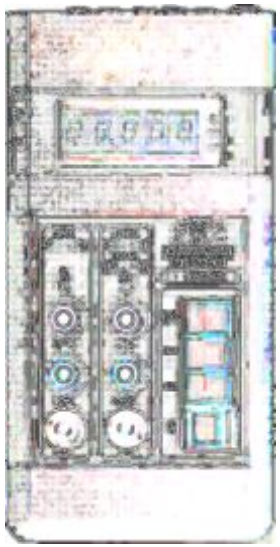
DIGITAL PORTABLE CHRONOMETER

User's Manual



PTE-30-CH

REFERENCE: FACVMV02

EDITION: FEBRUARY 27, 2012

VERSION: 7

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

DISCLAIMER

INDEX

PTE-30-CH PACKING LIST

1 PTE-30-CH unit
1 Calibration certificate
1 Warranty statement and registration form
1 User's Manual
2 Red Cables with 2 red Clips
2 Black Cables with 2 black Clips.
1 Replacement Fuses: 1 Fuse 5x20 0.25A Standard (*). 4 Fuses 5x20 100mA. Fast. *(*) Fuse 5x20 0.5A standard in place of Fuse 5x20 0.25A standard when power supply 125V.*

1. INTRODUCTION

The PTE-30-CH was designed and manufactured as instrument to fulfil the highest levels of quality and standards. Its function is to measure timed events in relay testing and in any temporized time event.

The reduced size and weight, high measurement accuracy, makes this instrument one of the most advance on the market, at this stage.

In achieving this objective, EUROSMC relied on various professionals and companies of recognized prestige, in protection relay maintenance and commissioning. Most of the functions and specifications of the unit were obtained as a result of advice, ideas, and suggestions given by the above mentioned. The most important features of the PTE-30-CH are:

- Robust, mechanical and electrical features.
- Easy transport.
- The capability to have various measurements in one unit to avoid carrying a large number of instruments.
- Easy to operate.

Furthermore, supplied with the PTE-30-CH unit are all the accessories needed for testing, such as cables, clips, transport bag, etc.

In any case, we appreciate suggestions you may have of the PTE-30-CH and this Instruction Manual, in that we always welcome new ideas and advice from users to make our product better. Whatever doubt you may have as an operator, whether it is for applications, use, etc, the technical staff of EUROSMC are at your complete disposal. Our address to assist you:

EUROSMC, S.A.
Pol. Ind. P-29 Calle Buril, 69
28400 Collado Villalba
MADRID (SPAIN)
TEL: 34-91-849.89.80 / FAX: 34-91-851.25.53
sales@eurosmc.com
http://www.eurosmc.com

2. PRINCIPAL FUNCTIONS

2.1. GENERAL

The PTE-30-CH utilizes the latest in high technology electronics. The internal control of the instrument is made by a digital Microprocessor of 8 bits, adequately programmed to achieve the functions necessary.

The equipment has included all the analog and digital electronics necessary to convert the input and output signals to the display.

The unit is designed without any moving parts and in a modular form to reduce and simplify maintenance of the instrument.

Throughout this section we will explain the principal functions of the various systems integrated in the PTE-30-CH.

2.2. TIME MEASUREMENT

The time measurement is carried out by 20 MHz high accuracy crystal quartz.

The measurement is obtained by the microprocessor (μC) and presents this in the display. By pressing the key DISP; seconds, cycles, and the frequency of power supply can be read in the display.

2.3. FREQUENCY MEASUREMENT

This measurement is carried out by the means previously mentioned. The frequency signal level, which can be measured, is 20 to 4,000 Hz with a minimum of 5V.

The measurement is obtained by the microprocessor (μC) and presents the frequency measurement Hz (cycles/s) in the display.

2.4. MONITOR TAP SIGNAL

The instrument has 2 different monitor tap signals. One to start the time measurement and the other to stop time measurement, and as well measures pulses and frequency. These monitors are composed of a circuit, which detects the condition of the power free contacts (dry contact) and the other, which detects the presence of voltage up to 250 V. An explanation of both of these functions is given below.

2.4.1. POWER FREE CONTACT (DRY CONTACT)

This circuit operates by injecting a low current in the test contact, to know if the contact is closed or open. The circuit is activated when the contact is closed. This information is passed to the μ C, which starts or stops the timer reading.

