X3M
Flash N (new)

Energy Data Manager
&
Electric Energy Analyzer

Installation Manual

Unless specifically itemized, this instructions manual is common to both the instruments type X3M and Flash N.

Edition 2 September 2005
The document is subject to modification without prior notice.

ELECTREX
the energy saving technology
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INTRODUCTION

We thank you for choosing an Akse instrument
We invite you to carefully read this instructions manual for the best use of the **X3M** instruments.

1.1 COPYRIGHT

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1.2 WARRANTY

This product is covered by a warranty against material and manufacturing defects for a period of 36 months period from the manufacturing date
The warranty does not cover the defects that are due to:
• Negligent and improper use
• Failures caused by atmospheric hazards
• Acts of vandalism
• Wear out of materials
Akse reserves the right, at its discretion, to repair or substitute the faulty products
The warranty is not applicable to the products that will result defective in consequence of a negligent and improper use or an operating procedure not contemplated in this manual.

1.3 RETURN AND REPAIR FORMALITIES

Akse accepts the return of instruments for repair **only** when authorized in advance. For instrument purchased directly, the repair authorization must be requested to Akse directly by using the enclosed RMA form. We recommend otherwise to contact your local distributor for assistance on the return/repair formalities. In both the cases, the following information must be supplied:
- Company full data
- Contact name for further communication
- Product description
- Serial number
- Description of the returned accessories
- Invoice / Shipping document number and date
- Detailed description of the fault and of the operating condition when the fault occurred

The Akse repair lab will send the authorization number to the customer directly or to the distributor as per applicable case.
The RMA authorization number shall be clearly marked on the packaging and on the return transport document.
WARNING: *Failure to indicate the RMA number on the external packaging will entitle our warehouse to refuse the delivery upon arrival and to return the parcel at sender's charge.*

The material must be shipped:
- within 15 working days from the receipt of the return authorization number
- free destination i.e. all transport expenses at sender's charge.
- to the following address: **Akse S.r.l.**
            Via Aldo Moro, 39 - 42100 Reggio Emilia (RE) - Italy
             Atn. Repair laboratory
- the units covered by warranty must be returned in their **original packaging**.

1.3.1 RE-SHIPPING OF REPAIRED PRODUCT

The terms for re-shipment of repaired products are ex-works, i.e. the transport costs are at customer charge. Products returned as detective but found to be perfectly working by our laboratories, will be charged a fixed fee (40.00 Euro + VAT where applicable) to account for checking and testing time irrespective of the warranty terms.

1.3.2 Return Material Authorization (RMA form)

Request for the authorization number for the return of goods

Date:

Company:

Contact name:

TEL:	FAX:

Product description:

Serial number:

Description of the returned accessories (if any):

Original purchase Invoice (or Shipping document) number and date.
NB: The proof of purchase must be provided by the customer. Failure to complete this area will automatically void all warranty.

Detailed description of the malfunction and of the operating conditions when the fault occurred

☐ Tick off for a quotation
Should a product be found by our laboratories to be perfectly working, a fixed amount of **40 Euro** (+VAT if applicable) will be charged to account for checking and testing time irrespective of the warranty tems.

<div align="center">Space reserved to AKSE</div>

R.M.A. No.

The RMA number shall be clearly indicated on the external packaging and on the shipping document:. Failure to observe this requirement will entitle the AKSE warehouse to refuse the delivery.

2 Safety

This instrument was manufactured and tested in compliance with IEC 61010 class 2 standards for operating voltages up to 250 VAC rms phase to neutral.
In order to maintain this condition and to ensure safe operation, the user must comply with the indications and markings contained in the following instructions:

- When the instrument is received, before starting its installation, check that it is intact and no damage occurred during transport.
- Before mounting, ensure that the instrument operating voltages and the mains voltage are compatible then proceed with the installation.
- The instrument power supply needs no earth connection.
- The instrument is not equipped with a power supply fuse; a suitable external protection fuse must be foreseen by the contractor.
- Maintenance and/or repair must be carried out only by qualified, authorized personnel
- If there is ever the suspicion that safe operation is no longer possible, the instrument must be taken out of service and precautions taken against its accidental use.
- Operation is no longer safe when:
  1) There is clearly visible damage.
  2) The instrument no longer functions.
  3) After lengthy storage in unfavorable conditions.
  4) After serious damage occurred during transport

The instruments X3M and Flash must be installed in respect of all the local regulations.

2.1 Operator safety

Warning: Failure to observe the following instructions may lead to a serious danger of death.

- During normal operation dangerous voltages can occur on instrument terminals and on voltage and current transformers. Energized voltage and current transformers may generate lethal voltages. Follow carefully the standard safety precautions while carrying out any installation or service operation.
- The terminals of the instrument **must** not be accessible by the user after the installation. The user should only be allowed to access the instrument front panel where the display is located.
- Do not use the digital outputs for protection functions nor for power limitation functions. The instrument is suitable only for secondary protection functions.
- The instrument must be protected by a breaking device capable of interrupting both the power supply and the measurement terminals. It must be easily reachable by the operator and well identified as instrument cut-off device.
- The instrument and its connections must be carefully protected against short-circuit.

Precautions: Failure to respect the following instructions may irreversibly damage to the instrument.

- The instrument is equipped with PTC current limiting device but a suitable external protection fuse should be foreseen by the contractor.
- The outputs and the options operate at low voltage level; they cannot be powered by any unspecified external voltage.
- The application of currents not compatible with the current inputs levels will damage to the instrument.
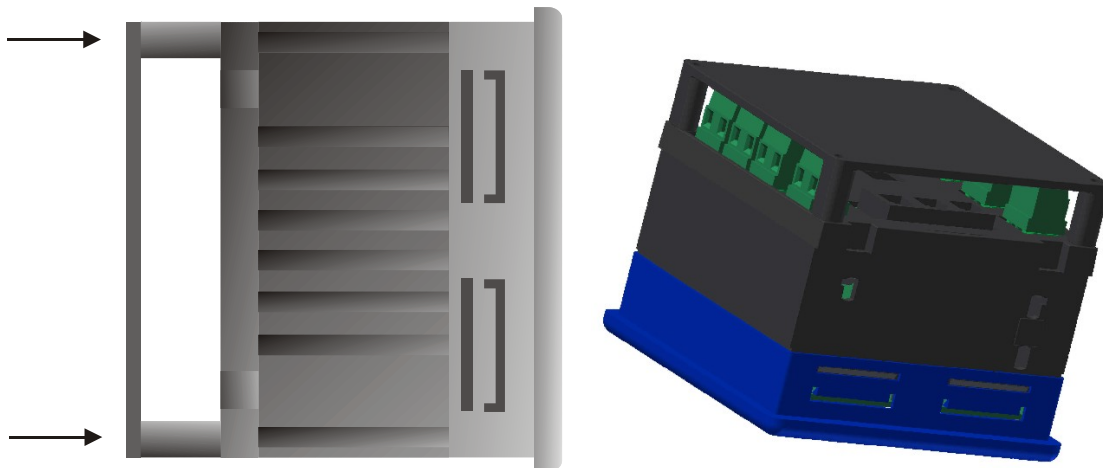
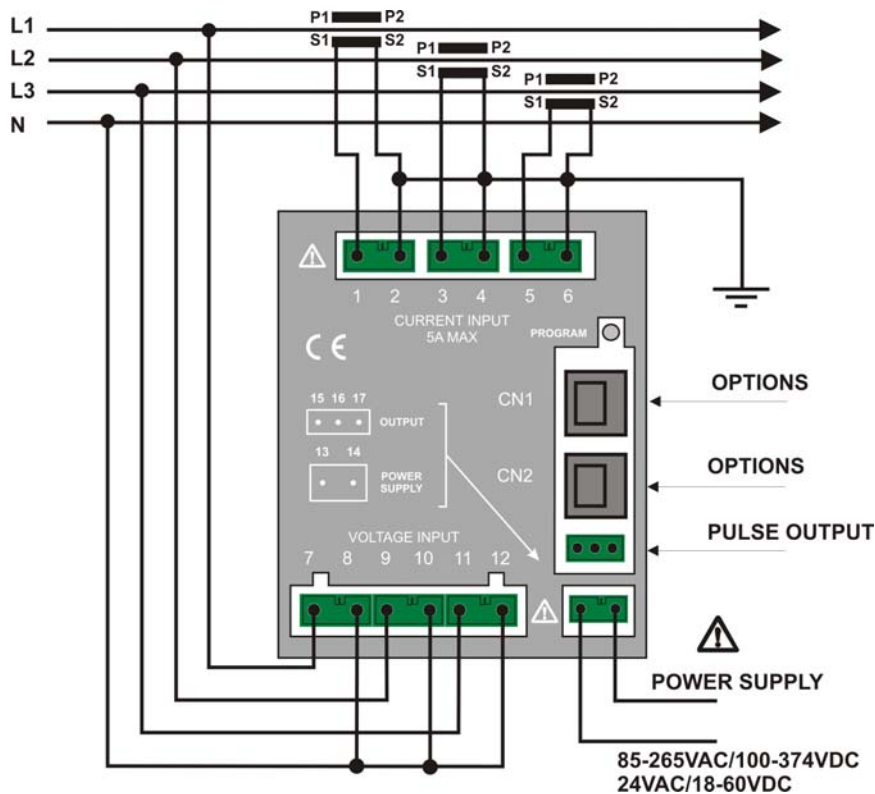# 3　Mounting

