmc.es/softdownloads/Downloads/BreakerAnalyzerControlInstaller.msi

SCAN ME

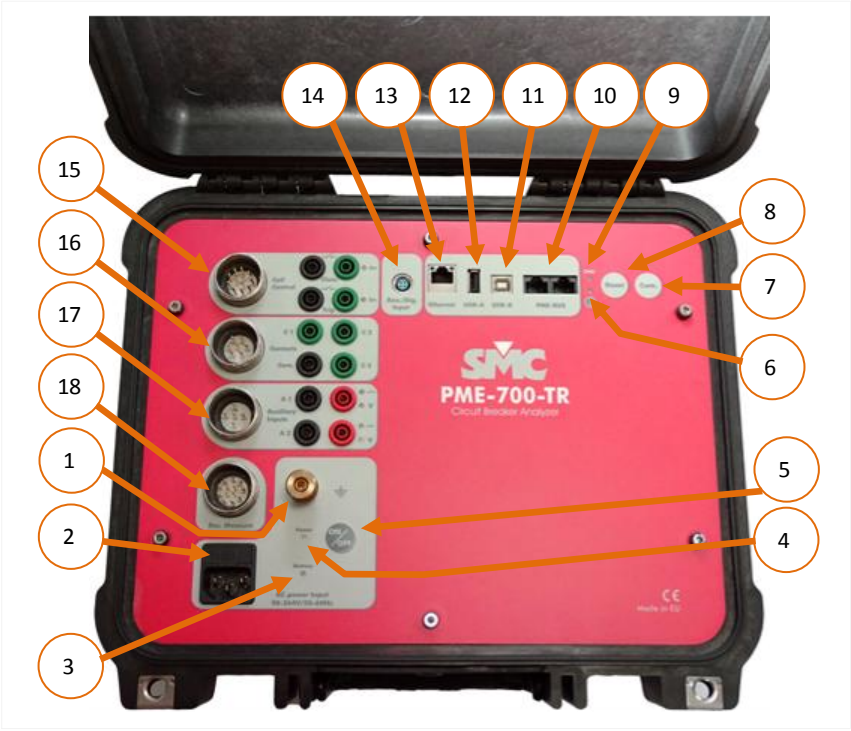
Breaker Analyzer Control for Android.

https://play.google.com/store/apps/details?id=com.eurosmc.pme

SCAN ME

	In this user guide, the PME-700-TR and PME-600-T circuit breaker analyzers will be referred to interchangeably as "*equipment*." Specific mention will be made to each of them only when necessary to differentiate between the two.
	In this user guide, the control systems for the equipment, computer, and tablet will be referred to interchangeably as "*controller*." Specific mention will be made to each of them only when necessary to differentiate between them.

LOCATION OF ELEMENTS



1	Ground terminal
2	Main fuses
3	Battery indicator (only on PME-700-TR)
4	Power indicator
5	ON/OFF button
6	Alarm indicators
7	Communications button
8	RESET button
9	Communications status indicator

10	PME BUS connectors
11	USB-B connector
12	USB-A connector
13	Ethernet connector
14	Analog/Digital measurement auxiliary input
15	Coil control connection
16	Main contact connections
17	Auxiliary inputs
18	Connection for measuring contact resistance (only on PME-700-TR)

POWER CONNECTION

	Please ensure that your power supply meets the equipment requirements (voltage 90-264 VAC and frequency 50-60 Hz) before connecting it. Use only the supplied power cable and make sure that the connecting plug has a connected grounding pin.
	Do not connect the equipment to the power source without removing it from its soft transport case

Before connecting any devices to the connection panel, plug the equipment into a suitable AC outlet and switch it on. During the startup process, which will take a few seconds, the following operations will be performed:

- The internal hardware of the equipment undergoes startup and self-diagnosis.
- The data connection for control is activated and ready for immediate use. Please note that this connection is activated with the configuration that was in place when the equipment was last powered off.
- The communications status indicator (blue) will begin flashing, and the power indicator (green) will remain illuminated continuously.

If there is any problem or malfunction that could cause an overload on the power grid, the fuse located next to the power switch will blow, thereby protecting the network, the equipment itself, and most importantly, the user.

COMMUNICATION MODES

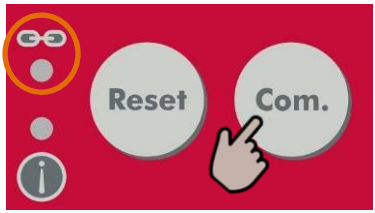
The equipment has two controllers for communications: Wi-Fi and wired Ethernet; both controllers are independent of each other.

In the equipment user can select three communication modes, *Wi-Fi Access Point*, *Wi-Fi Network* (Infrastructure) or *Wired Ethernet*. . The Wired Ethernet mode can be either through a local network or through a direct connection to the computer.

The communications LED, by means of the blinking frequency, indicates the selected communication mode and the connection status.

If the equipment is powered on while the Ethernet cable is connected between the equipment and another device, it will start in Wired Ethernet mode. Otherwise, it will start in the mode selected when it was last powered off.

To change the communication mode, press and hold the "COM" button for at least two seconds. With each sustained press, it will cycle through each of the communication modes.



Wi-Fi Access Point Mode

- *Slow blinking*. Indicates that Wi-Fi Access Point is selected

- *Connection status*. with rapid blip between blinks. Indicates that there is another device connected to the SSID of the equipment. This will prevent it from connecting when the device connected to the SSID is not that of the user, please disconnect the old device.

Wi-Fi Network mode

- *Slow double blink*. Indicates that *Wi-Fi Network* mode is selected.

- *Connection status:* With rapid blip between double blinks. Indicates that the equipment is connected to a Wi-Fi network and has a valid IP address for that network.

Wired Ethernet Mode

- *Triple slow blink*. Indicates that *Wired Ethernet* mode is selected.

- *Connection status:* With rapid blip between triple blinks. Indicates that the equipment is connected to a network through its RJ-45 port and has a valid IP address for that network..

Connection established with the application

- *The LED indicator* remains steadily lit when there is an application, either on a computer or on a tablet, in communication with the equipment.

- The indication of the *Mode* in which it is currently operating can be inferred from the blinking pattern of the blue LED, as previously mentioned.

	The most commonly used communication modes by users in a substation to control the equipment, when there are no communication networks in the substation yard and for convenience, are the WiFi Access Point and Ethernet cable with direct connection to a computer.
	If you have VMware, VM VirtualBox, or any other virtual machine software installed on your computer, they may generate conflicts when communicating with the equipment. Go to the Device Manager and disable any virtual network adapters that may appear under "*Network Adapters.*"

Wi-Fi Access Point Mode

In this mode, the equipment and the controller are directly connected through the built-in WiFi server in the equipment. It creates a private WiFi network acting as an access point and only allows one connection. Once a controller has connected to this network, another controller connection is not supported.

If there is already a controller connected to the WiFi network created by the equipment, any additional connection will be rejected. In such a case, turn off the WiFi on other smart devices near the equipment and keep only the WiFi of the controller you intend to connect turned on.

Communicating with the Breaker Analyzer Control application.

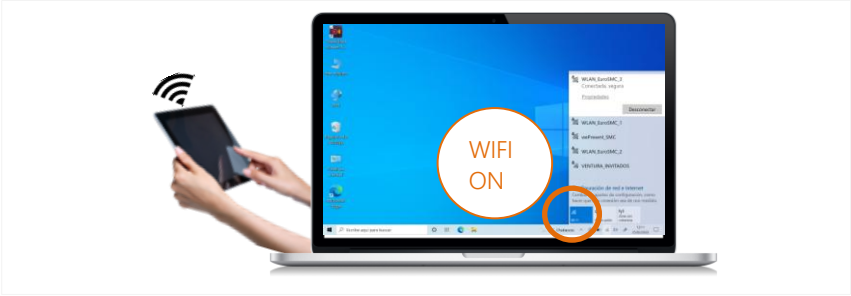
Follow the steps below to establish communication:

1) Verify that the equipment is configured in WiFi Access Point mode. If not, press the "COM" button for at least two seconds to change the communication mode until the appropriate mode is selected.

WiFi Access Point Mode

WiFi Access Point Status. There is a device already connected to the SSID.

2) Activate the WiFi in the controller.



3) Run the application

4) Tap on the WiFi AP option. The application will show a list with all the units that are nearby.

5) Select the unit you want to work with. Identify it by the serial number.

6) Click on “OK”. When the connection is established the communications indicator LED will remain lit on continuously and you will hear a beep.

Established Communication

Wi-Fi Network Mode

In this mode, the equipment and the controller are connected to the same local network where other devices (such as printers, computers, etc.) are usually connected, but only one device can control the equipment. The equipment is connected to the local network via WiFi, while the controller can be connected via WiFi or Ethernet cable interchangeably.

By default, the equipment is configured with DHCP enabled. DHCP enabled means that the equipment expects a DHCP server to be present on the network, which is responsible for assigning it an appropriate IP address for the connection. If this is the case, when you turn on the equipment, it will be assigned an IP address and automatically connect to the network.

