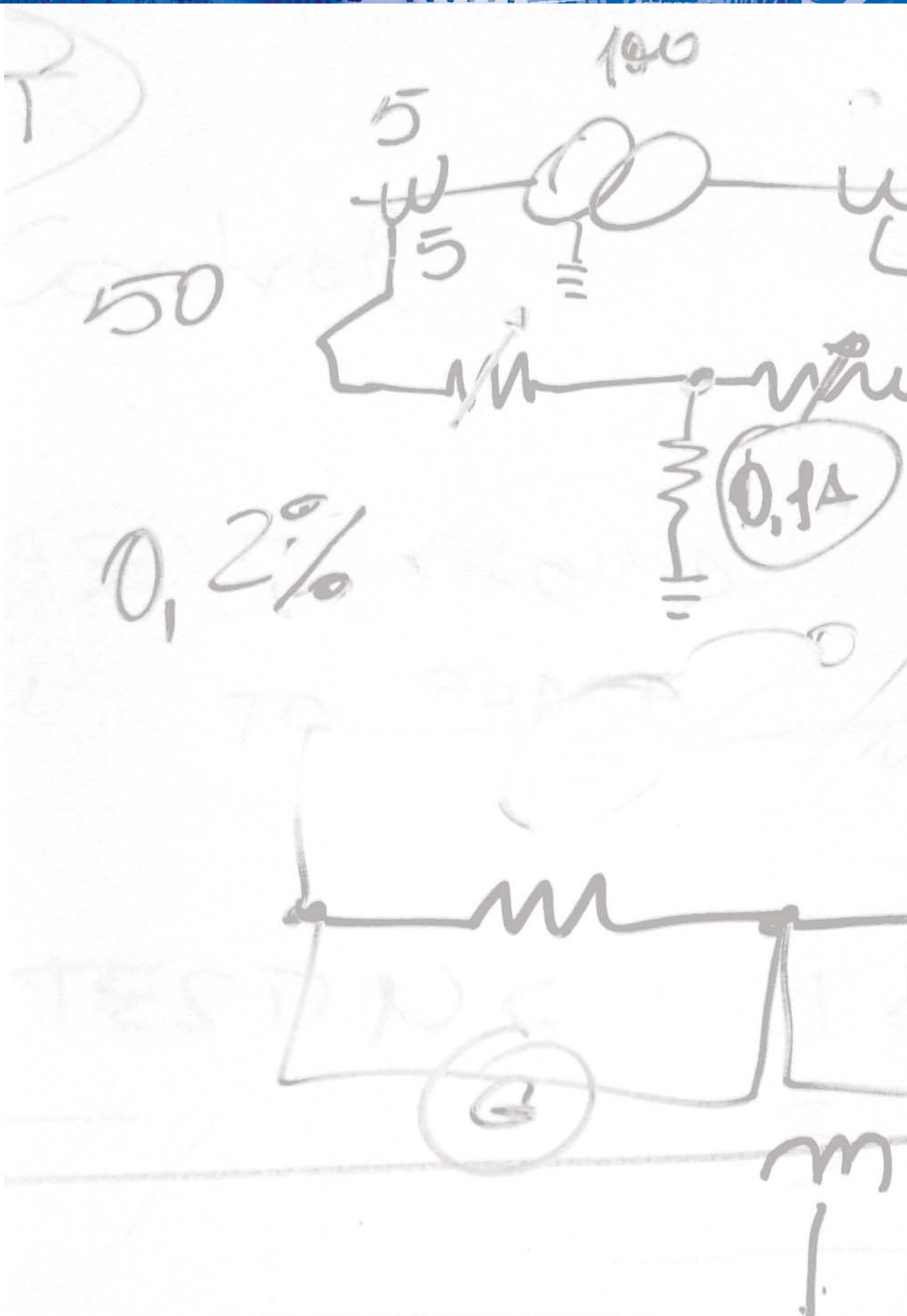
# ELECTRICAL TEST EQUIPMENT FOR SUBSTATION AND PROTECTION RELAY TESTING

## SHORT FORM CATALOG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EuroSMC is proud to present in this catalog the widest range of products that exist on the market for electrical test equipment in relay testing and for substations maintenance in applications for generation, distribution, transmission and industry.

The **Quality** is the and foundations of our company in all aspects and in all our company departments; R & D, production, sales, and after sales support.

Quality in **Design**, guaranties that our equipment meets the demands that we impose and what our customers expect.

Quality in **Products**, is obtained by taking care of the details during the entire production process and by selecting the best material and components that are used in the equipment.

A maximum **compliance** in the design of our products meets the needs of customers and users worldwide.

All our products are **Flexible** in their use, as we incorporate a very intuitive manual control along with software control. EuroSMC offers a range of products that meet the application required, which is reflected by our satisfied customers who use our products.

# INDEX

# SECONDARY INJECTION

The secondary injection equipment for relay testing has been the main activity of EuroSMC. For this reason, the extensive range of products comes from the experience obtained during the past 20 years.

Our tradition in the design and manufacturing of this type of equipment has enabled us to have complete range of equipment with different philosophies for the various applications and customers who use relay test equipment.

The **PTE-100-C** is single phase test set based on variac output regulation. The outstanding difference is; the smallest, lightest, highest power and easiest to use equipment of its kind on the market. Its versatility is an essential tool for common relay tests.

The **PTE electronic** range of equipment is designed to serve the majority of relay applications and can be combined with other equipment to expand the applications. These portable, robust, equipment have electronic generated outputs and are a favorite with service companies, along with the distribution and generation departments of the Utilities as they are adapted and designed to meet their requirements. The characteristics and the functionality of this range of products are not found anywhere else. Other unique benefit is the high power, both in current and voltage, being able to test all types of relays, including electromechanical relays. The reversibility in all output channels (current/voltage) and the external reference input, enables this range to work with other equipment, including all other brands on the market, being the most flexible test systems that can be found.

The **MENTOR** incorporates the latest designs and concepts in test equipment, based on leading edge technology. This revolutionary product, the most modern equipment of its class, fulfills the requirements of the transmission departments and for the commissioning of new installations. Unlike any other test equipment, both in power and features, the MENTOR can have up to two, three phase systems in one unit, with all logical inputs and outputs required when testing protection relays. This equipment continues the tradition of EuroSMC in designing the most complete equipment with sufficient and reversible power, along with independent output channels. The ability to upgrade the equipment with plug and play additions makes the MENTOR the most advance equipment on the market.

# PTE-100-C

**Current and voltage relay testing unit to 250A**

## APPLICATIONS

- Testing of single phase Current or Voltage Electromechanical and Electronic Relays.
- Current Transformer Test.
- Thermal Relays.
- Measurement of different parameters such as Power, Phase Angle, Impedance, etc.

## MAIN FEATURES

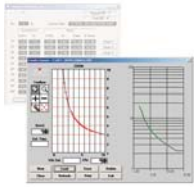
- Current output up to 250 A in 4 ranges.
- AC voltage output from 0 to 250 V (4 A).
- DC voltage output from 0 to 350 V (2.8 A).
- Auxiliary DC power supply up to 250 V.
- Built-in timer, 1ms resolution.
- Output power: 1000 VA.
- Electronic protection in all outputs.
- Special control functions.
- Special measurement functions.
- Case: IP-65.
- Dimensions: 200 x 300 x 200 mm / 13.5 kg.
  8 x 12 x 8 in / 30 lb.

PTE-FCC

PTE-FCE

PTE-FCN

PTE-FCB



PTE-OCT

## OPTIONS

### PTE-FCC

Load Option

**Applications**

- Increase load value.
- Improves current regulation.
- Improves output distortion.
- Obtain different angle values up to ±90°, enabling to test directional relays.

**Main Features**

- Resisters: 0.5, 1, 2, 25, 50, and 100 ohms.
- Mounted in top cover.

### PTE-FCL / PTE-FCN

Variable Voltage, Frequency and Phase Shifter Option

**Applications**

- Relay test which require variable frequency and phase angle.
- Can be used with any existing PTE-100-C.

**Main Features**

- AC voltage output to 140 V.
- Frequency output from 40-70 Hz.
- Variable phase angle 0-360°.
- Easily mounted in the top cover.
- Built-in LCD display (PTE-FCN).

### PTE-FCB

To test MCB's up to 250 A. Mounted in the cover of the PTE-100-C enables field testing of MCB's of one more poles.

### PTE-FCE

External Timer

**Applications**

- Starts timer with external contacts, (NO) normally open/(NC) normally closed.

**Main Features**

- Connected directly to monitor taps.
- Easily mounted and transported inside the unit.

### PTE-OCT

Overcurrent relay test software

**Applications**

- Software performs tests for overcurrent relays.
- Generates test reports.

**Main Features**

- The test is directed by software, including the test current values.
- The test values and test sequence is autmatically transmitted to the equipment.
- Results in MS Excel and can be compared to a timing curve.

Consult the software section (page 15) for more information.

# PTE-100-C Plus

**Single Phase Relay testing unit**

The PTE-100-C Plus can test all single phase relays, electromechanical to digital.

## APPLICATIONS

- Single-phase testing of relays:
  - · Definite and inverse time overcurrent.
  - · Min/max AC / DC voltage.
  - · Directional overcurrent.
  - · Frequency.
  - · Distance.
  - · Synchronizing.
  - · Directional power.
  - · Loss of Field.
  - · Reverse Phase.
  - · Negative sequence overcurrent.
  - · Reverse phase / voltage.
  - · Thermal.
  - · Power factor.
  - · Overvoltage.
  - · Earth detection.
  - · Phase angle, Out of Step.
  - · AC / DC reclosing.
  - · Directional voltage.
  - · Directional voltage and power.
- Moulded Case Breakers (MCB, MCCB) testing.
- CT Knee-point analysis and many other accurate electrical measurements.
- Three-phase testing when combined with other PTE-range equipment.

## MAIN FEATURES

- Selectable power outputs:
  - · Variable AC current output up to 0-250 A.
  - · Variable AC voltage output up to 0-250 V.
  - · Variable DC voltage output up to 0-350 V.
- Variable auxiliary voltage supply 0-250 V DC.
- Variable AC voltage 0-140 V.
- Variable Frequency 40-70 Hz.
- Variable Phase Angle 0-360°.
- Isolated and electronically protected outputs.
- 1ms resolution chronometer.
- External and internal signal measurement: voltmeter, ammeter, frequency meter, power meter, impedance meter and phase meter.
- Elapsed injection time limit control.
- Maximum current output limit control.
- Output current preset function.
- RS-232 communications port.
- Interconnection with EuroSMC exclusive PTE-BUS.
- Case: IP-65.
- Dimensions:
  - · 200 x 300 x 200 mm / 15.5 kg.
  - · 8 x 12 x 8 in / 35 lb.

# PTE-100-C Pro

**Single Phase Relay test unit with an independent voltage module**

PTE-100-C Pro with LCD display incorporated

## DESCRIPTION

The PTE-100-C Pro combines the basic unit PTE-100-C with the voltage supply module PTE-FCN. This is incorporated in PTE-100-C cover lid, and allows, regulated AC voltage, frequency, and phase angle. The values which are presented in the LCD display are highly accurate, easy to read, and independenent of the injection made by the PTE-100-C base unit.

The display shows continuously the phase difference between the voltage and the current injected, and can be adjusted during the test with an accuracy of 0.1°. This facilitates the test for directional relays or in re-connecters, and synchronizing relays, etc. The protection tests based on variable frequency are simple and direct, due to the variable frequency between 40 and 70 Hz incorporated in the module.

If you already have a PTE-100-C unit you can easily convert this to the PTE-100-C Pro with only adding the module PTE-FCN, at a low cost, without the need to send the unit.

## APPLICATIONS

The PTE-100-C Pro has the same applications of the PTE-100-C Plus, although its use is much easier due to the LCD display incorporated. Furthermore this module can be used in combination with any other PTE-Range equipment.

The characteristics of PTE-100-C Pro are the same as the PTE-100-C Plus, with the following specifications:

## MEASURES

| | Range | Resolution | Accuracy |
|---|---|---|---|
| Amplitude (Vac) | 0 – 140 V | 0.1 V | ±0.1 V |
| Phase Angle | 0 – 359.9° | 0.1° | ±0.1° |
| Frequency | 40 – 70.0 Hz | 0.1 Hz | ±0.1 Hz |

# PTE-100-V

**Single phase relay test set Voltage / Current**

The equipment has reversible outputs with a power of 100 VA for relays test in AC voltage or current with frequency and phase angle.