3.1　Dimensions (mm)
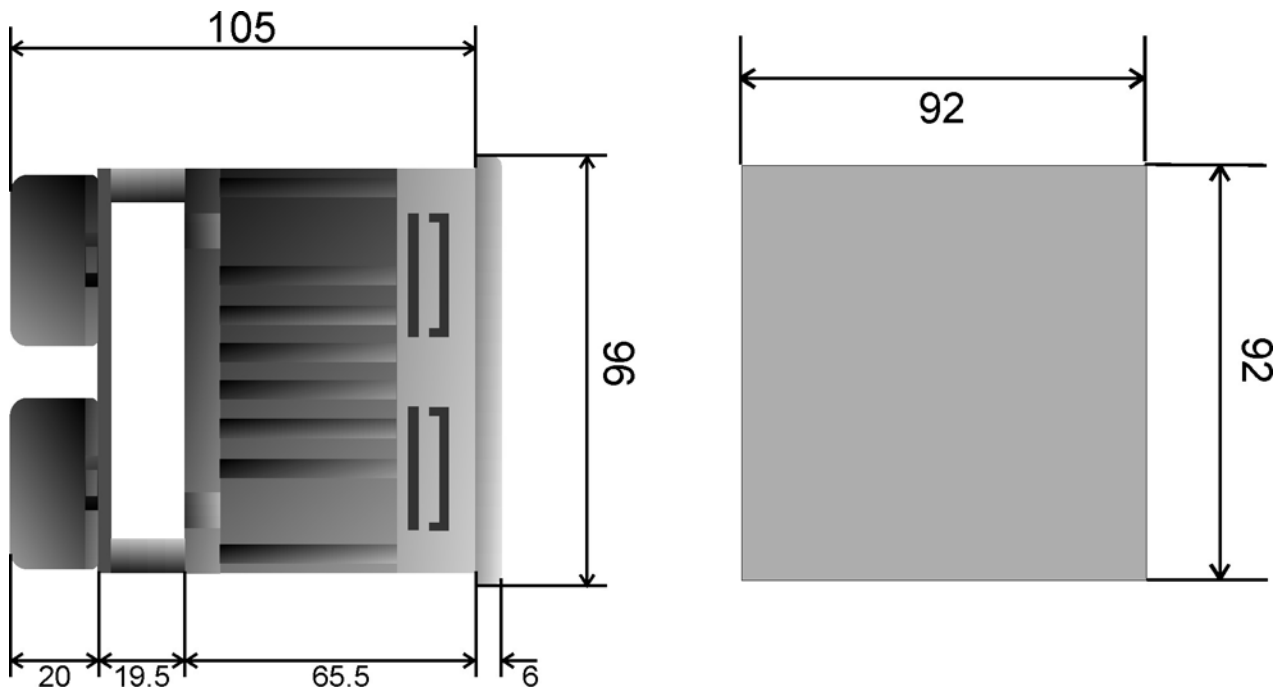
3.2　Fixing and blocking

The connection terminals of the instrument are held in place by a plastic panel, which must be mounted using 4 screws (supplied). This set up will prevent the disconnection of the current measurement terminals.
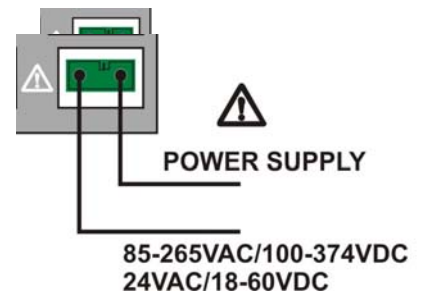
4   Wiring Diagrams

4.1   Power Supply

The instrument is fitted with a separated power supply with extended functioning range. The terminals for the power supply are numbered (13 and 14). Use cables with max cross-section of 4 mm^2.

4.2   Measurement Connections
4.2.1   Voltage connection

Use cables with max cross-section of 4 mm^2 and connect them to the terminals marked VOLTAGE INPUT on the instrument according to the applicable diagrams that follow.

4.2.2   Current connection

It is necessary to use external CTs with a primary rating adequate to the load to be metered and with a 5A secondary rating. The number of CTs to be used (1, 2 or 3) depends upon the type of network.
Connect the CT output(s) to the terminals marked CURRENT INPUT of the instrument according to the applicable diagrams that follow.
Use cables with cross-section adequate to the VA rating of the CT and to the distance to be covered. The max cross-section for the terminals is 4 mm^2.
N.B. The CT secondary must always be in short circuit when not connected to the instrument in order to avoid damages and risks for the operator.

Warning: THE PHASE RELATIONSHIP AMONG VOLTAGE AND CURRENT SIGNALS MUST BE CAREFULLY RESPECTED. ALL DISREGARD OF THIS RULE OR OF THE WIRING DIAGRAM LEADS TO SEVERE MEASUREMENT ERRORS.

4.2.3 4W Star Connection (4 wires)
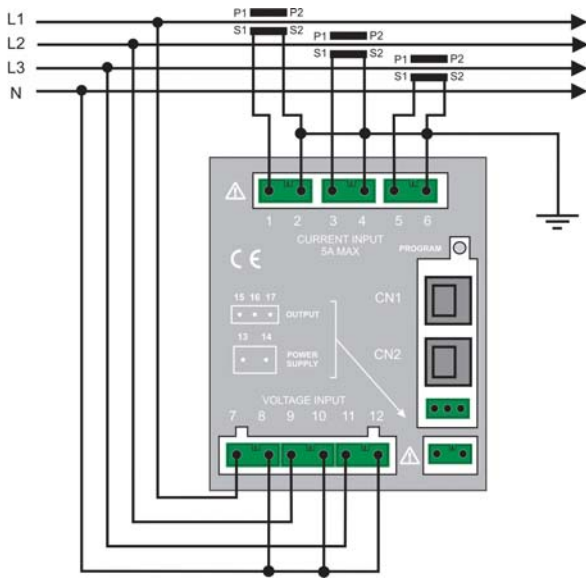
Low voltage   3 CTs
3P 4W Configuration
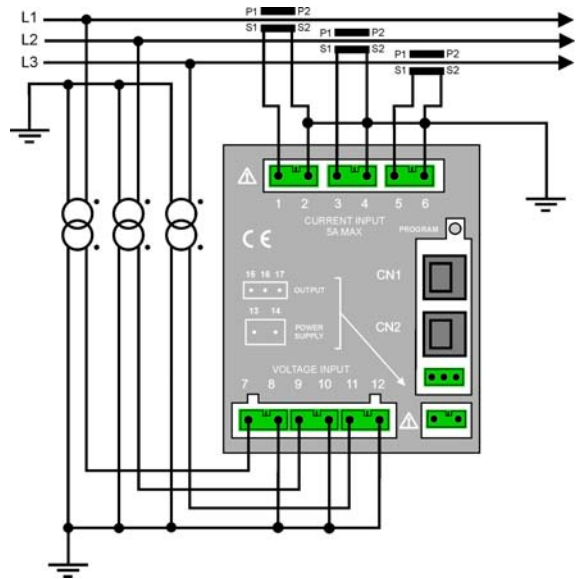
Average or high voltage 3 TCs 3 CTs
3P 4W Configuration
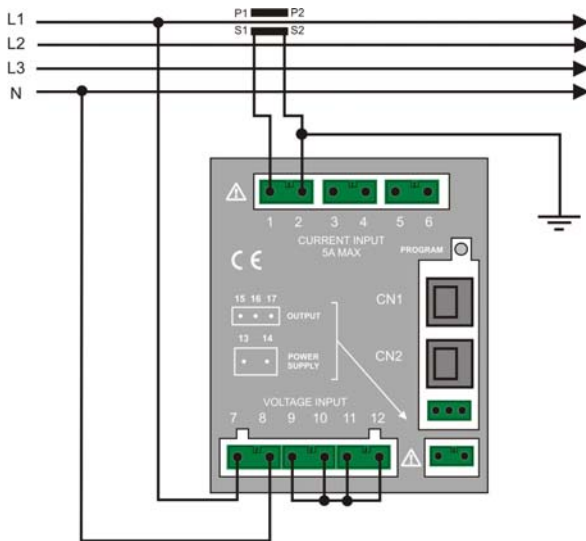
Low Voltage 1 CT (balanced and symmetric)
3P-b 4W Configuration

4.2.4 3W Delta Connection (3 wires)

Connection with 3 CTs   Connection with 1CT
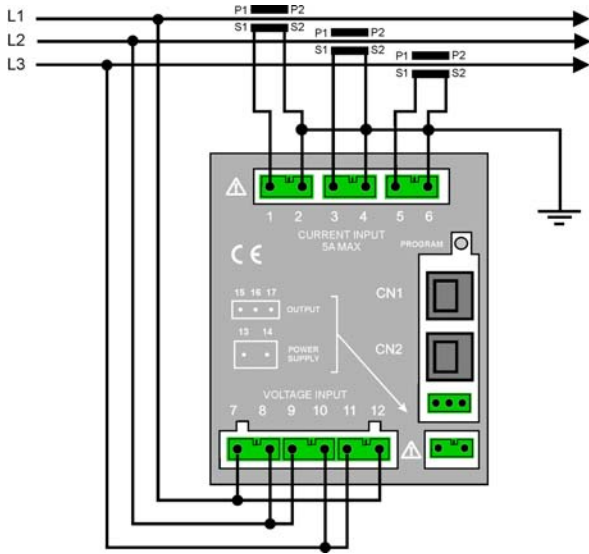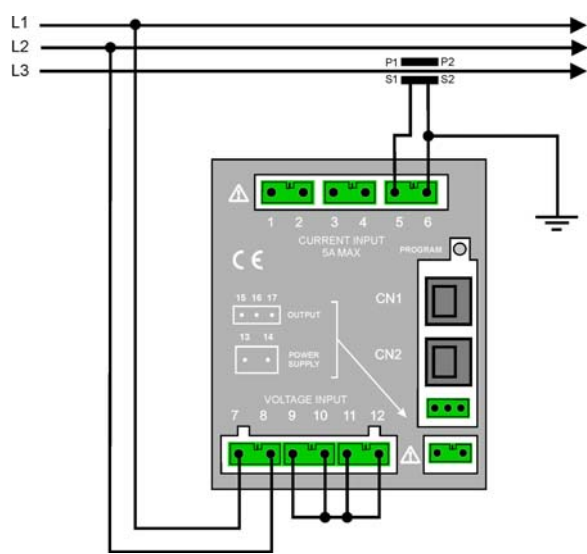
Low Voltage   3 CTs   Low Voltage 1 CT (Balanced and symmetric)
3P 3W Configuration   **3P-b 3W Configuration**

4.2.4.1   Connection with 2 CTs on L1 and L3
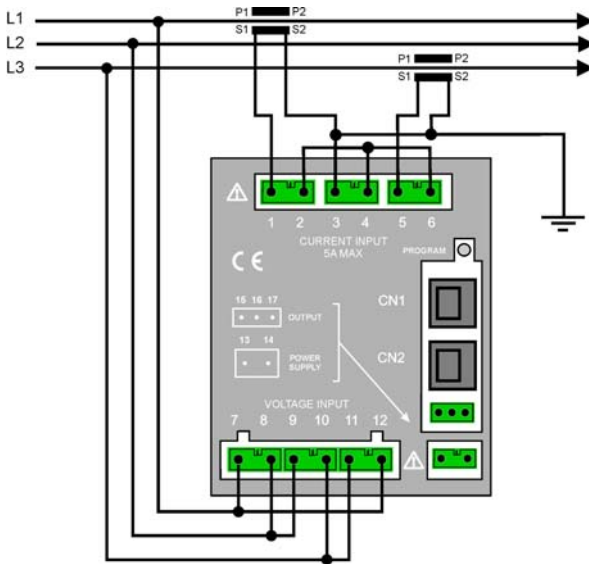
Low Voltage   Average or High Voltage
3P 3W Configuration   **3P 3W Configuration**

