

DIRIS A17

Multifunction meters - MFM

Multi-measurement meter - dimensions 72 x 72 mm

Operating instructions **EN**



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1. Documentation

All **DIRIS A17** documentations are available on the website at the following address:

www.socomec.com/en/documentation-diris-a17



2. Danger and warning

This equipment must be mounted only by professionals.

The manufacturer shall not be held responsible for failure to comply with the instructions in this manual.

2.1. Risk of electrocution, burns or explosion

- The device must be installed and serviced only by qualified personnel.
- Prior to any work on or in the device, isolate the voltage inputs and auxiliary power supplies and short-circuit the secondary winding of all current transformers (PTI SOCOMEC).
- Always use an appropriate voltage detection device to confirm the absence of voltage.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Always supply the device with the correct rated voltage.

Failure to take these precautions could cause serious injuries.

2.2. Risk of damaging device

Check the following:

- the voltage of the auxiliary power
- the frequency of the distribution system (50 or 60 Hz)
- the maximum voltage across the voltage-input terminals, (V1, V2, V3 and VN) 500 VAC phase-to-phase or 289 VAC phase-to-neutral
- a maximum current of 6 A on the current-input terminals (I1, I2 and I3).

3. Preliminary operations

For personnel and product safety, please carefully read the contents of these operating instructions before installation.

Check the following points as soon as you receive the **DIRIS A17** package:

- the packing is in good condition,
- the product has not been damaged during transport,
- the product reference number conforms to your order,
- the package contains the product fitted with a pull-out terminal block and a Quickstart,

4. Presentation

The **DIRIS A17** is a 72x72 mm compact multifunction meter for measuring electrical network parameters. The **DIRIS A17** provides measurements of voltage, current, power and energy. With display and push buttons, users can easily access to all product functionalities. It includes an input and an output, and depending on the reference, it can include a communication bus as well as the measurement of the harmonic distortion rate.

4.1. Main functions

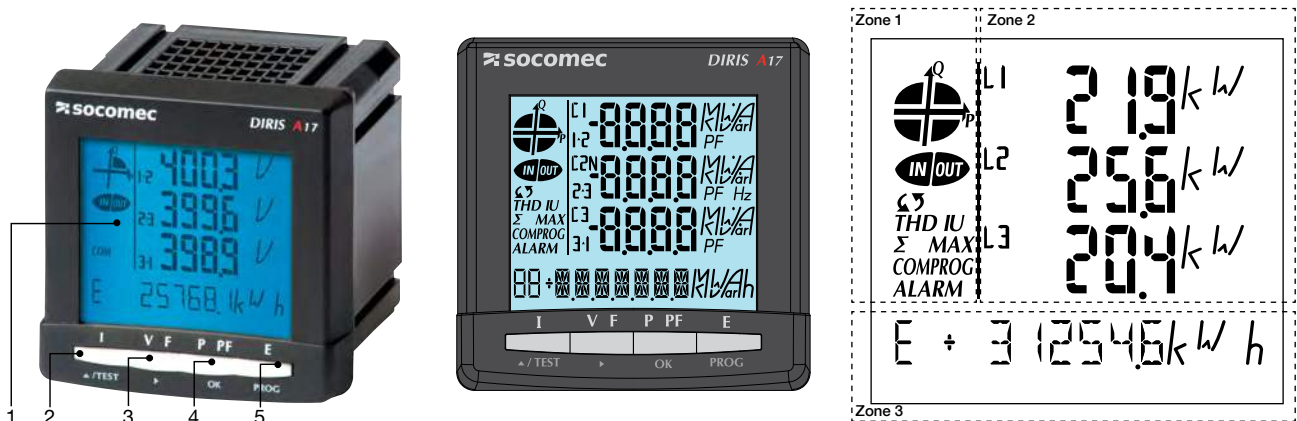
Multifunction meters - PMD*

- Measurement of electric variables: I, U, V, F
- Power, Power Factor and Energy
- THD (according to reference)
- 1 input / 1 output
- Alarms
- RS 485 MODBUS communication (according to reference)

Description	Reference
DIRIS A17 with pulse output	4825 0101
DIRIS A17 with RS485 Modbus communication	4825 0102
DIRIS A17 with RS485 Modbus communication and THD	4825 0103

*Performance Measuring and monitoring Device (IEC 61557-12)

4.2. Display views



1. Backlit LCD display.
2. Currents (instantaneous and maximum) and current THD.
3. Voltages, frequency and voltage THD.
4. Active, reactive, and apparent power (instantaneous and max. values) and power factor.
5. Powers.