2.4.2 POWER SIGNAL (VOLTAGE CONTACT)

This circuit operates by detecting the presence of voltage from 5V to 250V whether it is ac or dc. The circuit is activated when a voltage between these limits appears. This information is passed to this μ C, which starts or stops the timer reading.

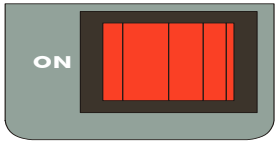
3. CONTROL DESCRIPTION

This section of the manual describes in detail all the controls, optic indicators (leds), displays and connectors of the PTE-30-CH. The situation and indications of these are shown by drawings.

To understand better, we have grouped the following in subgroups.

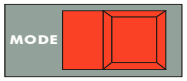
3.1. PRESS BUTTONS AND SWITCH CONTROLS

3.1.1. POWER SUPPLY SWITCH



This is a normal, rocking switch located on the left-hand side of the front panel. The switch is indicated by the word ON. When the switch is ON, voltage is supplied to the unit.

3.1.2. MODE SELECTION BUTTON



This press button is a cycle button, which means that each time it is pressed the mode changes in a sequential way. If the button is pressed for more than 2 seconds and the communication of the BUS is in BUS-PTE, you can select one of the four possible function modes:

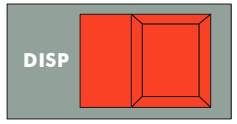
- Start by a signal in the bus and stop by the monitor.
- Start by monitor and stop by a signal in the bus.

- Start and stop by signals in the bus.
- Start and stop by signals in the bus or start and stop by the monitor

The function of this press button is to configure the different function modes which the unit has, to select the start, stop, pulse, or frequency mode.

When in the MENU mode, (see 4.4.12) and the button remains pressed, it will show the in the actual parameter the different options available.

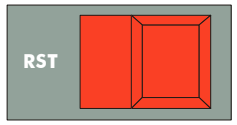
3.1.3. DISPLAY BUTTON



The function of this press button is to set the desired reading to be presented in the Display. Each time the button is pressed the display will show either seconds or cycles.

When in the MENU mode (see 4.4.12), the selection shown, will be accepted when the button remains pressed for more than 1 second. This is indicated, when the display is flashing.

3.1.4. RESET BUTTON.



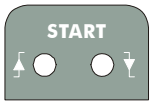
The function of this press button is to return the reading to "0" before starting a new timed reading.

While in MENU mode (see 4.4.12), press and hold this button to view the options available for the parameter currently selected.

3.2. OPTIC AND DISPLAY INDICATORS (LEDS)

This section explains the physical situation, of the led indicators in relation to the corresponding press buttons and switches of the PTE-30-CH. Also explained, are the measuring displays in relation to the buttons which operate them.

3.2.1. START MODE INDICATORS

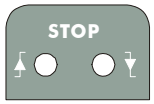


This indicates when the timer will start, when the monitor is activated or non-activated in the M1 taps. There are two red LEDs, which indicate the monitor state. When the left led is lit, it indicates the timer will start when the M1 is activated.

When the right led lit, it indicates the timer will start when the monitor M1 is not activated. These are selected by with the Mode button.

If one of these LEDs is flashing, it indicates the timer will stop by a positive signal or a negative signal from the BUS-PTE. If both LEDs are flashing, it indicates that the timer will stop by a specific signal from the BUS-PTE, recorded in an EEPROM inside the unit for the tests made by software.

3.2.2 STOP MODE INDICATORS

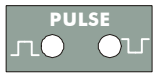


This indicates when the timer will stop when the monitor is activated or non-activated in the taps M2. There are two red LEDs, which indicate the monitor state, when the left led lit it indicates the timer will stop when the monitor M2 is activated.

When the right led lit, it indicates the timer will stop when the monitor M2 is not activated. The Mode button selects these.

If one of these LEDs is flashing, it indicates a positive signal or a negative signal from the BUS-PTE will stop the timer. If both LEDs are flashing, it indicates the timer will stop by a specific signal, from the BUS-PTE recorded in an EEPROM, inside the unit for the tests made by software.

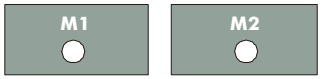
3.2.3. PULSE MODE INDICATORS



Whenever either of the 2 Pulse LEDs lit, it indicates that the chronometer is in the pulse mode. The pulse mode measures the presence or absence of a signal in the monitor taps circuit M2. There are two red LEDs.