4.2.4.2 L1 L2 Phase Connection with 2 CTs
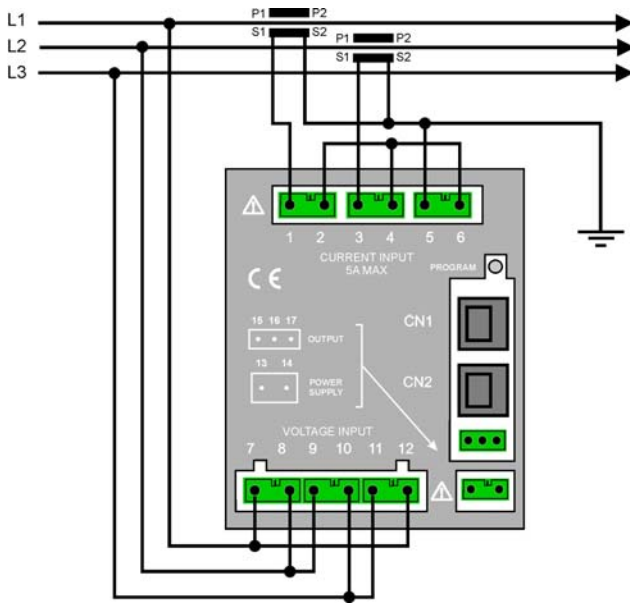
Low Voltage 2 CTs
3P 3W Configuration
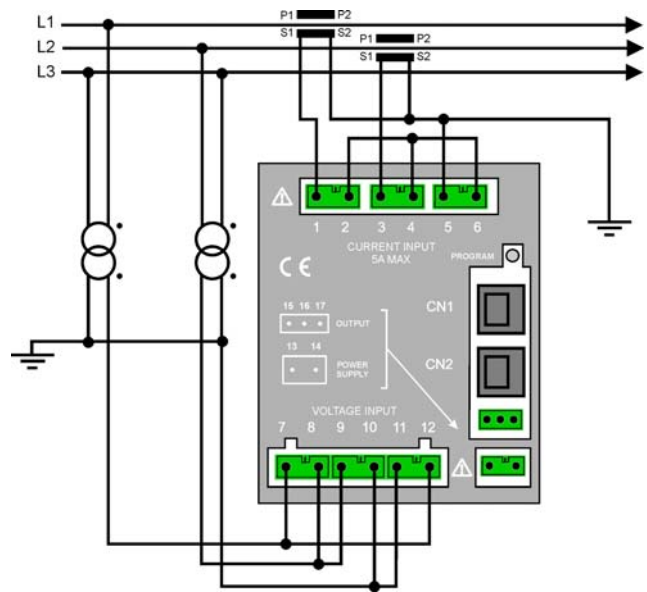
Average or High Voltage 2 CTs 2 TCs
3P 3W Configuration

4.2.5 2 Wire Connection (single phase)
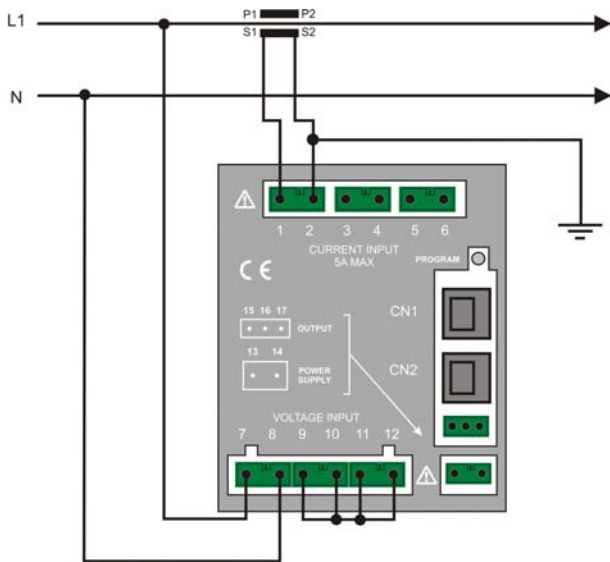
Low Voltage Phase Neutral 1 CT
1P 2W Configuration

4.2.6   2 Wire Connection (double phase)
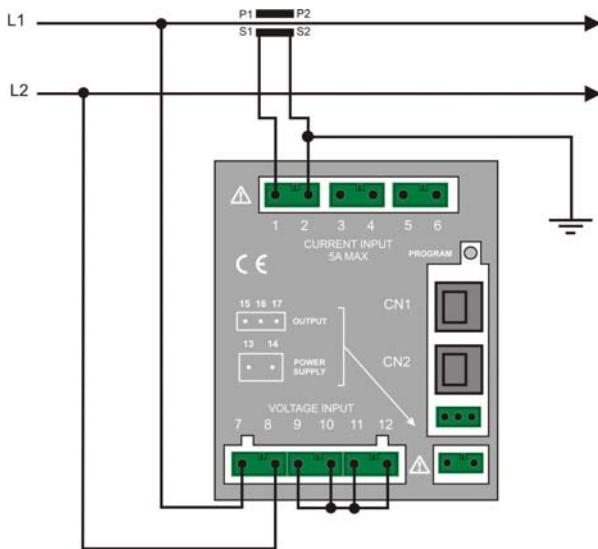
Low Voltage Phase Phase 1 CT
2P 2W Configuration

4.3   Output Impulses Connection

The instrument is equipped with two opto-isolated transistor outputs rated 27 Vdc, 27 mA (DIN 43864 standards).
The outputs working mode is set by default to operate as pulse output proportional to the Active energy (output 1) and to the Reactive energy (output 2). They support an output rate of 1.000 pulses per kWh (or kvarh) referred to the instrument input range without any CT and PT multiplier.
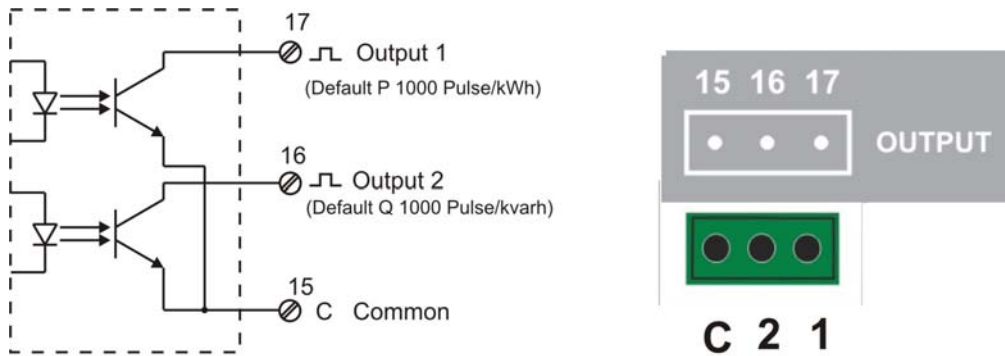
In order to calculate the energy value of each pulse the following formula must be considered.

$$K_P = \frac{K_{CT} \times K_{PT}}{Pulse / kWh}$$ Where: K_p = energy of each pulse; K_{CT} = CT ratio ; K_{PT} = PT ratio ;

Pulse/kWh = Pulse rate

Example: CT = 100/5;   PT = 20.000/100 $K_P = \dfrac{20 \times 200}{1000} = 4\,kWh / pulse$ or **kWh** = Pulse count / 4

Other pulse rate settings may be however programmed as described in the instrument set up section.

The operating mode of the digital outputs may also be changed to work as alarm output or as remote output device controlled by the Modbus protocol as described in the instrument set up section.

4.4   Connecting Optional Components

The optional components of X3M are assembled on the back panel of the instrument, where the RJ45 connectors are located
The optional component feature settings are only displayed when one of them is connected to the instrument
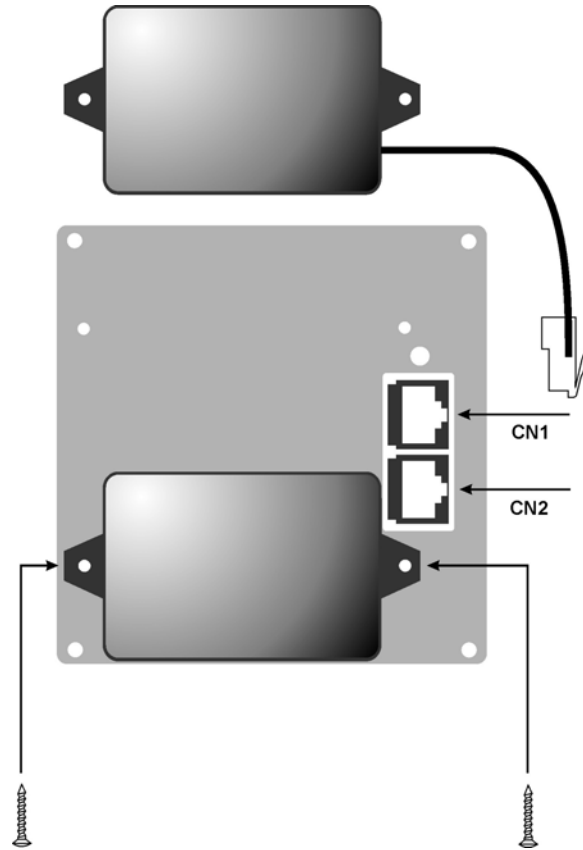
CN1 = *connector: suitable for the 4-20 mA optional module or for the Hardware up-date key*
CN2 = connector: suitable for the RS485 or RS232 optional modules

4.4.1   RS485 Option

4.4.2 RS232 Option

2	RD (Data to DTE)
3	TD (Data from DTE)
5	GND
6	DSR (Handshake to DTE)
7	RTS (Handshake from DTE)
8	CTS (Handshake to DTE)

RS232 INTERFACE

CN2
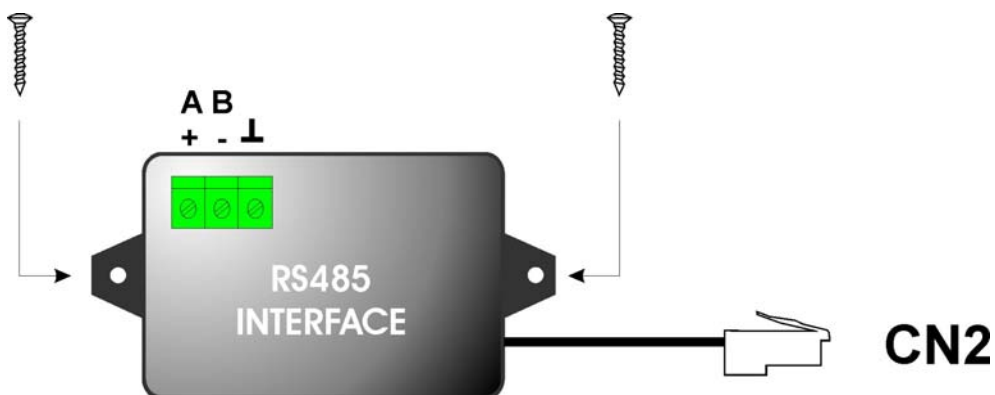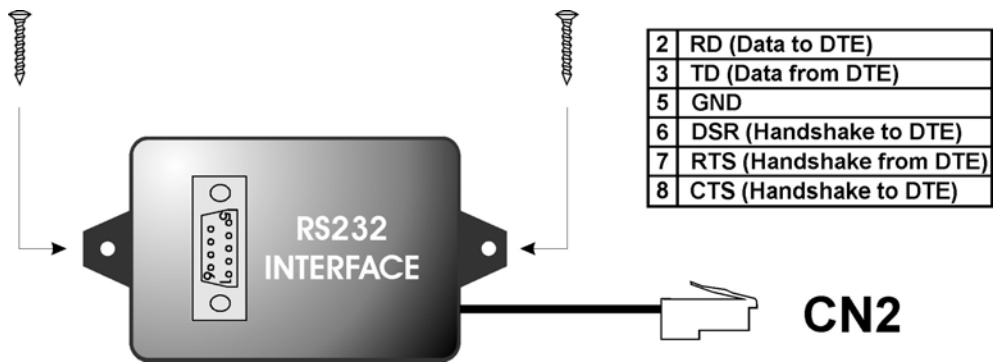
4.4.3 Double 4-20 mA analogic Output Option