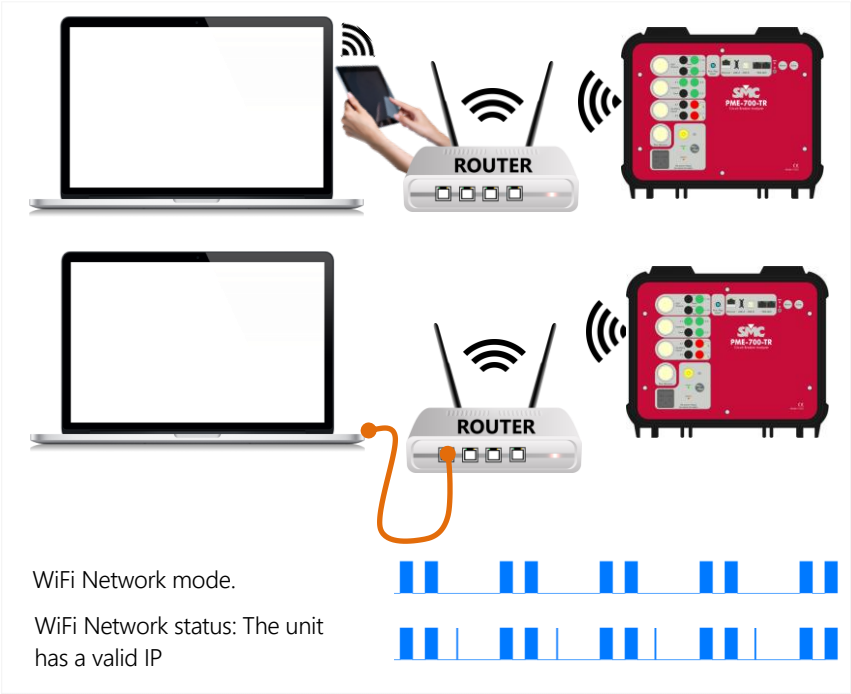
Please consult your network administrator to determine if a DHCP server exists on your network. If it does not exist, you must disable DHCP and manually configure the connection parameters on the PME equipment. To do this, you will need to obtain the following four parameters from your administrator:

- IP address
- Subnet mask
- Default gateway
- DNS server

You can copy the last three parameters from any computer connected to the network. *The IP address must be unique within the network.*

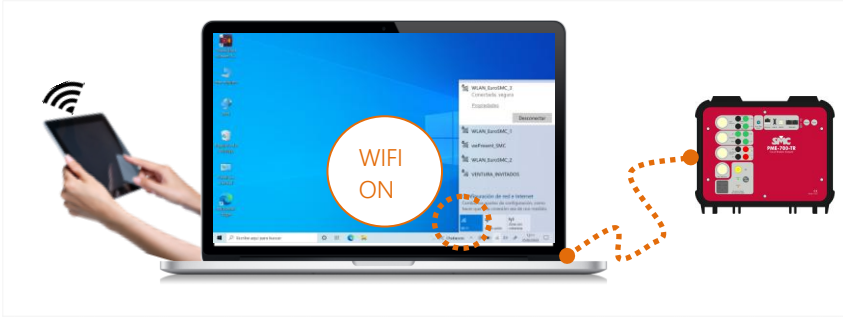
Communicating with the Breaker Analyzer Control application.

The following image displays the network configuration when the "WiFi Network" mode is selected, along with the communication LED frequency.



Follow the steps below to establish communication:

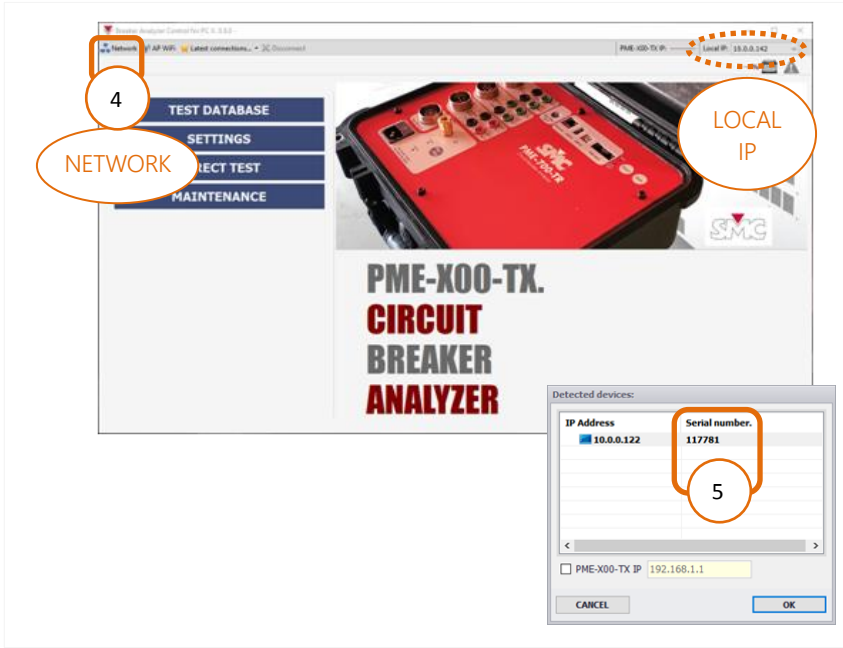
1) Verify the equipment's configuration in WiFi Network mode. If not configured, press the "COM" button for at least two seconds to switch to the appropriate mode.
2) On the controller, enable WiFi or connect the Ethernet cable.



3) Run the application and select the local IP address of your computer.

4) In the toolbar, select the "Network" option. The application will display a list of all the devices connected to the network.

5) Select the device you wish to work with. Identify it by its serial number.



6) Press "OK". When the connection is established, the communication indicator LED will remain continuously lit, and you will hear a beep sound.

Established Communication

Wired Ethernet Mode

In this mode, you have two connection options: through a local network or through a direct connection.

Connection via cable through a local network.

This mode is essentially the same as the WiFi network mode, but with the difference that in this case, the equipment is connected to the network using an Ethernet cable instead of its WiFi controller.

In this mode, the equipment and the computer are connected to the same local network, where there are usually other devices connected (such as printers, computers, etc.), but only one device can control the equipment. The computer can be connected to the network either via WiFi or Ethernet cable.

By default, the equipment is configured with DHCP enabled. DHCP enabled means that the equipment expects a DHCP server to be present on the network it connects to. The DHCP server is responsible for assigning an appropriate IP address for the connection. If this is the case, when you turn on the equipment, it will be assigned an IP address and will automatically connect to the network.

Please consult your network administrator to determine if a DHCP server is available on your network. If a DHCP server is not available, you will need to disable DHCP and manually configure the connection parameters on the equipment. To do this, you will need to obtain the following four parameters from your network administrator:

- IP address
- Subnet mask
- Default gateway
- DNS server

The last three parameters can be copied from any computer connected to the network. The IP address must be unique within the network.

Once you have obtained the necessary parameters, you should proceed as indicated in the section: "Manually Set the Connection Parameters on the Equipment.

Direct Ethernet connection.

In this mode, the equipment and the computer are directly connected using an Ethernet cable. In this mode, it cannot be strictly considered a network. However, it is crucial to understand that both devices, the equipment and the computer, must have identical network masks and IP addresses belonging to the same segment. If this is not the case, the connection will not be established. In this type of connection, there is no DHCP server, and therefore, the connection parameters must be set manually.

It is unlikely that the default assigned addresses on the equipment and the computer will be compatible without adjusting one of them.

Typically, you only need to adjust the connection parameters at one end. To do this, you need to know the parameters at the other end. You have two options:

a) Configure the connection parameters on the equipment. In this case, you should refer to the ones on the controller. See the section "Consulting the IP address of the Ethernet adapter."
b) Configure the connection parameters on the controller. In this case, you can restore the default parameters on the equipment (as detailed in the following section) or consult them as described in the section "Manually setting the connection parameters on the equipment."

Connection Parameters Configuration on the Equipment.

There are two ways to set the connection parameters on the equipment. The first is manually, as described in the section "Manually Set the Connection Parameters on the Equipment." The second and recommended method is to allow the equipment to configure them automatically. To do this, press and hold the "COM" button for approximately 10 seconds until you hear a beep. The equipment will then use the default configuration:

- DHCP Enabled
- IP address: 192.168.100.120
- Subnet Mask: 255.255.255.0

This procedure will erase any previously manually configured connection parameters.

Setting Connection Parameters on the Controller.

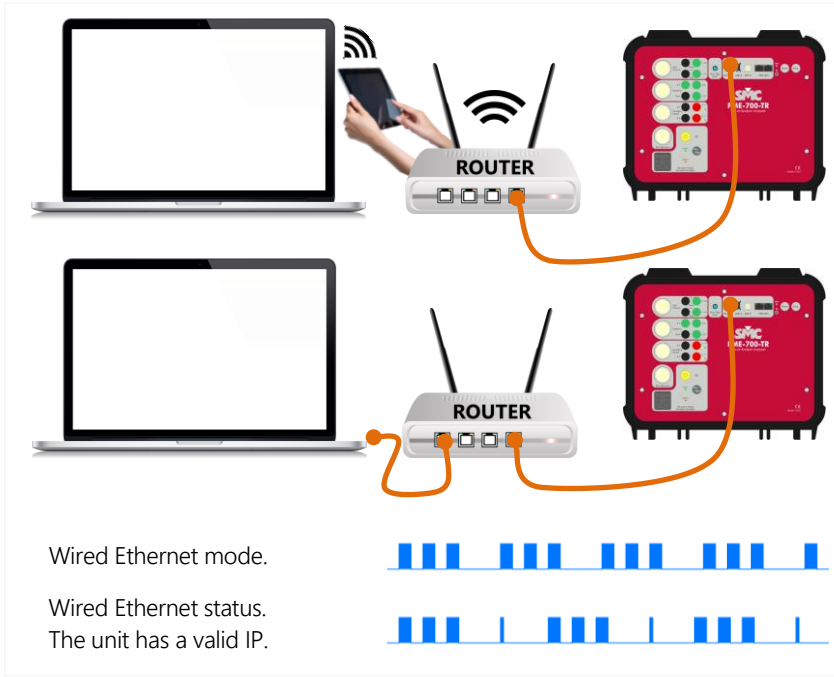
To do this, access the network adapter settings on the controller, disable DHCP, and then manually configure the connection parameters to match those of the equipment. This means using the same subnet mask and an IP address that only differs in the last value. For example:

- IP Address: 192.168.100.X (where X is a number between 1 and 255, excluding 120)
- Subnet Mask: 255.255.255.0

For more detailed instructions on how to perform this operation, please refer to the "Manually Setting Connection Parameters on the Controller" section.

Communicating with the Breaker Analyzer Control application.

a) Connection via Ethernet Cable through a Local Network: The following image shows the network configuration when selecting the mode of connection via Ethernet cable through a local network and the communication LED frequency of the equipment.



b) Direct Connection via Ethernet Cable: The following image shows the network configuration when selecting the mode of direct connection via Ethernet cable and the communication LED frequency of the equipment.

