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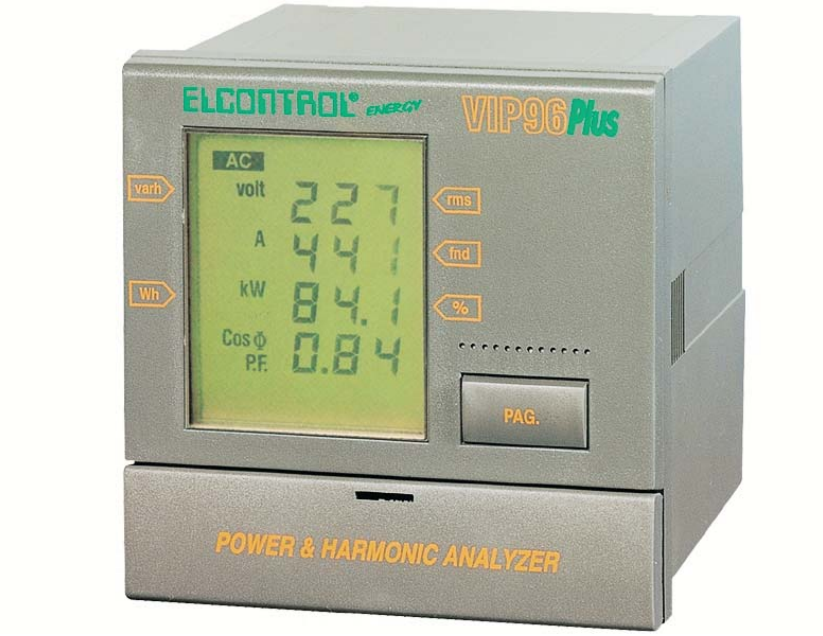
KEMA CERTIFICATE ISO 9001:2000 Certificate n.2007399