Zone 1

- Geometric representation of active and reactive Power
- Status of input/output
- Bad phases order
- THD IU** Current or voltage THD measurement
- Σ** Total power
- MAX** Current or power max value
- COM** In communication
- PROG** Programming mode selection
- ALARM** Alarm presence

Zone 2 Electrical values measurement with Phases and/or Neutral indication

Zone 3 Total energy measurement

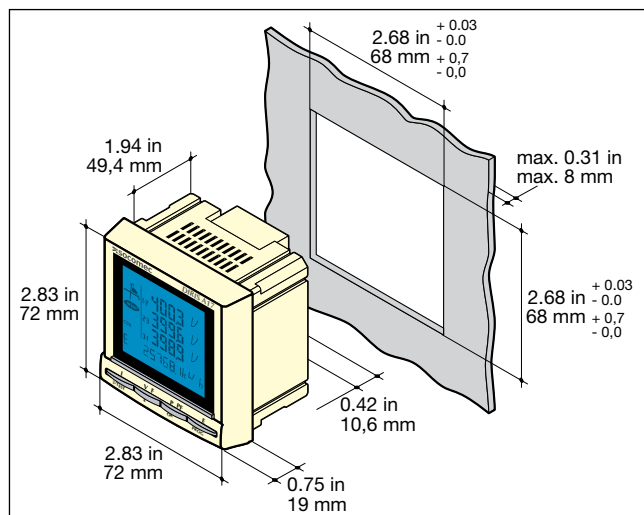
5. INSTALLATION

5.1. Recommendation

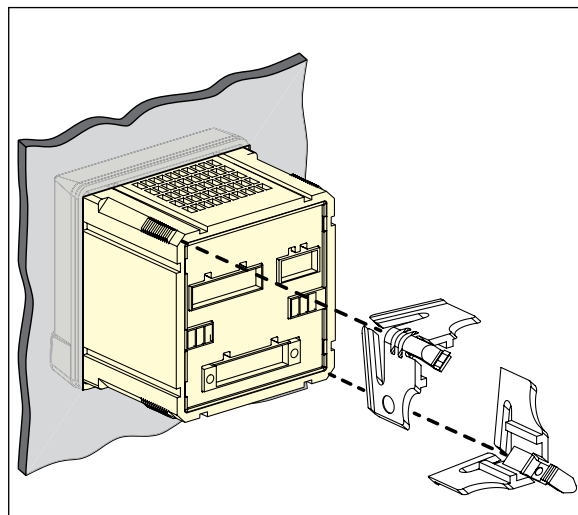
- avoid proximity to systems which generate electromagnetic interference,
- avoid vibrations with accelerations in excess of 1 G for frequencies below 60 Hz.

5.2. Cut-out diagram

- Panel mount of the device can be done according to the following cut-out diagram:

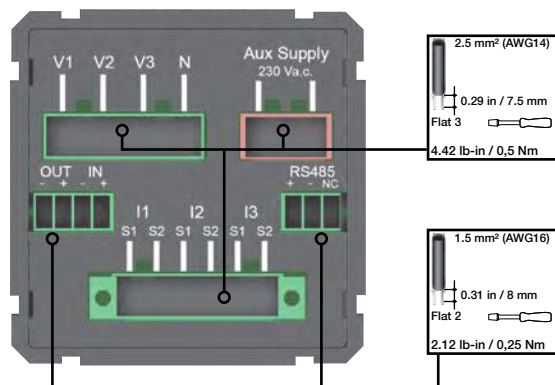


- Two fixing clips are used to fix the device to the panel.



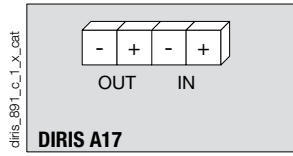
5.3. Terminals

Each CT's secondary winding must be short-circuited when disconnecting the DIRIS. This can be done automatically using one of Socomec's catalogue products: the PTI (ref.: 4990 **0521**). Please contact us for further information.



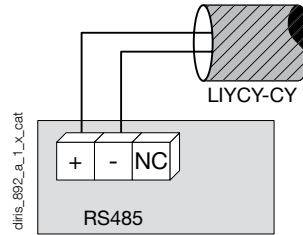
5.4. Connections

5.4.1. Connection (input / output)



Power supply between 8 and 30 VDC for the input /output.