Follow these steps to establish communication:

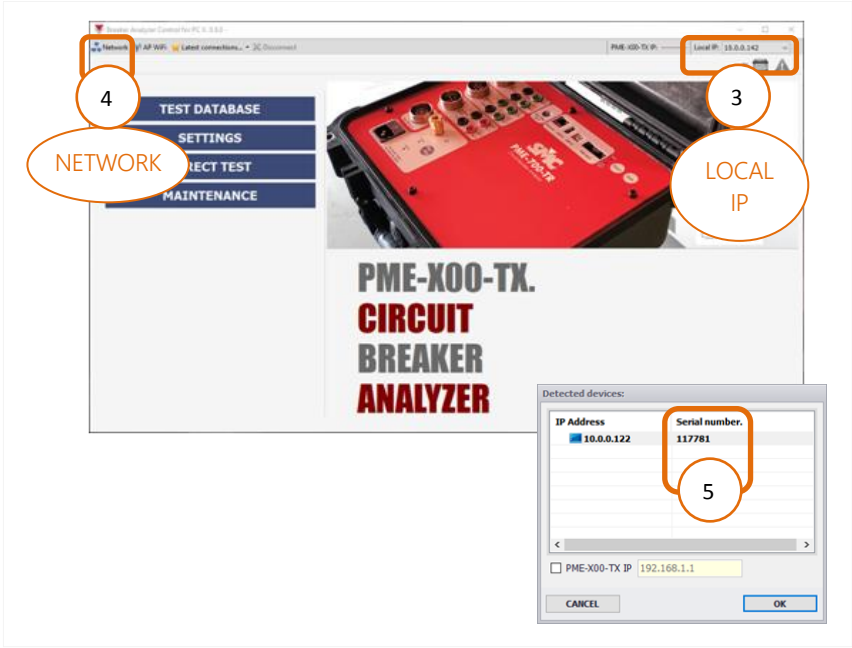
1) Check the equipment's configuration in Ethernet cable mode. If not, press the "COM" button for at least two seconds to switch to the appropriate mode

2) Connect the Ethernet cable as indicated in the previous figures.

3) Launch the application. Select the local IP address of your computer.

4) In the toolbar, select the "Network" option. The application will display a list of all devices connected to the network.

5) Select the equipment you want to work with. Identify it by the serial number.



6) Press "OK." When the connection is established, the LED communication indicator will remain continuously lit, and you will hear a beep sound.

Established Communication

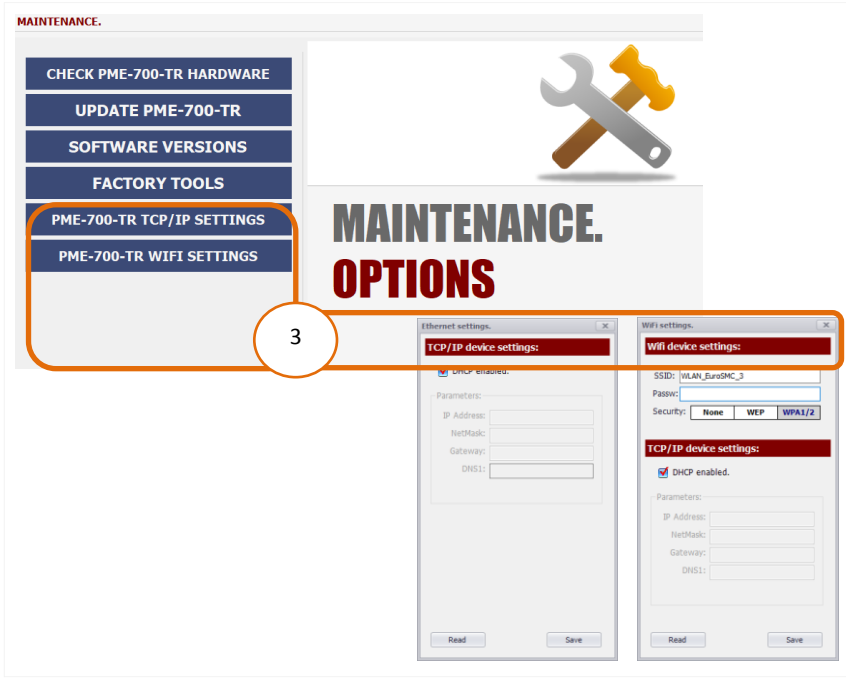
Manually set the connection parameters on the equipment.

Follow the steps below to configure a static IP address on the equipment using the Breaker Analyzer Control application:

1) Connect to the equipment in WiFi access point mode.

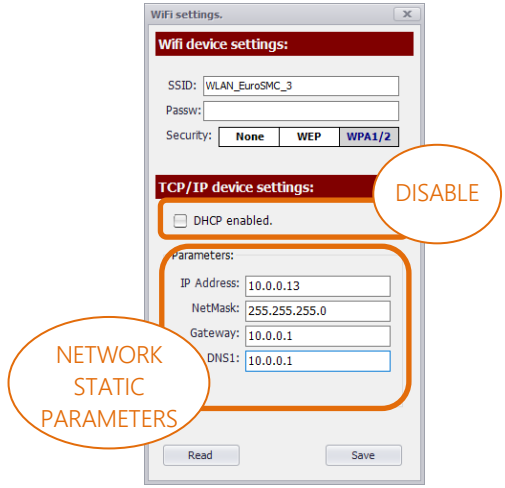
2) Once the connection between the equipment and the computer is established, click on the "Maintenance" button.

3) Click on the "TCP/IP Configuration" or "WiFi Configuration" option in the maintenance menu. This will take you to the window with the TCP/IP settings for the Ethernet or WiFi controller, respectively. For the WiFi network adapter, additionally configure the SSID of the WiFi network, the password (if applicable), and the network security type.



The following parameters are common for both WiFi and Ethernet adapters: DHCP, IP address, subnet mask, gateway, and DNS server. Additionally, WiFi configuration has three additional parameters: SSID, password, and security type (none, WEP, or WPA1/2).

4) Disable DHCP mode by unchecking the option. Configure the TCP/IP parameters.



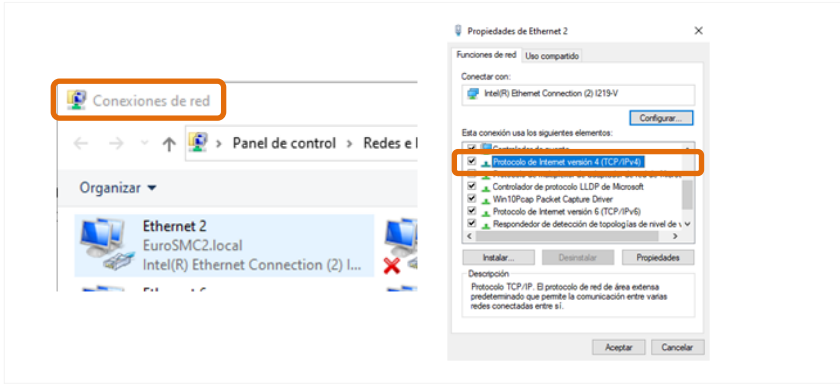
5) Press "Save" to send the configuration to the device. The "Read" button retrieves the saved configuration from the device.

When reading the TCP/IP configuration from the device, the password and its length are not displayed for security reasons.

Manually set the connection parameters on the computer.

To manually set the connection parameters on your computer, the method to access the Ethernet adapter configuration may vary depending on the version of your operating system. The following steps describe how to do it in Windows 10:

1) Click on the Start button and select "Settings".
2) Click on "Network & Internet" and then select "Ethernet".
3) In the menu on the right side, select "Change adapter options".
4) Select the adapter, and in the menu that appears when you right-click, choose "Properties".
5) Select "Internet Protocol Version 4 (TCP/IPv4)" and then click on "Properties".

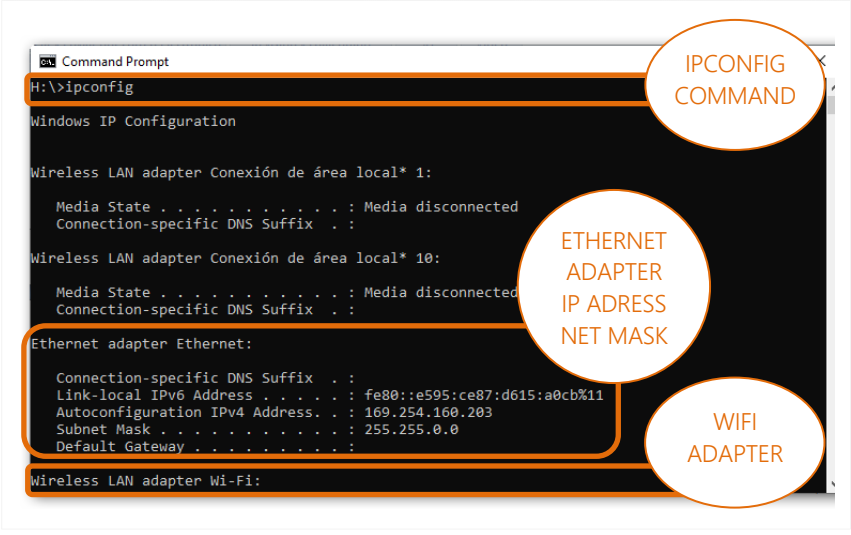


6) In the Ethernet Properties window, check the option "Use the following IP address" and enter the parameters as shown in the image.
7) Click on "OK" and then "Close" to save the changes.

Check the IP address of you Ethernet adapter.

Please follow the steps below to find the connection parameters of the Ethernet adapter on your computer:

1) Connect the Ethernet cable between the computer and the equipment.
2) Open the command prompt (cmd.exe) and type the command "ipconfig". This will allow you to obtain the values of the IP address and subnet mask.

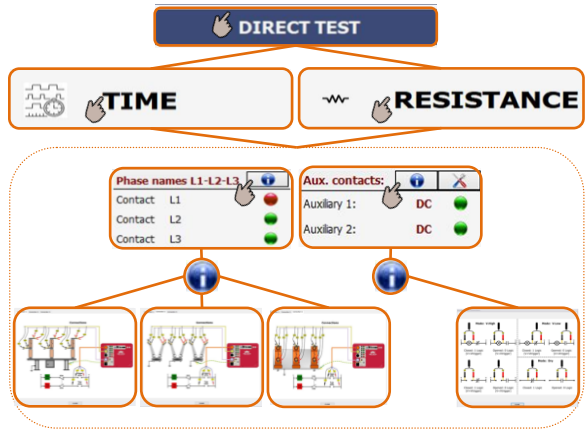


3) Take note of the IP address and subnet mask. In this example, the computer has the following configuration:
   - IP address: 169.254.160.203
   - Subnet mask: 255.255.0.0

HOW TO CONNECT THE SYSTEM TO THE SWITCH

The PME-700-TR connects to the different test points of the switch using the four threaded multi-contact connectors on the equipment. The first three (Coil Control, Main Contacts, and Auxiliary Contacts), just like in the PME-600-T, are duplicated to allow the use of common cables with banana-type connectors in case the multi-contact hoses are not available. The success of the analysis depends on the care taken when connecting the equipment to the switch. Please pay special attention to following these instructions.