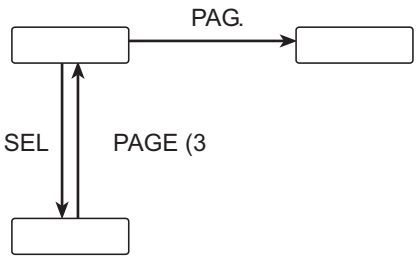
English

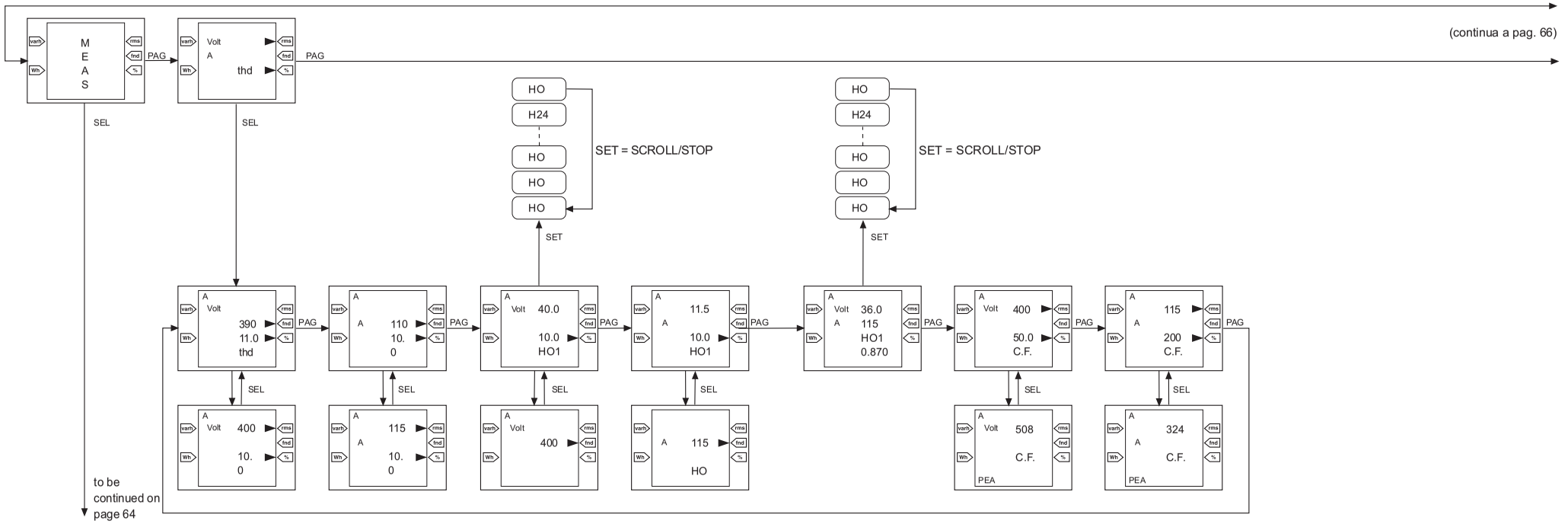
VIP96 PLUS



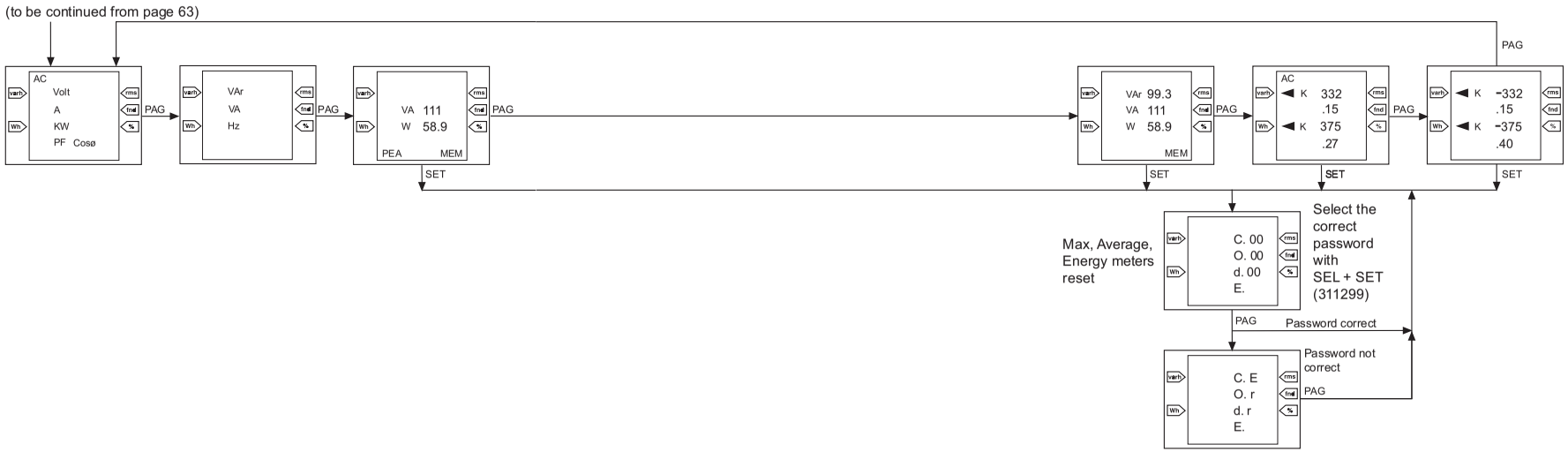
SUPPLEMENT TO VIP96
USER MANUAL

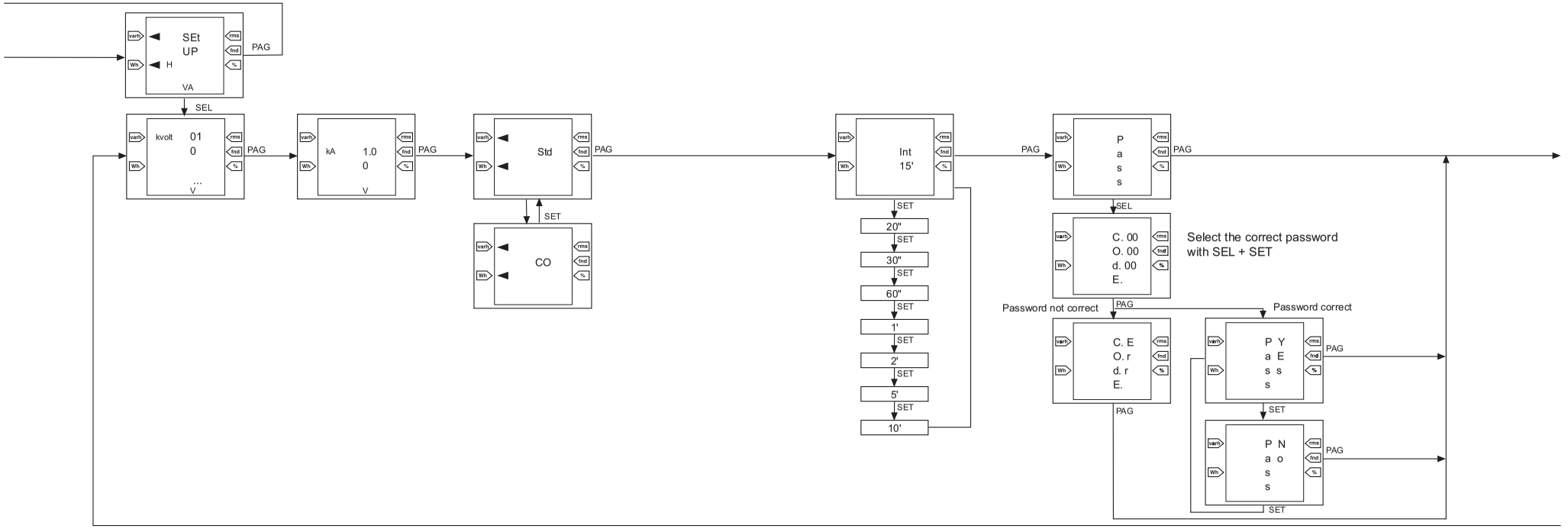
FUNCTION	PUSHBUTTON TO BE USED
MOVING ON THE SAME MENU LEVEL	PAG.
PASSAGE TO A LOWER MENU LEVEL	SEL PAGE (3
EDITING	SEL + SET SEL = select digit SET change
ESCAPE TO AN UPPER MENU LEVEL	PAG.