1 2 3

4-20 mA MODULE

3	COMMON +
2	OUT2
1	OUT 1

COMMON + Max 500 ohm
OUT2
Load 1
OUT 1
Load 2

CN1
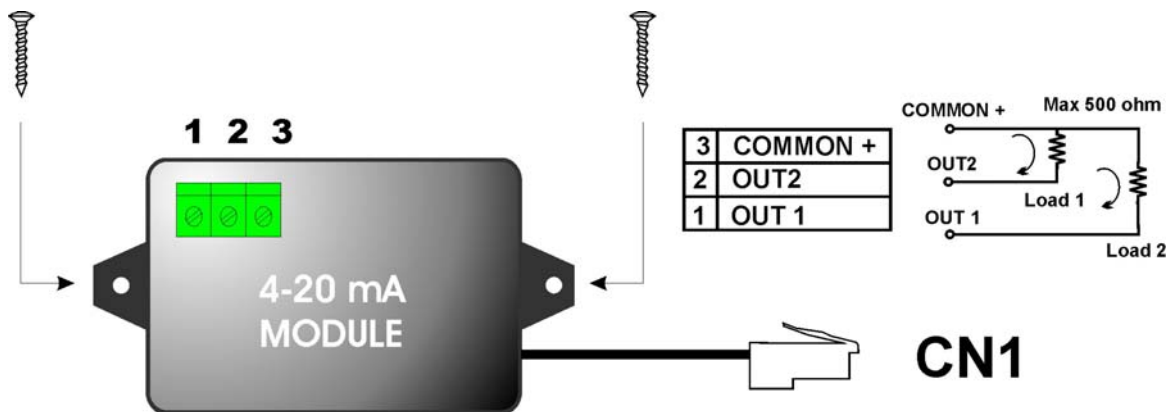
Self powered output: do not use external power supply.

5   Instrument Use

5.1   Instrument Configuration

The programming procedure allows to vary the instrument functioning parameters.
You can enter the procedure with the button Program located at the back of the instrument.
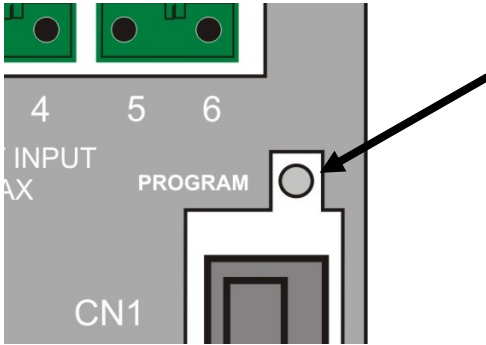
In this environment, you can enter the measurement parameters and the network configuration.

The various fields can be selected by pressing the ▶ button which also allows navigating to all the Setup pages

Pressing the ▼ and ▲ buttons you can modify the selected input fields (flashing)
The content of a field can be either numeric or a parameter controlling the device behavior.

The button t advances to the next page, while U f selects the previous page

By pressing the button PROGRAM (while in any configuration page) the menu is exited and the configuration saved.

5.1.1 Set up sequence
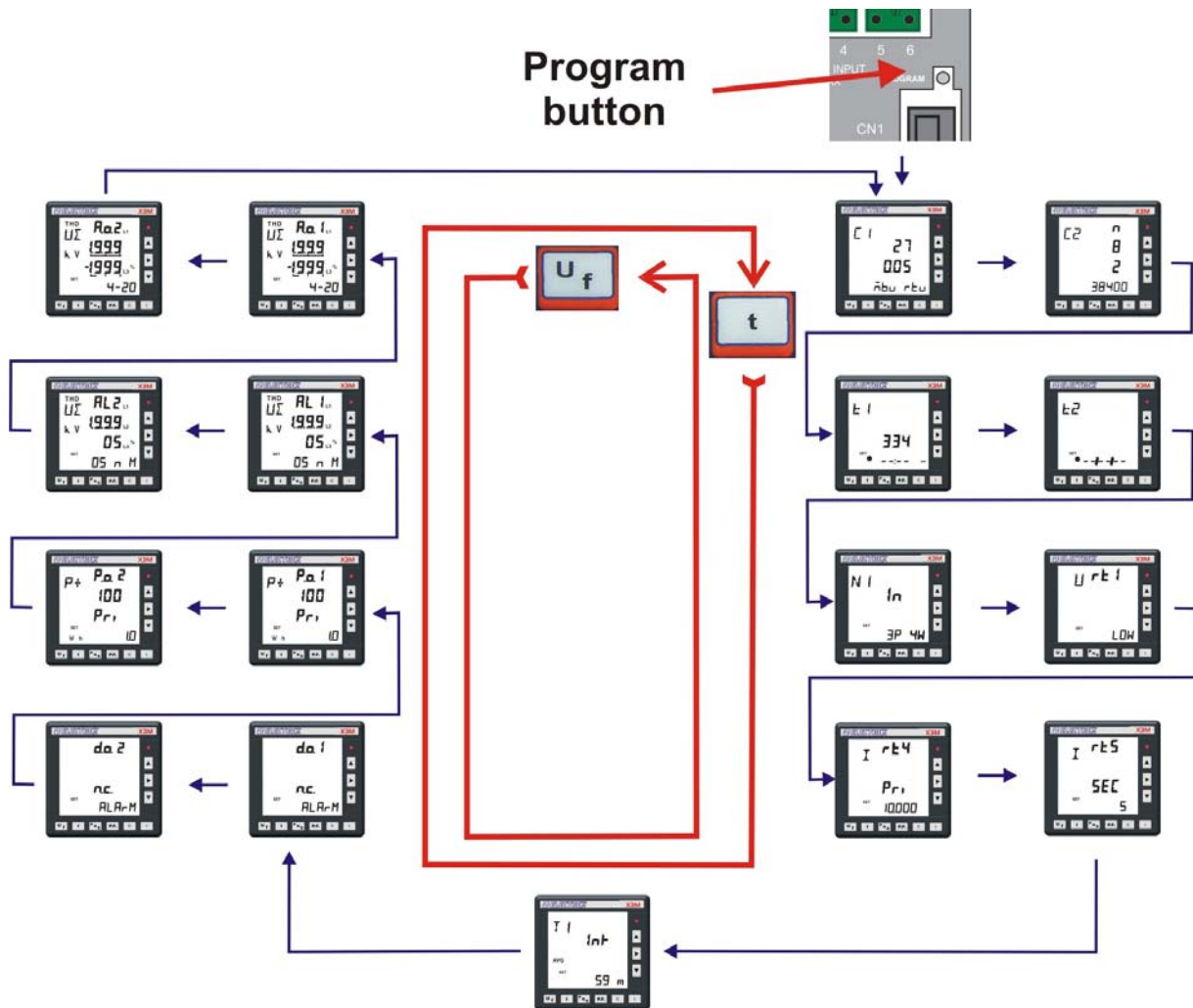
Within the first page of the instrument set up menu, the following functions are available too.

- a pressure of the [E] key opens the energy counters reset page.

- a pressure of the [PQs] key opens the reset page of the average and maximum demand.

Here below the page format and the programming flow.

NOTE: all the modifications to the instrument programming parameters are effective only when you exit the programming page pressing the PROGRAM button located on the instrument rear panel.

5.1.2 Configuration Procedure
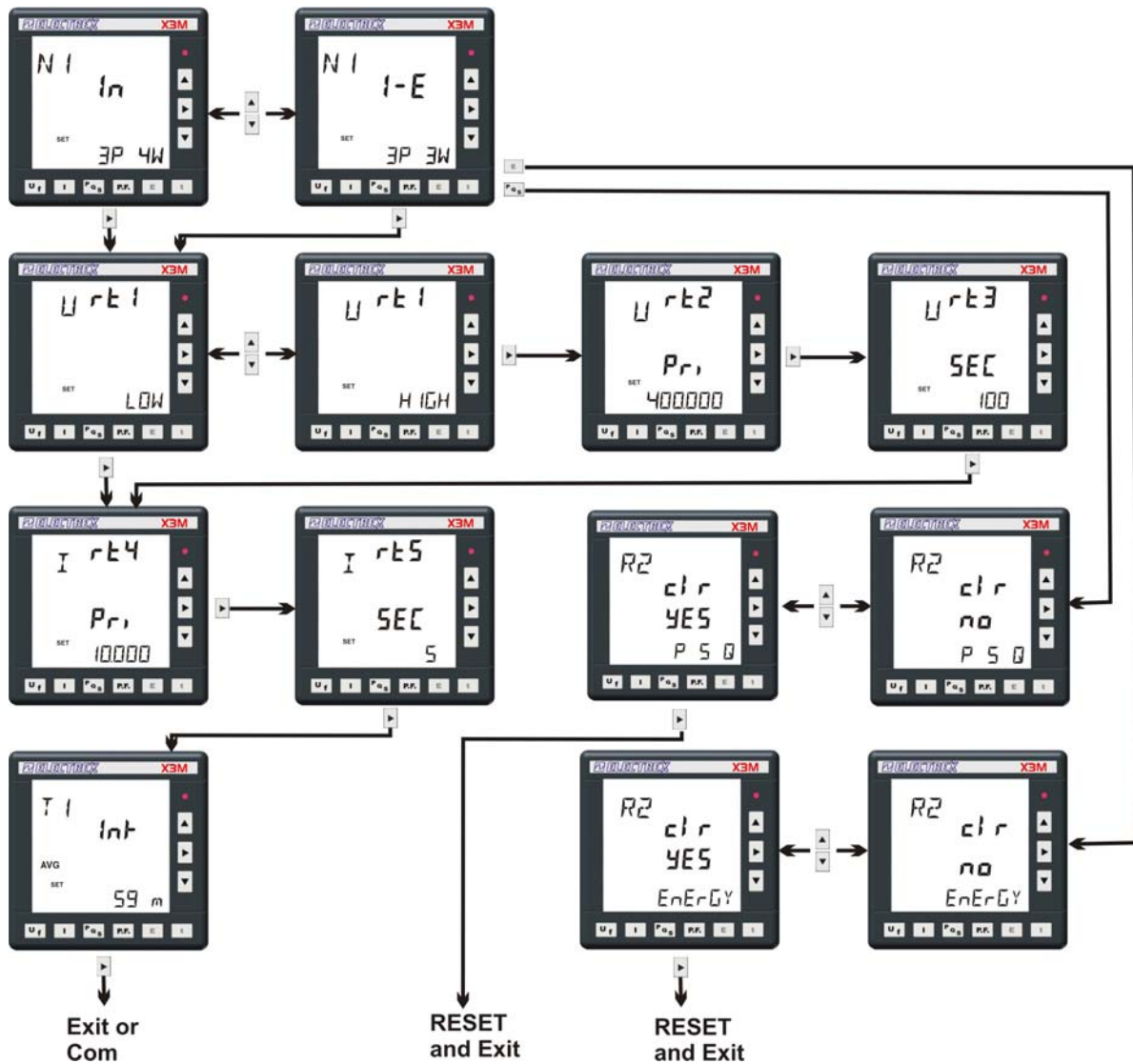
5.1.2.1 Electrical system configuration

The first programming page shows the configuration of the type of electrical system.