To facilitate understanding of the wiring, you can access the explanatory diagrams located in the application, as shown in the image.



Connection of the "Coil Control"

¡WARNING! The auxiliary voltage of a switch can reach up to 250 Vdc. Ensure that it is disconnected before manipulating the switch connections to wire the coil control outputs.

To facilitate your work, the equipment can control the switch during the test in the same way you would do it manually using the buttons typically found in the switch's connection box. For this purpose, the equipment is equipped with two solid-state relays capable of controlling both DC and AC coils, so you can simply connect them in parallel with those buttons. It is important to pay attention to polarity for graphical representation and result analysis. Here's how to do it: connect the blue cables to the end of the button that goes to the positive terminal of the battery or a specific pole of the AC power supply (the same for both buttons), and connect the black cables to the end of the button that goes to the corresponding T (Trip) or C (Close) coil. If for any reason you decide to use the duplicated connectors for coil control, remember that the black terminals go to the coil, and the green terminals go to the positive terminal of the battery or a specific pole of the AC power supply (the same for both buttons).

POLARITY for the switch coils should be respected during the wiring process. Otherwise, even though the control commands will be executed from the equipment, their graphical representation and analysis will appear inverted.

The red LEDs next to these connections will light up momentarily when each actuator is closing the circuit of its corresponding coil.

Connection of the main contacts "Contacts"

Connect the red terminals (marked with C1, C2, and C3) of the cable to each of the contacts on one side of the switch, and connect the black terminals (marked with C1, C2, and C3) to the contacts on the other side. Follow the order 1, 2, and 3, and use a distinct color for each side. If you choose to use the duplicated 4 mm sockets instead of the cable, create a common point by bridging a pair of terminals on one side of the switch and connect it to the black terminal.

WITH THE POLES CONNECTED TO GROUND. The measurement of times and contact resistance does not work if both sides of the switch are connected to ground. If you decide to keep one side grounded, connect that side to the black terminals and the free side to the red terminals.

During the time measurement test, the equipment injects a low current (100 mA) through the switch poles using these cables in order to detect and record changes in the contact state. This connection is sufficient for the time measurement operation. To measure the contact resistance, the equipment injects 10 Amperes through these cables and measures the voltage drop using the resistance measuring hose, as described further below.

If you subject these terminals to a significant voltage, one or more internal fuses may blow. Please refer to the troubleshooting guide at the end of this manual to locate and replace the fuses.

"Auxiliary Inputs"

These additional inputs serve two different purposes:

1) Analyzing the opening/closing times of any two contacts in the switch to complement the analysis of the main contacts' times.

2) Detecting the change in state (open/closed) of a contact or the presence/absence of voltage to initiate the scheduled test maneuver and establish the source of time measurement and data logging. The use of these "trigger events" is described in detail in the preparation and execution chapters of the manual.

These inputs are non-polarized and completely isolated from each other and from the equipment's ground connector. Next to the duplicated 4 mm connectors, there are two LEDs that indicate the detection mode (contact or voltage), and their details are described in the "Test Execution" section.

Although the most common connection for these inputs is the coil contacts of the switch, they are also frequently used to analyze the times of auxiliary control contacts or any other contact related to the main poles. These inputs are protected against overvoltage by internal fuses, as described in the troubleshooting section at the end of this manual.

Connection for measuring contact resistance "Res. Measure" (only for PME-700-TR)

As mentioned earlier, the PME-700-TR measures the resistance of each contact using the four-wire method: two wires for injection and another two for measuring the voltage drop on both sides of the contact.

We have already connected the two injection wires to each pole: these are the red and black "C1, C2, C3" terminals that we have wired on each side of the main contacts. Therefore, the remaining step is to connect the voltmeter wires "R1, R2, R3" to the same poles, maintaining the numbering and polarity, and most importantly, ensuring that the "R" measurement connections are between the "C" injection connections and the contact being measured. This way, we will avoid adding the resistance of the "C" connections themselves to the contact measurement.

WITH THE POLES CONNECTED TO GROUND. The timing and contact resistance measurement will not work if both sides of the switch are connected to ground. If you decide to keep one side grounded, connect that side to the black terminals and the free side to the red terminals.

Usage of optional PME-RESC clamps

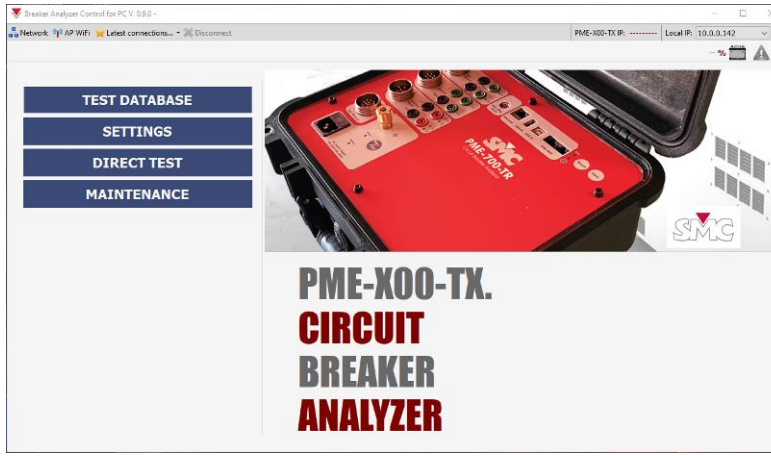
The PME-RESC clamps save time and prevent wiring errors. To use them, connect the black terminals C1 and R1 to the terminals of a black PME-RESC clamp. Repeat the same process with the remaining C/R pairs, using red clamps for the red terminals. Next, locate a good connection point on each side of the switch poles and place the 3 red clamps on one side and the 3 black clamps on the other, following the 1, 2, 3 correspondence.

DO NOT PERFORM THE RESISTANCE MEASUREMENT WITH A SINGLE CLAMP IF IT IS NOT THE ONE SUPPLIED IN THE PME-RESC OPTION. The results will be incorrect as it is necessary for both arms of the clamp to be electrically isolated.

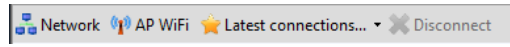
Remember that the measured contact resistance will be the sum of the resistances between the points where the clamps are connected on both sides of each pole.

BREAKER ANALYZER CONTROL APPLICATION

The equipment is fully operated through the *Breaker Analyzer Control* application, available for both Windows computers and Android tablets. All versions of the application have similar features, so the functionalities you will find in them are the same. In this manual, the screens refer to the PC version for Windows, with references to the tablet application when necessary.



The image displays the initial screen of the application. If you haven't connected to any equipment yet, only the Test Database button will be enabled, allowing you to print or export reports of the tests that have already been stored.



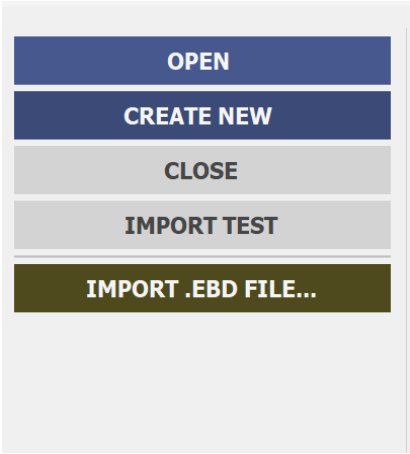
At the top of the screen, you will find the buttons for connecting to the equipment. Towards the end of this document, you will find information about the different modes of connection with the equipment.

At the top right corner, you will find the information about the IP addresses of both the computer running the application and the equipment it is connected to. If there is no connection, this information will appear empty.

These controls will be available on all application screens, although they will be enabled or disabled depending on the screen you are on. Once connected to a device, you have various options to choose from.

Tests DataBase

Proceeding to the screen for managing stored tests (TESTS). These tests are stored in database files and can be saved in any location on your computer. Please note that you can work with the device without having any test database file open, but you won't be able to save the results obtained from the tests.



OPEN

You can select a database file by clicking on the corresponding button, which will open a dialog box for selecting the desired file on your computer. Once selected and accepted, the buttons on the screen will change their state to reflect the new situation.

Please note that you can only select/open one database file at a time. If you want to select another file, you must first close the current one.

The database selection will remain even when you close the application. The next time you launch the application, the selected database will be remembered and automatically loaded if the file still exists and hasn't been moved. Otherwise, you will need to select the database file again.

CREATE NEW

You can organize your tests by creating multiple database files. This allows you to have separate databases for different sets of tests, providing better organization. To create a new database file, you can click on the corresponding button, which will open a dialog box where you can assign a name and location for the new database.

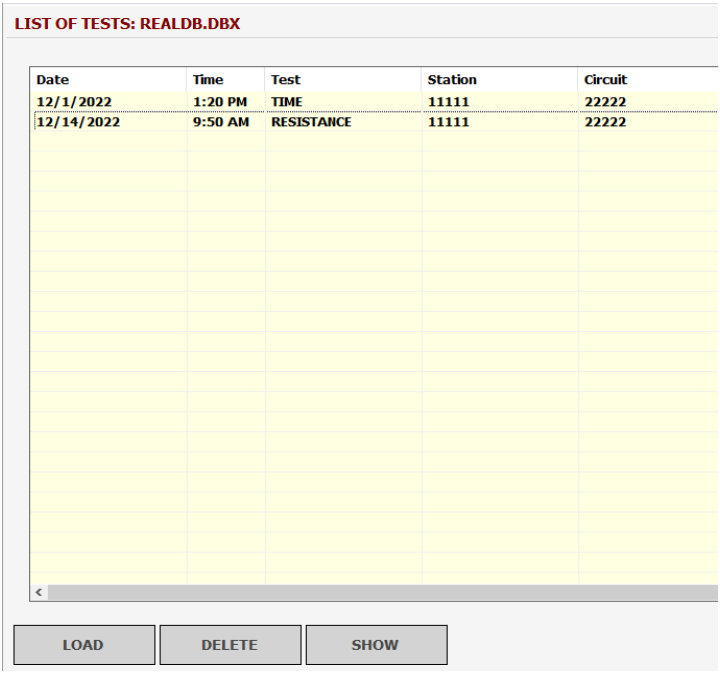
Similar to the "OPEN" action, the buttons on the screen will change their state to reflect the new situation.