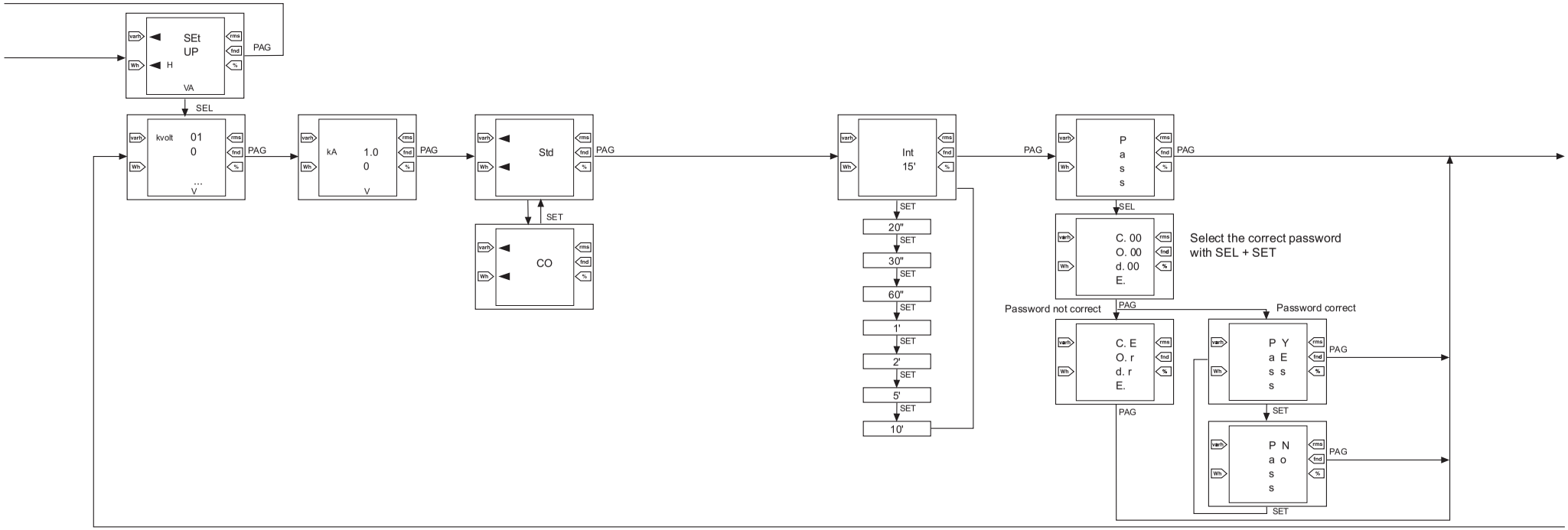


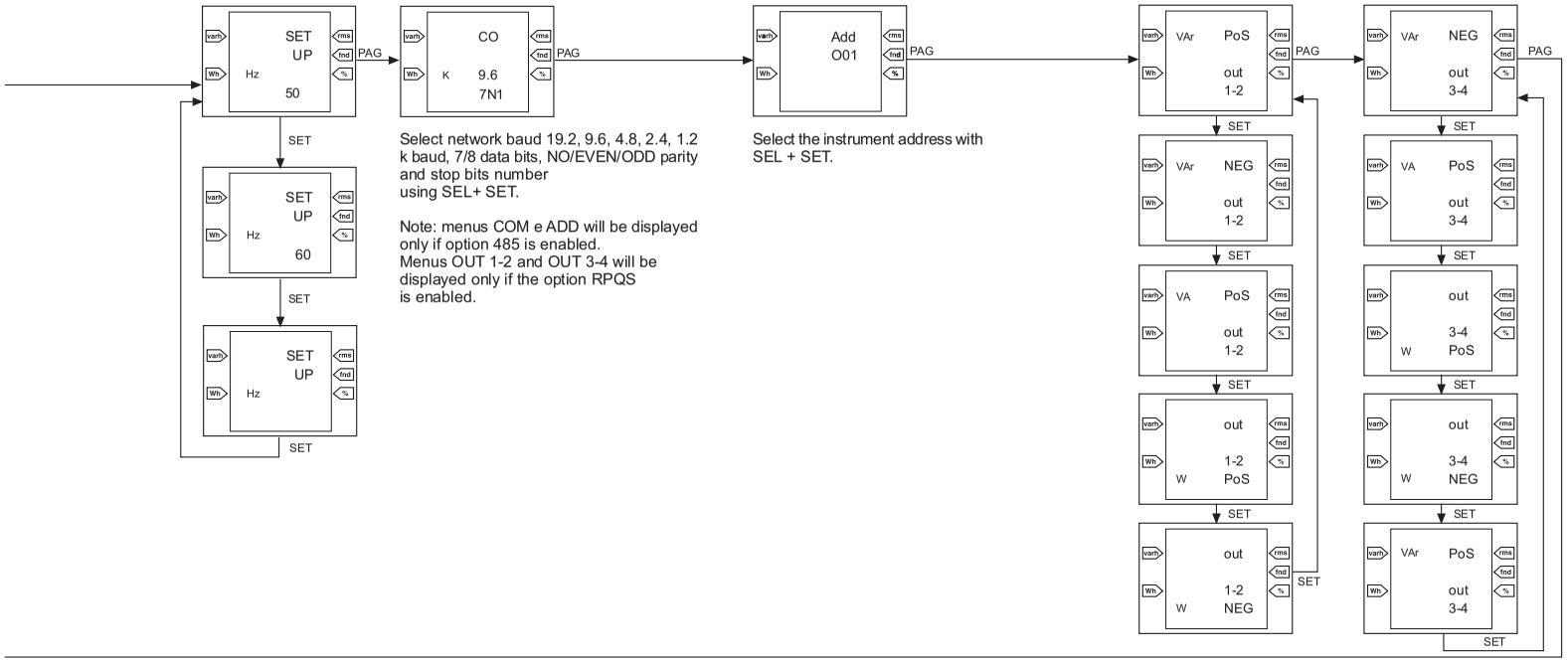

(continua a pag. 66)
MEAS
varh
Wh
rms
fnd
%
PAG
Volt
A
thd
SEL
HO
H24
SET = SCROLL/STOP
SET
390
11.0
110
10.
0
40.0
10.0
HO1
11.5
36.0
115
0.870
400
50.0
C.F.
200
508
324
PEA
HO
to be
continued on
page 64

(to be continued from page 63)




SEt
UP
H
VA
PAG
SEL
kvolt
01
0
...
V
kA
1.0
0
Std
CO
SET
Int
15'
20"
30"
60"
1'
2'
5'
10'
P
a
s
s
C. 00
O. 00
d. 00
E.
Select the correct password
with SEL + SET
Password not correct
Password correct
C. E
O. r
d. r
E.
P Y
a E
s s
s
P N
a o
s
s


SEt
UP
H
VA
PAG
SEL
kvolt 01
0
...
V
kA 1.0
0
V
Std
CO
SET
Int
15'
20"
30"
60"
1'
2'
5'
10'
P
a
s
s
C. 00
O. 00
d. 00
E.
Select the correct password
with SEL + SET
Password not correct
Password correct
C. E
O. r
d. r
E.
P Y
a E
s s
s
P N
a o
s
s



Select network baud 19.2, 9.6, 4.8, 2.4, 1.2 k baud, 7/8 data bits, NO/EVEN/ODD parity and stop bits number using SEL+ SET.

Note: menus COM e ADD will be displayed only if option 485 is enabled.
Menus OUT 1-2 and OUT 3-4 will be displayed only if the option RPQS is enabled.

Select the instrument address with SEL + SET.

INDEX

1 INTRODUCTION

VIP96 PLUS is a panel instrument giving all indications on VIP96 standard model: Voltage (V rms), Current (A rms), P.F. Cosø, Active power (W), Reactive power (var), Apparent power (VA), Frequency (Hz), Average max. peaks for Active power (W) and Apparent power (VA) during the set integration time.
Apart from all measures taken by the standard version, VIP96 PLUS offers many other functions; the total number of indications is more than 100:

- Average values taken during the set integration time for Active Power (W), Reactive Power (var), Apparent Power (VA).
- Active and Reactive Energy meters (kWh and kvarh) in standard version or Cogeneration (positive and negative kWh meters inductive and capacitive kvarh meters).
- Total Harmonic Distortion Factor (THD) for V and I with respect to the fundamental and total rms value.
- Harmonics for di V and I and Cosÿ value from 1st to 24th in absolute and percentage value with respect to the fundamental.
- Crest Factor for V and I in absolute and percentage value.

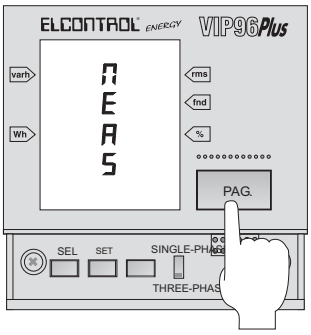
ELCONTROL ENERGY S.p.A. offers the following VIP96 PLUS models:

- VIP96 PLUS standard model;
- VIP96 PLUS APQS: with analogue output APQ or APS or ASQ as in VIP96, selectable on keyboard;
- VIP96 PLUS RPQS: RPQ relay output or RPS or RSQ as in VIP96 selectable on keyboard;
- VIP96 PLUS RS485: RS485 serial communication port PC connection with selectable settings for:
  19.2, 9.6, 4.8, 2.4, 1.2, Kbaud
  7/8 data bits
  1/2 stop bit
  none/even/odd parity;
- VIP96 30A: 30A versions available for all above mentioned models.

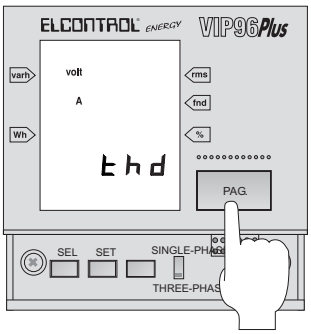
These functions can be used in a wide range of applications including:

- Electrical load consumption check and optimization;
- analysis of harmonic distortion caused by non-linear loads;
- prevention of resonance risk between timing capacitor sets and power supply transformers;
- data acquirement on Personal Computer for filling up graphic and numeric test reports for electric machines and systems.

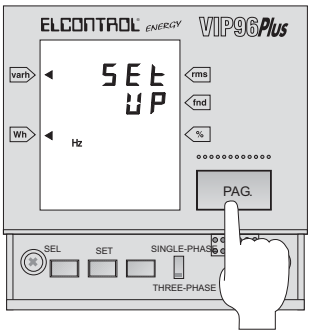
2 List of MENUS



Menu of HARMONIC ANALYSES
Press SEL to enter the menu.
Press PAG. to scroll the list of menus.
NOTE: this menu will be displayed if the frequency for the harmonic analysis has been set in the SETUP menu.



