**PHASE ANGLE METER**

**User's Manual**


# PME-20-PH

***REFERENCE: HACVMV02***

***EDITION: August 1,2007***

***VERSION: 2***



*Quality is the core reference for EuroSMC's activities, aimed to fully satisfy our customers' needs and expectations.*

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# 1. INTRODUCTION

From a general point of view, the phase angle reading is a vital piece of information in the commissioning process in almost any electrical installation, despite its size and/or power. Mainly it is used to check the accuracy of the expected phase angles, but also to check the correct phasing in all the elements that are related with measurement and protection. This also applies to the voltage and current instrument transformers. To properly perform this task, a phase angle measurement instrument is required. The phase angle measurement, which is found as a function in almost any multifunction portable meter these days, is not sufficient for this particular application. The application in commissioning requires a wider range in terms of input values and the ability to display angles between two currents or two voltages, instead the classic solution between one voltage and one current.

The PME-20-PH is designed to cover this particular application, bringing the most suitable solutions and facilities to assure a quick, easy, and accurate measurement, saving time and obtaining quality results.

Our address to assist you:

EUROSMC, S.A.
Client Service
Polígono Industrial P-29
Calle Buril 69
28400 Collado Villalba
Madrid (Spain)
Tel: 34-91-849 8980
Fax: 34-91-851 2553
support@eurosmc.com
http://www.eurosmc.com





# 2. MEASURMENT INPUTS

The instrument has 2 main input taps that are completely isolated, they are Channel 1 and Channel 2 marked as CH 1 and CH 2. Each of these inputs has a Common tap (BLACK), a current input tap (GREEN), and a voltage input tap (RED).

The input range is wide both in Current and Voltage. The instrument can accommodate current from 0.1 A to 25 A in the Current input taps (GREEN) and voltage from 0.2 V to 500 V in the Voltage input taps (RED). As there are no parameter ranges, the operator does not need to make any other connections to the inputs.

*ATTENTION: The current input has very low impedance (shunt). Be careful not to connect the current input to a voltage source, as it will produce a short-circuit in the voltage supply. This will not damage the PME-20-PH, but may damage the voltage source if it is not adequately protected.*

Having the ability of the instrument to have low values connected in both Current and Voltage enables the use of Current clamps without the need of cutting off the circuit. The transformer ratio of these Current Clamps is not limited to any type or brand as long as the secondary current is within the current range specified.

For example, the if current being analyzed is around 20 A, a current clamp with a ratio of 1000/5 A can be used as the secondary current would be 0.1 A.

If we measure with lower currents and use a Current clamp (for example 20/5, 100/5, etc), it may occur that the secondary current will be lower than 0.1 A. If this occurs the equipment will not display any reading.

*ADVISE: Any type or brand of current Clamp may be used with the equipment, but one should be aware that the current clamp being used can give an error in the phase angle reading. This depends on the accuracy of the Current Clamp and can influence the reading of the instrument.*





# 3. USE OF THE CONTROLS

The equipment has a membrane keyboard made up of 5 press button keys. Some of the keys have a double function, below each key and all its functions are described.

*ON/OFF:* This key has a double function. By pressing this key for various seconds the unit will turn ON and repeating the same will turn OFF.

The other function associated with this key it that it controls the LCD light. By pressing quickly and lightly the LCD Displays lights up or the Display is not lit.

*MODE:* This key works in a continuos cycle in 3 possible function modes, which can be selected. They are:

- *ANG:* Phase angle measurement between two channels whether it is Voltage or Current or the combination of both. (The equipment starts by defect in this mode)

- *FREQ:* Frequency Measurement. This mode measures the frequency input in Reference Channel 1 (Ch 1), whether it is current or voltage.

- *COS φ:* Power Factor Measurement. This mode measures the power factor between the 2 input channels.

*SET:* Once the mode has been selected, pressing the SET keys enters the instrument in sub menus that must be selected to configure the instrument to the options required.

*↑UP ARROW:* This key has a double function. With this key we can select the menus and sub menus to the option required.