## APPLICATIONS

- Testing of single phase Generation and Interconnection Relays, such as Frequency, Synchronizing, and Phase Angle.
- In combination with a current injector, forms a complete test in complete single phase test set (Current Voltage, Phase Angle) to test Directional, Power, etc., relays.
- Manual and/or software control.

## MAIN FEATURES

- Output power 100 VA.
- Variable voltage up to 300 V.
- Variable curent up to 8 A.
- Variable phase angle between 0 - 360º.
- Variable frequency from 40 to 420 Hz.
- Internal program to ramp frequency.
- External current or voltage reference input.
- RS-232 and PTE-BUS Connections.
- External timer control output.
- Monitor input to detect relay trips, dry or wet contact.
- Internal program to realize dymanic pre-fault and fault in both output level and phase angle.
- Electronic generation up to 3 kHz isolated from the main supply.
- Output stablized by microprocesor.
- Overload and thermal alarms, electronicaly protected.
- Case: IP-65.
- Dimensions:
  · 200 x 300 x 200 mm / 13.5 kg.
  · 8 x 12 x 8 in / 30 lb.

# PTE-50-CE

**Reversible 100-VA current / voltage output with variable phase angle, digital chronometer and programmable harmonics generation.**

## APPLICATIONS

Single-phase testing of electromechanical, static and digital relays. Timing and assessment of protective elements based in voltage, current or phase angle.

## CHARACTERISTICS

- 100-VA output power.
- Variable current: 0.000 – 50.00 A.
- Variable voltage: 0.000 – 150.0 V.
- Variable phase angle: 0.0 – 359.9º.
- Digital programmable chronometer with 1-ms resolution.
- Dry N/O, N/C or voltage-charged operation contact detection.
- Programmable dynamic pre-fault / fault step function.
- Harmonics generation between 50 and 420 Hz.
- Electronic overload and overheating protections.
- External synchronisation signal input.
- RS-232 communications for software-based testing.
- PTE Bus® for interconnection with other PTE units.
- IP-65 protective casing.
- Dimensions: 8 x 12 x 8 in. / Weight: 30 lb.

## PTE-50-CE PRO

**Featuring the optional PTE-FCN module**

Additional independent output channel with variable voltage, frequency and phase angle. Extends the PTE-50-CE applications to protective elements with two voltage inputs or one current and one voltage input (e.g. directional overcurrent, synchronisation, frequency relays, etc.)

## PTE-FCN MODULE CHARACTERISTICS

- 30-VA output power
- Adjustable voltage: 0.0 – 140.0 V
- Adjustable phase angle: 0.0 – 359.9º.
- Adjustable frequency: 40.0 – 70.0 Hz
- Digital high-contrast LCD display
- Installed inside the lid of the PTE-50-CE

# PTE-300-V

**Three phase voltage relay test set Voltage / Current**

The equipment has 3 reversible outputs with a power of 100 VA for relays test in AC voltage or current with frequency and phase angle.

## APPLICATIONS

- Testing of three and single phase Generation and Interconnection Relays.
- Testing of direcctional, differential, and power relays.
- Combined with a single phase Current injection set, enables relay tests which require three phase voltage.
- Reversible outputs (Current Voltage, Phase Angle) make a complete single phase unit.
- Manual and/or software control.

## MAIN FEATURES

- Output power 100VA x 3.
- Output power 300 VA single phase.
- Variable voltage up to 300 V x 3.
- Variable curent up to 8 A x 3.
- Up to 900 V or 24 A single phase.
- Variable phase angle between 0 - 360º.
- Variable frequency from 40 to 420 Hz.
- Internal program to ramp frequency.
- External current or voltage reference input.
- RS-232 and PTE-BUS Connections.
- External timer control output.
- Monitor input to detect relay trips, dry or wet contact.
- Internal program to realize dymanic pre-fault and fault in both output levels and phase angles.
- Electronic generation up to 3 kHz isolated from the main supply.
- Output stablized by microprocesor.
- Overload and thermal alarms, electronicaly protected.
- Case: IP-65.
- Dimensions:
  · 200 x 442 x 327 mm / 22 kg.
  · 8 x 18 x 13 in / 48 lb.

# PTE-50-CET

**Three phase relay test set Current / Voltage**

The equipment has 3 reversible outputs with a power of 100 VA for relays test in AC current or voltage withh built-in timer and harmonic generator.

## APPLICATIONS

- Testing three phase relays used in distribution networks and industry.
- Testing of three and Single Phase Motor Protection and Thermal Image relays.
- Reversible outputs (Current Voltage, Phase Angle) make a complete single phase unit.
- Combining with other equipment can generate a complete three phase system.
- Testing of direcctional, differential, and power relays.
- Manual control or software controlled.

## MAIN FEATURES

- Output power 100 VA x 3.
- Output power 300 VA single phase*.
- Variable voltage up to 150 V x 3.
- Variable curent up to 50 A x3.
- Up to 150 A or 450 V single phase.
- Variable phase angle between 0 - 360º.
- Built-in timer with a 1 ms resolution.
- External timer control output.
- External current or voltage reference input
- Harmonic generator.
- RS-232 and PTE-BUS Connections.
- Monitor input to detect relay trips, dry or wet contact.
- Internal program to realize dymanic pre-fault and fault in both output levels and phase angles.
- Electronic generation up to 3 kHz isolated from the main supply.
- Output stablized by microprocesor.
- Overload and thermal alarms, electronicaly protected.
- Case: IP-65.
- Dimensions:
  · 200 x 442 x 327 mm / 24 kg.
  · 8 x 18 x 13 in / 52 lb.

## SERIAL OPTION PTE-SER

This option enables to connect 2 or 3 output channels of the PTE-50-CET in series to increase the voltage and power in the current output taps.

* In current mode, the optional connecter PTE-SER is required to achieve more than 100 VA.

PTE-SER

# PTE COMBINATIONS

## TRES

The combination of PTE-50-CET and PTE-300-V is used for testing three phase relays and are interconnected via the PTE-BUS. To control both units simultaneously the equipment incorporates master/slave control for all outputs and levels. Each equipment retains their individual chrartaristic and can be used together or separately for single and three phase tests.

### APPLICATIONS

Testing of all types of relays either manually or by software via computer.

### MAIN FEATURES

- 6 reversible output channels in current or voltage, completely isolated, with phase angle control.
- Output power 100VA x 6.
- Output power 300 VA* single phase both in current and voltage.
- Variable voltage up to 300 V x 3.
- Variable curent up to 50 A x 3.
- Up to 150 A or 900 V single phase.
- Variable phase angle between 0 - 360º.
- Variable frequency from 40 to 420 Hz.
- Internal program to ramp frequency.
- External current or voltage reference input.
- RS-232 and PTE-BUS Connections.
- Manual control or software control of the 6 output channels.
- Overload and thermal alarms, electronicaly protected.
- Case: IP-65.
- Dimensions:
  · 200 x 442 x 327 mm x 2 / 22 +24 kg.
  · 8 x 18 x 13 in x 2 / 48lb + 52 lb.

See the specification of each unit in this catalog.

* More than 100VA in current can be achieved using the PTE-SER option.

## UNO

The combination of PTE-50-CE and PTE-100-V is used for testing single phase relays and are interconnected via the PTE-BUS. To control both units simultaneously the equipment incorporates master/slave control for all outputs and levels. These small, lightweight units incorporate a built-in timer (PTE-50-CE) and a frequency generator (PTE-100-V). Each equipment retains their individual characteristics and can be used together or separately for single and three phase tests.

### APPLICATIONS

Testing of all types of single phase relays whether they be electromechanical or digital, including differentials, synchronizing, directional, current and voltage.

### MAIN FEATURES

- 2 reversible output channels in current or voltage, completely isolated, with phase angle control.
- Output power 100 VA x 2.
- Variable voltage up to 300 V and variable current up to 50 A.
- Up to 150 A or 900 V single phase.
- Variable phase angle between 0 - 360º.
- Variable frequency from 40 to 420 Hz.
- Internal program to ramp frequency.
- Built-in timer with a 1 ms resolution.
- Manual control or software control of the 2 output channels.
- Overload and thermal alarms, electronicaly protected.
- Case: IP-65.
- Dimensions:
  · 200 x 300 x 200 mm x 2 / 13.5 +13.5 kg.
  · 8 x 12 x 8 in x 2 / 30lb + 30 lb.

See the specification of each unit in this catalog.

# PTE-300-V+PTE-100-C

This combination is formed by a single phase unit with voltage and current, and a three phase output unit. The flexibiliy and accurray of the PTE-300-V, combines with a high power (1000 VA) of the PTE-100-C, with current and voltage, a built-in timer, and special measurements fuctions.

Each equipment retains their individual characteristics and can be used together or separately.

## APPLICATIONS

- To test virtually any type of single phase or three phase relays* , whether it be elctromechanical, electronic, or digital, and including protections which require DC current or voltage.
- Test the saturation in CT's.
- Test of MCB's.
- Manual Control and/or software control**.

## MAIN FEATURES

- 4 reversible voltage or current outputs with phase angle, 0 -360º.
- 1000VA + 3 x 100 VA of power.
- up to 250 A and 900 V simuntaneouly.
- DC injection up to 350 V.
- A variable DC auxillary output up to 250V.
- Internal program to ramp frequency.
- Built-in timer with a 1 ms resolution.
- Dimensions:
  · 200 x 442 x 327 and 200 x 300 x 200 mm.
  · 8 x 18 x 13 and 8 x 12 x 8 in
- Weight: 22 + 13.5 kg / 48 + 30 lb.

See the specification of each unit in this catalog.

* Some three phase test must be made phase by phase.
** Optional Software allows control of each unit separately.

# PTE-300-V+PTE-50-CE

This combination is formed by 3 +1 amplifier outputs, with a built-in timer and a frequency generator. This combination serves as an economic alternative to a complete three phase system and with software and/or manual control.

Each equipment retains their individual characteristics and can be used together or separately.

## APPLICATIONS

- To test virtually any type of single phase or three phase relays , whether it be elctromechanical, electronic, or digital, and can test differential, directional, synchronizing, impedeance, voltage and current protection relays.

## MAIN FEATURES

- 4 reversible floating voltage or current outputs with individual phase angle.
- 100 VA of power in each output.
- Up to 50 A and 900 V in single phase and 50 A and 300V x 3 in three phase*.
- A variable frequency output between 40 - 420 Hz.
- Internal program to ramp frequency.
- Built-in timer with a 1 ms resolution.
- Manual and/or software control.
- Dimensions:
  · 200 x 442 x 327 and 200 x 300 x 200 mm.
  · 8 x 18 x 13 and 8 x 12 x 8 in.
- Weight: 22 + 13.5 kg / 48 + 30 lb.

See the specification of each unit in this catalog

* Having 3 phase in voltage and one current.

# PTE COMBINATIONS

## PTE-50-CET+PTE-100-V

This combination is formed by 3 +1 amplifier outputs, with a built-in timer and a frequency generator. This combination serves as an economic alternative to a complete three phase system, with software and/or manual control.

Each equipment retains their individual characteristics and can be used together or separately.

### APPLICATIONS

- To test virtually any type of single phase or three phase relays , whether it be elctromechanical, electronic, or digital, and can test differential, dirrectional, synchronizing, impedeance, voltage and current protection relays.

### MAIN FEATURES

- 4 reversible floating voltage or current outputs with individual phase angle.
- 100 VA of power in each output.
- Up to 150 A and 300 V in single phase and 50 A x 3 and 300V in three phase*.
- A variable frequency output between 40 - 420 Hz.
- Internal program to ramp frequency.
- Built-in timer with a 1 ms resolution.
- Manual and/or software control.
- Dimensions:
  · 200 x 442 x 327 and 200 x 300 x 200 mm.
  · 8 x 18 x 13 and 8 x 12 x 8 in.
- Weight: 22 + 13.5 kg / 48 + 30 lb.

See the specification of each unit in this catalog.

*Having 3 phase in current and one voltage.

## PTE-IOLogic

**Control Logic Simulator**

### APPLICATION

The use of the PTE-IOLOGIC is extremely wide, as it is capable of simulating any control situation, particularly for the following applications:

- Simulation and analysis of logic controls in protection relays.
- Simulation, analysis, and verification of the control system in substations.
- Simulation of any breaker system.
- Simulation and analysis of traffic control systems.
- Analysis of logical programs in automatic remote systems (SCADA).
- In general, to reproduce and to analyze any sequential programmed logic system.