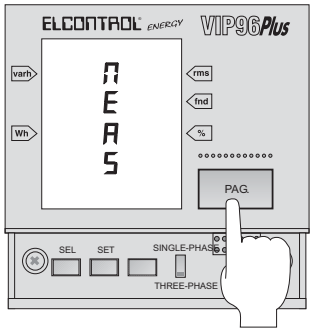
Menus of MAIN MEASURES
Press the key PAG. for 3 seconds to go from measures pages to the list of menus.
Press SEL to enter the menu.
Press PAG. to scroll the list of menus.

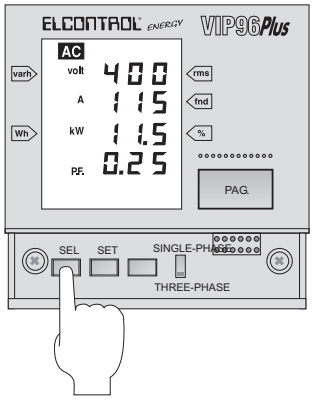


SETUP menu
Press SEL to enter the menu.
Press PAG. to scroll the list of menus.

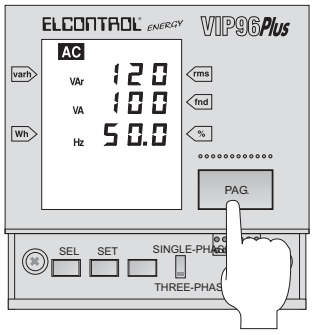
3 Menu of MAIN MEASURES

Press SEL for page display.

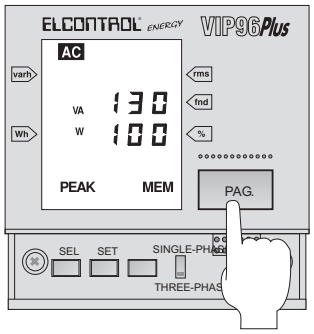




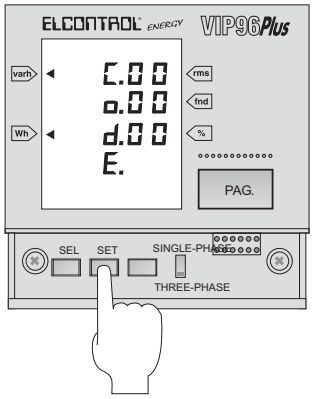
Momentary measures for Volt, Ampere, Watt, P.F.
Press PAG. to continue scrolling these menu pages. Press PAG. for at least 3 seconds to quit this menu.



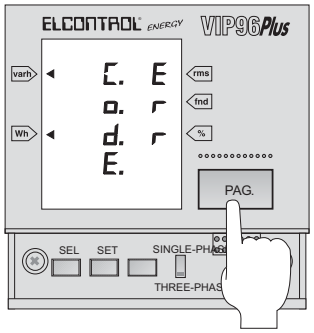
Momentary Measures for Reactive Power, Apparent Power and Frequency.
Frequency values range between 20 and 999 Hz (AC). Press PAG. to continue scrolling these menu pages.



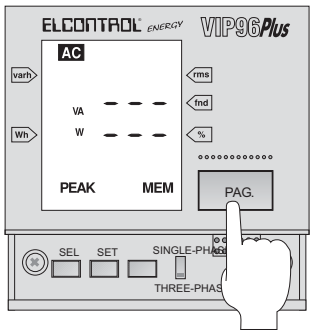
Average peak values during the set integration time for Active and Apparent Power.
Press PAG. to continue scrolling these menu pages.



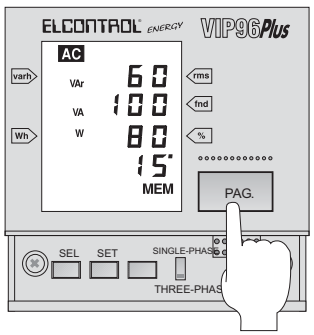
Reset of average peak values for Active and Apparent Power and average values for Active, Reactive and Apparent Power.
Press SET to display the password set-up page (if enabled). Enter code 311299 using the keys SEL and SET. Press PAG. to continue.



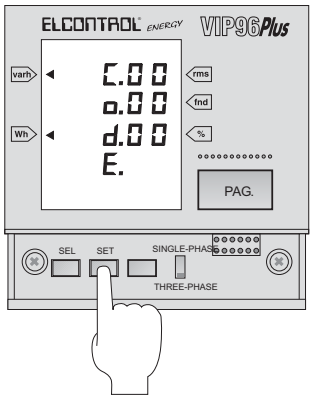
Password error.
Failure to reset Average peaks for Active and Apparent Power and average values for Active, Reactive and Apparent Power.
Press PAG. to continue.



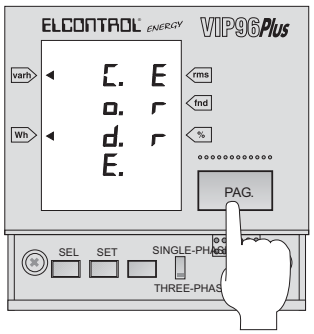
Reset of peak values and average values successful.
Press PAG. to continue scrolling these menu pages.



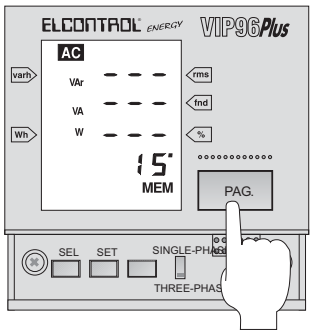
Average values, during the set integration time, for Active, Reactive and Apparent Power.
Press PAG. to continue scrolling these menu pages.



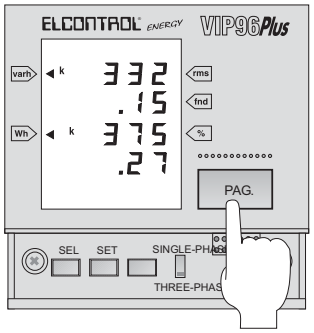
Reset of average values for Reactive, Apparent and Active Power and average peaks for Active and Apparent Power.
Press SET to display the password page (if enabled). Enter code 311299 using the keys SEL and SET. Press PAG. to continue.



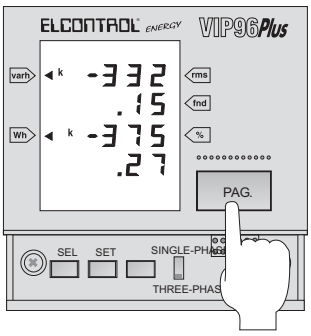
Password error.
Failure to reset average values for Active, Reactive and Apparent Power and peak values for Active and Apparent Power.
Press PAG. to continue.



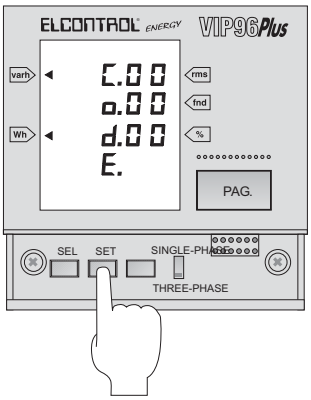
Reset of average values for Active, Reactive and Apparent Power and peak values for Active and Apparent successful.
Press PAG. to continue scrolling these menu pages.