CLOSE

This action allows you to close the selected database file. It is necessary if you want to work with a new database. You can also work without an open database, but you will not be able to save the obtained results.

IMPORT TEST

With this action, a new screen opens where you can select a saved test from the database. You can load the test to repeat it, delete it from the database, or view and export the results in a printable format.



IMPORT .EBD FILE...

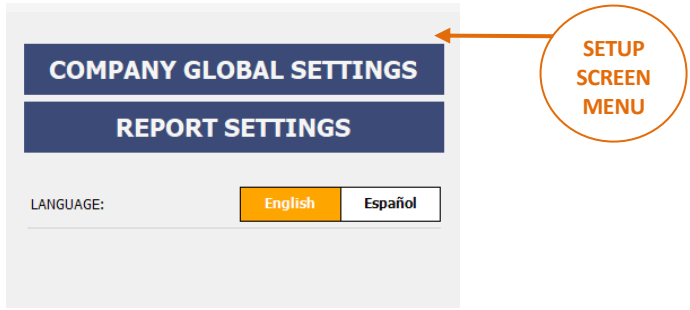
With this action, you can import or display a test from an "*.EBD" file. These are test files generated with a PMR-700-TR or PME-600-T device.

Importing a test allows it to be executed again with the same configuration as it was created. It is executed as a TIME test.

Configuration

SETTINGS

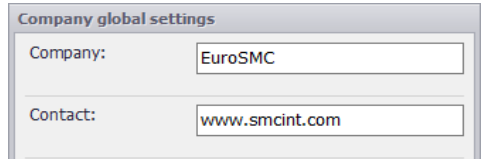
This option opens the configuration window, where the user can assign different parameters related to the application interface and user data responsible for conducting the tests. In this screen, no parameters related to the tests themselves are configured.



Global company settings

COMPANY GLOBAL SETTINGS

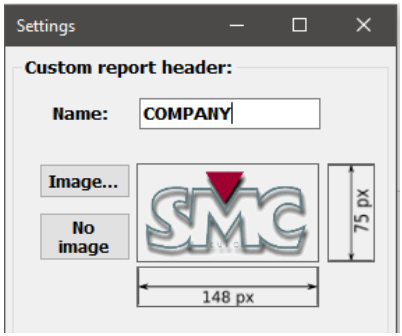
Before using your equipment for the first time, you can personalize it by entering various parameters. By clicking on this button, you can configure the parameters of your company (name and contact). These fields are useful for being able to contact the person responsible for the tests in the future. They are free text fields, and you can write whatever you want in them. This information will appear at the top of the test results report.



Report header settings.

REPORT SETTINGS

By clicking on this button, you can configure the information that appears in the report header. It includes a free text field and an image (logo) of your choice.

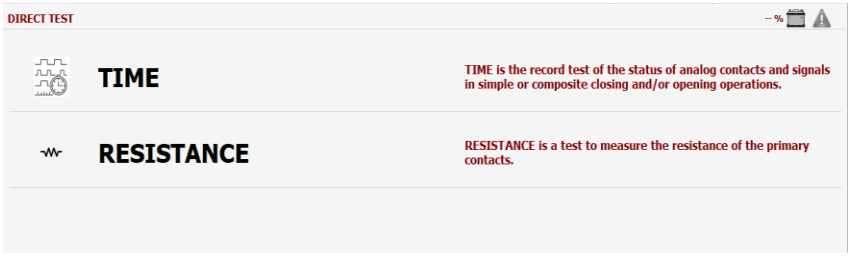


Direct Test.

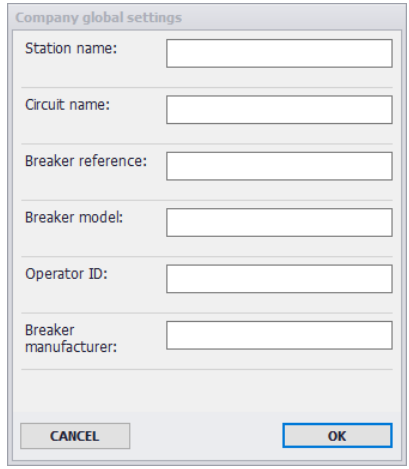
DIRECT TEST

By clicking on this button, you will access the test selection screen and some additional options. In the initial version of the Breaker Analyzer Control program, there are only two types of tests available: TIME and RESISTANCE.

In future versions, new types of tests will be added.



Before selecting the test to execute, you can establish the information that identifies the breaker you are going to test: Station Name, Circuit Name, Breaker Reference, Breaker Manufacturer, etc. To do this, click on the button located at the bottom left of this screen.



Fill in these fields before conducting the tests to ensure that the reports are properly identified. Once the information in the fields has been completed, click "OK." This information will be stored for future tests.

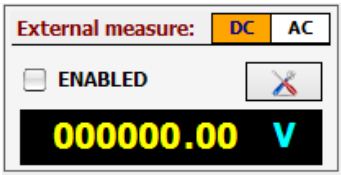
ANALOG/DIGITAL MEASUREMENT AUXILIARY INPUT

The equipment can be used to measure two types of external quantities through the analog/digital measurement auxiliary input.

Analog Input

AC/DC analog inputs (Low range: between 0 and 1.2V, High range: between 0V and 5.6V). These quantities are typically generated by transducers and sensors of different types such as energy meters and Rogowski coils. The measurement is performed through the appropriate input labeled as Ana./Digi. Inputs on the connection panel.

Digital Input.

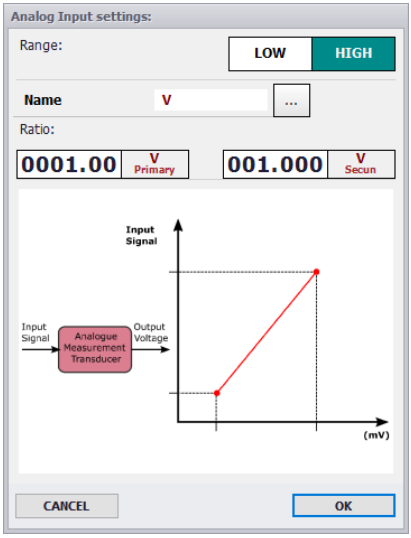


At the top of the test execution screen, you will find the external measurement control. This control is only used for analog measurements and does not allow selecting digital measurements.

You can select between DC or AC measurement and enable or disable the measurement. Enabling the measurement in this control can be done at any time, as long as a test is not running. If a test is initiated, the measurement will be deactivated.

By clicking on the configuration button, you can access the window for selecting various parameters of the meter.

- *Range selection: Choose between high range or low range. Refer to the technical specification for the maximum values of each range.*
- *Measurement unit: You can select from V, mV, A, mA, or a custom unit.*
- *Transformation ratio: If you connect a measuring transducer, you can assign the ratio of the device.*

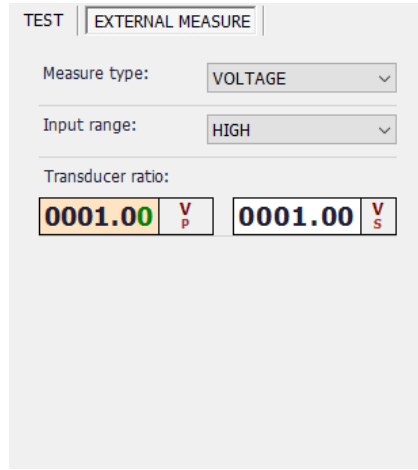


External Measurement Configuration for a Test

Click on the configuration button located at the bottom left of the screen to access the test configuration. Click on External Measurement. The following window will appear.

You can select from Traveling, Voltage, Current, or No measurement.

- Traveling: Allows digital or analog measurement. You can select the type of transducer (angular or linear) and the type of encoder (analog or digital).
- Voltage/Current: Allows analog measurement. You can select the range of measurement (low or high) and the ratio of the connected transducer.
- None: No measurements are captured through this input.

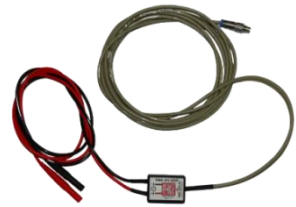


Optional Accessories.

PME-BV-ADP

The voltage measurement accessory. It is connected to the analog/digital measurement auxiliary input.

- Transformation ratio: 85V/1V.



PME-BC-ADP

The current measurement accessory. It is connected to the analog/digital measurement auxiliary input. It has two sensitivities:

- 100mV/A (clamp) - 10A/1V (transformation ratio).
- 10mV/A (clamp) - 100A/1V (transformation ratio).

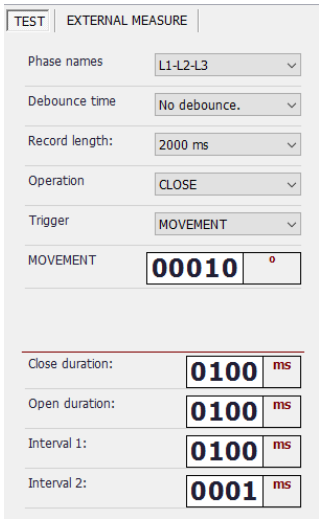
Time Test

Select the type of test to be performed, TIME or RESISTANCE.

The image shows the screen for executing the time test. At the bottom of the screen, there are action buttons for this test.

Test setting.

By clicking this button, the configuration window will be displayed. Here, you can select the type of test you want to perform and some additional options.



OPERATION: Here, you can select one of the simple or combined sequences that can be tested: Opening (O), Closing (C), Opening-Closing (O-C), Closing-Opening (C-O), Opening-Closing-Opening (O-C-O), and Closing-Opening-Closing (C-O-C).

DURATION: Here, you set the maximum duration in milliseconds for the opening and closing commands, and optionally, the pauses between them. It's important to note that the specified duration will be interrupted if the equipment detects that at least one pole has changed state. The test will then continue with the next pause and the next programmed command, if any.