A system with these features saves time and can prevent damage in primary equipment especially during commissioning process.

### CHARACTERISTICS

- 16 Inputs in 8 groups galvanically isolated.
- 8 isolated outputs.
- Inputs and Outputs are configured with the software EURO-IOLog.
- Dimensions:
  · 150 x 340 x 300 mm / 5.4 kg.
  · 6 in x 13 in x 12 in / 12 lb.

# PTE-FCF

Variable Voltage Option


## APPLICATION

- Enables to regulate the fixed voltage output of 110 V AC which is common in all the PTE-Range.

## CHARACTERISTICS

- Regulation range: 10 to 120 V.
- Maximum current: 0.3 A.
- Designed to be connected directly.
- Dimensions:
  · 90 x 120 x 60 mm / 0.8 kg.
  · 3.5 x 5 x 2.5 in / 2 lb.

# PTE-12

RS-232 Interface / PTE BUS


## APPLICATION

- Enables the control of the PTE equipment from a RS-232 serial port.
- Extraordinary flexibility as it can control up to 6 PTE equipment.

## CHARACTERISTICS

- Power is automatically supplied by the connected equipment.
- Includes all cables and connectors required.
- Includes the PTE-COM control command manual.
- Dimensions:
  · 90 x 120 x 60 mm / 0.5 kg.
  · 3.5 x 5 x 2.5 in / 1 lb.

# PTE-GPS

GPS Synchronizer

## APPLICATION

- This option allows the initial synchronization of faults, previously recorded to be played back by the PTE equipment, with an accuracy of less than 1 microsecond.
- To establish the moment of injection, with the EUROFAULT software can be programmed to begin the test at the required time.

## CHARACTERISTICS

- Accuracy: <±1µs.
- Time until ready for operation: typically 3 min.
- Power supply: via PTE-BUS.
- Power consumption: 2W.
- Accessories: GPS antenna, PTE cable, box.
- Dimensions:
  · 9 X 120 x 60 mm / 0.5 Kg.
  · 3.5 x 5 x 2.5 in / 1 lb.

# MENTOR

**Universal Relay Test equipment**

The MENTOR is the result of the wide range of experience EuroSMC has in the protection relay test field which has led to the main philosophies incorporated in this equipment:

- The parameters and methods which new technology demands and the older systems which still exist today.
- To achieve the reliability, accuracy, and the efficiency with the best technology now available.
- The ergonomics and the adaptability of different work situations and the different types of users worldwide.

## POWER

The control capacity of the MENTOR has allowed us to remain true to our traditional philosophy in equipment which has sufficient power to test all types of relays. Maintaining the accuracy and quality, thanks to a hardware control, completely new on the test market today. The unique design has been made specifically to cover all functions required in today's market, and with firmware and software easily upgraded for the future. The equipment is completly and automatically protected with alarms against any misuse in the most rugged working conditions.

The IAC (Integrated Adaptive Control) enables the use and powerfulness of the equipment to be within the reach of any user and the complete use of the equipment for the experience user. The 100 VA outputs in continous duty, reversible channels in voltage/current, auxiliary DC voltage, highly acccurate built-in timer, binary inputs and ouputs, elctronic GPS incorporated, communications ports... and a other abundance features at your disposition, guaranting efficient and reliable test results.

## ACCURACY

With the success of the PTE Range equipment, EuroSMC has gone one step more in insuring reliability and accuracy. The technology used in the MENTOR both in construction and design has set a new presence in equipment for Relay Testing, now being the first in technology and innovation.

## FLEXIBILITY

It is now not necessary to purchase and connect the PC to the test equipment. The MENTOR has incorporated the Standard Windows® platform into the unit.
The equipment is configured to preserve the applications and avoid the problems the normal PC has. All this with the routine test required at your disposition.

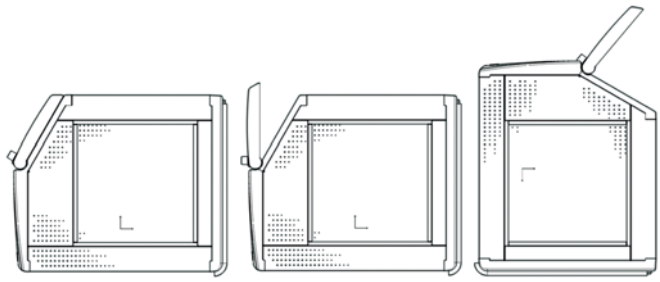
The human interface of the MENTOR enables routine testing and specialized testing. If the relay does not perform as expected during a test, you can suspend and investigate the problem and once solved return to the point where this occurred. Settings and routines can be saved and used again in another moment.

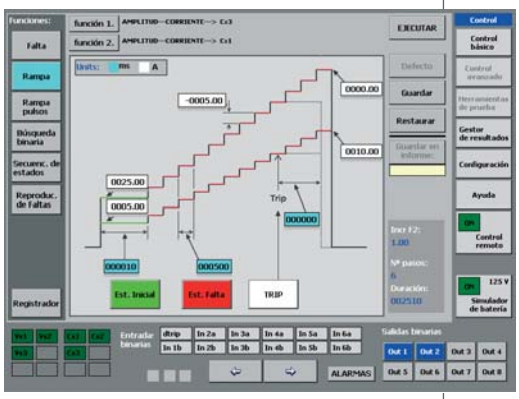
The MENTOR concept enables users to widen the capabilities of the equipment without purchasing other units or add-ons. More output channels and internal software can be added at any time, without returning your equipment. Thanks to the system of auto detection, additional amplifiers can be added with the plug and play system incorporated. Internal software can be easily upgraded via Internet with the RJ-45 Ethernet Port.

## COMMON CHARACTERISTICS OF ALL THE POSSIBLE CONFIGURATIONS

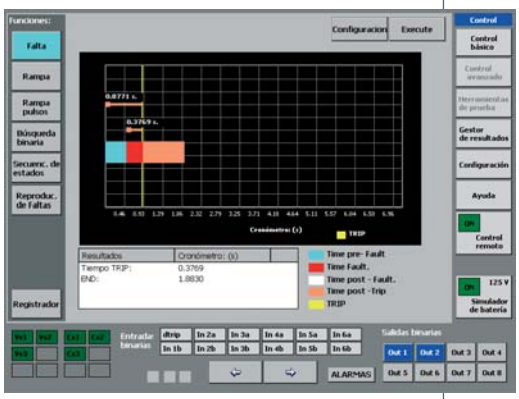
- Auxiliary DC output: 48, 125 y 250 V (60 W).
- Analog measuring inputs: 0-10 V DC, 0-20 mA DC, Accuracy: ±0.02%.
- Binary inputs: 12. Up to 400 V or dry contact. Resolution: 0.1 ms.
- Binary Outputs: 8. Capacity up to 8 A or 250 V. Resolution: 0.1 ms.
- Low level outputs: 6. Range: 0 a ± 10 V.
- Frequency generator: DC from 0.1 to 2,000 Hz and up to 3,000 Hz in transient.
- Phase Angle: 0.00 a 359.99º.
- Connections: RS-232, CENTRONICS, ETHERNET, USB, VGA, keyboard/mouse PS2, Digital I/O, GPS antenna (optional).
- Voltage supply: 100 - 240 V, 50/60 Hz.
- Dimensions: 422 (height) x 254 (width) x 511 mm. (depth).
- Weight: 22 - 33 kg. Depending on the output channels installed.
- Working temperature: 0 - 55 ºC.
- Storing temperature: -40 - 70 ºC.
- Humidity: up to 95% non condensing.


Connectivity Block

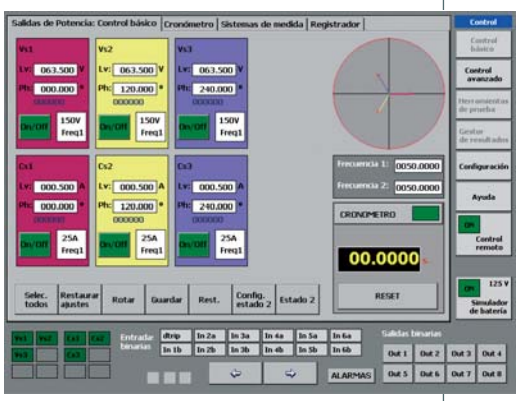





Dual Ramp Setup




Fault Execution




Basic Control Screen

| MENTOR 12 CONFIGURATIONS AND APPLICATIONS | | | |
|---|---|---|---|
| | 1 PHASE | 3 PHASE | APPLICATIONS |
| 3vi + 3i | 450 V<br>75 A | 150 V<br>25 A | Single and Three phase tests for all types of relays, transducers, and energy meters. Up to 600 VA of output power with Touch Screen TFT with Windows® CE. |
| 4vi + 3i | 600 V<br>75 A | 150 V<br>25 A | Adequate for synchronizing relays. Direct three phase test with neutral and a current up to 5 A. Capable for tests of three phase differential relays. Testing low voltage line relays. |
| 4vi + 4i | 600 V<br>100 A | 150 V<br>25 A | A fourth current supply up to 25 A for devices with neutral. Single phase test up to 100 A with 400 VA of power. Testing single phase differentials with up to 25 A. |
| 3vi + 6i | 450 V<br>150 A | 150 V<br>50 A | Three phase electromechanical relays. Direct test on differential relays with triple windings. |
| 6vi + 3i | 900V<br>75 A | 300 V<br>25 A | Calibration of measurement converters and energy meters. Fault tests of high impedance relays, detection of differential neutral with high voltage and sufficient current. |
| 4vi + 6i | 600 V<br>150 A | 150 V<br>50 A | Single and three phase test with high current. |
| 6vi + 6i | 900 V<br>150 A | 300 V<br>50 A | Testing of 2 relays simultaneously. Complete transitory simulation. Three phase differential testing with quadruple windings. |

| OUTPUT CHANELS | VOLTAGE OUTPUT REVERSIBLE VOLTAGE/CURRENT | CURRENT OUTPUT |
|---|---|---|
| AC Range: | 0 - 150 V / 0 - 5 A | 0 - 25 A |
| DC Range: | 0 - 212 V / 0 - 7 A | 0 - 9 A |
| Resolution: | 0.5 mV / 0.5mA | |
| Output channel installed: | 3, 4 or 6 | |
| Power: | 100 V A / 100 W | |
| Accuracy: | ±0.1% | |
| Distortion: | ±0.1% | |
| Protection: | All outputs are electronically protected both thermal and overload | |

## RELAY TYPES THAT CAN BE TESTED

| DEVICE IEEE | RELAY TYPE | PTE-20-FA | PTE-100-C | PTE-50-CE | PTE-100-V | PTE-300-V | PTE-50-CET | PTE-100-V PTE-50-CE | PTE-100-V PTE-100-C | PTE-300-V PTE-50-CE | PTE-300-V PTE-100-C | PTE-50-CET PTE-100-V | TRES | MENTOR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Time-Delay Starting Relay | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 21 | Distance 1Ø | | Plus / Pro | Pro | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 21 | Distance (open triangle) | | | | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 21 | Distance 3Ø | | | | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 24 | Volts / Hertz | | Plus / Pro | Pro | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 25 | Synchronizing | | Plus / Pro | Pro | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 27 | Undervoltage Relay AC/DC | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 32 | Directional Power Relay 1Ø | | Plus / Pro | Pro | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 32 | Directional Power Relay 3Ø | | | | | | | | | □ | □ | ✔ | ✔ | ✔ |
| 37/76 | DC Under/Over Voltage Relay | ✔ | ✔ | | | | | | ✔ | | ✔ | | | ✔ |
| 40 | Loss of Field Relay | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 46 | Reverse Phase Relay | | Plus / Pro | Pro | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 46N | Negative Sequence Overcurrent Relay | | Plus / Pro | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 47 | Reverse Phase Relay-Voltage | | Plus / Pro | Pro | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 49 | Thermal Relay | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 50 | Instantaneous Overcurrent Relay | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 51 | Overcurrent Relay AC | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 55 | Power Factor Relay | | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 59 | Overvoltage Relay | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 60 | Balance Relay-Voltage | | Plus / Pro | Pro | | ✔ | ✔ | | | ✔ | ✔ | ✔ | ✔ | ✔ |
| 64 | Ground Detection Relay | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 67 | Directional Overcurrent Relay | | Plus / Pro | Pro | □ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 67N | Ground Directional Overcurrent Relay | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 78 | Phase Angle measuring or Out of Step Protective Relay | | Plus / Pro | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 79 | Reclosing Relays | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 81 | Frequency Relay | | Plus / Pro | Pro | ✔ | ✔ | | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 82 | DC Reclosing Relay | ✔ | ✔ | | | | | | | | | | | ✔ |
| 85 | Carrier or Pilot Wire Relay | | □ | □ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 87 | Differential Relay | | □ | □ | □ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 91 | Voltage Directional Relay | | Plus / Pro | □ | □ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 92 | Voltage and Power Directional Relay | | Plus / Pro | □ | □ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| 94 | Tripping Relay | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |

✔ Complete, does not need other equipment nor accesories
□ Not all functions

## COMPARATIVE CHARACTERISTICS CHART

| | PTE-100-C / Plus, Pro | PTE-50-CE / Pro | PTE-100-V | PTE-300-V | PTE-50-CET | UNO | PTE-100-V PTE-100-C | PTE-300-V PTE-50-CE | PTE-300-V PTE-100-C | PTE-50-CET PTE-100-V | TRES | MENTOR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of output channels | 1 / 2 | 1 / 2 | 1 | 3 | 3 | 2 | 2 | 4 | 4 | 4 | 6 | 6 up to 12 |
| Reversible outputs (voltage or current) | ✔ | 1 | ✔ | ✔ | ✔ | ✔ | 1 | ✔ | 3 | ✔ | ✔ | 3 up to 6 |
| Voltage outputs | 1 / 2 | 2 | 1 | 3 | 3 | 2 | 2 | 4 | 4 | 4 | 6 | 6 |
| Current outputs | 1 | 1 | 1 | 3 | 3 | 2 | 2 | 4 | 4 | 4 | 6 | 12 |
| Maximum voltage reached per phase | 250V | 150V | 300V | 300V | 150V | 300V | 300V | 300V | 300V | 300V | 300V | 150V |
| Maximum current reached per phase | 250A | 50A | 8A | 8A | 50A(1) | 50A | 250A | 50A | 250A | 50A (1) | 50A (1) | 25A |
| Possibility to synchronize to an external phase | - | ✔ | ✔ | ✔ | ✔ | ✔ | Only PTE-100-V | ✔ | Only PTE-300-V | ✔ | ✔ | - |
| Isolated outputs | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Manual control | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Software control | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | - | ✔ | ✔ | ✔ | ✔ | ✔ |
| Output power per phase | 1000 VA | 100 VA | 100VA | 10VA | 100VA | 100VA | 100VA | 100VA | 100VA | 100VA | 100VA | 100VA |
| Harmonics generator | - | up to 7th | up to 7th | up to 7th | up to 7th | up to 7th | up to 7th | up to 7th | up to 7th | up to 7th | up to 7th | up to 35th |
| Digital chronometer | ✔ | ✔ | - | - | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| External measurement | ✔ | - | - | - | - | - | ✔ | - | ✔ | - | - | ✔ |
| Frequency generator | - / 40-70Hz | - / 40-70 Hz | 40-420Hz | 40-420Hz | - | 40-420Hz | 40-420Hz | 40-420Hz | 40-420Hz | 40-420Hz | 40-420Hz | 0.1 a 2kHz |
| Fault & Transient playback | - | - | - | - | ✔ | - | - | - | - | ✔ | ✔ | ✔ |
| On-board dynamic faults | - | ✔ | ✔ | ✔ | ✔ | ✔ | Only PTE-100-V | ✔ | Only PTE-300-V | ✔ | ✔ | ✔ |
| On-board frequency ramp | - | - | ✔ | ✔ | - | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Auxiliary AC Voltage Output | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | - |
| Auxiliary DC Voltage Output | ✔ | -(2) | -(2) | -(2) | -(2) | -(2) | ✔ | -(2) | ✔ | -(2) | -(2) | ✔ |
| Number of Inputs | 1 | 2 | 1 | 1 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 12 |
| Phase Angle Range | - / 0-360° | 0-360° | 0-360° | 0-360° | 0-360° | 0-360° | 0-360° | 0-360° | 0-360° | 0-360° | 0-360° | 0-360° |
| Phase Angle Resolution | - / 0.1° | 0.1° | 0.1° | 0.1° | 0.1° | 0.1° | 0.1° | 0.1° | 0.1° | 0.1° | 0.1° | 0.01° |

✔ Available
(1) 150 A with 3 channels in parallel
(2) With PTE-FCG option

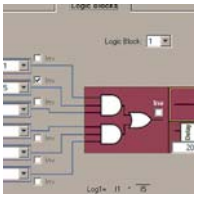
# SOFTWARE

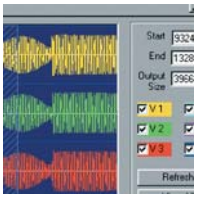
The software used by EuroSMC for our test equipment are designed using the concepts of flexibility, compatibility, and expandability with a varied application, depending on the hardware it controls.

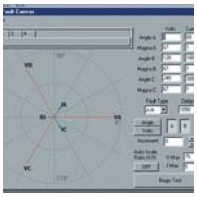
Various software applications are available for single phase equipment. In the case of the PTE-100-C, it simplifies the use of the equipment and acquire test results. The rest of the software for the PTE Range of products, incorporates a strong power control with numerous applications in Windows®:

The reproduction of pre-recorded relay faults played back in COMTRADE format, as well as fault editing and the generation of faults, by the user.

Automatic test of relays and a data base, not found in other relay software packages, to manage a group of relays in any facility. The modularity and compatibly of this software, makes the EuroTEST RTS® a complete programming tool for today and for the future.





The MENTOR platform has been designed and constructed with software in mind. From the high electronic output power to the sub-system communication are designed to be continually adapted to user requirements. There are distinctive human interface levels which are implemented in the MENTOR equipment; the maximum sophistication internally, with a simple and intuitive use externally, reaching the dynamic and flexible adaptation to the experience of the operator and the complexity of the test required.

Also the EuroSMC relay test equipment are supplied with the calibration software required to adjust and calibrate the equipment on a periodical bases, with the need of only a Standard Instrument to verify the calibration.

# EUROTEST RTS

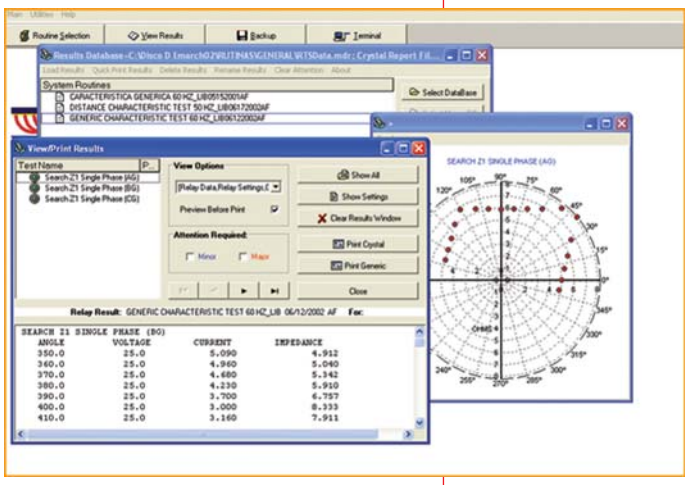
**Software to test protective relays**

## APPLICATION

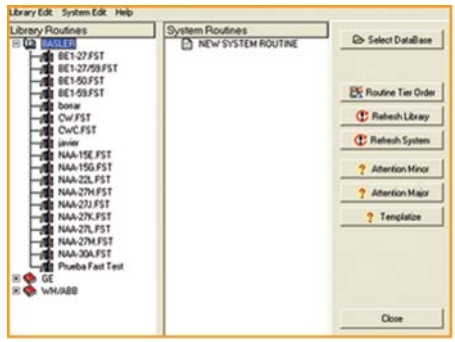
- EuroTest RTS software can test any kind of protective relay automatically.
- The test reports are automatically generated and these can be edited and customized.
- The test wizard, FastTest, creates new test routines without the need of programming.
- The possibility to organize a data base with all the test routines of the protective relays, in any facility, with the particular settings and the test results of each individual relay.

## MAIN FEATURES

- Generic test routines for the following protective relay types: distance, differential, frequency, synchronism, overcurrent, thermal, instantaneous, over/undervoltage, reverse power, directional, etc... These generic routines are adapted to the particular relay models by entering the relay settings and selecting the functions to be tested.
- Test routine library for the most common relay models.
- Large and comprehensive help menus.
- Saves time in relay testing.
- Relay tests can be repeated under the same conditions.
- EuroTest RTS software is compatible with the relay test sets of many manufacturers (optional).

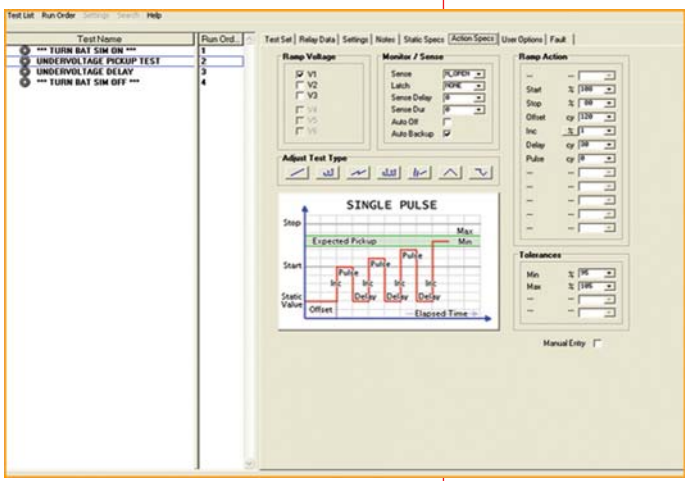


Distance relay test results

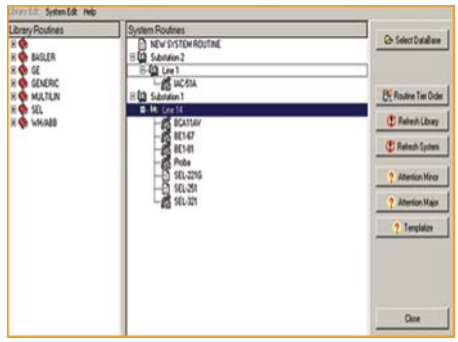


Test routine selection

The FastTest tool enables the creation of new test routines in an intuitive manner and without the need of programming




Data base of the test routines of all the relays from various substations



# EUROFAULT

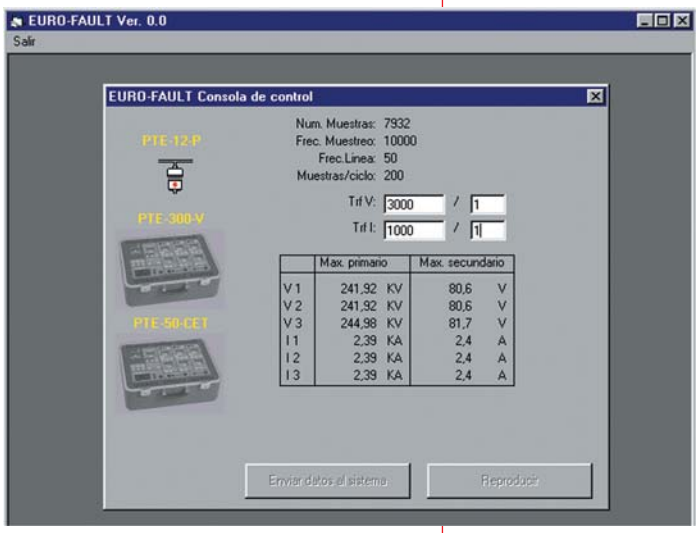
**Transient playback software in COMTRADE format**

## APPLICATION

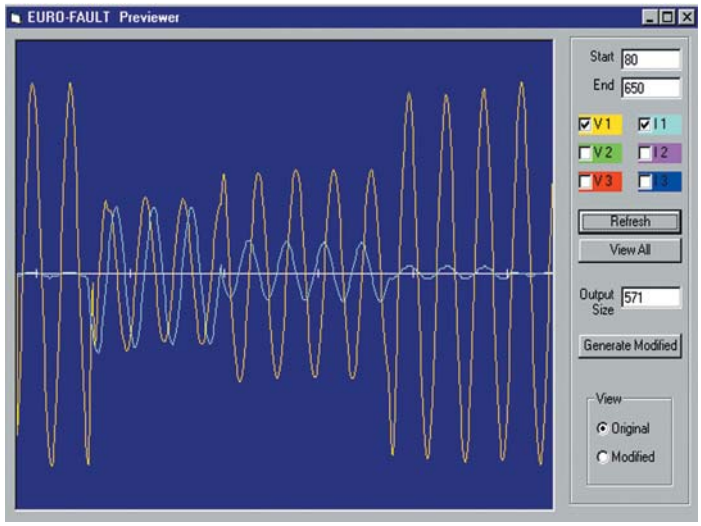
- Playback of previously registered faults and transients, or calculated by EMTP programs.
- Enables to analyze the behavior of a protection relay or system against the above mentioned.