The first selection sets the type of electrical system and the type of wiring used:
- 3 phase 4 wire system $3P$ $4W$, Star λ,
- 3 phase 3 wire system $3P$ $3W$, delta Δ,
- balanced 3 phase 4 wire system (1 CT only) $3P-b$ $4W$,
- balanced 3 phase 3 wire system $3P-b$ $3W$,
- single phase system $1P$ $2W$
- double phase system $2P$ $2W$.

The second selection sets whether the operating mode is:

- Import only user In
- Import-Export system I-E.

The instrument is set by default to $3P$ $4W$ and Import only In mode. and automatically corrects possible CTs connection errors
The following page enables to set the type of voltage measurement.

If the voltage measurement is direct in low voltage, select LOW; the menu passes directly to the currents setting page.

If the voltage measurement is made on the HT side and/or via a voltage transformer, select $HIGH$ and proceed to the next page for setting the Volatge transformer (PT) primary and secondary values
Enter the PT <u>rated</u> primary and secondary values indicated on the PT label; the values taken by measurement are unsuitable to this purpose.
The primary and the secondary values must be integers, the ratio can also be fractional.

The instrument is set by default to LOW

After the voltage setting, the current set up page is prompted for programming the CT values; it requires the entry of the CT primary rating and the CT secondary rating.
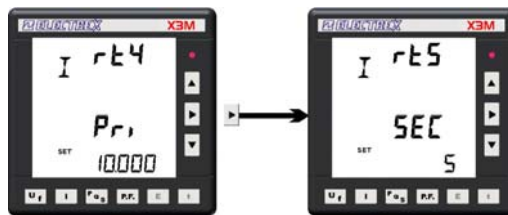
Ensure to enter the CT <u>rated</u> primary and secondary values as indicated on the CT label.
When using 2 or 3 current transformers ensure that all the current transformers have the same ratings.
The instrument is set by default to **[00005/5]**.

The next page allows to set the integration time for calculating the Average and the Maximum Demand.

The value is expressed in minutes in a 1 to 60 min. range.

The instrument supports two average values: one calculated by using the sliding window method and the other one calculated on a fixed time basis. The time setting that is programmed by keyboard is the average demand integration time with the sliding window method. The Maximum Demand too is calculated on the sliding window basis.

The integration time on a fixed time basis is used for storing the energy data however this setting is available only as a MODBUS register via serial port setting.

5.1.2.2 Communication Parameters Configuration

This menu appear only upon connection to the instrument of an RS-485 or an RS-232 optional module.
The setting of the RS485 communication characteristics requires to scroll the programming pages with two keys;

The ⌷t⌷ key advances to the next page, the ⌷U f⌷ key returns to the previous page

The first page is the following:

This page enables the setting of respectively:
- communication speed
- number of data bits
- parity
- stop bits

All these data are correlated depending upon the stop bit value.

Additional parameters regarding the MODBUS communication protocol may be set in the next page:

- Mode: it may be configured to RTU or to ASC (ASCII) mode.
- Slave Address
- Transmission delay; it stands for the time delay the instrument will wait prior to reply to a data query. It is expressed in milliseconds, the default value is 100 msec and a 0 setting is also possible.

5.1.2.3 Output Configuration

The instrument is equipped with 2 digital outputs that are set by default to operate as pulse outputs proportional to P_Σ (output 1) and Q_Σ (output 2) at a rate of 1.000 pulses per kWh (or kvarh) referred to the instrument range without any CT and PT multiplier.

The operating mode of digital outputs may be changed to operate as alarm output or as remote output device controlled by the Modbus protocol.
When operating on the Modbus protocol, in order to ensure a protection to the outputs in case of communication failure, it is possible to configure a watchdog timer (programmable from 0 to 60 minutes; 0 = disabled).

The following entry fields are prompted (example for output 1):
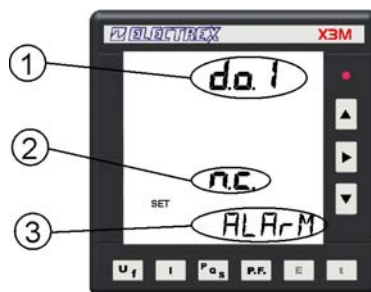
(1) **Digital out number** being programmed.
(2) **Contact:** it configures the rest state of the output transistor.
    n.c. normally closed   or   **n.o.** normally open:

(3) **Mode** of operation**:**
    PULSE (default setting) for operation as pulse output

      ALARM for operation as alarm contact output
      REM Remote for operation as remote output device controlled via Modbus

5.1.2.4 Pulse characteristics configuration

If the PULSE selection is operated, the following page is shown allowing the configuration of the pulse characteristics:
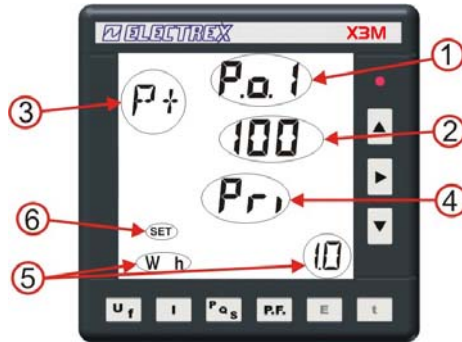
Where:
- (1) Pulse output number being programmed.
- (2) Pulse duration in mSec; programmable from 50 up to 900 in steps of 10
- (3) Identifies the quantity proportional to the impulse output, selecting among:

        $P+$ Imported active Power (import)

        Inductive reactive Power with imported active Power

        Capacitive reactive Power with imported active Power

        Apparent Power with imported active power

        Exported active Power (export)

        Inductive reactive Power with exported active power

        Capacitive reactive Power with exported active Power

        Apparent Power with exported active Power

- (4) **Pri** the pulses take into account the CT and PT ratio and are referred to their primary readings
  SEC the pulses are referred to the CT (and PT) secondary reading without any multiplier .
- (5) Pulse **weight**: programmable from 0,1 Wh up to 1 MWh through all the intermediate steps.
          Example: 1.0 Wh = 1000 pulses/kWh.
- (6) Identifies SETUP.

5.1.2.5 Alarm Configuration

The Instrument is equipped with two alarms that are triggered by a programmable threshold on anyone of the measured parameters.
The types of alarm available are: maximum, minimum and 1-of-3.
A minimum alarm is triggered when the selected parameter is lower than the alarm threshold.
A maximum alarm is triggered when the selected parameter exceeds the alarm threshold.
A 1-of-3 alarm is triggered when anyone of the phase readings, whichever the phase involved, trespasses the alarm threshold – this alarm can be either maximum or minimum. On a 1-of-3 current alarm, the threshold is expressed as percentage (rather than a value) that stands for the unbalance between the phases. The alarm therefore triggers when the percent difference between two of the three phases exceeds the threshold; it is calculated as $100 \times (I_{max} - I_{min})/I_{max}$.
All alarms allow also the setting of an hysteresys and a delay time.
The **hysteresys** (in percent) sets the difference between the triggering threshold and the end threshold (this prevents repeated alarm triggering when the reading oscillates around the trigger value). Example: a 5% hysteresys on a threshold of 100, triggers the alarm when the reading exceeds 100 but it will switch off the alarm when the reading becomes lower than 95.
The **delay time** sets a time delay for triggering on the alarm after its actual occurrence (or triggering off after its actual end).

The alarm setup procedure is activated from the output configuration screen or at the end of page configuration using the [▶] button or the [t] button.

The fields meaning of Alarm 1 is as follows:
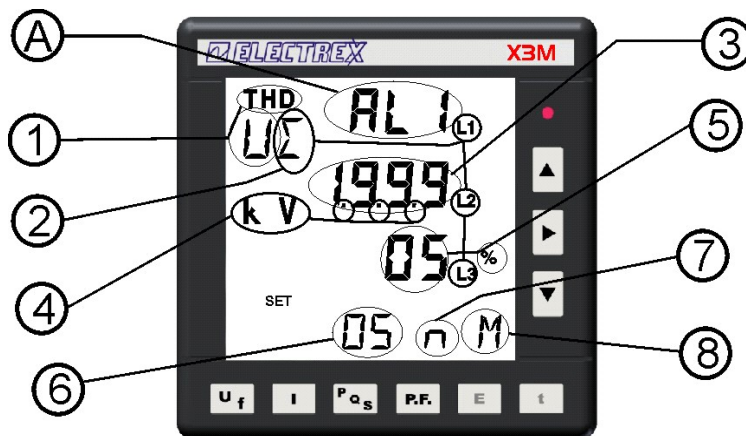
(A) Alarm No. identification (**AL1** = alarm 1 that may be associated to output 1)

(1) Parameter type applying to Alarm 1. The possible choices are:

--	Disabled
U	Voltage
f	Frequency
I	Current
P	Active Power
Q	Reactive Power
S	Apparent Power
λ (PF)	Power Factor
THD_U	Total Harmonic Distortion (voltage)
THD_I	Total Harmonic Distortion (current)

(2) Quantity definition: The possible definitions are:

Λ	Average star value (voltage, current and THD only).
Δ	Average system voltage (voltage and voltage THD only)
$\cap$	Neutral value (current only)
Σ	Three phase power (only on active, reactive, apparent power)

20

L1	Phase 1 quantity.
L2	Phase 2 quantity.
L3	Phase 3 quantity.
L1-L2	Phase L1 phase L2 value (chained voltages and THD only)
L2-L3	Phase L2 phase L3 value (chained voltages and THD only)
L3-L1	Phase L3 phase L1 value (chained voltages and THD only)
1di 3 ◿	Alarm on all three phases. The symbols L1-L2, L2-L3 and L3-L1 are flashing (voltage and THD only).
1di 3 ⋀	Alarm on all the three phases. The symbols L1, L2 and L3 are flashing (voltage,current and THD only).
AVG	Alarm on average powers.

(3)Threshold voltage: programmable in the range –1999 +1999

(4)Decimal point position. The quantity can be scaled by powers of ten by using the m, K, M symbols and the decimal point. Range is between 10-3 and 109.

(5)Hysteresis value, from 0% to 99%

(6)Latency time, from 0 to 99 seconds

(7)Output trigger type. n=normal (the relay is active for the duration of the alarm), p=pulsed (the alarm triggering generates a pulse).

(8) Alarm type: M=max; m=min

The procedure for alarm 2 is identical.