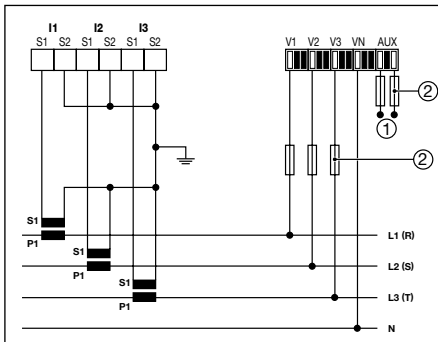
5.4.2. Communication connection



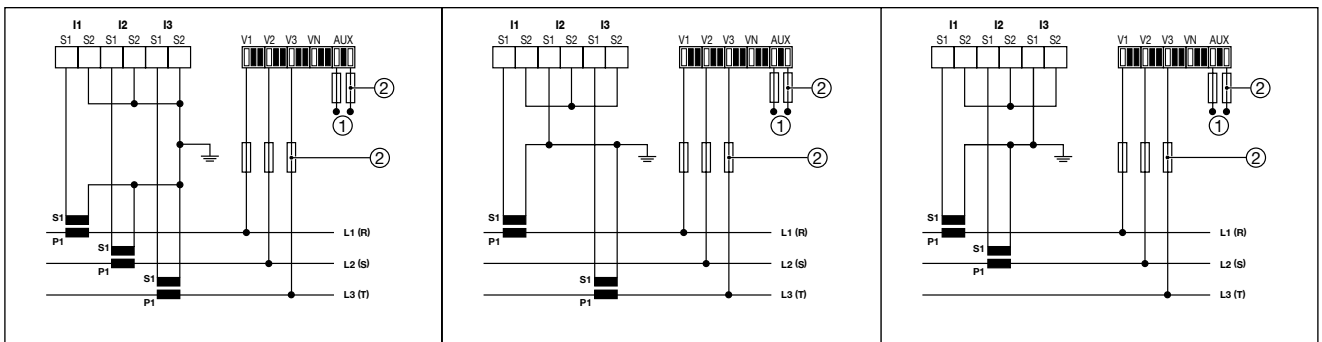
NC: not connected. can be used for shield continuity.

5.4.3. Network connections

5.4.3.1. Unbalanced three-phase network (4NBL)

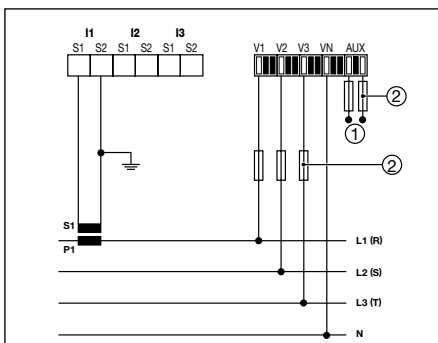


5.4.3.2. Unbalanced three-phase network (3NBL)

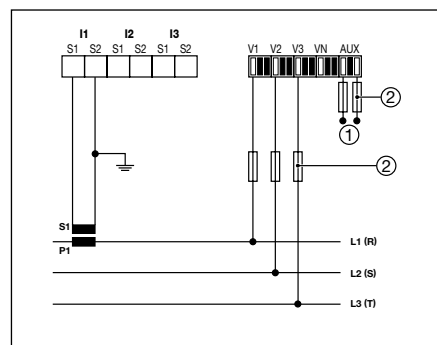


The solution with 2 CTs with the 2nd and 3rd phase current calculated via vectorial summation, results in an 0.5% reduction in phase accuracy.