## MAIN FEATURES

- Windows based.
- Extremely easy to edit in terms of adding pre-fault cycles, adding the cycles, etc.
- Compatible with any combination of the PTE Range equipment (except PTE-100-C).

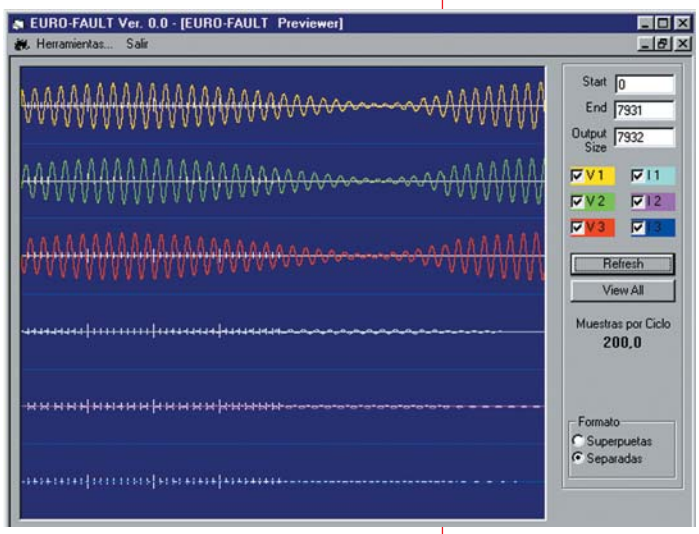



Control panel

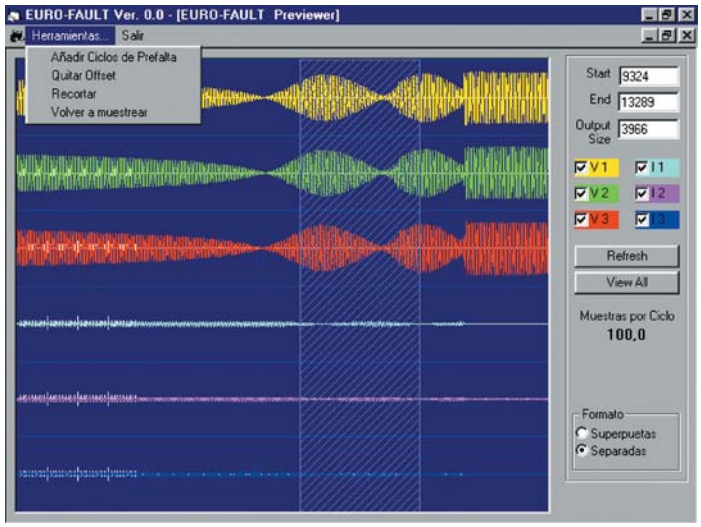



Zoom screen

Cutting a COMTRADE file and increasing the sampling rate

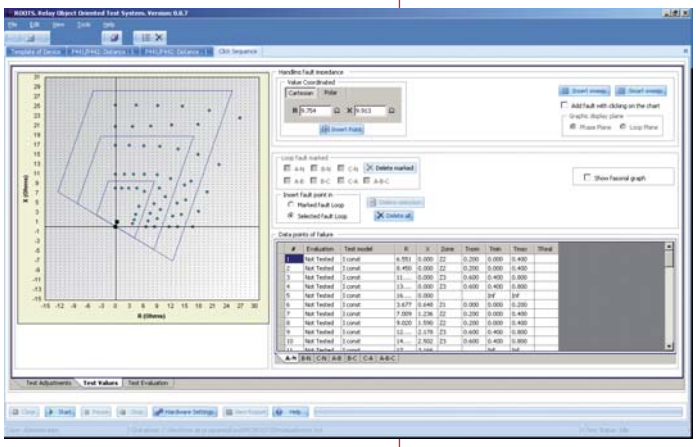



Previewer screen

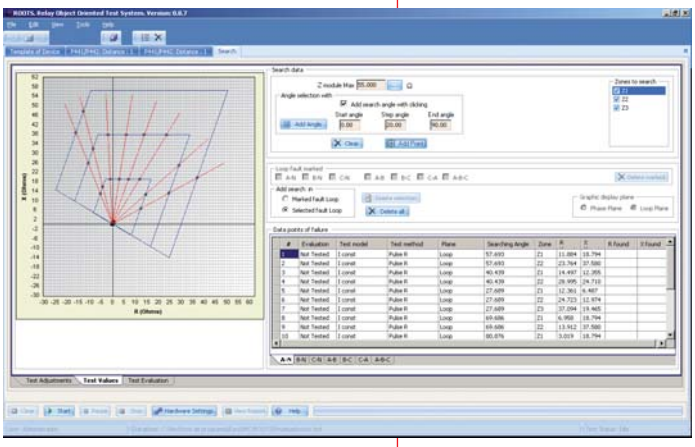


# ROOTS

## Advanced relay testing software

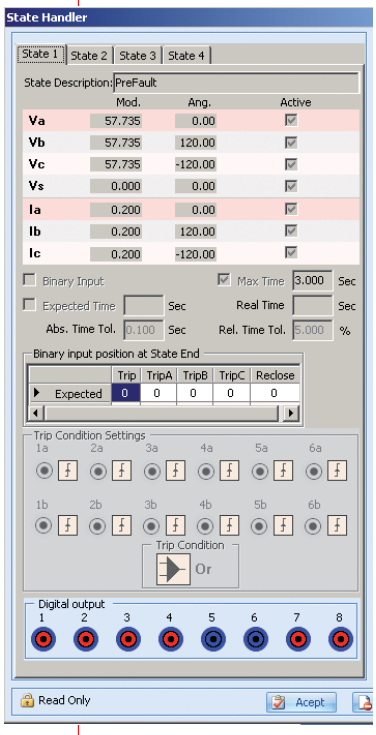


SMARTsweep: test point generation with a mouse click



ZONEsearch: locate zone boundaries at a given fault angle


Direct import of RIO files




State Handler – protective automation testing

### Making the difficult easy

RooTS *(Relay object-oriented test software)* is EuroSMC's answer to the growing complexity and variety of testing methods emerging with the last generation of numerical relays or IEDs.

The user picks up the required functions to build a complete test protocol by just clicking on a list.

Every IED is identified, described and cataloged in a database along with the various tests assigned and the results obtained throughout the relay's lifecycle. Reporting can be made fully automatic, and test data can be exported to other information systems.

The innovative paradigm in RooTS allows the Protections Engineer to calculate, view and express the test parameters in terms of each protective function (e.g. reactance, impedance, differential current, restraint voltage, negative sequence, etc.), saving lots of time and eliminating errors.

The IED's operation characteristic can also be graphically defined from scratch, thanks to an easy and intuitive built-in graphical editor. This feature supports the manual click & test method, as well as computer-assisted test point generation and automatic report production.

The IED's settings and trip logic equations can be directly read from the configuration files supplied by the main relay vendors. No interpretation mistakes, no waste of data transfer time, no typing errors. Values can be labled to the user's preferences or according to the relay manufacturer's nomenclature.

RooTS' architecture includes a library for optional test modules (Overcurrent, directional, distance, metering, synchronism/voltage, converters etc.) that the user may choose to add at any time. Each module contains a test kit with test routines (reclosing, power encroachment, breaker failure, etc.) that can be used right off-the-box or quickly and easily customized to the user's needs.

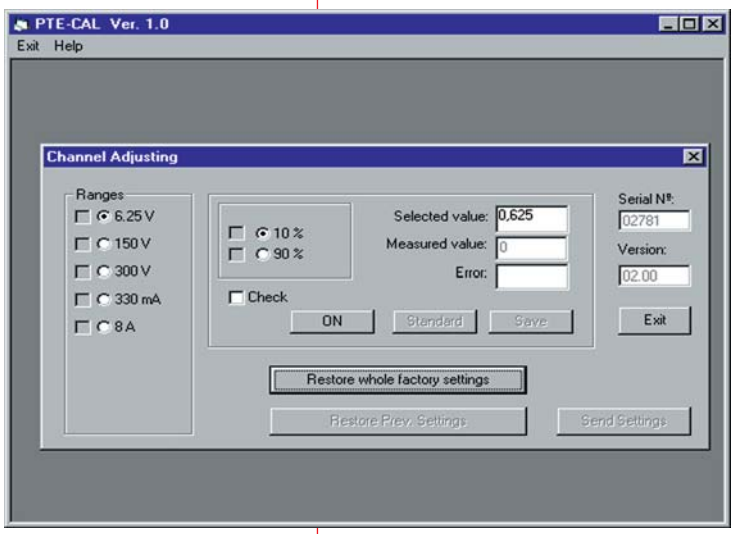
RooTS has been designed and developed using state-of-the-art programming technology and is outstanding in the field of electrical protection testing to free up the user from the tedious task of assimilating the huge diversity of relay implementations, the different protective concepts by each individual IED manufacturer and the need to be trained on diverse test equipment.

If you are in charge of the control and maintenance of complex protective schemes, and cannot afford to lose the grip from the continuous evolution of test technology, your natural choice is RooTS by EuroSMC.

Call us for a demonstration.

# PTE-CAL

## Calibration software for the PTE equipment




The calibration and adjustment software enables the user to calibrate the equipment with the adequate standards required.

### APPLICATIONS

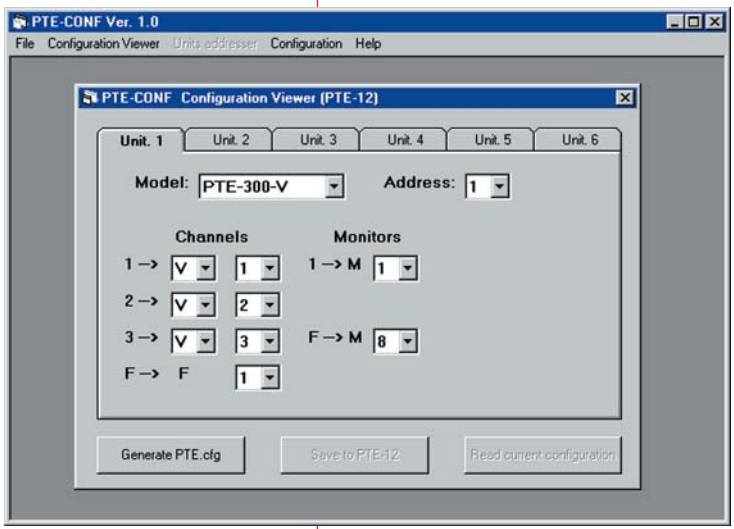
- Enables the adjustment and calibration of the PTE units without the need of any intervention inside the unit (Closed Case Calibration).

### MAIN FEATURES

- Windows based.
- Reduces time in adjustment and calibration of the equipment.
- Reduces possible errors and interior damage of the equipment.
- Enables to store different adjustment files.

# PTE-CONF

## Software for configuring the PTE equipment



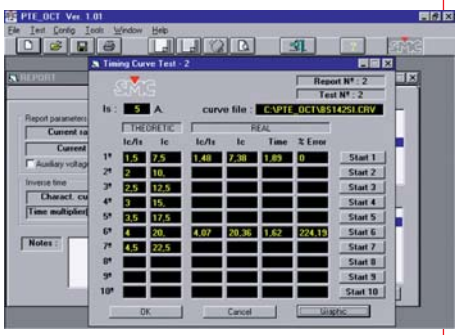

The software program PTE-CONF was designed to configure the PTE-12 interface, enabling this to function with any test routine in the EUROTEST software.

Configuring the PTE-12 , utilizes the full capacity of PTE equipment to work as current or voltage channel outputs and giving the possibility to use different configurations of the test equipment for performing complex tests and controlling them by the software.

For example, with the PTE-CONF software an automatic routine for a distance relay which requires 2 voltages and 1 current can be made with the PTE-50-CET unit.