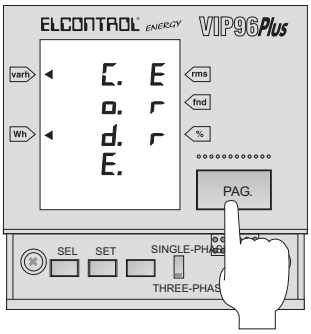
Meters for (Imported) Positive Active Energy and Inductive Reactive Energy.
Min. 0.01 kWh kvarh
Max 999.99 MWh Mvarh
Press PAG. to continue.



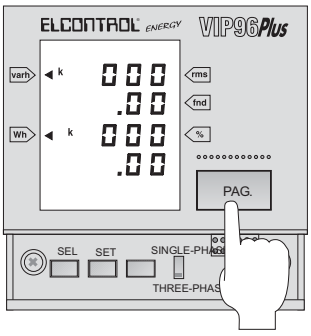
Meters for (Exported) Negative Active Energy and Capacitive Reactive Energy.
Min. 0.01 kWh kvarh
Max 999.99 MWh Mvarh
Press PAG. to continue.



Reset of Energy Meters.
Press SET, on either of the meter pages, to clear (reset) all meters.
If the password has been enabled before clearing (resetting), the password page will be displayed. Enter code 311299 using the keys SEL and SET. Press PAG. to continue.

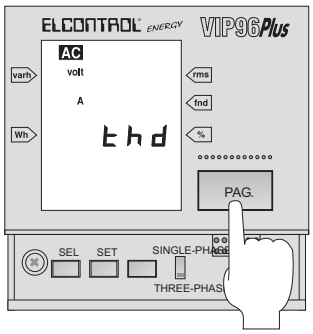


Password error.
Failure to clear (reset) Energy Meters.
Press PAG. to continue.



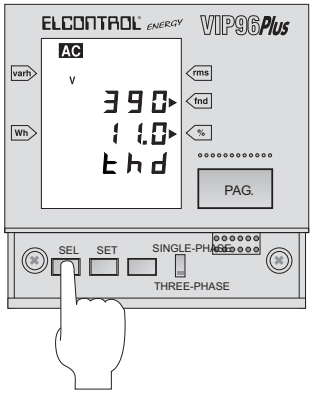
Password correct, therefore all Energy Meters are zeroed.
Press PAG. to go to the next page.

4 Menu of HARMONIC ANALYSES



Press SEL to access the menu.
Press Pag. to scroll the list of menus.

Note: this menu will be displayed only if the fundamental has been selected in SETUP.

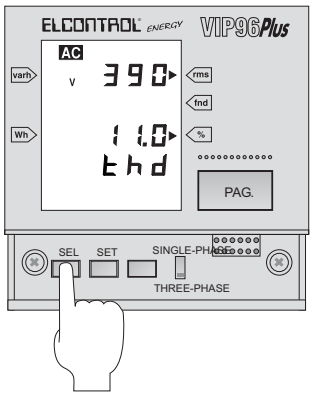


Percentage Total Harmonic Distortion Factor of the voltage referred to the fundamental (THD).
This values ranges between 0 and 999% and is refreshed every 24 sec.

$$THDV = \frac{\sqrt{(S^V)}}{V_1}$$

Referred to the fundamental
V1 = fundamental
Vk = harmonic K

Keep SEL press to display the THD referred to the RMS value.
Press PAG. to go to the next page.

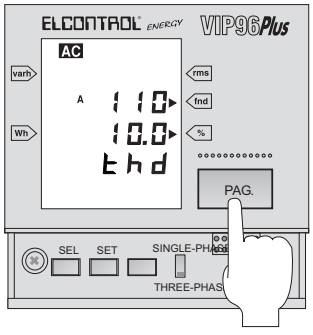


Percentage Total Harmonic Distortion of the voltage referred to the RMS value.
It ranges between 0 and 100% and is refreshed every 24 sec.

$$THDV = \frac{\sqrt{(S^V)}}{V_{RMS}}$$

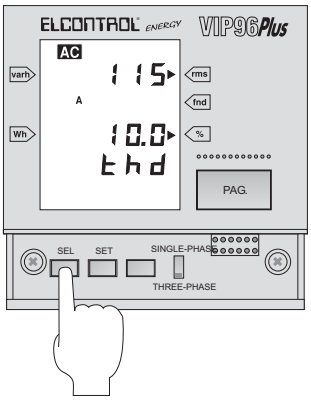
Referred to the RMS value
VRMS = Actual voltage
Effective value
Vk = harmonic K

Release SEL to return to the previous page.



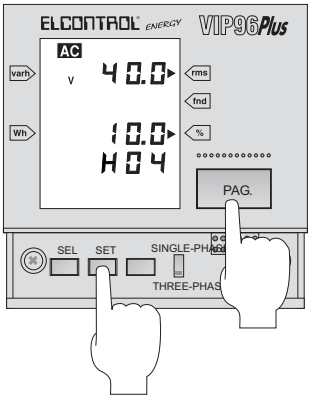
Percentage Total Harmonic Distortion Factor of the Current referred to the fundamental (THD).
This measure ranges between 0 and 999% and is refreshed every 24 seconds.
Keep SEL pressed to display the THD value in Current referred to the RMS value. Press PAG. to go to the next page.

$$THDI = \frac{\sqrt{(Sk =}}{I_1}$$

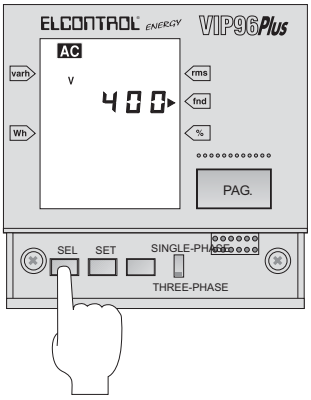


Percentage THD value of the Current referred to the RMS value.
This measure ranges between 0 and 100%.
Values are refreshed every 24 seconds, the instrument will beep to confirm successful refreshment. Release SEL to return to the previous page.

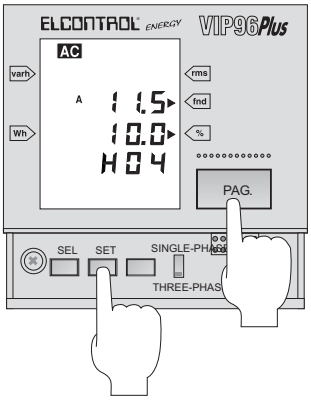
$$THDI = \frac{\sqrt{\left(Sk = 2,24\right)}}{I_{RMS}}$$



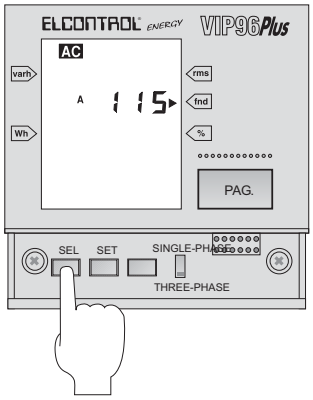
Harmonic spectrum
RMS value of the Voltage Harmonics and percentage value referred to the fundamental (0-999%).
The Harmonic Order (1 to 24) can be selected through an automatic scrolling function: press SET to start scrolling, press it again to stop on the selected Harmonic Order.
Keep SEL pressed to display the fundamental.
Accuracy of the harmonic measures:
1% Lt. + 0.6% F.S.