TRIGGER: Here, you can choose the event that will trigger the entire testing process. Please note that this field should not be confused with the concept of triggering or opening the switch. Here are the available options (events):

- OPERATION: This is the most common option. In this case, pressing the START/STOP button will start the timer, execute the first programmed command, and record data. Refer to the section "Performing the Test" for more details.
- AUX1 (ON) or AUX2 (ON): If one of these events is selected, when the operator presses the START/STOP button, the equipment will wait for a positive change in the corresponding auxiliary input 1 or 2. A positive change can be the closure of a dry contact or the appearance of a voltage.
- AUX1 (OFF) or AUX2 (OFF): If one of these events is selected, when the operator presses the START/STOP button, the equipment will wait for a negative change in the corresponding auxiliary input 1 or 2. A negative change can be the opening of a dry contact or the disappearance of a voltage.

  The test start is often conditioned by one of these auxiliary inputs when the working conditions do not allow the maneuver to be executed from the equipment or when we want to reference the operating times to a different origin than the first programmed command.

- DELAYED: This option allows for the analysis of maneuvers with a duration longer than 2 seconds, such as the closure of a switch-disconnector assembly. After sending the first coil command, data capture will begin when:
    - A change is detected at any main contact ("MAIN CNT")
    - A change is detected at any auxiliary contact ("AUX CNT")
    - A change is detected at any contact ("ANY CNT")
    - The time specified in the TRIG. DELAY parameter (see below) is elapsed ("TIME")
- MOVEMENT: If this event is selected, when the operator presses the START/STOP button, the equipment will wait for a displacement of the number of degrees or millimeters according to the configuration of the *"Movement"* parameter to occur. Selecting this type of trigger will involve configuring the *traveling* within the *"External Measure."*

The maximum waiting time in any of the cases will be 18 seconds.

MOVEMENT: This option sets the minimum movement (in degrees or millimeters) required to trigger the start of the test.

RECORD LENGTH: This parameter determines the scale of the result graph. Although the analysis duration is always 2,000 milliseconds, and the size of the graph is always the same, here we can specify how many milliseconds from the start of the analysis we want to be represented in that graph. It is equivalent to the display distance: the smaller it is, the more detailed the graph will be. We can choose between 200, 400, 800, 1600, or 2000 milliseconds. We can modify this parameter and reprint the test without having to repeat it. However, the data recording will be truncated to the specified duration when saving the test in non-volatile memory for later reuse or sending to the computer.

DEBOUNCE TIME: This value determines the minimum duration in milliseconds that a state (open, closed, pre-insertion) must have to appear in the time list. It is used to filter out momentary states, typically due to contact bounce or transitions, that saturate the numerical list of results and make it difficult to calculate the net actuation times. You can choose between 0, 0.5, 1, and 2 ms to determine the minimum duration of a valid state. This filter, which is usually set to 0.5 milliseconds, only affects

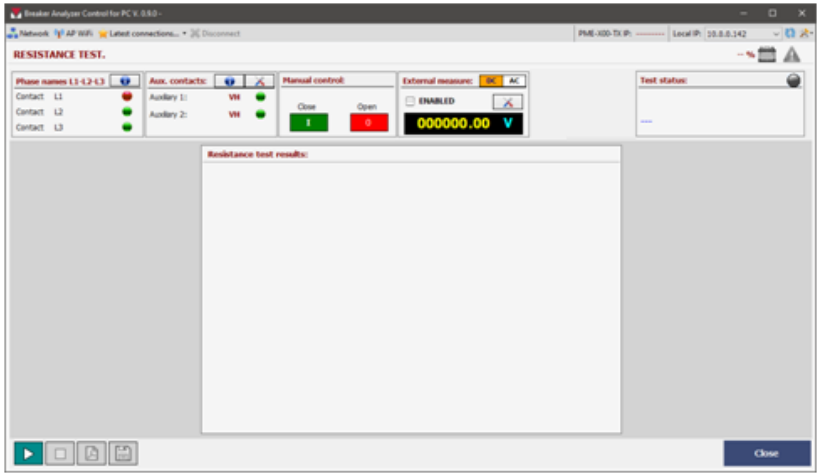
the numerical list of times and not the graphical representation, where all distinguishable states are captured at the sampling frequency of the equipment.

TRIGGER DELAY: This value determines the delay in seconds that will be applied from the execution of the first programmed maneuver until the information capture begins, provided that the DELAYED...TIME option is selected in the DISPARO parameter. It can be adjusted between 0.1 and 18 seconds in steps of 0.1 seconds.

Test for contact resistance measurement. (only PME-700-TR)

The contact resistance measurement is a separate process that you can perform as long as the switch is closed and you have made the appropriate connections as described at the beginning of this guide. The resistance values measured at the three poles will be added to the set of results from the last time test performed.

Select the type of test to perform, TIME or RESISTANCE.



To perform this measurement, click on the START button located at the bottom of the window.

If you try to perform the resistance measurement with the switch in the open position or with any cables poorly connected, you will receive error messages instead of resistance values.

When performing the measurement using the 4-wire method, and thanks to the programming of its microprocessor, the PME-700-TR ensures the reliability of the measurement result. When the measurement conditions are inadequate (poor contact, discharged battery, incorrect connection, etc.), the system always responds with an error message, never with an incorrect resistance measurement.

TEST EXECUTION

Time and Coil Current Analysis

The time analysis involves recording what happens inside the switch in terms of:

- Changes in the position of the Main Contacts.
- Changes in the position of the Auxiliary Contacts.
- Evolution of the control current in the coils.

During this analysis, which lasts 2 seconds, the equipment collects 20,000 samples of the state of each contact and 2,000 values of current in each coil. With 2 seconds, the opening-closing-opening sequence of any switch is more than adequately covered.

Within the 2-second duration of the acquisition, the initials 100 ms are allocated to the pre-trigger recording *(PreTrigger "PT")*. This allows an analysis of different measurements before the trigger. The 100 ms of PreTrigger data are acquired for all configured Trigger sources except for *"OPERATION"*.

Before operating a power switch, notify the people around you to prevent surprises and possible accidents.

Once the equipment is connected and the test is programmed correctly, the analysis process essentially consists of pressing the START button.

During a brief moment, the equipment will clear the memory, initialize the counters, and check the initial state of the switch contacts. Then, the process will continue as follows:

a) If OPERATION was set as the trigger event for the test, the programmed sequence will be triggered immediately.

b) If the test start was conditioned to an event on any of the AUX inputs, the equipment will wait for the specified event on that input, and the message "Status: Waiting for Trigger" will be displayed.

If desired, you can abort the process now by pressing the STOP button.

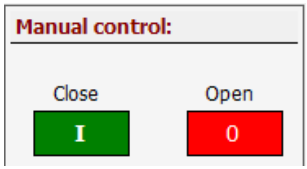
c) If the DELAYED... option was chosen for the Trigger parameter in the configuration menu, the programmed maneuver will start immediately, but no information will be recorded until a change is detected in the specified contacts or the time specified in Delay Disp: has elapsed, as applicable.

In either case, the system's timer will start exactly when the first opening or closing command is sent to the switch.

At the end, the message "Test Finished" should appear. If the contacts are not in their expected position at the end of the test, the message "Test Failed" will appear instead.

Before starting the test, verify the initial position of the switch. If, for example, the test sequence starts with a closing command, you should first open the switch if necessary. Or close it if the first command is for opening.

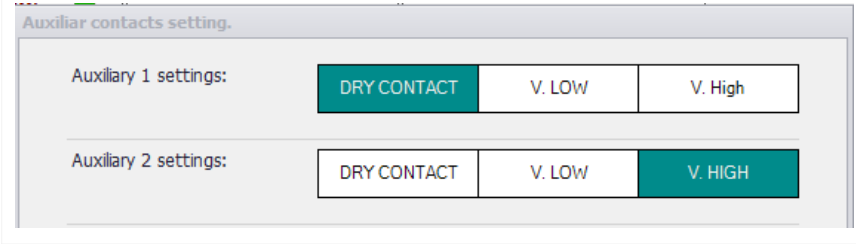
If you have connected the equipment to the coil circuits and have auxiliary power, you can conveniently do this by using the corresponding manual operation buttons: "OPEN" or "CLOSE." These buttons are located on the same TEST screen.



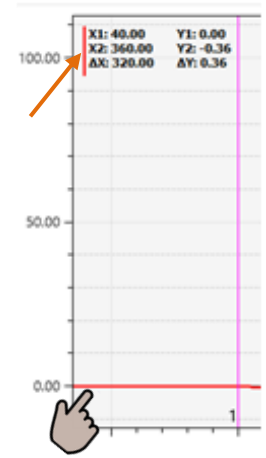
If the switch is open and you initiate a test that starts with a close command, you will receive the message "Status: Incorrect Switch." In this case, close the switch and retry the test. Please note that the equipment does not record times or currents when the switch is operated using these manual operation buttons.

Furthermore, if you are using the auxiliary inputs, use the configuration button for the auxiliary inputs to determine the type of detection (dry contact, low voltage, high voltage) required..

For example, if you have the auxiliary input 2 connected to a low voltage point of 24 Vdc, press the configuration button and in the popup window, select V. HIGH for auxiliary contact 2.



Pressing this button enables or disables the measurement cursors on the graph for measuring quantities. To take measurements, you need to select the curve you want to measure by clicking on it. It will be highlighted with a thick line, and the results will be associated with the color of the trace. The measurements will reference the selected graph.



ERROR AND STATUS MESSAGES

The equipment displays these messages in the upper right area of the TEST screen (Test status).

Here is a list of possible status and error messages that may appear during the test execution:

Error During Test: An error has occurred during the test. Repeat the test.

Switch Incorrect: The initial position of the main contacts make the first test command execution impossible.

Test In Progress: This message is displayed during the execution of the operation sequence.

Test Done: Test successfully completed (this does not mean a good breaker's condition).

Test Aborted: The user has pressed the START/STOP button a second time.

Switch Close: Circuit breaker closed.

Switch Open: Circuit breaker open

Waiting Trigger: Waiting for the specified trigger event to occur at the selected auxiliary input.

Switch Cooling: Equipment's Internal switchgear is cooling down (test temporarily not allowed).

Switch Open Ovld: When current through the trip coil control circuit reaches 53 Adc a protective mechanism will automatically cut off.

Switch Close Ovld: When current through the close coil control circuit reaches 53 Adc a protective mechanism will automatically cut off.

Aux1 (2) Overload: Auxiliary input will switch to voltage mode whenever any significant voltage is detected.