When the left led is lit, it indicates that the chronometer will measure the active pulse duration in the monitor, M2. If the right led is lit, it indicates that the chronometer will measure non-active pulse duration in the monitor M2. The Mode button selects these.

3.2.4. MONITOR STATE INDICATOR (M1, M2)



The PTE-30-CH has 2 monitor tap signals, M1 and M2. The state of each is indicated by both red LEDs, marked M1 and M2. When this led is lit, it indicates that the corresponding monitor is activated.

3.2.5. FREQUENCY MODE INDICATOR (FREC)

When lit, it indicates the instrument is in Frequency mode, which measures the frequency signal of a voltage applied in the monitor (M2) and consists of 1 led (RED).

When lit, the timer function is invalidated. This is selected by the Mode button.

3.2.6. DISPLAY PRESENTATION

This highly efficient display consists of 5 digits of 7 segments, along with 3 luminous indicators, which show the reading, whether it be frequency, seconds, or cycles, automatically changing the decimal point.

When working in "Chronometer" mode, and by pressing the display button (DISP), time in seconds(s) or time in the number of cycles will be displayed, calculated with a 50 Hz or 60 Hz, depending on configuration ordered. That is, 20 or 16.6666 ms corresponding to 1 cycle.

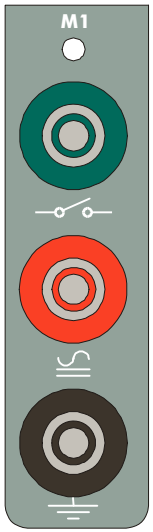
When working the in "Frequency" mode, the instrument automatically changes to read cycles in seconds (Hz).

3.3. INPUT/OUTPUT TAPS AND CONNECTORS

3.3.1. MAIN POWER SUPPLY

Integrated in the top part of the unit, is the power supply connector. It is 2m long, and has a European type plug of 2 poles.

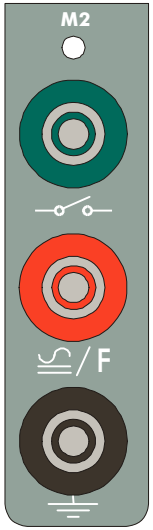
3.3.2. INPUT TAPS OF THE START MONITOR, M1



The monitor M1 has 3, 4mm taps, marked as follows. Common tap (black), power voltage input tap (red) and the dry contact or power free contract tap (green).

This monitor is used to start the timer.

3.3.3. INPUT TAPS OF THE STOP MONITOR, M2



The monitor M2 has 3, 4mm taps, marked as follows. Common tap (black), power voltage input tap (red), and the dry contact or the power free contact tap (green).

This monitor (M2) is used for the following:

- Stop the timer.
- Start and stop the timer, when it is in pulse mode.

Measures the frequency input.

3.3.4. BUS PTE CONNECTOR

This connector is situated on the top section of the timer, it is a 9 pin, female CANON type connector which allows the interconnection of the PTE-30-CH with other equipment in the PTE range, or the connection to an EMU-100 unit or SMC-12 system.

3.4. PROTECTION FUSES

3.4.1. GENERAL POWER SUPPLY FUSE.

This fuse is located on the top section of the unit along with the BUS-PTE. The general power supply fuse protects all power circuits.

This fuse is a standard tubular fuse of 5x20mm and has nominal current of 0.25A, normal speed.

To check or change this fuse, turn the cap of the fuse holder to the left. Take out the fuse and replace, and turn the cap a half turn to the right.

3.4.2. MONITOR INPUT PROTECTION FUSES

These fuses are located on the top section of the unit and are clearly marked. These fuses protect the internal circuits of the PTE-30-CH of any misuse by the user or inputs into the unit. Both fuses are a standard tubular fuse of 5x20mm and have a nominal current of 0.1A, fast fuse (F).

To check or change this fuse, turn the cap of the fuse holder to the left. Take out the fuse and replace, and turn the cap a half turn to the right.

Please Note: Never use fuses other than specified.

4. DESCRIPTION AND USE

4.1. GENERAL

The PTE-30-CH was designed as an instrument to measure time between two predetermined signals. For this reason, once a timed measurement is read, the display becomes blocked and holds the reading. This occurs even if there are other signals given. The timer will not begin to work (function) until the Reset button is pressed. When the Reset button is pressed, the display will return to "0" and the timer is prepared to make a new timed reading.