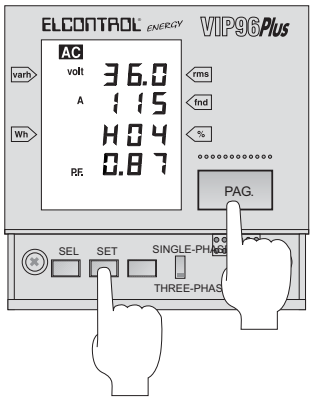
RMS value of the Voltage Fundamental.
Release SEL to return to the previous page.



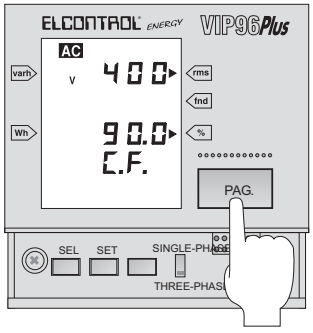
RMS value of the Current Harmonics and percentage value referred to the fundamental (0-999%).
The Harmonic Order (1 to 24) can be selected through an automatic scrolling function: press SET to start scrolling, press it again to stop on the selected Harmonic Order.
Keep SEL pressed to display the fundamental (monostable).
Press PAG. to continue.
Accuracy of the harmonic measures:
1% Lt. + 0.6% F.S.



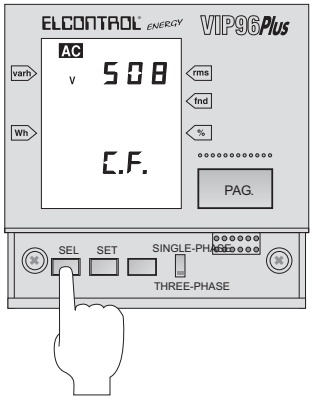
RMS value of the Current Fundamental.
Release SEL to return to the previous page.



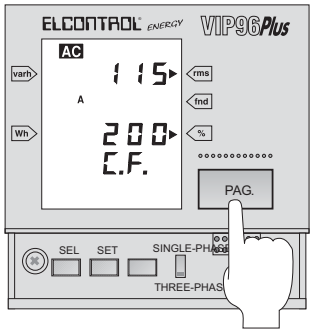
RMS values of Voltage and Current and cosine of the selected harmonic.
In order to select another harmonic, press SET to activate the above described automatic scrolling function. Press PAG. to continue.
Note: the cosø sign, as in B.B. Harmonics, indicates the direction of the Harmonic Power. Furthermore, cosø measure is not affected by single phase/three phase mode (1ø, 3ø).



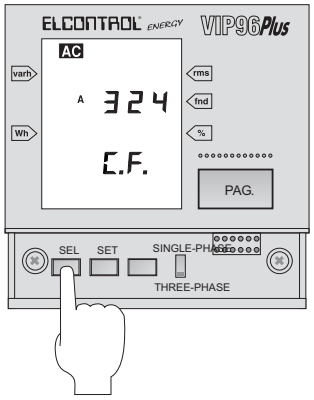
Crest Factor
RMS value and Crest Factor percentage value of Voltage normalized to 100 = 100* Crest/(1.41*RMS) (70 to 999.9%).
Keep SEL pressed to display the absolute Crest Value, max. value of the voltage wave shape.
Press PAG. to go to the next page.



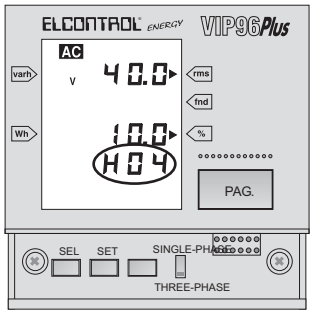
Crest Value
Max. value of the voltage wave shape.
Release SEL to return to the analyzer previous page.



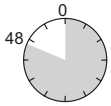
RMS value and percentage value of the Current Crest Factor, normalized to 100 = 100*crest/(1.41*RMS) from 70 to 999.9).
Keep SEL pressed to display the absolute Crest value, max. value of the current wave shape (monostable).
Press PAG. to go to the next page.



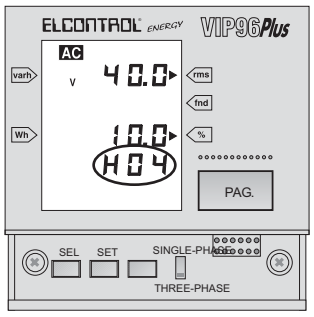
Crest Value, max. value of the current wave shape.
Release SEL to return to the previous page.



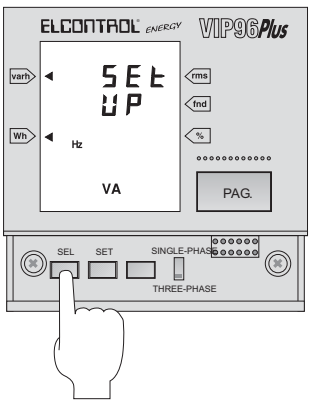
Harmonic spectrum automatic scrolling.
A new harmonic value is available every 2 seconds, 48 seconds are needed for the complete range.



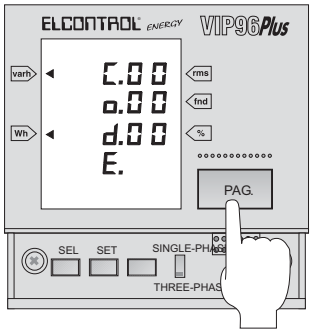
THD measures are refreshed every 24 seconds.



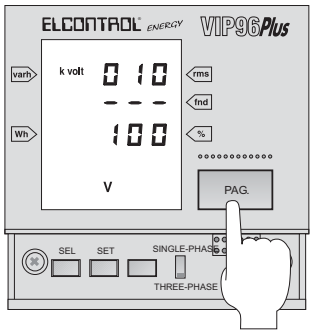
Each time new THD is calculated, the instrument will beep to confirm successful calculation.



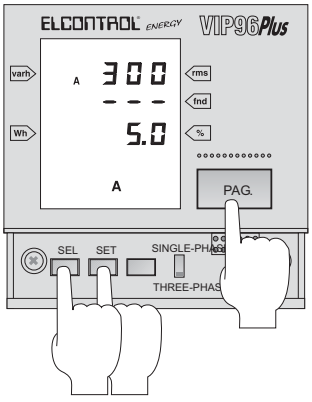
SETUP Menu
Press SEL to access the SETUP menu.
Press PAG. to scroll the list of menus.