# PTE-OCT

**Overcurrent relay test software used with PTE-100-C**



The PTE-OCT Software is designed to perform semi-automatic overcurrent relay tests. The software is WINDOWS based, with text and graphical presentation of results, Database handling, report, etc.

The software works with Inverse Time Overcurrent Relays and Definite Time Overcurrent Relays Inverse Time Overcurrent Relays:
- Creep Current Test.
- Run Back Time Test.
- Timing Curve Test.
- Tripping Time Test.

Definite Time Overcurrent Relays:
- General Condition Test.
- Pick-Up, Drop-Out Test.
- Tripping Time Test.

All the test results are recorded and stored in MS ACCESS format.

The software includes a Graphic Curve Editor that enables the user to create standard curves. These curves can be used as the comparison standard by the software, comparing results against the expected value, in the Timing Curve Tests.

## APPLICATIONS

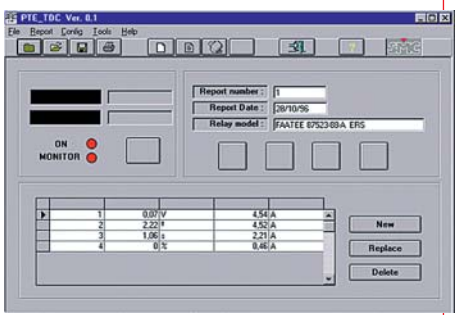
- The test is "directed" by the software, including the test current values.
- Storage of Test Results, and the ID data of the relay under test.
- Automatic comparison of the Test Results with the desired Standard Curve.
- Industry-standard MS Access database, allows users to create and also integrate results into planned maintenance systems.

## CHARACTERISTICS

- Windows based.
- Enables the operator to create the time reference curve.
- Shows and directs the test at all times.
- Calculates the values that should be tested.
- Results in MS Excel worksheet format.

# PTE-TDC

**Test data capture software used with the PTE-100-C**



This software is intended to acquire data from a PTE-100-C equipment, simplifying the task of acquiring an adequate data format in order to print or transfer results into a file. The file can be Microsoft Access or standard ASCII format. It is possible to store test results and retrieve to print.

The software is designed for MS Windows and is easy to use. It enables identification of results, by means of a test header where data can be introduced, such as dates, location codes, operator, device under test, etc.

The connection between PC and PTE-100-C is made by an RS-232 cable supplied with the equipment.

## APPLICATIONS

- Acquires test data in order to print or transfer test results into other formats.

## CHARACTERISTICS

- Windows based.
- Associates each test group result obtained with a header which identifies the relay being tested.
- The test results are obtained and stored in MS Excel worksheet format.

# MEASUREMENT EQUIPMENT

In the constant search of satisfying our customer's needs and requirements, EuroSMC found that many of our customers require modern and practical measuring test equipment, especially in the maintenance and commission departments, incorporating the characteristics and functions required by them.

EuroSMC has been designing innovative and revolutionary products for electrical measurement tests. Our independent and traditional concepts in product and design, focus on the necessities of our customers.

**Portability**. Reduced size, weight, and robust which is essential for field use.

**Autonomy**. Almost all this range of products has internal rechargeable batteries incorporated in the equipment. Therefore can be used without a voltage supply which is not always available in commissioning and substation work.

**Integration**. The use of microprocessors and other technical advances, enables the equipment to be multifunctional, as well as, avoiding errors and saving time.

**Reliability and accuracy**. The equipment is designed and produced with the latest technology and components, assuring the accuracy and reliability.

The Circuit Breaker Analyzer, which incorporates a three phase contact resistance measurements, is one of the example that EuroSMC incorporates into our designs. All the new equipment designed by us in the past years have been leaders in the market.



# PME-500-TR

Circuit Breaker Analyzer

## APPLICATIONS

- Simultaneous measurement for the 3 main contacts (open/closed) and 2 auxiliary contacts, including pre-insertion resistors (if required).
- Evaluates the synchronism between the circuit breaker poles.
- Determines the maximum currents, opening and closing times, simultaneously in both coils.
- Evaluates the state of the substation auxiliary batteries by graphically showing the coil consumption.
- Immediately displays and prints test results, both numerically and graphically.
- Automatically calculates the contact resistance.

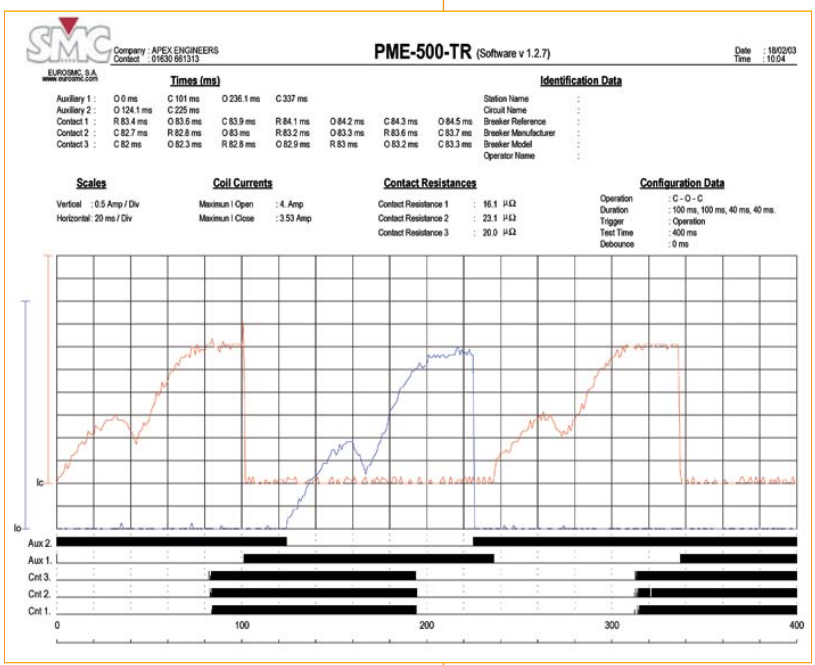
## MAIN FEATURES

- 3 timing inputs for the three main contacts, 0.1ms resolution.
- 2 isolated auxiliary binary inputs, with a capacity for dry contacts or voltage signals up to ±360 V DC, 0.1ms resolution.
- Measures and records the Coil currents simultaneously (open and closed) , with 1ms resolution up to 50 A DC (auto range).
- Connection to the breaker by means of a special simplified cable connector or by 4 mm input taps.
- Built-in thermal paper printer, 110 mm.
- Autonomous power supply with internal rechargeable batteries, up to 10 hours.
- Programmable operating sequences C, O, C-O, O-C, C-O-C and O-C-O.


Graphical results display


Numerical results display

- Automatic measurement of the contact resistance, 0.1μΩ resolution at 10 A.
- Immediate graphic display of the test results.
- A large Touch Screen panel (113 5 61 mm) displays graphic images and is also the front panel control.
- Allows the setup of the test data and test configuration from the touch screen panel (it converts into a complete keyboard).
- Software is supplied to download test results.
- Firmware can be upgraded via computer.
- Reduced size and weight.
- Dimensions:
  · 340 x 300 x 150 mm / 8 kg.
  · 14 x 12 x 16 in/ 17.6 lb.




The test results can be viewed, exported or printed from the computer. The report can be personalized by adding your corporate logo.

## PME-RESC

Optional set of fast measurement clamps.

# PME-TCE

**Optional travel, speed and acceleration analysis plug-in module**


## APPLICATION

The PME-TCE adds travel, speed, acceleration, and wipe data and graphics to the circuit breaker analysis report. This small module is powered from the PME-500-TR and provides connections for one analogue and three digital encoders. Results from multiple tests are saved in its flash memory and then downloaded to the PC by means of the USB connection.

## CHARACTERISTICS

| | |
|---|---|
| Digital inputs (3): | single-ended TTL, 5 V, 100mA |
| Analogue input (1): | 7.5 V, 10 mA |
| Data interfaces | USB, PME BUS® |
| Power supply | USB, PME BUS® or external adapter |
| Sampling frequency | 5 kHz per channel |
| Max. recording time | 20 seconds |
| Dimensions | 148 x 89 x 25 mm |
| Weight | 192 g |

## TRANSDUCERS

Movement sensors and mechanical adapters

**PME-ATK:** Rotary Transducer Kit
Full angular measurement kit consisting of digital angular encoder, articulated arm with magnetic stand, set of four shaft adapter bushings and hex key wrench.

**PME-ATA:** Angular measurement set consisting of digital angular encoder, 19-mm machineable shaft adapter bushing, and articulated arm with magnetic stand.

**PME-AAxxx:** Assortment of adjustable and machineable adaptation bushes for rotary encoder.

# PME-10 / PME-100

**Digital Microohmmeters**


## APPLICATION

The microohmeters PME-10 and PME-100 are designed to measure contact resistance for circuit breakers, busbars, and other applications which require to measure low resistance values easily, with high accuracy. Measurement is by 4 wires.


## MAIN FEATURES

- Accuracy: ±0.25% of the scale ±1 digit.
- Direct reading in ohms and miliohms depending on the scale selected.
- Voltage supplied by a rechargeable battery or conventional voltage supply.
- Portable ABS case.
- Dimensions PME-10:
  - 175 x 380 x 335mm / 11.5 kg.
  - 7 x 15 x 13 in / 25 lb.
- Dimensions PME-100:
  - 175 x 380 x 335mm / 6.5 kg.
  - 7 x 15 x 13 in / 14 lb.

# PME-20-PH

**Phase Angle Meter**


## APPLICATIONS

- Measures the phase angle between two Voltages, two Currents, or Voltage-Current.
- Measures Frequency.
- Measures Power Factor.
- Synchroscope.
- In general, for Maintenance in Transmission and Distribution Systems, all well as industrial or commercial centers.

## MAIN FEATURES

- Phase angle accuracy: ±0.1°.
- Voltage input: 0.2 to 500 V RMS direct.
- Current input: 0.1 to 25 A RMS direct.
- Selected Measurement Modes:
  · Phase Angle displayed as ±180°.
  · Phase Angle displayed as 0 - 360°.
  · Frequency: 40 to 500 Hz.
  · Power Factor: 0 to ±1 and indicates phase angle quadrant.
- RS-232 port for computer connection.
- Battery Powered.
- Reduced size and weight.
- Dimensions:
  · 226 x 115 x 45 mm / 650 gr.
  · 9 x 4.5 x 1.8 in / 1.45 lb.

# PTE-30-CH

**Portable Timer**


## APPLICATIONS

- Measures the trip time in protection relays and in general the lapse time between two events.
- Measures the time duration of electrical signals.
- Measures frequency.

## MAIN FEATURES

- Measurement range: 3 modes
  · S Mode: 00.000-99999s.
  · Cycle Mode: 0000.0-9999.9 Cycles.
  · Frequency Mode: 20.000-4000.0 Hz.
- Functions:
  · Start/Stop: time between two events.
  · Pulse: measures the time of a signal pulse.
  · Frequency: Reads the signal frequency at the input taps.
- Accuracy: ±0.01% ±1ms.
- Dimensions:
  · 190 x 100 x 40 mm / 1 kg.
  · 8 x 4 x 2 in / 2.2 lb.

# PRIMARY INJECTION


The maintenance and substation departments traditionally have found limitations when selecting primary injection test equipment. Either the equipment is a home made brand with low reliability, poor accuracy at a low price, or a small selection of equipment with the accuracy and quality required, but at high price.

EuroSMC primary injection sets are a perfect solution, as the range of products are situated between the two options previously mentioned. The primary injection equipment manufactured by EuroSMC is a large range of products that meet the power, current, and accuracy required for this type of testing.

The LET range of primary injection test equipment are perfectly adequate to test current transformers, busbars, circuit breakers, switchboards, complete system such as transformers-relays, and interconnections with the adequate technology and accuracy at an economic price. The large product range enables the selection of appropriate equipment required for the application required.


# LET-400

**Primary Injection Test Set up to 2,500 A**


## APPLICATIONS

- Primary injection tests.
- Test of measurement and protection transformers.
- In general, primary injection tests including the complete loop, such as current transformer, cables, protective relays, and circuit breakers.

## MAIN FEATURES

- Permanent current up to 400 A, 1 kVA in 4 ranges.
- Maximum current output up to 2.5 kA.
- Thermal and short-circuit protection.

# LET-400-RD

**Primary Injection Test Set up to 2,500 A**


## APPLICATIONS

- Test of the I/T curve in primary current relays test.
- Primary injection tests.
- Test of measurement and protection transformers.
- In general, primary injection tests including the complete loop, such as current transformer, cables, protective relays, and circuit breakers.