TEST RESULTS

Test results are displayed and printed in graphical and alphanumerical representation. Numerical data include peak current measured at both coils, chronological list of position changes in main and auxiliary inputs and the contact resistance values for the three poles if measured. If you have selected the DELAYED option in the Trigger menu, the event that determines the beginning of the data capture or the TRIG. DELAY time value will also be displayed. Chronographic drawing of contact changes and coil current evolution compose the graphic section of the test results.

Total elapsed time values, rather than partial times, are displayed in the results report. Time origin is when first command in the programmed sequence is issued to the corresponding coil.

The printed version of the graphics area shows the chronological evolution of operation coils currents in a separate time/current grid, and a 5-stroke contact chronogram at the bottom. A solid black stroke indicates CLOSED contact. For main (1, 2 and 3) contacts, an intermediate, half-width stroke indicates the actuation of pre-insertion resistors:

	Abierto (precedido en el listado por la letra “O”)
	Cerrado (precedido en el listado por la letra “C”)
	Pre-inserción (precedido en el listado por la letra “R”)

For auxiliary inputs only full and empty strokes are used, which corresponds to closed contact / voltage on and open contact / voltage off, depending on the detection mode used.

The printed report includes a header with date, breaker’s identification, test setup parameters and graphics scale.

Printing the test report

Once the test is completed, the results are displayed. On the test screen, if the test includes graphical visualization, the graph control is shown with the time variation of different magnitudes. The numerical results can be viewed by pressing the RESULTS button at the bottom of the screen.

If there is no graphical visualization available, the test results are displayed on the test screen.

To generate the test report with the test result, you need to click on the report button located at the bottom of the screen.

This will generate a preview of the report, and then you can save the document in the file system using the chosen standard format.

Save performed tests

To be able to store the conducted tests, it is necessary to have an open report database file. Once you have done that, click on the save button located at the bottom of the screen.

BUS PME CONNECTORS

Communication port for use with possible options compatible with BUS-PME.

USB-B CONNECTOR

General-purpose communication port.

USB-A CONNECTOR

Communication port used for firmware updates of the equipment.

Firmware Update.

The update can be performed without the *Breaker Analyzer Control* application being connected to the equipment. It will be done using a USB disk that contains the file with the new firmware, connected to the USB-A connector of the equipment. Follow these steps from a computer to execute the update:

1) Open the *BreakerAnalyzerControl* application.

2) Connect a USB disk to an available USB-A port on the computer where the application is running.

3) Click on the *"Firmware Update"* button located at the top right corner of the application window.

4) A list of detected USB disks will be displayed. The disks should be formatted in FAT32. If you want to refresh the list, you can click *"Refresh"*. The new disk should appear in the list.

5) Once you have selected the desired disk, click the *"COPY"* button. The firmware file from the application will be copied to the root directory of the USB disk.

6) Safely remove the USB disk from the computer and connect it to the USB-A connector of the equipment

It is not necessary for the *Breaker Analyzer Control* application to be connected to the equipment to perform the update.

7) Once the USB drive is connected to the computer, turn it on. Keep the *COM, RESET, and ON/OFF* buttons pressed. While holding down the *COM and ON/OFF* buttons, release the *RESET* button. The blue LED will blink more rapidly. Release the *COM and ON/OFF* buttons. When the update process is complete, the device will power off.

8) If everything has been done correctly, the communications status Indicator (blue) will blink rapidly, indicating that the update is in progress. Once it is finished, the equipment will restart automatically.

THE RECHARGEABLE BATTERY (PME-700-TR ONLY)

The internal 12 Vdc battery is automatically recharged when the PME-700-TR equipment is connected to the power supply. If the equipment is connected to the Breaker Analyzer Control application, the battery icon is displayed in the upper right corner of the screen, providing an approximate indication of the battery's charge status.

Always recharge the batteries with the equipment turned off. If the battery appears to be discharging too quickly, follow the procedure described in the "Troubleshooting" section.

TECHNICAL SPECIFICATIONS

Input channels

Main contacts	
Number of inputs:	3 + Common (ground)
Open circuit voltage:	10 V Dc maximum
Test current	100 mA maximum
Detected states:	Closed (C) (r < 30 Ω) Pre-insertion (R) (30 Ω < r < 10 kΩ) Open (O) (r > 10 kΩ)
Auxiliary inputs	
Number of inputs:	2 Fully isolated binary inputs.
Contact detection	Open circuit voltage: 5 Vdc. Test current: maximum 20 mA.
Voltage detection	De ±1.5 a ±375 Vpk (265 Vdc/ac) in two ranges: Low level (Lower threshold): ± 1.5 Vdc High level Upper threshold): ± 15 Vdc

Simple and combined maneuvers

Programmable sequences:	Close (C)
	Open (O)
	Close - Open (C – O)
	Open - Close (O – C)
	Close – Open - Close (C – O – C)
	Open - Close – Open (O –C – O)

Test start and time origin	
Selectable between:	Coil actuation
	Auxiliary input 1 ON or OFF
	Auxiliary input 2 ON or OFF
	Change in any contact
	Delay up to 18.0 seconds
Programmable duration of commands	
Close, Trip, Pause 1, Pause 2	From 10 to 2000 ms in 10 ms increments.

Measurement

Time measurement	
Graphical window:	100, 200, 400, 800, 1600 o 2000 ms
Time resolution:	± 0.1 ms (Sampling frequency 10 kHz)
Time accuracy:	± 0.05 % ± 0.1 ms
Current measurement	
Range:	0 – 50 A pk
Resolution:	0.1 A
Sampling frequency:	1 kHz
Accuracy:	1% of the range ± 125 mA
Contact resistance measurement	
Range:	Auto-ranging in decades: 100.0 μΩ <–> 1Ω
Maximum resolution:	0.1 μΩ
Accuracy::	± 1% of the range ± 1 dígito
Test current:	10 A dc maximum

Voltage measurements (multi-function input)	
Ranges:	0-0.85Vac,0-4Vac, 0-1.2Vcc,0-5.6Vcc
Resolution:	0,6mV / 2,78mV
Accuracy:	± 1.2% of the range
Time resolution:	± 0.1 ms (sampling frequency 10 kHz)
Digital mode:	0 - +5.5 Vcc TTL / Maximum frequency: 90 kHz

TROUBLESHOOTING

Here are described the symptoms, causes, and solutions for problems that may occur in the equipment and can be repaired by the user. Problems arising from incorrect use are not included here.

Access to the internal assembly.

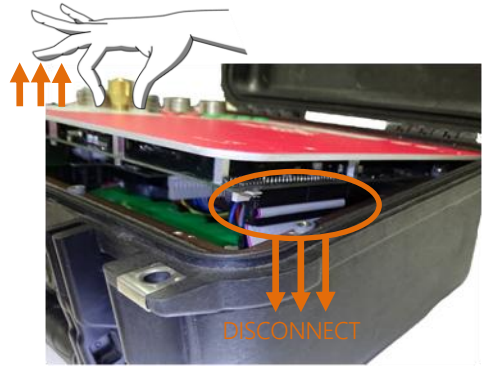
It contains fuses and connections that may need to be manipulated to resolve some faults. None of these interventions require disassembling the internal components, as that operation is reserved for EuroSMC and authorized services.

To uncover and access the internal assembly of the equipment, it is necessary to remove the front panel.

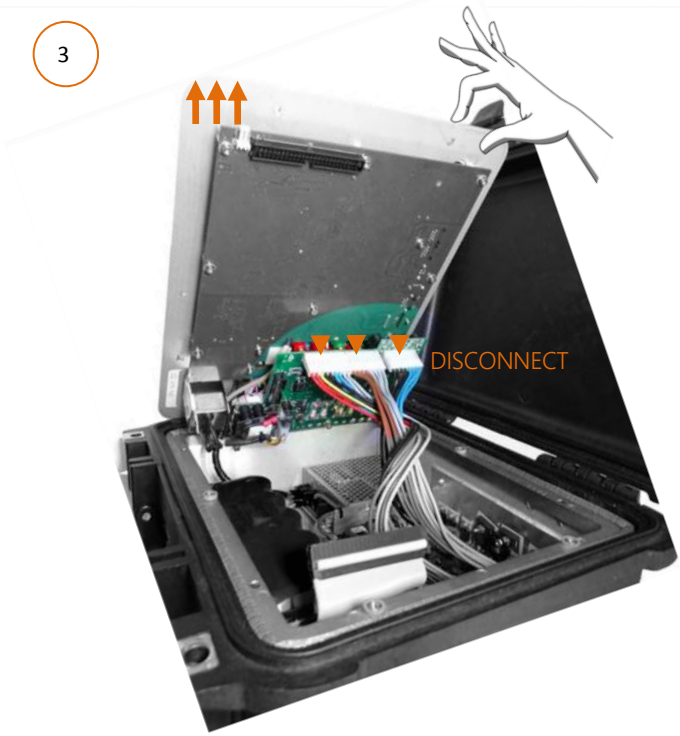
Keep the equipment disconnected from the power supply whenever the front panel is open.