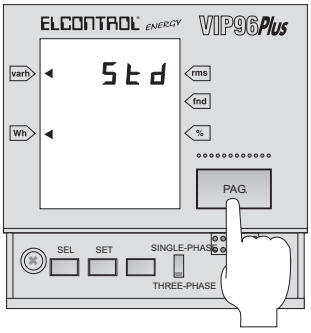
If the password is enabled, enter the right password (311299) through SEL + SET to access the SETUP menus.
Press PAG. to continue.



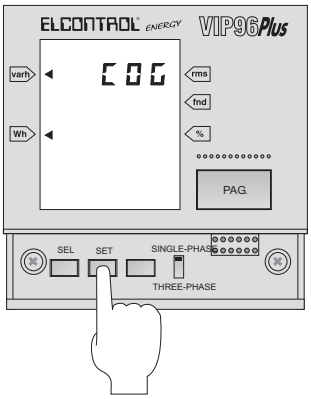
Setting to 10000/100V of the voltage transformer ratio.
Set the value for each figure of the primary using SEL + SET. The primary can be set either in Volts or kVolts with one, two or no decimal figures. The secondary can be selected among the following values: 57.7, 63.5, 100, 110, 115, 120, 173, 190, 200, 220V. Press PAG. to save data and go to the next page.



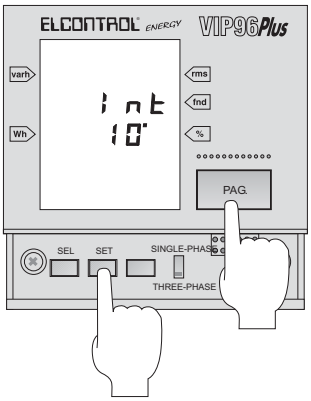
Setting to 300/5A of the current transformer ratio.
Set the value of each figure of the primary using SEL + SET. The primary can be set either in A or kA with one, two or no decimal figures. The secondary can be selected among the following values: 1.0, 2.0, 2.5, 5.0 Ampere.
This page is not available in the 30A model.
Press PAG. to save data and go to the next page.



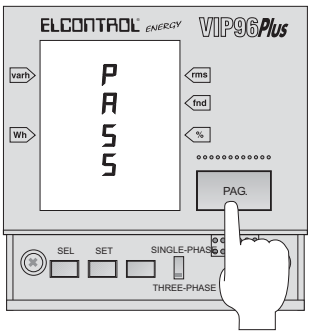
Selection of the Energy Meters:
Standard (STD), Cogeneration (COG), negative and positive kWh (Import/Export), negative and positive kvarh (Inductive/Capacitive).
Press SET to select and then press PAG. to confirm. Select COG only for single phase operation mode.



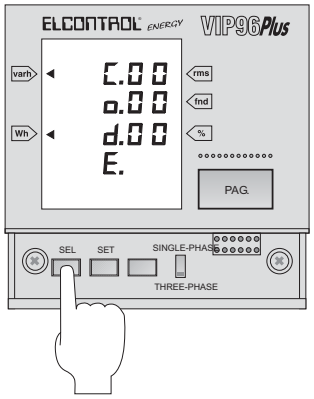
Selection of the Energy Meter:
Standard / Cogeneration.
Press SET to select and then press PAG. to confirm.
Please note: COG can be selected only for single phase operation mode.



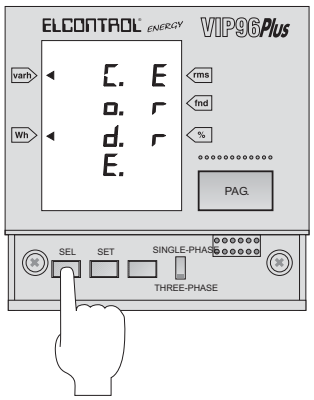
Integration Time
The integration time can be selected among the following values: 1', 2', 5', 10', 15', 20', 30', 60'.
Set the required values with SET.
Press PAG. to go to the next menu.



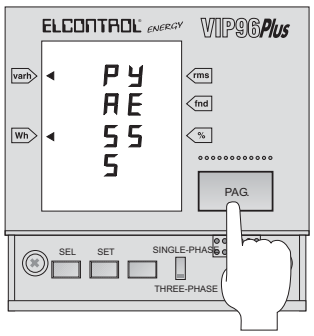
Menu for password enabling/disabling.
Press SEL to display the password page.
Press PAG. to scroll the list of menus.



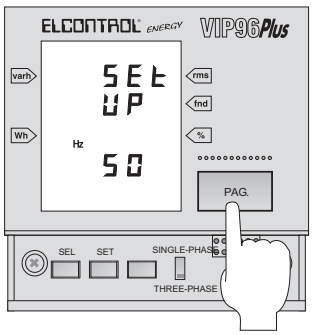
Menu for entering password numbers (311299).
Enter the password using SEL + SET.
Press PAG. to continue.



If the entered password is not correct, Err. Will be displayed.
Press PAG. to continue.

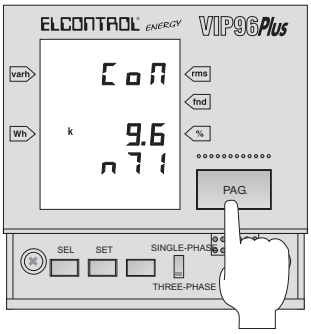


If the entered password is correct, the menu for password enabling/disabling will be accessed.
Select enable (YES) or disable (NO) password with SET.
Press PAG. to continue.

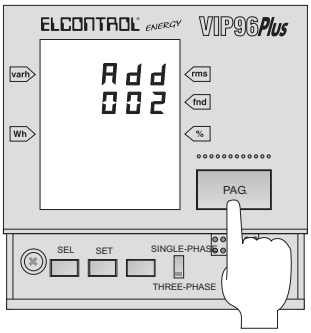


Harmonic analysis
SETUP menu of frequency for the harmonic analysis.
Press SET to select among the following options:
- OFF disabled
- 50Hz fundamental frequency
- 60Hz fundamental frequency

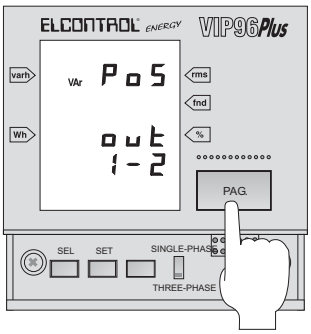
Press PAG. again to go to the next menu.



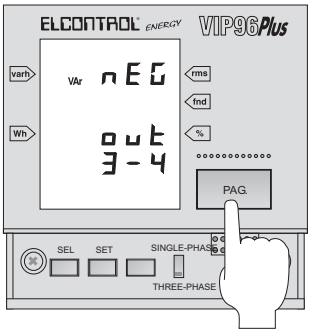
Communication parameters
(only for 485 models)
19.2, 9.6, 4.8, 2.4, 1.2 kbaud (fixed k) 7, 8 data bits; Odd, Even, no parity 1, 2 stop bits.
Set the required values using SEL and SET.
Press PAG. to go to the next page.