5.4.3.3. Balanced three-phase network (4NBL)



5.4.3.4. Balanced three-phase network (3NBL)



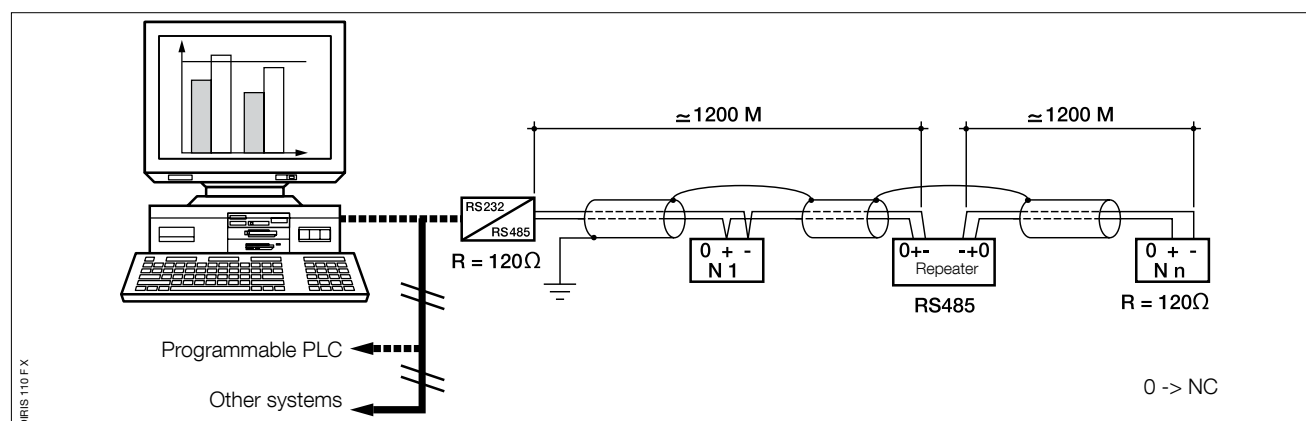
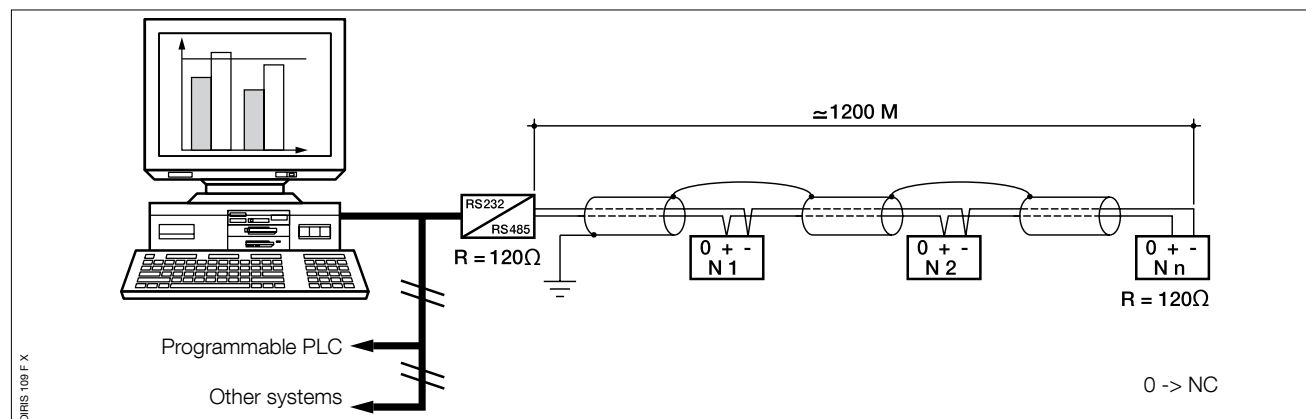
6. Communication MODBUS®

6.1. General Information

The MODBUS® communication bus is available on **DIRIS A17** (ref. 4825 0102 et 4825 0103).

It is achieved via an RS485 serial link (2 or 3 wires) for using products from a PC or an API.

In a standard configuration, an RS485 link enables the interconnection of 32 products to a PC or an automaton over a distance of 1200 meters.



6.2. Recommendations

It is necessary to use a shielded twisted pair (LIYCY type). In a disturbed environment or large network (in terms of length) we recommend the use of a shielded twisted pair (type LIYCY-CY).

A repeater should be used if the distance of 1200 m and/or maximum number of 32 products are exceeded.

A 120 ohms resistance must be fixed at both ends of the link.

6.3. Communication structure

The MODBUS® used by the product involves a dialogue using a master-slave structure. The mode of communication is the RTU (Remote Terminal Unit) using hexadecimal characters of at least 8 bits.

Structure of the MODBUS® sequence (question master -> slave):

Slave address	Function code	Address	Number of words to be read	CRC 16
1 byte	1 byte	2 bytes	2 bytes	2 bytes

According to the MODBUS® protocol, transmission time must be less than 3 silences, i.e. the emission time of 3 characters so that the message is processed by the **DIRIS A17**.

To use this information correctly, it is necessary to use the MODBUS® functions according to the codes:

- 3: to read n words (maximum 128).
- 6: to write one word.
- 16: to write n words (maximum 128).