The time measurement via the BUS-EMU is a function, which is totally controlled by the software supplied with the EMU-100, or SMC-12 system, which it is connected to.

For a better understanding of the BUS-PTE timer function see section 4.3 as there are more details given about this concept "signals by the BUS-PTE".

Another feature, incorporated in the PTE-30-CH, is that the frequency can be measured, this functions as a normal frequency meter.

In the continuation of this section the steps necessary in using the PTE-30-CH will be explained. All the functions will be explained and especially to clarify the function of the Monitor tap signals.

4.2. MONITOR TAP SIGNALS

The monitor tap signal is the "Interface" between the instrument and the external elements.

The PTE-30-CH has 2 monitor signals, M1 and M2. Each one is capable of working with 2 types of signals. They are:

4.2.1. DRY CONTACT OR VOLTAGE FREE SIGNALS

The black tap (common) and the green tap (contact) are used to detect the operation of a dry contact. This contact must be absolutely free from voltage, if not, the corresponding fuse will break.

Once the monitor is connected, and the contact is closed, the monitor led marked M (red) will be lit. If the contact is open, the monitor led marked M will not be activated, and therefore not lit.

When the PTE-30-CH is configured to work in the BUS-PTE, the M1 or M2 monitors become active when there is a transmission of a positive signal and

becomes inactive when it receives a negative signal. If this does not occur if the timer is in the FREQUENCY MODE (see 4.4.7)

4.2.2. VOLTAGE SIGNALS

The black tap (common) and the red tap (voltage) are used to detect this signal. The operating margin is 5 to 250V in ac or dc. If the voltage is higher than 250V the corresponding fuse will break.

Once the monitor is connected, and the voltage value is between the specification limits, the monitor led marked M1 or M2 (red) will be activated and lit.

When the PTE-30-CH is configured to work in the BUS-PTE, the M1 or M2 monitors become active when there is a transmission of a positive signal. This does not occur if the timer is in the FREQUENCY MODE (see 4.4.7).

If no voltage is detected or is less than 5V the monitor is not active and the monitor led marked M1 or M2 will not be lit.

In the PTE-BUS the M1 or M2 monitor becomes inactive when it receives a negative signal. This does not occur if the timer is in the FREQUENCY MODE (see 4.4.7).

The PTE-30-CH uses the monitor M1 as the starting system of the timer and monitor M2 stops the timer. This also works in the same manner, to measure pulse duration and frequency.

4.3. SIGNALS IN THE BUS-PTE

The PTE Range equipment has been designed in such a way that test equipment can be interconnected via the BUS-PTE connector, thus forming a stronger system when testing. The equipment not only receives orders by software, but can also give information of determined signals. Opening and closing of a dry contact, signal cut off, a change in a output signal, change in a phase signal, etc.

These signals carry information from their origin (PTE equipment which produces them), in allowing a detailed timer program from the test software.

These signals can be positive or negative; the positive signals are as follows:

- Monitor active in a PTE equipment
- Output active in a PTE equipment

- A signal changing to a second level
- Changing an output or phase value to a second level
- Etc.

The negative signals are as follows:

- Monitor becomes non-active
- Equipment output is cut off
- Changing to a minor level
- Etc.

In any case, the documentation/instruction manuals supplied with the PTE equipment, gives the information of the signal transmitted to the BUS-PTE.

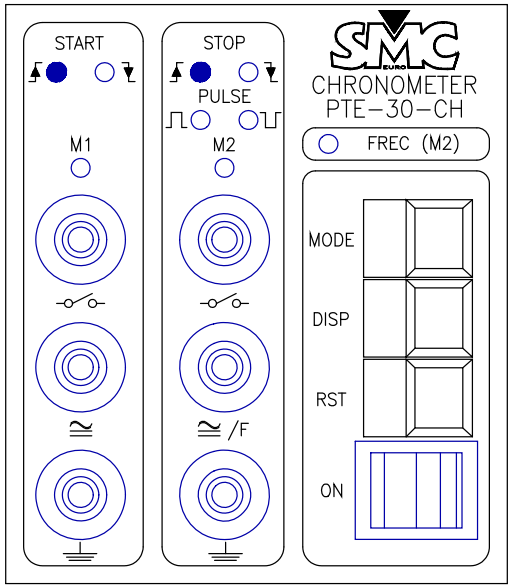
4.4. USE

The following explains the now to make various tests and measurements. To explain these in detail we will show the front panel of the timer, selecting the various function modes.