## MAIN FEATURES

- Permanent current up to 400 A, 1 kVA in 4 ranges.
- Maximum current output up to 2.5 kA.
- Built-in digital ammeter 0.5% accuracy.
- Built-in digital timer resolution 1 ms.
- Thermal and short-circuit protection.

# LET-400-RDC

**Primary Injection Test Set up to 6,250 A**


## APPLICATIONS

- Test of the I/T curve in primary current relays test.
- Primary injection tests.
- Test of measurement and protection transformers.
- In general, primary injection tests including the complete loop, such as current transformer, cables, protective relays, and circuit breakers.

## MAIN FEATURES

- Permanent current up to 400 A, 1 kVA in 4 ranges.
- Maximum current output up to 2.5 kA.
- Built-in digital ammeter 0.5% accuracy.
- Built-in digital timer resolution 1 ms.
- Thermal and short-circuit protection.
- Variable AC and DC voltage up to 220 V.
- Variable auxiliary DC power supply up to 220 V.

# LET-1000-RD

**Primary Injection Test Set up to 6,500 A**

## APPLICATIONS

- Test of the I/T curve in primary current relay test.
- In general, primary injection tests including the complete loop, such as current transformer, cables, protective relays, and circuit breakers.

## MAIN FEATURES

- Permanent current up to 1,000 A, 2 kVA in 3 ranges.
- Maximum current output up to 6.5 kA.
- Built-in digital ammeter, 0.5% accuracy.
- Built-in timer, resolution 1 ms.
- Thermal and short-circuit protection.

# LET-2000-RD

**Primary Injection Test Set up to 10,800 A**

## APPLICATIONS

- Direct and motor overload relay test.
- In general, primary tests including the complete loop, such as, current transformer, cables, protective relay and circuit breaker.

## MAIN FEATURES

- Permanent current up to 2000 A, 4 kVA in 4 ranges.
- Maximum current output up to 10,800 A.
- Made up of two units.
- Built-in digital ammeter 0.5% accuracy.
- Built-in digital timer resolution 1 ms.
- Thermal and short-circuit protection.

# LET-2000-RDM

**Primary Injection Test Set up to 10,800 A**

## APPLICATIONS

- Direct and motor overload relay test.
- In general, primary tests including the complete loop, such as, current transformer, cables, protective relay and circuit breaker.

## MAIN FEATURES

- Permanent current up to 2000 A, 4 kVA in 4 ranges.
- Maximum current output up to 10,800 A.
- Made up of 2 units, control and power unit.
- Built-in digital ammeter 0.5% accuracy.
- Built-in digital timer resolution 1 ms.
- Thermal and short-circuit protection.
- Motorized Variac.

# LET-2010-RD

**Primary Injection Test Set up to 13,000 A**

## APPLICATIONS

- Direct and motor overload relay test.
- In general, primary tests including the complete loop, such as current transformer, cables, protective relays and circuit breakers.

## MAIN FEATURES

- Permanent current up to 2000 A 6 kVA in 3 ranges.
- Maximum current output up to 13,000 A.
- Made up of two units.
- Built-in digital ammeter 0.5% accuracy.
- Built-in digital timer resolution 1 ms.
- Thermal and short-circuit protection.

# LET-4000-RD

**Primary Injection Test Set up to 21,600 A**

## APPLICATIONS

- Direct and motor overload relay test.
- In general, primary tests including the complete loop, such as, current transformer, cables, protective relay and circuit breaker.

## MAIN FEATURES

- Permanent current up to 4000 A, 8 kVA in 4 ranges.
- Made up of two units.
- Built-in digital ammeter 0.5% accuracy.
- Built-in digital timer resolution 1 ms.
- Thermal and short-circuit protection.

# LET-4000-RDM

**Primary Injection Test Set up to 21,600 A**

## APPLICATIONS

- Direct and motor overload relay test.
- In general, primary tests including the complete loop, such as, current transformer, cables, protective relay and circuit breaker.

## MAIN FEATURES

- Permanent current up to 4000 A, 8 kVA in 4 ranges.
- Made up of 2 units, control and power unit.
- Built-in digital ammeter 0.5% accuracy.
- Built-in digital timer resolution 1 ms.
- Thermal and short-circuit protection.
- Motorized Variac.

# PRIMARY INJECTION

## APPLICATIONS

The Primary Injection Test units offers multiple applications, the most are:

- Primary injection tests including the complete loop, such as current transformer cables, protective relays, and circuit breakers.
- Test of measurement and protection transformers.
- Detection of the heating points of substation busbars.
- Testing of Low Voltage Molded Case Circuit Breakers.
- Testing extra fast relays in DC current with the model LET-4000-R.

## MODELS AND CHARACTERISTICS

| MODEL | POWER | RANGES | MAXIMUM CURRENT | | | | | | TIMER | AMMETER | MOTORIZED REGULATION | AUXILIARY DC SUPPLY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PERMANENT | 60m | 15m | 3m | 1m | 1s | | | | |
| LET-400 | 1 kVA | 10 A, 50 A, 200 A, 400 A | 400 A | 600 A | 800 A | 1,1 kA | 1,4 kA | 2,5 kA | - | - | - | - |
| LET-400-RD | 1 kVA | 10 A, 50 A, 200 A, 400 A | 400 A | 600 A | 800 A | 1,1 kA | 1,4 kA | 2,5 kA | X | X | - | - |
| LET-400-RDC | 1 kVA | 10 A, 50 A, 200 A, 400 A | 400 A | 600 A | 800 A | 1,1 kA | 1,4 kA | 2,5 kA | X | X | - | X |
| LET-1000-RD | 2 kVA | 250 A, 500 A, 1000 A | 1 kA | 1,5 kA | 2,25 kA | 2,25 kA | 2,75 kA | 6,25 kA | X | X | - | - |
| LET-2000-RD | 4 kVA | 250 A, 500 A, 1000 A, 2000 A | 2 kA | 2,4 kA | 3,6 kA | 4,8 kA | 6 kA | 10,8 kA | X | X | - | - |
| LET-2000-RDM | 4 kVA | 250 A, 500 A, 1000 A, 2000 A | 2 kA | 2,4 kA | 3,6 kA | 4,8 kA | 6 kA | 10,8 kA | X | X | X | - |
| LET-2010-RD | 6 kVA | 500 A, 1000 A, 2000 A | 2 kA | 2,5 kA | 4 kA | 5,5 kA | 7 kA | 13 kA | X | X | - | - |
| LET-4000-RD | 8 kVA | 500 A, 1000 A, 2000 A, 4000 A | 4 kA | 4,8 kA | 7,2 kA | 9,6 kA | 12 kA | 21,6 kA | X | X | - | - |
| LET-4000-RDM | 8 kVA | 500 A, 1000 A, 2000 A, 4000 A | 4 kA | 4,8 kA | 7,2 kA | 9,6 kA | 12 kA | 21,6 kA | X | X | X | - |
| LET-4000-R | 8 kW | 4000 A | 4 kA DC | | | 5 kA DC | | | X | X | - | - |

X Available
- Not available

# DC INJECTION EQUIPMENT

EuroSMC has designed a range of products when DC voltage or current injection applications are required.

This range includes portable battery simulators, which can be used as an accessory when testing relays and other applications which require DC injection.

Responding to specific requirements, EuroSMC offers high power DC current injection equipment designed mainly for the railway industry.

# PTE-20-FA

**DC Voltage / Current Power Supply**

## APPLICATIONS

- A highly accurate and stable DC power supply.
- Battery simulator for substations.
- Testing of seal-in units in protection relays.
- Testing of DC voltage or current relays.

## MAIN FEATURES

- Voltage or current output up to 300 V or 6A respectively.
- Digital measurement reading.
- Four outputs ranges.
- Power: 150 W.
- All outputs are fully isolated.
- Completely programmable.
- Dynamic test capability.
- External timer control output.
- RS-232 serial port connector.
- Dimensions:
  · 200 x 300 x 200 mm / 12 kg.
  · 8 x 12 x 8 in / 26 lb.

# PTE-FCG

**Battery Simulator**


## APPLICATIONS

- Provides an auxiliary DC voltage supply to the relay under test.

## MAIN FEATURES

- Voltage output: 48/125/250 V DC.
- Power: 60 W in each output.
- Designed to be mounted in the top lid of the PTE Range of equipment or can be used as an independent unit.
- Dimensions:
  · 110 x 180 x 60 mm / 2 kg.
  · 4 x 7 x 2 in / 4 lb.

# LET-4000-R

**High DC Current Injection Set**

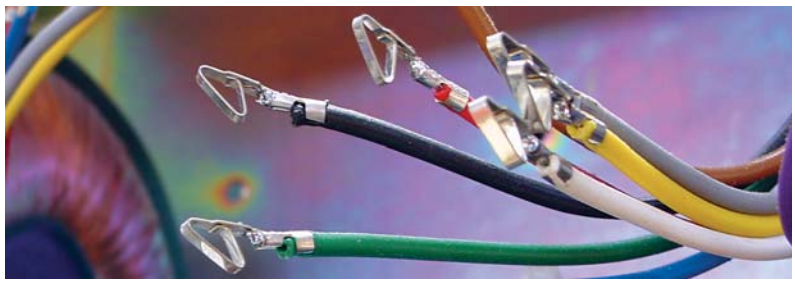
## APPLICATIONS

- For testing extra fast relays in DC current, mainly used in the railway industry.
- In general the use of any high DC current applications.

## MAIN FEATURES

- DC Current output to 5000 A, 8000 W.
- Built in digital ammeter, 0.5% accuracy.
- Built in digital timer resolution 1 ms.
- Thermal and short-circuit protection.

# STEP AND TOUCH MEASUREMENTS



The evolution of equipment for the industrial sector and electric utilities, has led EUROSMC to develop equipment to measure grounding circuit measurements which is known as step and touch. This range of equipment has been achieved with the collaboration of the main Spanish Electrical Utilities.

This range of products is designed strictly to the IEC 11-8-176 (MIERAT-13) Standards.

# LET-60-VPC

Instrument for Grounding Circuit Measurements

## APPLICATIONS

- This equipment is designed to test grounding circuit measurements, in what is called step and touch, voltage measurement, according to IEC standards used in some countries.
- This equipment is designed for small substations and transfomer centers.

## MAIN FEATURES

- Accessories for measurements incorporated.
- Inversion of current output.
- Regulation: 0-60 A / 6 kVA.
- Current measurement: ±0.5%.
- Voltage measurement: ±1%.

# LET-500-VPC

Instrument for Grounding Circuit Measurements

## APPLICATIONS

- This equipment is designed to test grounding circuit measurements, in what is called step and touch, voltage measurement, according to IEC standards used in some countries.
- This equipment is designed for substations.

## MAIN FEATURES

- Accesories for measurements incorporated.
- Inversion of current output.
- Regulation: 0-50 A / 50 kVA.
- Current measurement: ±0.5%.
- Voltage measurement: ±1%.

# MCB TEST EQUIPMENT

The testing of MCB's enables the detection of the deviations in the characteristics and the quality control of these devices for the companies which manufactures or sells them. Random sample testing is required for MCB manufactures and is normally carried out by Utilities when purchasing large quantities. Testing those already installed in Industry is also required.

A complete analysis is fundamental in determining, both independently and simultaneously, the characteristic of these devices with an equipment which reduces testing time and has a stabilized current injection source, required by international standards.

EuroSMC has found that many MCB test are made with homemade testing equipment, with unstable current sources, connected in series, resulting in unreliable test results and a limited capacity in the tests which can be made.

With this situation and the experience of EuroSMC in AC current equipment, along with the demands of the market in MCB testing, the design of this range of products, required by users in this type of devices, is a product which is flexible to test various MCB's, with different nominal values and different tests at the same time. The stabilized current generator along with software control gives reliable results. The system not only is capable of meeting international standards, but also to those standards required in each country.

# EMU RANGE

**Current Power Supply in A.C.**




## EMU-25
## EMU-100
## EMU-300

### APPLICATIONS

- Testing of small circuit breakers.
- Calibration of shunts and measurement instruments.
- Testing of thermic relays which require a long duration.
- Overheating test.