1

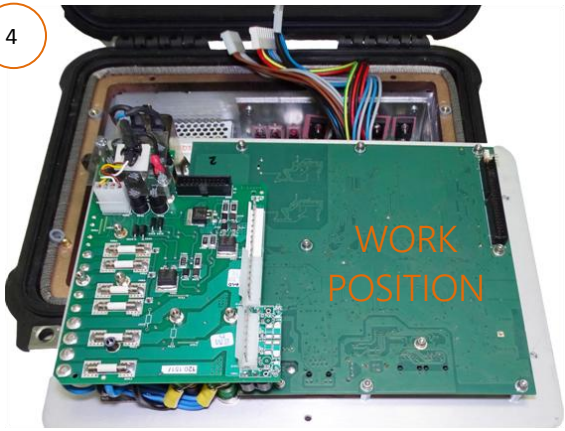
2



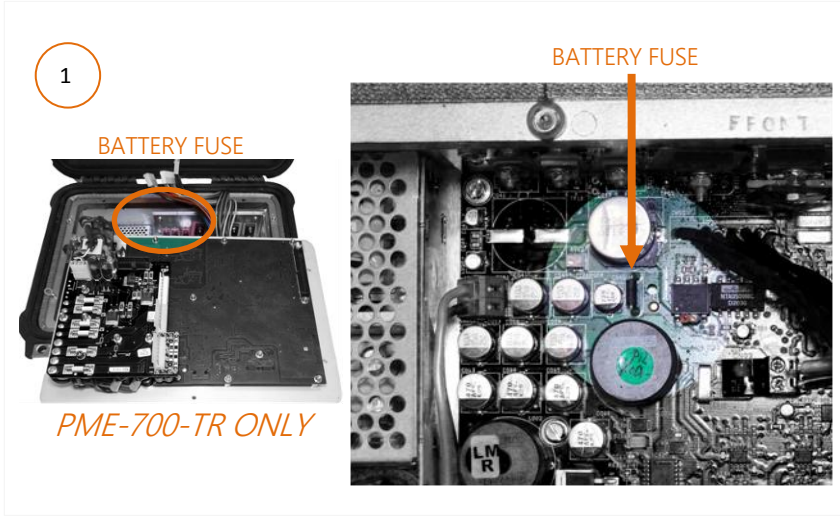
3

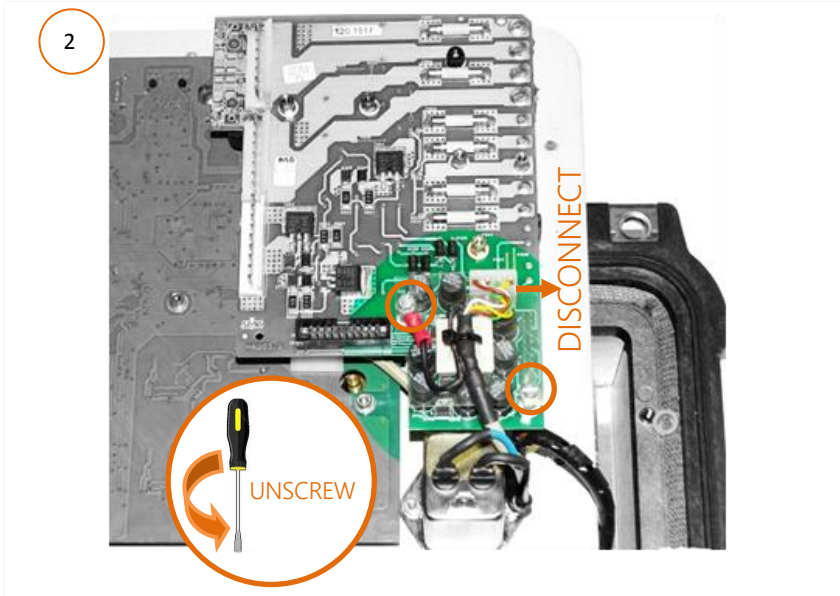


4

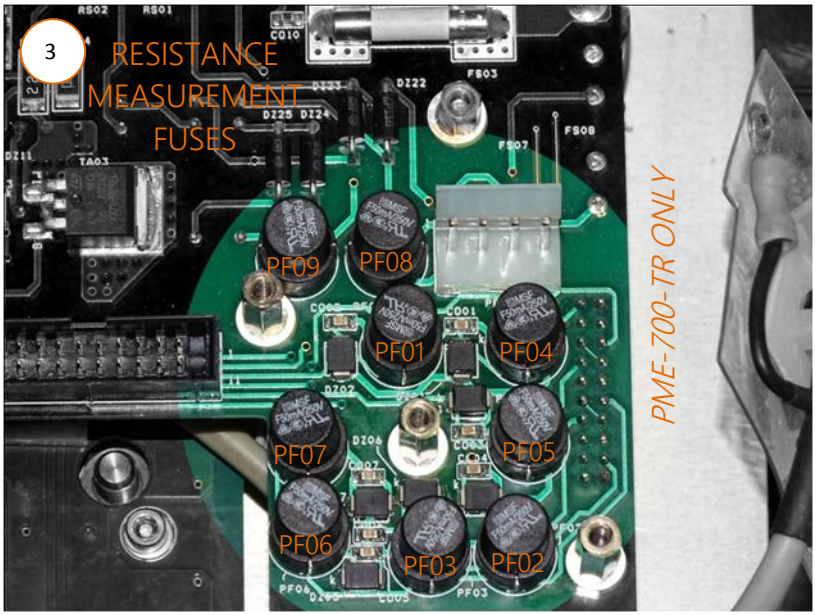


Fuse location.

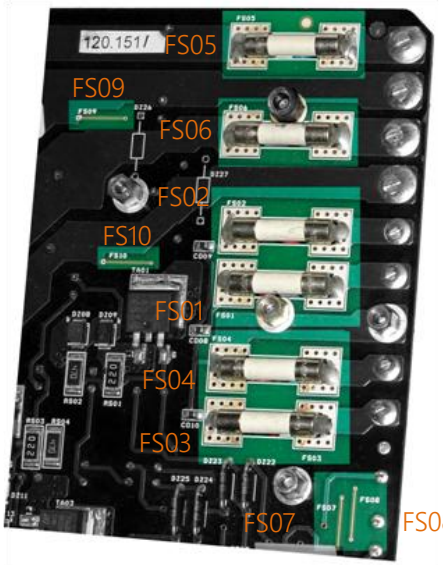




3 RESISTANCE MEASUREMENT FUSES



4 EQUIPMENT CONTACTS FUSES



Status Screen.

The status screen provides useful information for diagnosing and troubleshooting equipment issues. To access it, open the *MAINTENANCE* menu and then click on *CHECK HARDWARE.*

I. BAT.	Battery Current: Positive - Charging, Negative - Discharging
V. BAT.	Battery Voltage: Normal range is between 12 and 14 volts
Actual capacity	Battery Charging Capacity: Normal:
Util capacity	Battery Useful Capacity: Not specified
TH. AMB.	Internal Equipment Temperature: Measured temperature inside the equipment
+3V3	Internal Voltage Measurement: Approximately 3.3 V
+5V	Internal Voltage Measurement: Approximately 5 V
+3V3CHG	Internal Voltage Measurement: Approximately 3.3 V
+5VCHG	Internal Voltage Measurement: Approximately 5 V
+5VBUS	Internal Voltage Measurement: Approximately 5 V
FREESNS	Unused Value: Not currently in use

Faults, Causes, and Solutions.

Symptom	Possible cause	Solution
The unit will not power up	Exhaust battery	Connect to an AC supply and/or recharge for 48 h.
	Main supply fuses L or N possibly blown (see the diagram)	Replace the blown fuse(s)
Poor battery performance	Battery partially charged	Charge for 48 h.

The battery doesn't come to any charge	10 A battery fuse blown (see the diagram). Disconnect the battery terminals and check.	Replace the blown fuse.
The unit cannot be switched off	Hang microprocessor	RESET (see procedure #3 below)
Close or open commands are not executed by the breaker	Command duration is set to zero or too short	Set a valid duration (see procedure #4 below)
	Blown + (FS05, FS06 – 16 A slow) or GROUND (FS09, FS10 BTF) close or trip fuses (see the diagram)	Replace the blown fuse(s) or repair (BTF)
"Switch incorrect" message upon start of test	Inconsistent initial breaker's position	Close or open to match the first command in sequence
	Both sides of breaker are grounded	Disconnect from ground the side with the red terminals
No time recordings for one or two breaker's main contacts	Channel protection fuses FS01, FS02 or FS03 (4 A slow) blown (see the diagram)	Replace the blown fuse(s)
No time recordings for any main contacts	Common main contact fuses (FS04, 5 A slow) blown (see the diagram)	Replace the blown fuse(s)
Resistance value too big	Dirty, defective or misaligned contacts	Submit the breaker to maintenance
	"R" and "C" terminals in wrong position	Refer to the *connections* section

No resistance measure-ment from one or two main contacts	~~~ message displayed or printed	Unable to perform a reliable resistance reading	Check for loose connections
	Vsns? message displayed or printed	50 mA FAST fuses for channel 1 (PF01 or PF04), channel 2 (PF02, PF05) or channel 3 (PF03, PF06) (see the diagram)	Replace the blown fuse(s)
	R>>> message displayed or printed (Time will not be recorded either)	Channel protection fuses FS01, FS02 or FS03 (4 A slow) blown (see the diagram)	
No resistance measure-ment from any main contacts	Vsns? message displayed or printed	Common 50 mA FAST PF07 fuse blown (see the diagram)	Replace the blown fuse(s)
	R>>> message displayed or printed	Common main contact fuses (FS04, 5 A slow) blown (see the diagram) or battery too low.	Replace the blown fuse(s) or fully recharge the battery
AUX1 or AUX2 record no event		+ (PF08, PF09 – 50 mA FAST) or GROUND (FS07, FS08 BTF) aux input fuses (see the diagram)	Replace the blown fuse(s) or repair (BTF)

	Check your connections and repeat the test before suspecting of a blown fuse. A broken cable or open contact in the circuit breaker can produce the same symptoms as a blown fuse.
	Use only fuses with the same rate and type as the ones replaced. Failure to do this may invalidate the warranty.

Duration of Close and Open Commands.

If the duration of the coil commands is set to 0 milliseconds, it may appear that the equipment is not functioning properly or there is a loose cable. If you notice that the tested switch does not respond to the close or open commands, first check the settings for these durations in the equipment:

1) Press the configuration button in the test settings.
2) Select the control whose duration you want to adjust (CLOSE, OPEN, INTERVAL 1, or INTERVAL 2). The current value will be highlighted.
3) Increase or decrease the duration (in milliseconds).
4) Repeat the steps to adjust the duration of the other commands. Press OK to confirm the selected value.

Battery Troubleshooting (PME-700-TR only).

If you are unable to power on your PME-700-TR without a mains connection or if it shuts off immediately, let it charge for 48 hours.

The PME-700-TR electronically controls the battery charging process and has an indicator that provides an approximate idea of the available charge level. When the equipment is left unused for a long time, this indicator, which appears on the screen during the charging process or when the equipment is used without a mains connection, becomes inaccurate. However, it can be reset as follows:

1) Turn off the equipment and connect it to the mains. The battery will enter rapid charging mode, indicated by a flashing symbol in the upper right corner of the screen. When the battery reaches a certain voltage value, the equipment enters slow charging mode, and the symbol disappears. Do not disconnect the equipment. Let it charge for 16 to 48 hours, depending on the current charge level.
2) Disconnect the power supply from the equipment and leave it turned on until the battery is completely drained, and the equipment shuts off. This process may take about 6 hours. Do not use the screen backlighting to accelerate the discharge process. When the equipment shuts off, the charge indicator will have regained its accuracy. Proceed to perform a full 48-hour charge before using the equipment again.

IMPORTANT