In the following drawings the leds are lit, when they are colored in dark.

4.4.1. THE TIMER STARTS WHEN M1 IS ACTIVATED AND STOPS WHEN M2 IS ACTIVATED

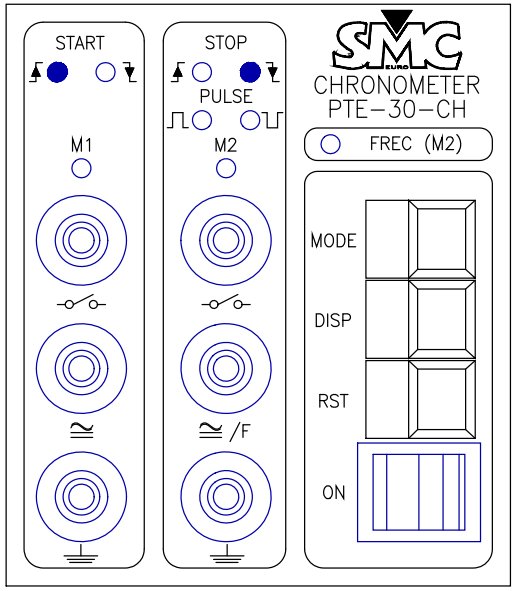
The configuration is as follows:



The timer will start when monitor M1 is activated and will stop when the monitor M2 is active. If the monitor M1 is active when the timer is RESET, the timer will not start until the Monitor is not active and is activated again.

4.4.2. THE TIMER STARTS WHEN M1 IS ACTIVATED AND STOPS WHEN M2 IS NOT ACTIVE

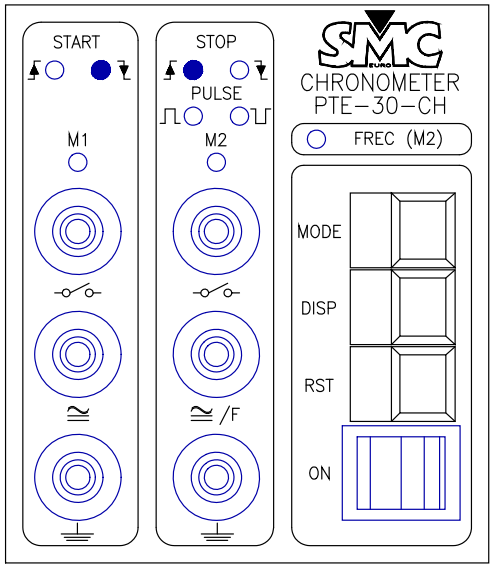
The configuration is as follows:



The timer will start when monitor M1 is activated and will stop when monitor M2 is not active. If the monitor M1 is active when the timer is RESET, the timer will not start until the Monitor is not active and is activated again.

4.4.3. THE TIMER STARTS WHEN M1 IS DEACTIVATED AND STOPS WHEN M2 IS ACTIVE

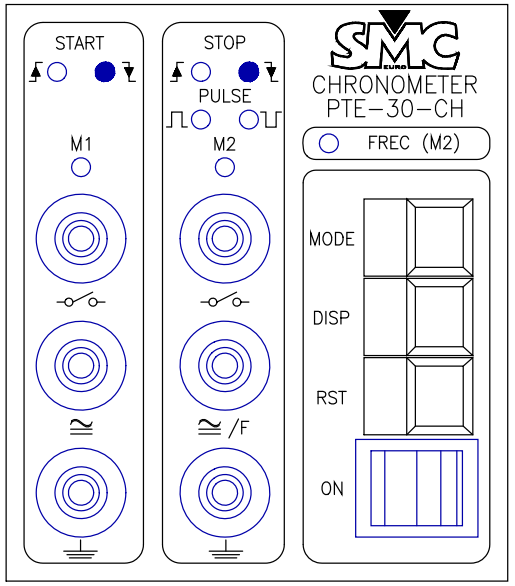
The configuration is as follows:



The timer will start when monitor M1 is deactivated and will stop when activated M2 is active. If the monitor M1 is not active when the timer is RESET, the timer will not start until the Monitor is active and is deactivated again.