Note:

1 word<=> 2 octets <=> 16 bits

2 word<=> 4 octets <=> 32 bits

When selecting the slave address 0, a message is sent to all the devices present on the network (only for functions 6 and 16).

Note: The response time (time out question/answer) is 250 ms.

6.4. Register table

The communication tables and associated explanations are available in the documentations page of **DIRIS A17** on internet web site at the following address:

www.socomec.com/en/documentation-diris-a17

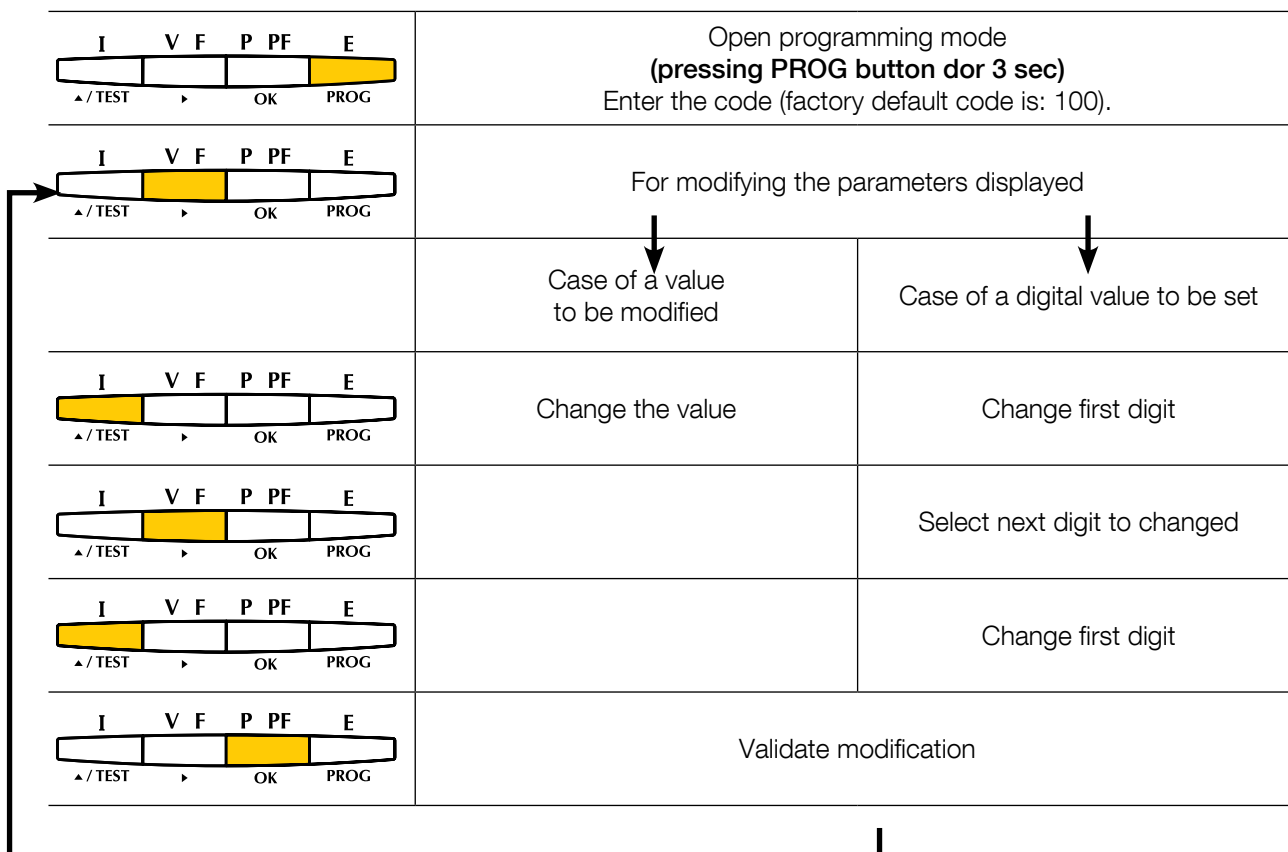


7. Programming

Programming can be achieved from the Easy Config configuration software or directly from the **DIRIS A17** display. Refer to following paragraphs for programming from the display.