5.1.2.6 Analog 4-20 mA Outputs Configuration.

The instrument supports two 4-20 mA or 0-20 mA analog outputs with 500 ohms maximum load. Each output is to one of the parameters handled by the instrument.
The output is updated every 10 cycles of the network frequency (i.e. every 200mSec with 50 Hz mains) with a maximum delay of 50 mSec from the actual measurement.
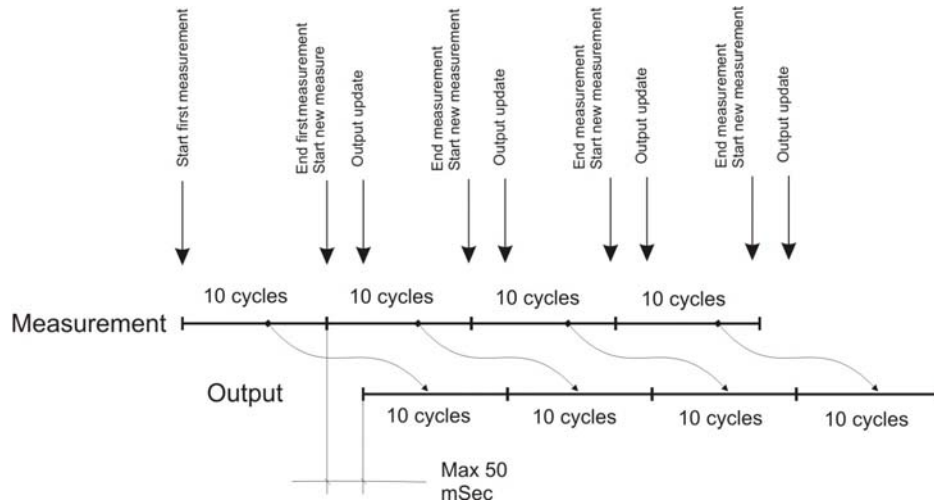
(A) Output identification, A.o.1 = Analog output 1.
(1) Parameter applying. The possible choices are:

--	Disabled
U	Voltage
f	Frequency
I	Current
P	Active Power
Q	Reactive Power
S	Apparent Power
λ (PF)	Power Factor
THD_U	Total Harmonic Distortion (Voltage)
THD_I	Total Harmonic Distortion (Current)

(2) Parameter definition: The possible choices are:

$\bigwedge$	Average star value (applicable to voltage, current and THD only).
Δ	Average system value (applicable to voltage and THD only).
n	Neutral value (applicable to current only)
Σ	Three phase value (applicable to active, reactive and apparent power only)
L1	Phase 1 Value.
L2	Phase 2 Value.
L3	Phase 3 Value.

L1-L2	Phase-phase (L1-L2) value (applicable to system voltages and THD only)
L2-L3	Phase-phase (L2-L3) value (applicable to system voltages and THD only)
L3-L1	Phase-phase (L3-L1) value applicable to system voltages and THD only)
AVG	Average value (applicable to average powers - demand - only).

(3) Threshold voltage: programmable in the range −1999 +1999

(4) The quantity can be scaled by powers of ten by using the m, K, M symbols and the decimal point. Range is between 10-3 and 109.

(5) Beginning of range value (4 or 0 mA), programmable from −1999 to 1999.

(6) It can be associated to the above value and it identifies it as end of scale value (end of range symbol). It cannot be modified.

(7) Associated to the value above identifies it as beginning of range value (empty on 0 mA, two marks on 4 mA). It cannot be changed

(8) Output type: 4-20 mA or 0-20 mA.

Output 2 requires the same procedure

5.1.2.6.1 4-20 mA output configuration of the average AVG values

In Import-Export mode, the instrument can provide the measuring on the 4 dials, but the selection can be made on a dial at a time.
In selection mode, the measures are visualized as follows:

$P \dotplus$ Imported active Power (import)

$Q \not{\vee}$ Inductive reactive Power with imported active Power.

$U \not{\wedge}$ Capacitive reactive Power with imported active Power

$S \dagger$ Apparent Power with imported active Power

$P \because$ Exported active Power (export)

$Q \not{\nearrow}$ Inductive reactive Power with exported active Power

$U \dagger$ Capacitive reactive Power with exported active Power

$S \because$ Apparent Power with exported active Power

The quadrant selection is operated according to the following trigonometric convention:
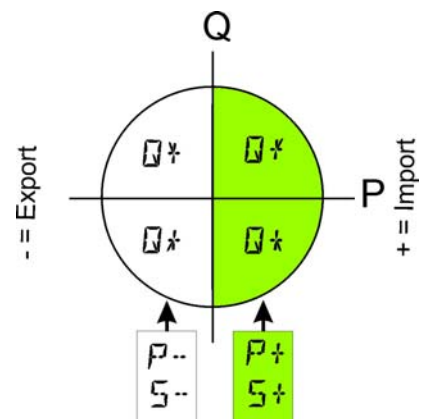
5.1.2.7 Clock calendar configuration (for X3M only)

The X3M is equipped with a clock/calendar with internal battery having a 20 years life time.
The clock/calendar supports the time zone handling functions and the automatic change from Standard Time to Daylight Saving Time and vice versa.
The instrument is set by default to the Europe/Rome time and time zone.
The clock/calendar setting is covered by the last two SETUP pages.

Clock format
The following Time formats are foreseen:

> **Coordinated Universal Time (UTC):** commonly known as GMT (Greenwich Mean Time): it is the universal time, applicable to any place on earth.
> **Standard Time:** it is the local time of a specific time zone, based on the sun cycles (known as Solar Time
> **Daylight Saving Time** it is the local time of a specific time zone when an offset on standard time is applied (DST offset). The introduction of this offset allows to increase the availability of hours with natural light in the summer evenings.
> **Wall time:** it is how we refer to the clock time in each time zone. The Wall time actually coincides with the Daylight Saving Time or the Standard Time depending whether an offset Solar time is occurring or not.

The difference between Standard Time and UTC time is called GMT offset.
Summarizing:
GMT offset = UTC – Standard Time
Wall Time   = Standard Time + DST offset = UTC + GMT offset + DST offset

The instrument RTC supports the following time information:
- UTC Date/time
- Time zone identification

Starting from the UTC time, the instrument automatically calculates the local time (Wall Time) of any place on earth
The pertinent time zone is entered to the instrument by a numeric index (time zone index) either on the set up procedure or on a MODBUS register.

**NOTE:** The instrument clock operates in UTC, therefore a correct time zone attribution is essential. Check whether the time zone entry is correct before modifying the clock. Otherwise a wrong time setting could be involuntarily programmed

The clock is updated by using the local time or "wall time" that the instrument converts in UTC, consequently, if the time zone is wrong, the clock will be wrong too.
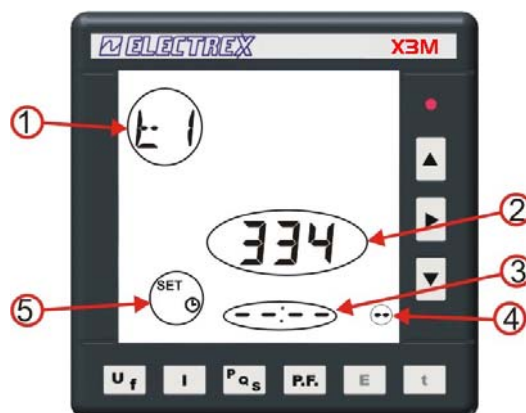
(1) It identifies the time programming page N° 1.

(2) Time zone 334 = Europe/Rome is valid all over central Europe. See the enclosed layout to identify the right time zone

(3) Time Configuration in hours and minutes. Starting the selection the configuration is ⏤ ⏤:⏤ ⏤

Pushing the button ▼ and ▲ it is possible to visualize the actual time and date and modify them, first the hours then the minutes. The hour change will occur only exiting the programming mode. The hour change will influence the data storage thus it is important to operate modifications only if strictly necessary, otherwise leave to the instrument management software the clock update.. If you maintain the configuration ⏤ ⏤:⏤ ⏤ the clock will not be modified. Should modifications be edited and clock changes be avoided, it is necessary to set the display to ⏤ ⏤:⏤ ⏤ which is located after the last valid hour or minute (i.e. beyond 11 pm or under 12 am).

(4) Identifies the standard time. *12:30* ⁃⁃ while *12:30* *5* identifies the daylight saving or summer time.

(5) Identifies the clock set up page.
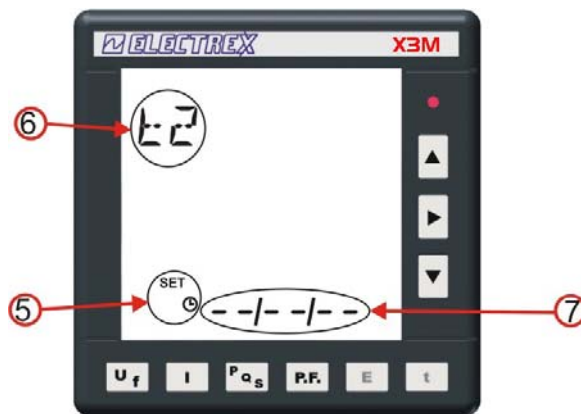
In the second page of clock set up it is possible to program the calendar.

(6) It identifies the time programming page N° 2.

(7) Area of calendar setting and starting from left: year, month, day *04 12 06*. Even for the date it is possible to avoid the modification saving, switching to the initial position ⏤ ⏤/⏤ ⏤/⏤ ⏤ which does not save modifications.

5.1.2.7.1 Time zones

The pertinent time zone is entered to the instrument by a numeric index (*time zone index*).
The time zone index and the standard time zone names are shown in the charts below:

Standard Timezone Name (FW > 1.06)	X3M Timezone Index
Africa/Abidjan	0
Africa/Accra	1
Africa/Addis_Ababa	2
Africa/Algiers	3
Africa/Asmera	4
Africa/Bamako	5
Africa/Bangui	6
Africa/Banjul	7
Africa/Bissau	8
Africa/Blantyre	9
Africa/Brazzaville	10
Africa/Bujumbura	11
Africa/Cairo	12
Africa/Casablanca	13
Africa/Ceuta	14
Africa/Conakry	15
Africa/Dakar	16
Africa/Dar_es_Salaam	17
Africa/Djibouti	18
Africa/Douala	19
Africa/El_Aaiun	20
Africa/Freetown	21
Africa/Gaborone	22
Africa/Harare	23
Africa/Johannesburg	24
Africa/Kampala	25
Africa/Khartoum	26
Africa/Kigali	27
Africa/Kinshasa	28
Africa/Lagos	29
Africa/Libreville	30
Africa/Lome	31
Africa/Luanda	32
Africa/Lubumbashi	33
Africa/Lusaka	34
Africa/Malabo	35
Africa/Maputo	36
Africa/Maseru	37
Africa/Mbabane	38
Africa/Mogadishu	39
Africa/Monrovia	40
Africa/Nairobi	41
Africa/Ndjamena	42
Africa/Niamey	43
Africa/Nouakchott	44
Africa/Ouagadougou	45
Africa/Porto-Novo	46
Africa/Sao_Tome	47
Africa/Timbuktu	48

Standard Timezone Name (FW > 1.06)	X3M Timezone Index
Africa/Tripoli	49
Africa/Tunis	50
Africa/Windhoek	51
America/Adak	52
America/Anchorage	53
America/Anguilla	54
America/Antigua	55
America/Araguaina	56
America/Argentina/Buenos_Aires	66
America/Argentina/Catamarca	71
America/Argentina/ComodRivadavia	400
America/Argentina/Cordoba	76
America/Argentina/Jujuy	109
America/Argentina/La_Rioja	401
America/Argentina/Mendoza	121
America/Argentina/Rio_Gallegos	402
America/Argentina/San_Juan	403
America/Argentina/Tucuman	404
America/Argentina/Ushuaia	405
America/Aruba	57
America/Asuncion	58
America/Bahia	59
America/Barbados	60
America/Belem	61
America/Belize	62
America/Boa_Vista	63
America/Bogota	64
America/Boise	65
America/Cambridge_Bay	67
America/Campo_Grande	68
America/Cancun	69
America/Caracas	70
America/Cayenne	72
America/Cayman	73
America/Chicago	74
America/Chihuahua	75
America/Costa_Rica	77
America/Cuiaba	78
America/Curacao	79
America/Danmarkshavn	80
America/Dawson	81
America/Dawson_Creek	82
America/Denver	83
America/Detroit	84
America/Dominica	85
America/Edmonton	86
America/Eirunepe	87
America/El_Salvador	88
America/Fortaleza	89