4.4.4. THE TIMER STARTS WHEN M1 IS DEACTIVATED AND STOPS WHEN M2 IS NOT ACTIVE

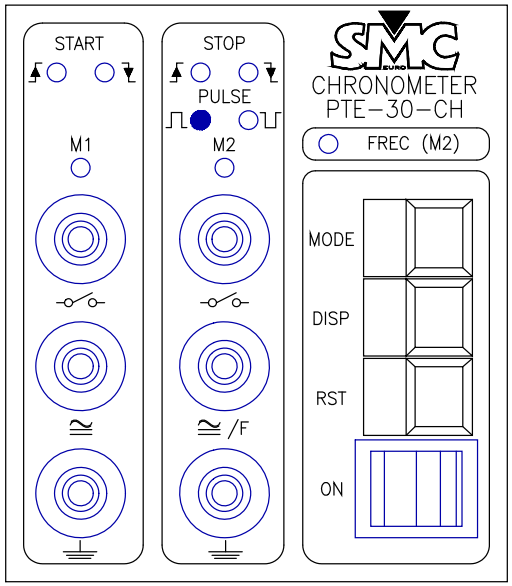
The configuration is as follows:



The timer will start when monitor M1 is deactivated and will stop when M2 is not active. If the monitor M1 is not active when the timer is RESET, the timer will not start until the Monitor is active and is deactivated again.

4.4.5. MEASURING AN ACTIVE PULSE DURATION IN THE MONITOR, M2

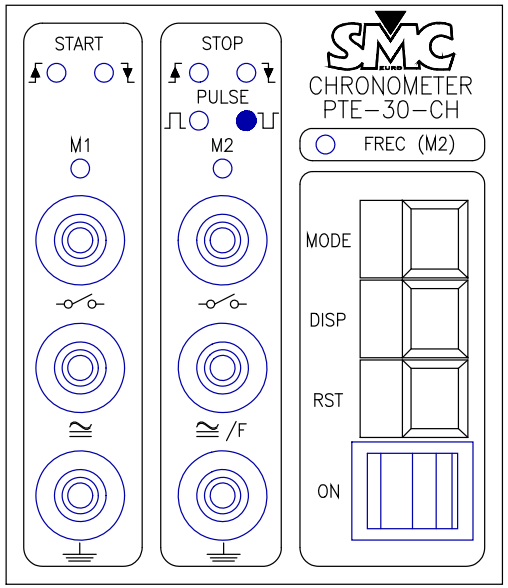
The configuration is as follows:



The timer starts when the taps M2 are activated, and measures the time of this active pulse. The timer will stop when it is deactivated.

4.4.6. MEASURING A NON ACTIVE PULSE DURATION IN THE MONITOR, M2

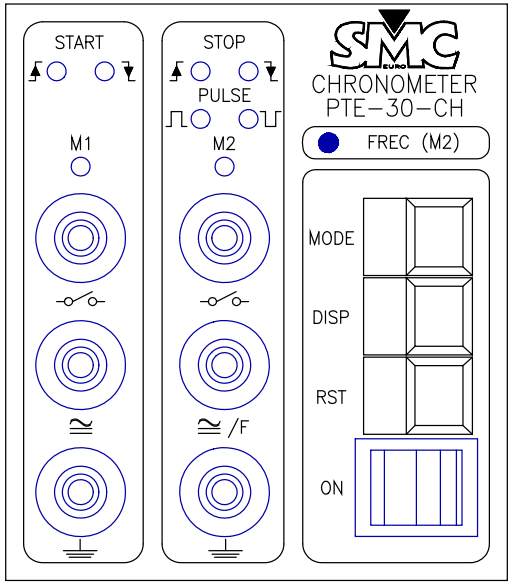
The configuration is as follows:



Timer starts when the monitor tap M2 is deactivated, and measures the time it is not active and stops when here is active.

4.4.7. FREQUENCY MEASUREMENT

The configuration is as follows:

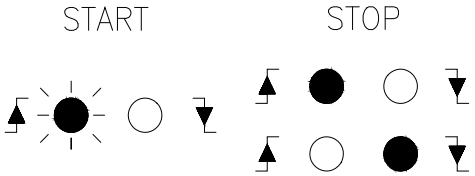


The Frequency measurement has a lapse period of 5 seconds before it is correctly shown in the Display.