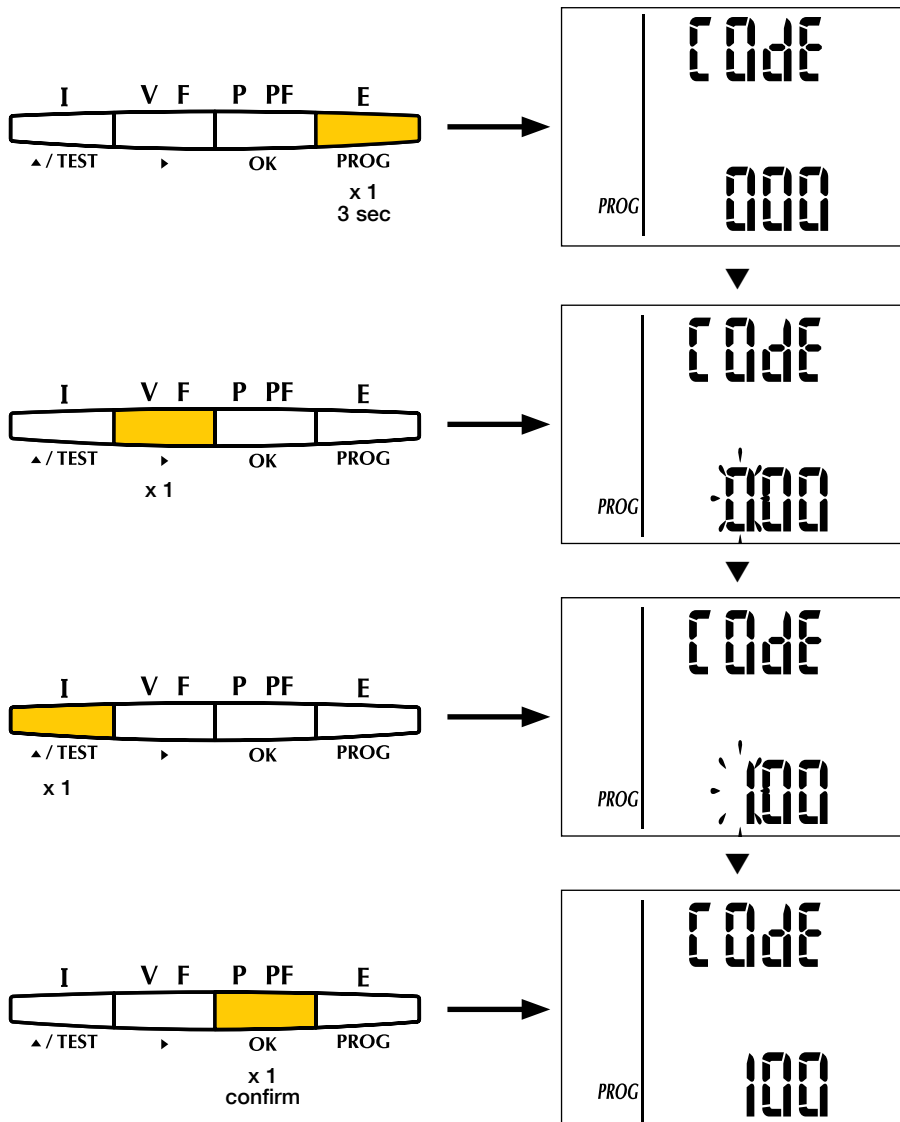
7.1. Navigation principle

The programming mode allows to modify parameters such as network type, integration time, input/output, alarms or communication parameters. The process to navigate inside the programming mode is described in the following steps:



7.2. Access to programming mode

By pressing "E/PROG" button for 3 seconds, device will enter the programming mode. Default code is: 100.