Standard Timezone Name (FW > 1.06)	X3M Timezone Index
America/Glace_Bay	90
America/Godthab	91
America/Goose_Bay	92
America/Grand_Turk	93
America/Grenada	94
America/Guadeloupe	95
America/Guatemala	96
America/Guayaquil	97
America/Guyana	98
America/Halifax	99
America/Havana	100
America/Hermosillo	101
America/Indiana/Knox	102
America/Indiana/Marengo	103
America/Indiana/Vevay	104
America/Indianapolis	105
America/Inuvik	106
America/Iqaluit	107
America/Jamaica	108
America/Juneau	110
America/Kentucky/Monticello	111
America/La_Paz	112
America/Lima	113
America/Los_Angeles	114
America/Louisville	115
America/Maceio	116
America/Managua	117
America/Manaus	118
America/Martinique	119
America/Mazatlan	120
America/Menominee	122
America/Merida	123
America/Mexico_City	124
America/Miquelon	125
America/Monterrey	126
America/Montevideo	127
America/Montreal	128
America/Montserrat	129
America/Nassau	130
America/New_York	131
America/Nipigon	132
America/Nome	133
America/Noronha	134
America/North_Dakota/Center	135
America/Panama	136
America/Pangnirtung	137
America/Paramaribo	138
America/Phoenix	139
America/Port_of_Spain	141
America/Port-au-Prince	140
America/Porto_Velho	142
America/Puerto_Rico	143
America/Rainy_River	144

Standard Timezone Name (FW > 1.06)	X3M Timezone Index
America/Rankin_Inlet	145
America/Recife	146
America/Regina	147
America/Rio_Branco	148
America/Santiago	149
America/Santo_Domingo	150
America/Sao_Paulo	151
America/Scoresbysund	152
America/St_Johns	153
America/St_Kitts	154
America/St_Lucia	155
America/St_Thomas	156
America/St_Vincent	157
America/Swift_Current	158
America/Tegucigalpa	159
America/Thule	160
America/Thunder_Bay	161
America/Tijuana	162
America/Toronto	163
America/Tortola	164
America/Vancouver	165
America/Whitehorse	166
America/Winnipeg	167
America/Yakutat	168
America/Yellowknife	169
Antarctica/Casey	170
Antarctica/Davis	171
Antarctica/DumontDUrville	172
Antarctica/Mawson	173
Antarctica/McMurdo	174
Antarctica/Palmer	175
Antarctica/Rothera	176
Antarctica/Syowa	177
Antarctica/Vostok	178
Asia/Aden	179
Asia/Almaty	180
Asia/Amman	181
Asia/Anadyr	182
Asia/Aqtau	183
Asia/Aqtobe	184
Asia/Ashgabat	185
Asia/Baghdad	186
Asia/Bahrain	187
Asia/Baku	188
Asia/Bangkok	189
Asia/Beirut	190
Asia/Bishkek	191
Asia/Brunei	192
Asia/Calcutta	193
Asia/Choibalsan	194
Asia/Chongqing	195
Asia/Colombo	196
Asia/Damascus	197

Standard Timezone Name (FW > 1.06)	X3M Timezone Index	Standard Timezone Name (FW > 1.06)	X3M Timezone Index
Asia/Dhaka	198	Asia/Yakutsk	251
Asia/Dili	199	Asia/Yekaterinburg	252
Asia/Dubai	200	Asia/Yerevan	253
Asia/Dushanbe	201	Atlantic/Azores	254
Asia/Gaza	202	Atlantic/Bermuda	255
Asia/Harbin	203	Atlantic/Canary	256
Asia/Hong_Kong	204	Atlantic/Cape_Verde	257
Asia/Hovd	205	Atlantic/Faeroe	258
Asia/Irkutsk	206	Atlantic/Madeira	259
Asia/Jakarta	207	Atlantic/Reykjavik	260
Asia/Jayapura	208	Atlantic/South_Georgia	261
Asia/Jerusalem	209	Atlantic/St_Helena	262
Asia/Kabul	210	Atlantic/Stanley	263
Asia/Kamchatka	211	Australia/Adelaide	264
Asia/Karachi	212	Australia/Brisbane	265
Asia/Kashgar	213	Australia/Broken_Hill	266
Asia/Katmandu	214	Australia/Darwin	267
Asia/Krasnoyarsk	215	Australia/Hobart	268
Asia/Kuala_Lumpur	216	Australia/Lindeman	269
Asia/Kuching	217	Australia/Lord_Howe	270
Asia/Kuwait	218	Australia/Melbourne	271
Asia/Macau	219	Australia/Perth	272
Asia/Magadan	220	Australia/Sydney	273
Asia/Makassar	221	CET	274
Asia/Manila	222	EET	275
Asia/Muscat	223	Etc/GMT	276
Asia/Nicosia	224	Etc/GMT+1	277
Asia/Novosibirsk	225	Etc/GMT+10	278
Asia/Omsk	226	Etc/GMT+11	279
Asia/Oral	227	Etc/GMT+12	280
Asia/Phnom_Penh	228	Etc/GMT+2	281
Asia/Pontianak	229	Etc/GMT+3	282
Asia/Pyongyang	230	Etc/GMT+4	283
Asia/Qatar	231	Etc/GMT+5	284
Asia/Qyzylorda	232	Etc/GMT+6	285
Asia/Rangoon	233	Etc/GMT+7	286
Asia/Riyadh	234	Etc/GMT+8	287
Asia/Saigon	235	Etc/GMT+9	288
Asia/Sakhalin	236	Etc/GMT-1	289
Asia/Samarkand	237	Etc/GMT-10	290
Asia/Seoul	238	Etc/GMT-11	291
Asia/Shanghai	239	Etc/GMT-12	292
Asia/Singapore	240	Etc/GMT-13	293
Asia/Taipei	241	Etc/GMT-14	294
Asia/Tashkent	242	Etc/GMT-2	295
Asia/Tbilisi	243	Etc/GMT-3	296
Asia/Tehran	244	Etc/GMT-4	297
Asia/Thimphu	245	Etc/GMT-5	298
Asia/Tokyo	246	Etc/GMT-6	299
Asia/Ulaanbaatar	247	Etc/GMT-7	300
Asia/Urumqi	248	Etc/GMT-8	301
Asia/Vientiane	249	Etc/GMT-9	302
Asia/Vladivostok	250	Etc/UCT	303

Standard Timezone Name (FW > 1.06)	X3M Timezone Index
Etc/UTC	304
Europe/Amsterdam	305
Europe/Andorra	306
Europe/Athens	307
Europe/Belfast	308
Europe/Belgrade	309
Europe/Berlin	310
Europe/Brussels	311
Europe/Bucharest	312
Europe/Budapest	313
Europe/Chisinau	314
Europe/Copenhagen	315
Europe/Dublin	316
Europe/Gibraltar	317
Europe/Helsinki	318
Europe/Istanbul	319
Europe/Kaliningrad	320
Europe/Kiev	321
Europe/Lisbon	322
Europe/London	323
Europe/Luxembourg	324
Europe/Madrid	325
Europe/Malta	326
Europe/Minsk	327
Europe/Monaco	328
Europe/Moscow	329
Europe/Oslo	330
Europe/Paris	331
Europe/Prague	332
Europe/Riga	333
Europe/Rome	334
Europe/Samara	335
Europe/Simferopol	336
Europe/Sofia	337
Europe/Stockholm	338
Europe/Tallinn	339
Europe/Tirane	340
Europe/Uzhgorod	341
Europe/Vaduz	342
Europe/Vienna	343
Europe/Vilnius	344
Europe/Warsaw	345
Europe/Zaporozhye	346
Europe/Zurich	347
Indian/Antananarivo	348
Indian/Chagos	349
Indian/Christmas	350
Indian/Cocos	351
Indian/Comoro	352
Indian/Kerguelen	353
Indian/Mahe	354
Indian/Maldives	355
Indian/Mauritius	356

| Standard Timezone Name (FW > 1.06)	X3M Timezone Index
Indian/Mayotte	357
Indian/Reunion	358
MET	359
Pacific/Apia	360
Pacific/Auckland	361
Pacific/Chatham	362
Pacific/Easter	363
Pacific/Efate	364
Pacific/Enderbury	365
Pacific/Fakaofo	366
Pacific/Fiji	367
Pacific/Funafuti	368
Pacific/Galapagos	369
Pacific/Gambier	370
Pacific/Guadalcanal	371
Pacific/Guam	372
Pacific/Honolulu	373
Pacific/Johnston	374
Pacific/Kiritimati	375
Pacific/Kosrae	376
Pacific/Kwajalein	377
Pacific/Majuro	378
Pacific/Marquesas	379
Pacific/Midway	380
Pacific/Nauru	381
Pacific/Niue	382
Pacific/Norfolk	383
Pacific/Noumea	384
Pacific/Pago_Pago	385
Pacific/Palau	386
Pacific/Pitcairn	387
Pacific/Ponape	388
Pacific/Port_Moresby	389
Pacific/Rarotonga	390
Pacific/Saipan	391
Pacific/Tahiti	392
Pacific/Tarawa	393
Pacific/Tongatapu	394
Pacific/Truk	395
Pacific/Wake	396
Pacific/Wallis	397
Pacific/Yap	398
WET	399

The X3M features a built-in database including all the information (*time zone rules*) which allow to calculate the GMT and DST offsets at any time in each time zones listed in the charts. By knowing the GMT and the DST offset, the instrument is able to convert from universal time to local time and vice versa. The database with the time zone data is compiled from the pack distributed by *elsie.nci.nih.gov* (*tzdataXXXXX.tar.gz*) and it is integrated in the instrument firmware. Database updates are therefore possible only by installing a new version of firmware.

5.1.3 Reset Procedure
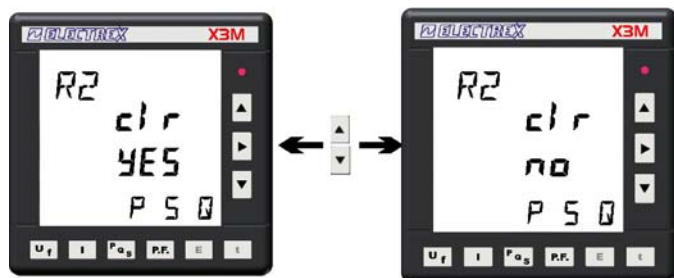
In order to reset the Average Powers, the Maximum Demand and the Energy counters it is necessary to:

- Enter into the programming menu by pressing the PROGRAM button.

- Press the P_{Qs} key to display the powers reset page or the E key to display the energy counters reset page.