The other function of this key is that it is related to the Display contrast light. By pressing quickly and lightly and on the display will appear a contrast scale bar. By continuing to press this key the contrast scale bar will show the contrast scale and the actual Display light will continue to become dimmer.

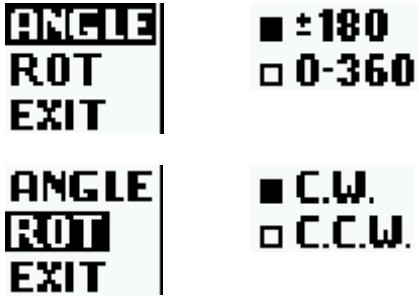
**↓*DOWN ARROW*:** The function of this key is exactly the same as the UP Arrow except enhances the light of the Display.





# 4. MENU DESCRIPTION

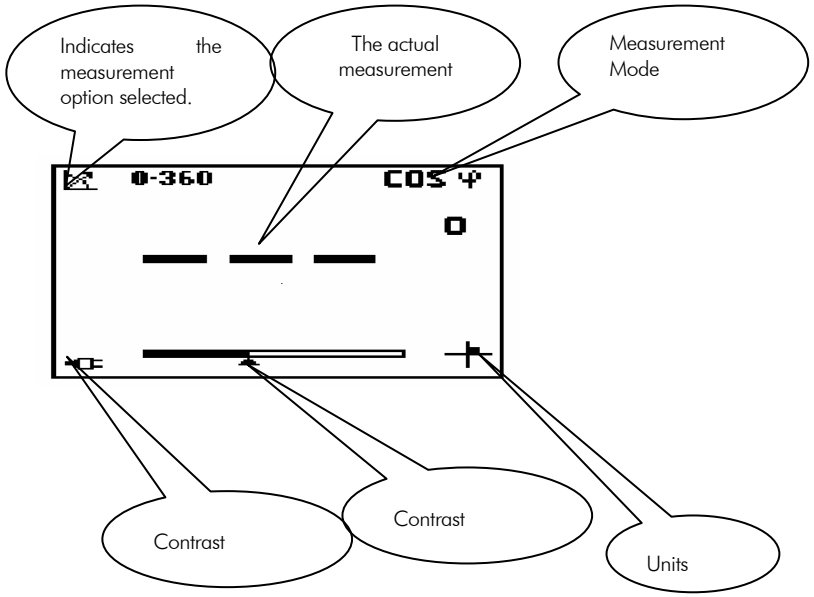
Once we have selected one of the 3 modes, to select menu and sub menus we use the keys **SET, ↑UP, ↓DOWN**. With the instrument ON we make the first selection by pressing the key **SET**, by doing so the first menu appears in which we can select between **ANGLE**, **ROT** (Rotation sense) and **EXIT.** Once one of the 3 choices are made, press again **SET,** and another sub menu will appear in which we can choose the type of angle reading between **[0 – 360º]** or **[+-180º]**, and for the phase angle positive rotation sense, whether they are lagging or leading between **[CCW]** o **[CW]**. (CCW= Counter clockwise and CW= clockwise). Once everything has been selected for the reading, then select **EXIT** and press SET.




The settings made both in Display light contrast and the sub menus selected are stored and are the parameters and are displayed in future measurements. In this way when the equipment is turned off and used at a later date it is not necessary to reconfigure everything again. The last settings made are maintained.

# 5. DESCRIPTION OF DISPLAY

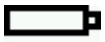
The drawing below shows the Display LCD of the PME-20-PH. A brief description is given of the various icons and abbreviations of this Display








# 6. ICONS



Battery Level indicator. With the instrument turned off and with the battery charge connected, the symbol will be flash while the batteries are charging. **It does not indicate the battery charge level.** When the battery is fully charged it will stop flashing.

When the equipment is turn ON and there is no battery charger connected, then it indicated the level of the battery charge.

Indicates that the Battery Charger is connected and the battery is fully charged.

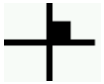
Indicates that the Battery Charger is connected and the equipment may not batteries or that the batteries are charging.


Indicates that the phase angle measurement is between + 180° and -180°. This reading is always measured from the reference channel 1 - Ch 1.