4.4.8. START BY BUS-PTE AND STOP BY M2

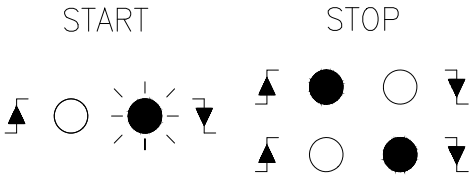
There are 6 different configurations:

a) Start by a positive signal in the BUS-PTE



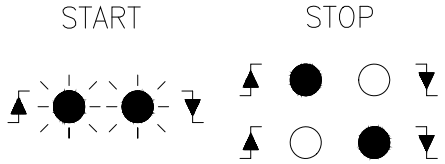
The timer will start when any PTE unit has transmitted a positive signal, via the BUS-PTE and will stop according to the signal programmed in M2.

b) Start by a negative signal in the BUS-PTE



The timer will start when any PTE unit has transmitted a negative signal, via the BUS-PTE and will stop according to the signal programmed in M2

c) Start by a specific signal in the BUS-PTE

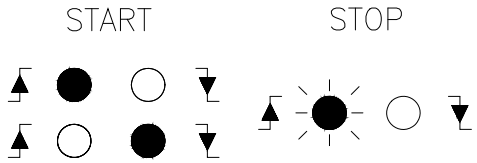


The timer will start when a PTE unit has transmitted via the BUS-PTE a specific signal and STOP according to what has been programmed in M2. The specific signal is made by software defined in the unit PTE and the specific signal is made by adequate test software.

4.4.9. START BY M1 AND STOP BY BUS-PTE

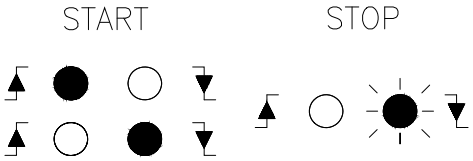
There are 6 different configurations

a) Stop by a positive signal in the BUS-PTE



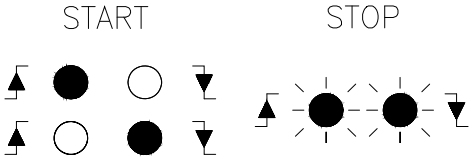
The timer will start according to the signal programmed in M1 and stop when any PTE unit has transmitted

b) Stop by a negative signal in the BUS-PTE



The timer will start according to the signal programmed in M1 and stop when any PTE unit has transmitted a negative signal, via the BUS-PTE.

c) Start by a specific signal in the BUS-PTE

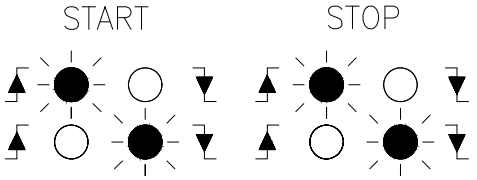


The timer will start according to the signal programmed in M1 and stop when the PTE unit has transmitted a specific signal via the BUS-PTE. The specific signal is made by software defined in the unit PTE and the specific signal is made by adequate test software.

4.4.10. START AND STOP BY THE BUS-PTE

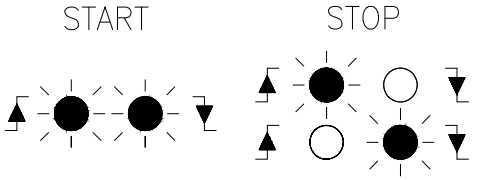
There are 9 different configurations

a) Stop and Start by positive and negative signals



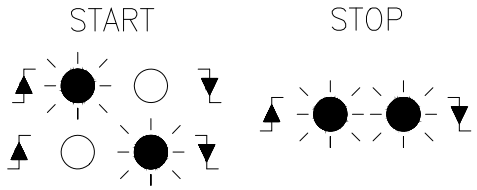
The timer will start when any PTE unit has transmitted a positive or negative signal, via the BUS-PTE and will stop when a negative or positive signal is transmitted

b) Start by a specific signal and stop by a positive or negative signal



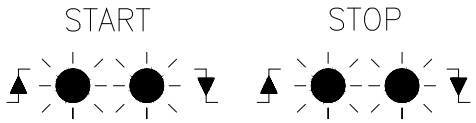
The timer will start when any PTE unit has transmitted specific signal, via the BUS-PTE and will stop when any PTE unit, via the BUS-PTE transmits a negative or positive signal.

c) Start by positive and negative signals and stop by a specific signal



The timer will start when any PTE unit has transmitted a positive or negative signal, via the BUS-PTE and will stop when any PTE unit has transmitted specific signal, via the BUS-PTE.

d) Stop and Start by specific signals



The timer will start when any PTE unit has transmitted specific signal, via the BUS-PTE and will stop when any PTE unit has transmitted specific signal, via the BUS-PTE.