- Select YES to reset, NO to skip. Resetting is confirmed by pressing the ▶ key that executes the reset and returns automatically to the readings pages.

- The reset operation clears all the average powers and the Maximum Demand.
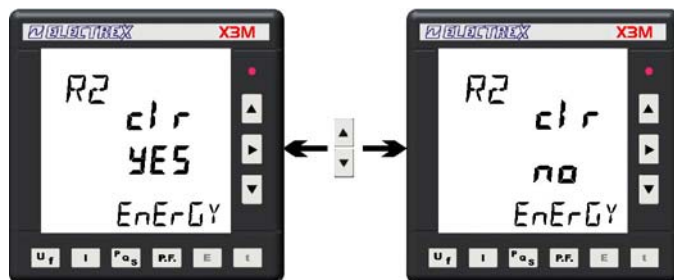
It is also possible to exit the procedure, at any time without resetting, by pressing the PROGRAM button.

5.2 Visualizations

5.2.1 X3M Visualization Sequences

The visualization of the measurements is through buttons:

U f Voltage and frequency visualizations.

I Current visualization.

P Q s Power visualization.

P.F. Power factor visualization

E Energy visualization.

t Functioning time visualization.

▲ **▼** These buttons allow you to move up and down in the measurement pages.

**▶** This button is not used in measurement visualization.

5.2.1.1 Voltage and Frequency Readings

By pressing once the **U f** key, a first voltage readings page is prompted showing the phase-neutral voltages and, on the bottom right side of the display, the average 3-phase system voltage.

By pressing the **▲** key, a second voltage readings page is prompted showing the phase-phase voltages and, on the bottom right side of the display, the average phase-neutral system voltage.

Another pressure of the **▲** key prompts the total harmonic distortion readings of the voltage of each phase.
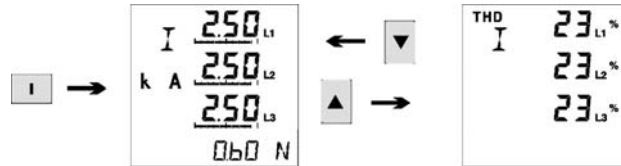
By pressing again the **U f** key the frequency is shown on the lower right side on thedisplay.
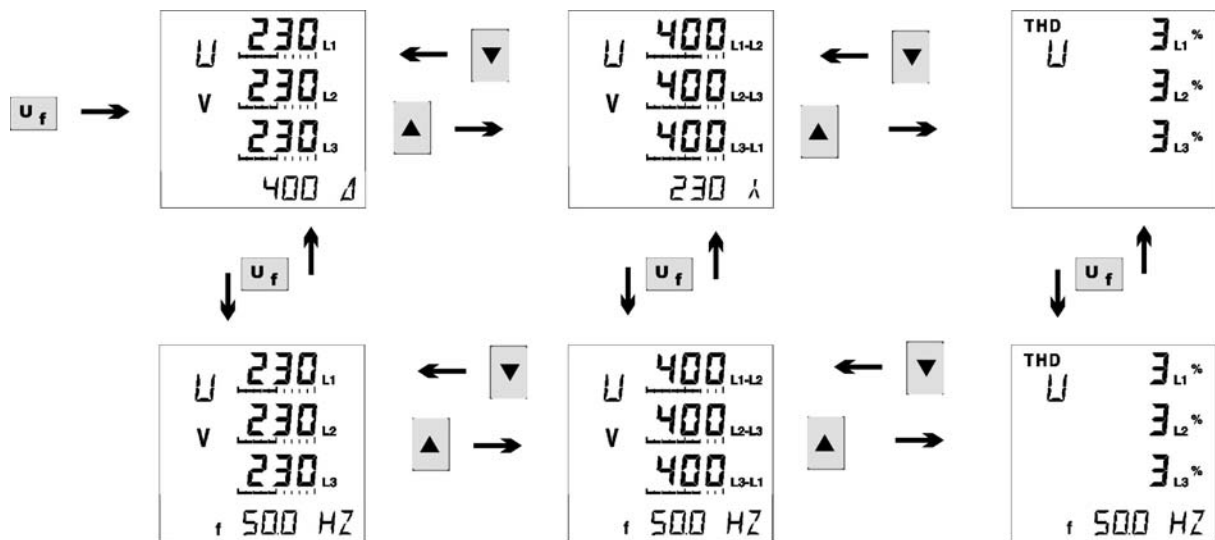
5.2.1.2 Current readings

By pressing the [I] key, the current readings page is prompted showing the currents of each phase as well as the neutral current.
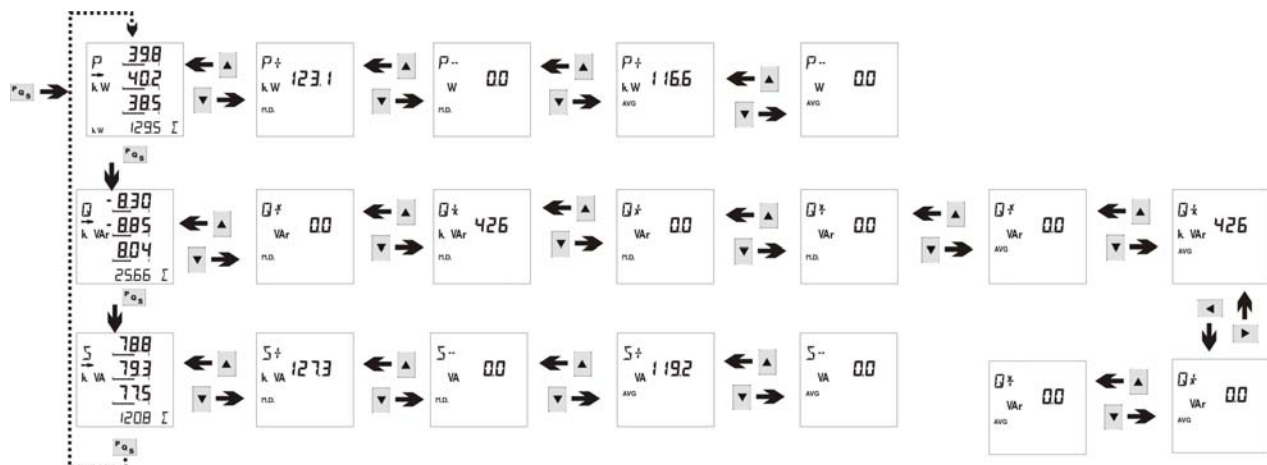
A pressure of the [▲] key prompts the total harmonic distortion readings of the current of each phase.

5.2.1.3 Powers

By pressing the [PQs] key the power reading pages for P Active power, Q Reactive power and S Apparent power are scrolled in sequence.
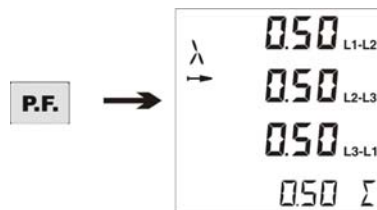
By pressing the [▲] and [▼] keys the average and the maximum powers (Demand and Maximum Demand readings) are displayed.

5.2.1.4 P.F. Visualization

By pressing the [P.F.] key, the power factor readings page is prompted showing the PF of each phase as well as the 3-phase reading. Only one page is displayed.

The – sign ahead of the value identifies a capacitive (leading) reading.

5.2.1.5 Energy

By pressing repeatedly the $\boxed{E}$ key, the several energy readings will be displayed consecutively on the lower right part of the screen.
The energy readings may be recalled at any time irrespective the readings page being displayed.
The energy readings will however disappear upon selection of another readings page but they may be recalled, at any time, by pressing the $\boxed{E}$ key.
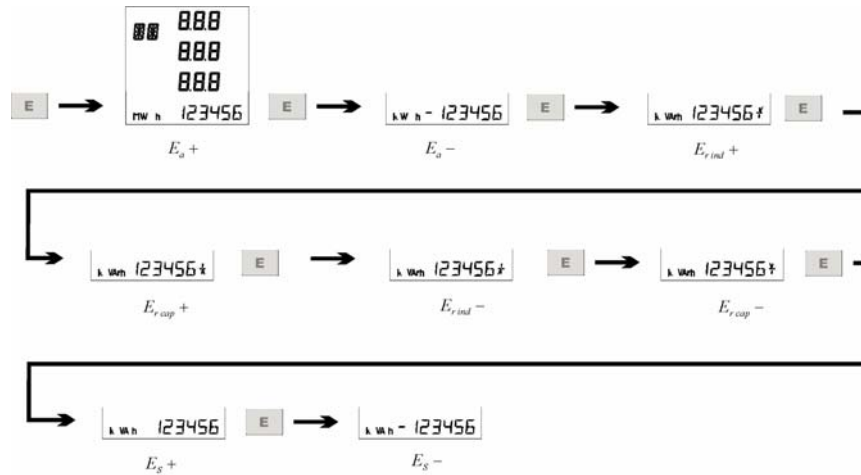
The quadrant selection is operated according to the following trigonometric convention:

Where:

(E_a^+) Imported active energy (import)

(E_a^-) Exported active energy (export)

($E_{r\,ind}^+$) Inductive reactive energy with imported active Power.

($E_{r\,cap}^+$) Capacitive reactive energy with imported active Power

($E_{r\,ind}^-$) Inductive reactive energy with exported active Power

($E_{r\,cap}^-$) Capacitive reactive energy with exported active Power

(E_s^+)   Apparent Energy with imported active Power

(E_s^-) Apparent Energy with exported active Power
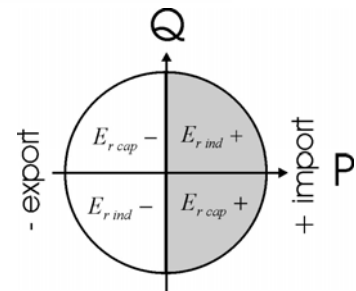
5.2.1.6 Tariff Energies and Tariff Maximum Demand (for X3M only).

By pressing the $^{P}Q_{S}$ key for 2 seconds from any page, it is possible to display the Energy counters and the Max Demand of each tariff.

The top left symbol identifies the parameter being displayed and the Maximum Demand reading is shown next to it.
The tariff number is indicated on the top right while the energy reading is indicated below.

All the energy and MD readings applicable to the 8 parameters of a 4 quadrant measurement are foreseen.

Press shortly the $^{P}Q_{S}$ key to scroll the different parameters.

Press the ▼ and ▲ keys to scroll the different tariffs.

To move back to the traditional reading mode, press the $^{P}Q_{S}$ key again for 2 seconds.

NB
In the case the instrument is not loaded with a proper calendar file or in the case some tariffs are not included in the calendar, dashes will be displayed in place of the readings.

5.2.1.7 Calendar Clock (for X3M only) and Life Time

By pressing the t key the instrument calendar clock (time and date) and the life time reading are displayed.

The life time is the instrument operating time (when powered on) since it was manufactured.
The readings is expressed in hours and hour hundredths; it can reach 99.999 hours equal to 11 years. The life time reading reset is not possible.

A broader instructions manual including the Modbus protocol mapping
may be downloaded from our web page www.electrex.it.

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For instrument with firmware version higher then 1.11
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