Indicates that the phase angle measurement is between 0 and 360°. This reading is always measured from the reference channel 1 - Ch 1.

Indicates that the phase angle measured with a + sign are moving in Clockwise sense against the reference (Lagging in an ABC system).

Indicates that the phase angle measured with a + sign are moving in Counterclockwise sense against the reference (Leading in an ABC system).



Indicates the quadrant where the vector power is situated. This indicator will only appear when the Power Factor Mode is selected and the interpretation depends on the positive sense of the phase angle rotation as leading or lagging.

Indicates the phase angle value on a linear scale, depending on the phase angle mode ( + 180° and - 180°or 0 and 360°. ). This indicator will only appear when the Phase Angle Mode is selected.

Indicates the contrast level selected. The arrow moves to the right and left depending on the light whether it is increased or decreased. This indicator only appears for a few seconds and once selected will not appear on the Display.

Indicates that there is no measurement signals in the inputs and will also flash. Depending on the Mode selected it may be that there may be a signal necessary in both channels or that ti is not connected to the reference channel 1.





# 7. TECHNICAL SPECIFICATIONS

## *INPUTS:*

- Range of Voltage Input: 0.2 – 500Vrms
- Range of Current Input: 0.1 - 25Arms

Each Input can be either Voltage or Current and have a independent reference.

## *PHASE ANGLE MEASUREMENT*

- Range +/- 180 – 0° 0 – 359,9°
- Accuracy +/- 0.1° +/- 1 digit

In the whole range functions with direct Inputs

## *FREQUENCY MEASUREMENT*

- Range 40 – 50 Hz
- Resolution 0001HZ
- Accuracy +/- 0002Hz

## *LCD DISPLAY*

- Color B/N
- Back Light Yes
- Contrast Adjustable
- Dimensions 62 x 44 cm

## *TEMPERATURE*

- Range 0 – 50°C

## *BATTERY CHARGER*

- DC Voltage 9 – 12 Vdc
- DC Current 1A minimum

Battery Charger is supplied with the instrument

## *BATTERIES*

- Nominal Voltage 1.2 Vdc
- Capacity 1,500 mAh
- Number 4
- Type NiMH
- Duration 2 Hours with back light
- Duration 4 Hours Without back light
- Charge time 3 hours

<u>If Batteries are changed, use NiMH type batteries and voltage</u>

## *OTHER*

- Dimensiones Height: 226 mm
  Width: 115 mm
  Depth: 45 mm
- Weight 600 g With batteries

*ADVISE: When the equipment is used for the first time with new batteries, be sure to make a complete cycle of charging and a full discharge of the battery. This should be done anytime new batteries are used.*





# 8. TECHNICAL ASSISTANCE , AFTER SALES SERVICE AND WARRANTY

## *WARRANTY*

Our warranty expresses the confidence we have in our products, based on the reliability and functions that are expected by our clients.

The warranty covers the repairs and/or replacements of components, which are faulty without costs.

The software designed by EUROSMC, either installed in the product or in the computer, is guaranteed of programming instruction failures.

Period: All products made by EUROSMC are guaranteed for a period of one year from the date and/or day reflected in the warranty, which is included with the unit.

EUROSMC will repair or replace any abnormal function or defects in our product that were not provoked by the following, which may cause the warranty to be revoked:

- Improper use of the product, incorrect connections or operations not specified or explained in this Instruction Manual.
- Any manipulation of the product, repairs, adjustments, or changes, made by unauthorized persons.
- The use of the product outside its specifications.

## *AFTER SALES SUPPORT*

EUROSMC offers the supply of materials and components in all our products for 3 years after the product is no longer manufactured. We offer our technical support for a 5-year period.

## *OTHER EUROSMC PRODUCTS*

For more information of our product range, please consult our local representative or us. We manufacture the following:

- Relay testing equipment for voltage, current, frequency and synchronizing relays.
- Circuit Breaker Analyzers

- Portable timers,
- Alternating current test equipment.
- Current supplies.
- Systems to test MCB's.
- Voltage or current regulation equipment,