4.4.11. TIME MEASUREMENT WITH THE EMU-100

When the PTE-30-CH is configured to work with an EMU-100 unit or a SMC-12 system (see 4.4.12), the chronometer will measure time signals that occur in the EMU associated with the timer. The test software, supplied with the EMU automatically makes this configuration of the PTE-30-CH to the BUS-EMU.

4.4.12 MENU MODE

It is possible to modify the behavior of the PTE-30-CH communication BUS directly from the front panel controls, of the timer.

If the MODE and DISP button are pressed simultaneously the unit will leave the normal function mode and enter to the MENU mode. In this mode, some parameters of the PTE-30-CH can be modified permanently. When working in

the MENU mode and the buttons remain pressed the parameters that can be changed / modified will appear in a rotating sequential way.

The different options available in the MENU mode are:

1. PRINT: Functions only in BUS-PTE. This option is selected when the button DISP (Button to accept the function) remains pressed and the timer is configured in BUS-PTE.

The PTE-30-CH initiates the process to send data to a PTE equipment connected to the BUS-PTE and at the same time *a printer connected to the RS-232 connector*. This process may take various seconds.

2. COMMUNICATION BUS: This option selects the 2 possible communication Buses; BUS-PTE or BUS-EMU. To confirm the function press the DISP button.

3. ADDRESS: To be able to connect in the same BUS (PTE or EMU) various PTE-30-CH timers to function independently, it is necessary to assign each of them a different address. In the BUS-PTE you can select between 1 and 7, and in the BUS-EMU you can select between 01H and 7FH.

When purchasing this timer with a software package, you should not change the address sent by the manufacturer, as the timer may not respond to the BUS it was connected to.

To accept the address, press the button DISP.

4. PROGRAMMING: Function only in BUS-PTE. With this option you can enable / disable the start and /or stop of the timer by a specific signal of the BUS-PTE from a software programmed test. To activate/non activate the detection of these signals the button DISP must be pressed. If the signal received was recorded in an EEPROM, the 2 stop or start LEDs will begin to flash.

When the 2 buttons DISP and RST are pressed simultaneously the unit will exit the MENU mode and return to the normal function mode.

5. SPECIFICATIONS.

Voltage Supply: 220V±10% 50-60Hz 3VA.

Display reading: Led with 5 digits, 7 segments.

Measurement range: 3 modes:

- S Mode: 00.000-99999 s
- Cycle Mode: 0000.0-9999.9 cycles
- Frequency Mode: 20.000-4000.0Hz

Functions:

- Start/Stop: time between two events.
- Pulse: measures the time of a signal pulse.
- Frequency: Reads the signal frequency in the input taps.

Accuracy: ±0,01% ±1msg.

Temperature Range:

- Accuracy range: 20-30°C.
- Working range: 0-50°C.

Contact input:

- Open circuit voltage 10.2V.
- Short circuit current 25mA.

Voltage input:

- 5-250Vcc o Vca.
- Frequency: 20-4000 Hz.
- Input Impedance: 19kΩ.

Dimensions:

- Height: 190mm.
- Width: 100mm.
- Depth: 40mm.
- Weight: 1Kg.

6. After-sales Service and Warranty

6.1. WARRANTY

This is an expression of trust that our products obtain, based on the reliability and functionality standards that our customers expect.

The warranty covers the free replacement or repair of defective components for one year in the terms specified in the supplied warranty statement and registration card.

Damages resulting from improper handling of the product, use outside the scope and limits of the product's specifications, negligence, installation not in accordance with the standards or warnings listed in the Instructions Manual and servicing or manipulation by unauthorized persons are not covered by the warranty.

6.2. CUSTOMER SUPPORT

EUROSMC guarantees the supply of materials and components for its products up to 3 years after discontinuation. This support is extendable to 5 years for technical service.

6.3. OTHER EUROSMC PRODUCTS

Portable Relay Test Equipment and Software

Primary injection units up to 20,000 A

Circuit breaker analyzer

Digital handheld phase angle meter

Digital Portable micro ohmmeter up to 100 A test current

Test systems for automatic miniature circuit breakers

Voltage and current regulation equipment

Step & Touch Voltage measurement equipment

Power transformer condition analysis equipment

Rotary machine condition analysis equipment