### MAIN FEATURES

- Regulation:
  · EMU-25: 0 – 25 A.
  · EMU-100: 0 – 100 A.
  · EMU-300: 0 – 300 A.
- Nominal power: 300 VA.
- Can be connected in parallel.
- Input for external phase and/or frequency reference.
- Computer controlled by RS-485 interface.
- Overload, overheating alarm LED's.
- Rack mounting 19 in (482 mm), height 4 U.
- Accuracy: ±1%.
- Distortion: <1.

# SMC-12

**Automatic Test System for Miniature Circuit Breakers - MCB's**

### APPLICATIONS

- Designed to test thermal and magnetic (Instantaneous) response of miniature circuit breakers (MCB's).
- Meets the IEC requirements for testing MCB's.
- Programmable testing unit, RS-485, computer controlled.
- Records, stores, and prints all test results.

### MAIN FEATURES

- Pre-selected current up to 100 A in each test position.
- Can be connected in parallel to attain higher currents.
- Low current output distortion (<1%)
- Time measurement: up to 9999s, ±1s.

# ETP and EDA III Systems

The ETP system is a set of equipment orientated to predictive maintenance in power transformers. The objective of all the equipment that makes up the system of predictive maintenance of transformer and rotary machines is to optimize the maintenance costs and to detect any faults before they occur. Also to manage the status of the machine to avoid and minimizing any out of service.

The basic elements that are common to all the equipment are:

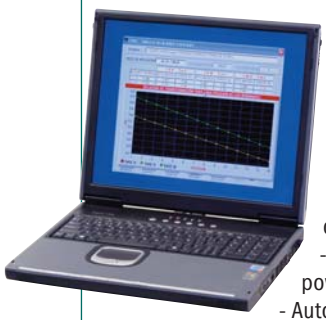
- Common control elements.
- Specific software for each application.
- Easy to follow software guide.
- Automatically stores and manages test results.
- Tendency analysis.
- Modular system easy to transport.
- System can de updated.

The results of the test are in numeric values and graphically displayed and are automatically saved. When the test is finalized and results obtained you can print and save test result for further analysis.

The advantage of the system, and especially with three phase transformers with tap changers, gives the rapid measurement results, obtaining simultaneously the simple and compounded values with external correction factors such as temperature. Therefore achieving savings in the test time in obtaining the measurement, managing the information results, and generating the test reports.

# ETP-1

## Transformer Turns Ratio Measurement



### DESCRIPTION

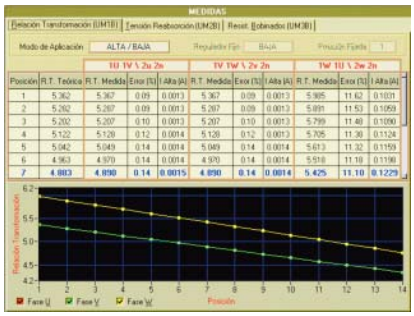
The ETP-1 equipment measures the following:
- Actual turn ratio for each position of the tap changer.
- No load current and power, at the test voltage.
- Automatically calculates results according with the connection group.

With these measurements it is possible to detect problems in the tap changer, coils, winding short-circuit, defective contacts, open circuit, etc, and with the turns ratio measurement and problems in with the no load current measurement which are referred to the test voltage of 220V rms.

The software enables selection of the tap changer, the number of positions, and how you want to measure. With this selected, the software generates a table with all the measurement made for each position and automatically creates a graphic comparison between the theoretic values and the values measured during the test for each tap position.

### CHARACTERISTICS

- The connection to the transformer taps is guided from the computer to avoid connection errors.
- Enables to select the number of the tap changer positions to be measured, as the software informs the position that should be measured each time.
- For each tap changer position, a three phase automatic measurement is performed. It is not necessary to change the connection to the transformer taps.
- The no load test current waveform is presented on the computer screen. It detects possible problems in the iron core.
- The test time for each three phase test position is less than 10 seconds.
- The measuring range has a ratio between; 1:1 to 3000:1.




Results of Turns Ratio measurement which determines a short-circuit between secondary windings

# ETP-2

## Recovery Voltage and Insulation Measurement

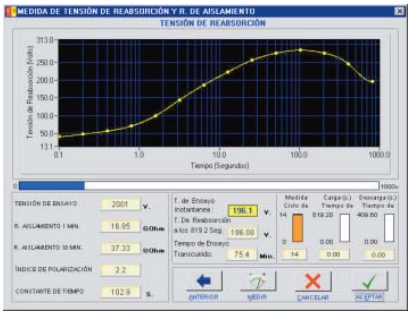
### DESCRIPTION

The ETP-2 equipment measures the following:
- Recovery Voltage of the insulation.
- Insulation Resistance.
- Polarization Index.

To measure these parameters, the unit applies different levels of DC test voltage through an internal programmable voltage supply. The measured values are acquired automatically in the specified time. The equipment evaluates the actual general status of the insulation, and detects possible aging problems in the quality of the paper/oil insulation.

### CHARACTERISTICS

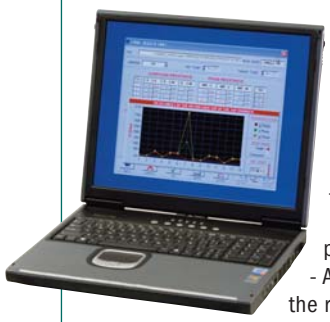
- Fully automatic Recovery Voltage test in all the test cycles of voltage application and discharge of the insulation and measurement acquisition.
- Automatic generation of the measured values on each test cycle graphic representation.
- Results values are automatically corrected to a reference temperature enabling standard results.
- Numerical and graphic presentation gives the results of the following parameters:
  · Recovery Voltage.
  · Raising time of the capacity.
  · Insulation Resistance.
  · Time constant.
  · Polarization Index.
- The control program allows selecting the following possibilities to perform the insulation tests:
  · HV + LV against Ground.
  · HV against LV + Ground.
  · HV against LV + Tertiary + Ground, etc.




Test Screen of the RVM of the ETP-2

# ETP-3

## Winding Resistance Measurement



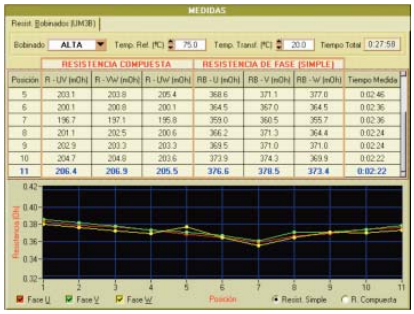
### DESCRIPTION

The ETP-3 equipment measures the following for any type of transformer or autotransformer:

- Winding resistance value in single or three phases.
- Automatic correction of the resistance per phase to a predetermined reference temperature.
- Automatic calculus of the compound winding resistance, for different configurations Delta, Star, etc.

### CHARACTERISTICS

- Performs the measurement of each phase, sequentially, without any change in the connection to the transformer, for each tap changer position.
- Uses a four wire measuring method.
- Automatic magnetization and de-magnetization of the iron core.
- Auto range from 1 mΩ to 1 KΩ.
- The test current range from 5 mA to 20 A is automatically selected.
- Automatic calculus of the resistance per phase.
- The measured value is not affected by temperature variation or/and changes in the test current and with immunity to external perturbations and corrected to a reference temperature.




Test Results of the coil resistance showing a problem in the primary windings

# ETP-4

## Short-circuit Impedance Measurement

### DESCRIPTION

The ETP-4 equipment measures the following for any type of power, distribution, or current transformer:

- Short-circuit Impedance measurement.
- Short-circuit current at the test voltage.
- Short-circuit power loss.

The unit performs the test in a fully automatic way. The test voltage is generated through a motor driven “variac”. This assures the repeatability of the successive tests in terms of the voltage application mode and avoids undesired risks due to sudden transients

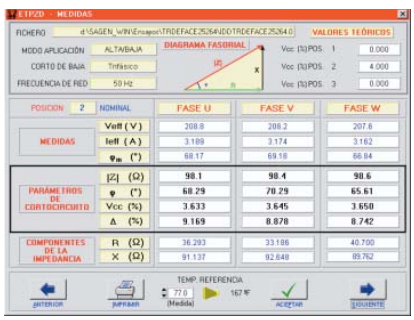
The typical problems that are easily detected with this unit are the following:

- Physical displacement of the transformer windings, due to electromagnetic efforts.
- Problems in the iron core.
- Transport damages.
- Fixation elements which may be broken.

The program obtains from the measured values the components of the impedance triangle in short-circuit. From this information, and its evolution in time it is possible to determine which part of the transformer is being deteriorated.

### CHARACTERISTICS

- The software program guides the correct connection of the test cables on the primary winding and the short-circuits that must be done in the secondary (or tertiary) side, according with the specific connection group the transformer under test has.
- The software program recommends the tap changer positions that should be tested according with the maximum regulation % and the nominal tap.
- Displays and records the current and voltage waveform. This improves the diagnostic capability for further analysis.




Results of the short-circuit tests, indicating changes in the geometric circuit

# ETP System

## Test System for Predictive Maintenance in Power Transformers

Complete ETP system (ETP-1, ETP-2, ETP-3 & ETP-4 with application software)

### CHARACTERISTICS

The combination of the equipment ETP-1, ETP-2, ETP-3, and ETP-4, along with the measurement, diagnostic, and trend software is a powerful tool of transformer maintenance and prediction based on the critical state of the transformer.

The software ETP DiagHelp integrates the results of all the measurements obtained and applies in the knowledge base which visually and directly indicated the critical and important information of the transformer which may require attention in the immediate or short term future.

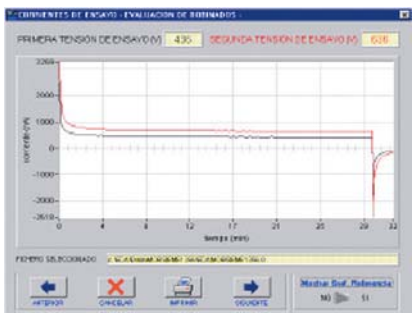
The software ETP Trends is a historical register of the previous test made and offers a visual evolution of all the factors analyzed, allowing a practical planning and maintenance integration avoiding costly close downs or unnecessary substitutions.

The ETP is designed for easy use and accuracy, a good inversion for predictive maintenance in power transformers.

Optional multi-socket power surge protection

# EDA III System

## Evaluation Test for Electrical Rotary Machines



Charge and discharge curves

### APPLICATIONS

The EDA system is ideal for the evaluation and diagnosis of the insulation condition in electrical rotary machines such as motors, generators, alternators, etc. Its main function is to analize the condition of the stator winding insulation, using DC voltage levels without risk to the element under test.

The system obtains various parameters to evaluate the state of each of the components that make up the insulation in a rotary machine. Using these values and changes over time, it is possible to make a reliable diagnosis of the overall condition or specific problems, such as pollution, internal or external humidity, insulation degradation, and partial discharges. The system has been developed using the experiences of users, resulting in a completely automated system with optimized measuring features.

### CHARACTERISTICS

For initial reception and quality control of rotary machines (generators, alternators, LV and MV motors). Forming a part of a maintenance program on rotary machines, where a non-programmed failure would represent a high costs, risks and installation outage, and of course, to verify failures.

To create historical information of the motors, etc. tested as the EDA system generates a report. In this report all technical data of previous tests are presented in a structured manner to easily follow the history of the element tested.

To evaluate the parameters tested, anticipating failures and to diagnose the type of problem, thus planning in advance, the necessary maintenance steps required.


**HEAD OFFICE**

EuroSMC S.A.
Polígono Industrial P-29
Calle Buril, 69
28400 Collado Villalba
Madrid, Spain
Tel: +34 91 8498980
Fax: +34 91 8512553
sales@eurosmc.com
www.eurosmc.com

**USA OFFICE**

NoramSMC Inc.
5840 South Memorial Drive - Suite 208
Tulsa - OK 74145 - USA
Tel: +1 918 622 5725
Fax: +1 918 664 2073
sales@noramsmc.com
www.noramsmc.com

**LATIN AMERICA OFFICE**

EuroSMC S.A.
World Trade Center - Torre C
Calle 100 - Nº 8A - 55. Piso 10
Bogotá -Colombia
Tel: +57 1 638 6125
Fax: +57 1 621 1565
latinam@eurosmc.com
www.eurosmc.com

**ASIAN OFFICE**

EuroSMC S.A.
Room 803, Wellborne Commercial Centre,
8 Java Road, North Point,
Hong Kong SAR.
Tel: +852 3590 2499
Fax: +852 8343 0198
Mob: +852 9151 6899
asia@eurosmc.com
www.eurosmc.com

Cámara Madrid
Con el patrocinio de la Cámara
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