Communication parameters
(only for 485 models)
Address of the instruments settable within the range 1-247.
Set the required values using SEL and SET.
Press PAG. to go to the next page.



SETUP menu for RPQS and APQS outputs
(only for RPQS and APQS models)
Menu for selecting the power for the analogue (APQS) or impulsive (RPQS)output, identified by output 1-2.
Press SEL to change the type of output: this can be as follows:
VAr POS, VAr NEG, VA POS, W POS, W NEG. Press PAG. to go to the next page.



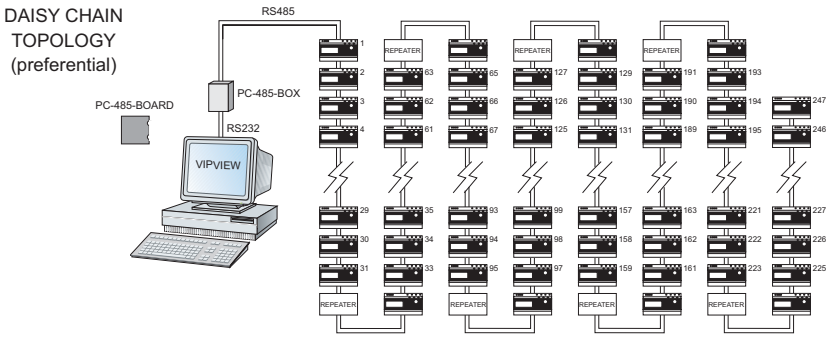
SETUP Menu for RPQS and APQS outputs
(only for RPQS and APQS models)
Menu for selecting the power for the analogue (APQS) or impulsive (RPQS) output, identified by output 3-4.
Press SEL to change the type of output: this can be as follows:
VAr POS, VAr NEG, VA POS, W POS, W NEG. Press PAG. to go to the next page.

ANNEX A

A.1 The VIP96 PLUS-485 and the local network VIPNET-485 instruments

ELCONTROL ENERGY solves the problem of price and dependability with it's VIPNET-485 (monitoring network), a complete electrical energy measurement and control system, by connecting the VIP ENERGY-485, VIP ONE 485 and VIP96 PLUS-485 to a Personal Computer which has installed the VIPVIEW software for use in a Windows environment and VIPLOAD software for use in a DOS environment.
The network connection of the RS485 instruments data lines is carried out by a normal shielded twisted pair, which is suitable for this type of connection (see page 114).
The network is based on the EIA RS485 electrical standard, while the communication protocol respects the MODBUS industrial standard. According to this standard it is possible to address and manage up to 247 instruments.
These instruments are distributed on at least 8 lines interconnected by REPEATER-485 signal repeaters.
Each line can contain a maximum of 32 devices, subdivided into VIP ENERGY-485, VIP ONE-485, VIP96 PLUS-485 or REPEATER-485.
The first line can contain 31 instruments plus the internal converter RS232 - RS485 for personal computer or the PC485 BOARD or PC485 BOX external converter.

ELCONTROL ENERGY has optoisolated the data lines of its VIP-485 instruments and has equipped the electrical interface circuits with a galvanically isolated power supply, so as to enable the VIPNET-485 networks to be able to operate both in industrial environments with strong interfences and in the presence of severe events such as atmospheric discharges.
The instantaneous overvoltage allowable is 2500 VAC for 1 minute.



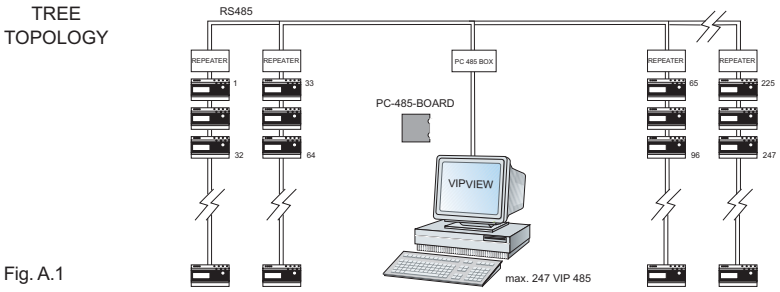


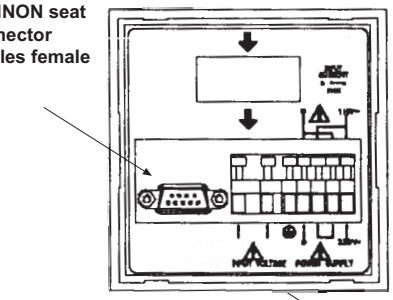
Fig. A.1

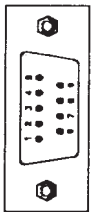
A.2 External connections and setup of the RS485 option

The VIP96 PLUS-485 can be connected to a Personal Computer with a 2-pole shielded cable with maximum lenght 1200 meters. Other devices can be connected to the same line (VIP ENERGY-485, VIP ONE 485, VIP96 PLUS-485 or REPEATER-485 signal repeaters) up to a maximum of 31 units. By utilizing REPEATER-485 signal repeaters other groups of 32 units can be added, up to a maximum of 247 VIP-485.
Every VIP96 PLUS-485 is identified by its own address, which can be set on the display by means of a selection video page.

The connection of VIP96 PLUS-485 to the network is by means of a shielded bi-polar cable connected to the terminals located in the top of the instrument, next to the power supply terminals.

CANNON seat connector 9 poles female





PIN	FUNZIONE
1	A
2	B
3	N.C.
4	N.C.
5	N.C.
6	N.C.
7	N.C.
8	N.C.
9	N.C.

Fig. A.2

A.3 The REPEATER-485 signal

Power supply 220 VAC ± 10% or 110 VAC ± 10%. The REPEATER-485 signal repeater is a bidirectional amplifier which is connected to the VIPNET-485 network according to the following diagram:

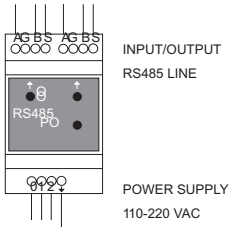


Fig. A.3

Depending on the type of system, the REPEATER-485 can be utilized in various network configurations, linear type (Linear Bus Topology Daisychain) - Fig. A.1 - for long areas and "tree" type (Tree Topology) - Fig. A.2 - for more extended areas.

A.4 The Board for Personal Computer
PC485-BOARD

The master of the VIPNET-485 network is a PC485-BOARD installed in a free slot of a PC with the following minimum specifications:

Personal Computer Specifications:
- CPU 80486 66 MHz or greater IBM® compatible
- Central Memory RAM 8 Mbytes
- VGA graphic video controller board
- Floppy disk unit: 3.5 inch 1,44 MBytes
- Hard disk: 180 Mbytes
- 2 RS232 serial ports
- 1 CENTRONICS parallel port
- VGA color video
- Mouse
- Microsoft MSDOS® operative system 5.0 version or equivalent

A.5 The PC485-BOX external converter

The PC485-BOX, an RS232/485 external converter, is also available powered by the power suppliers of the Personal Computer or externally by a power supply 220V ± 10%, 110 VAC ± 10%.