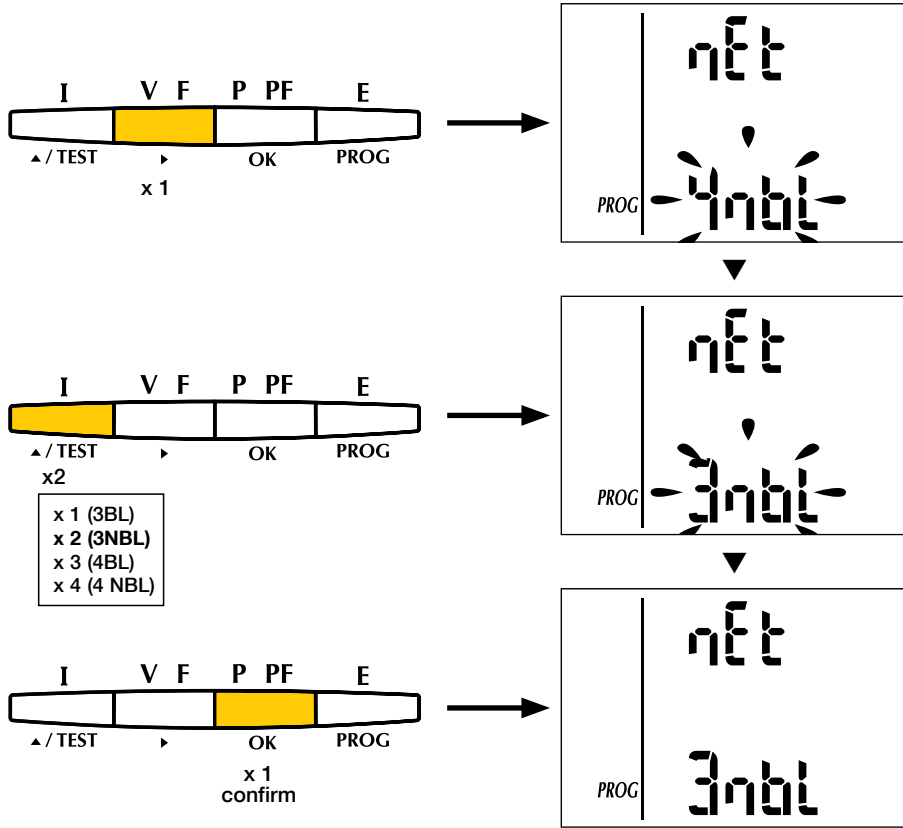
If the entered code is the right one, device will enter programming mode successfully and remains in this mode until user finishes the session by pressing "PROG" button for 3 seconds.

Attention: For a timeout of 60 seconds without activity on the pushbuttons the device leaves the programming mode without saving possible changes.

7.3. Example: network selection.

In programming mode (see page 10), go to screen "Network type - nEt"

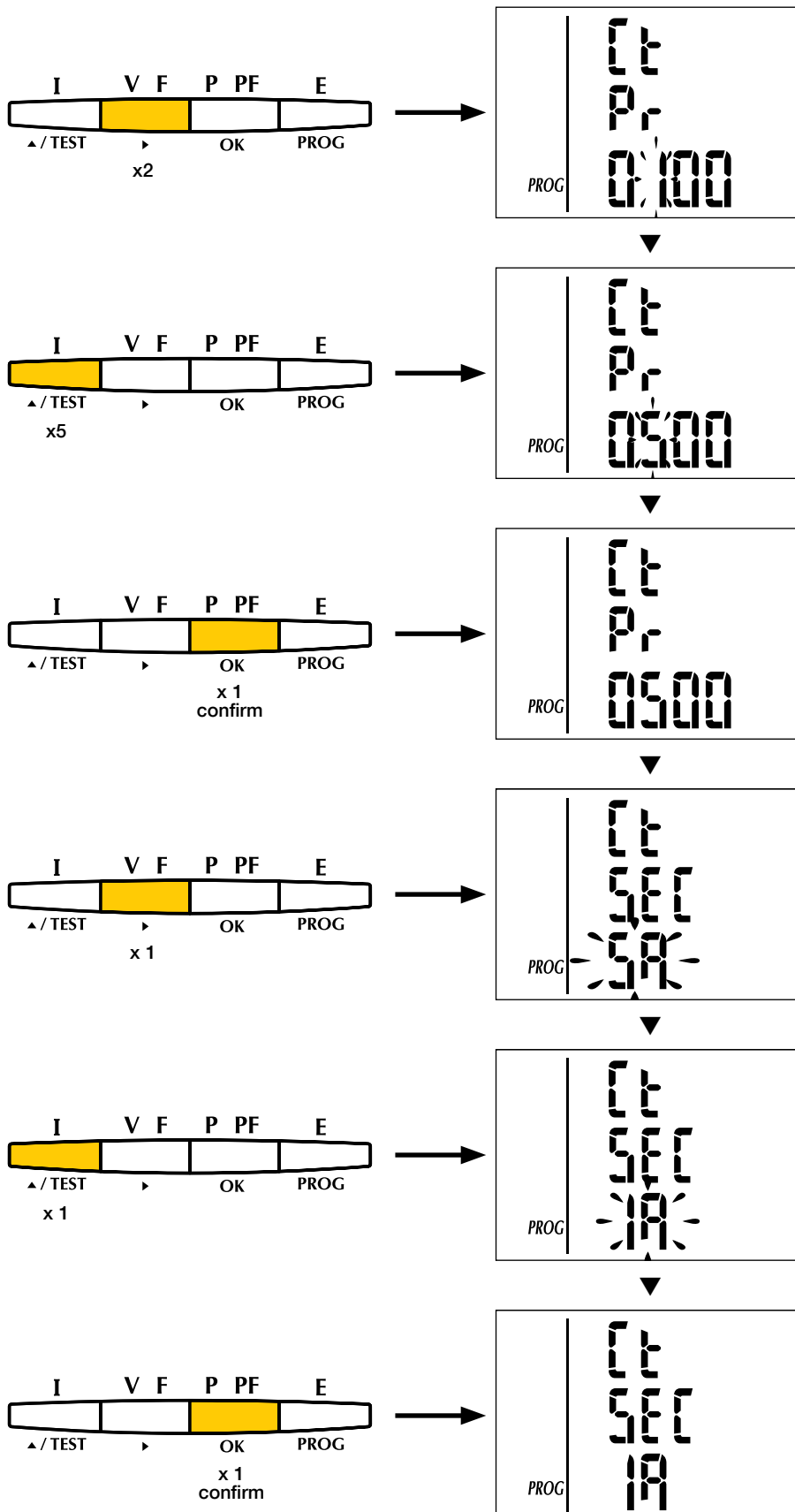
In this example, network change from 4NBL to 3NBL:



7.4. Example: choice of current transformer

In programming mode (see page 10), access to screen "Current transformer - Ct"

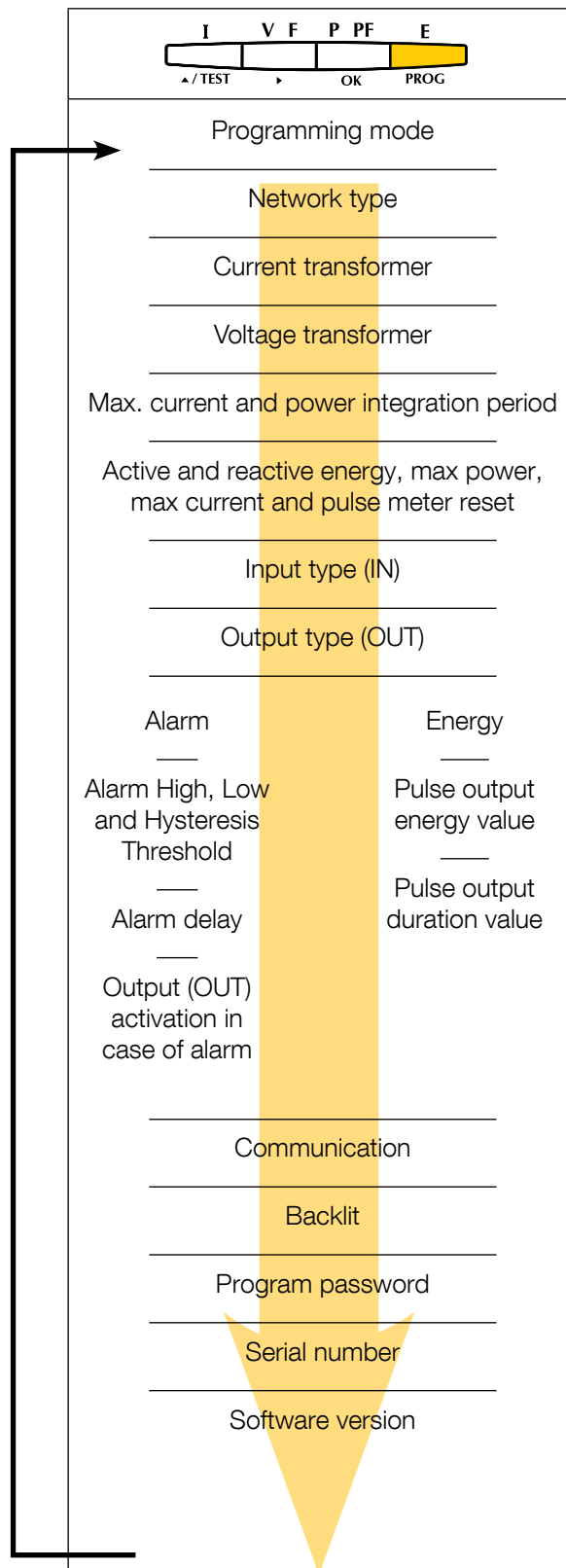
Example: ratio change to 500/1.



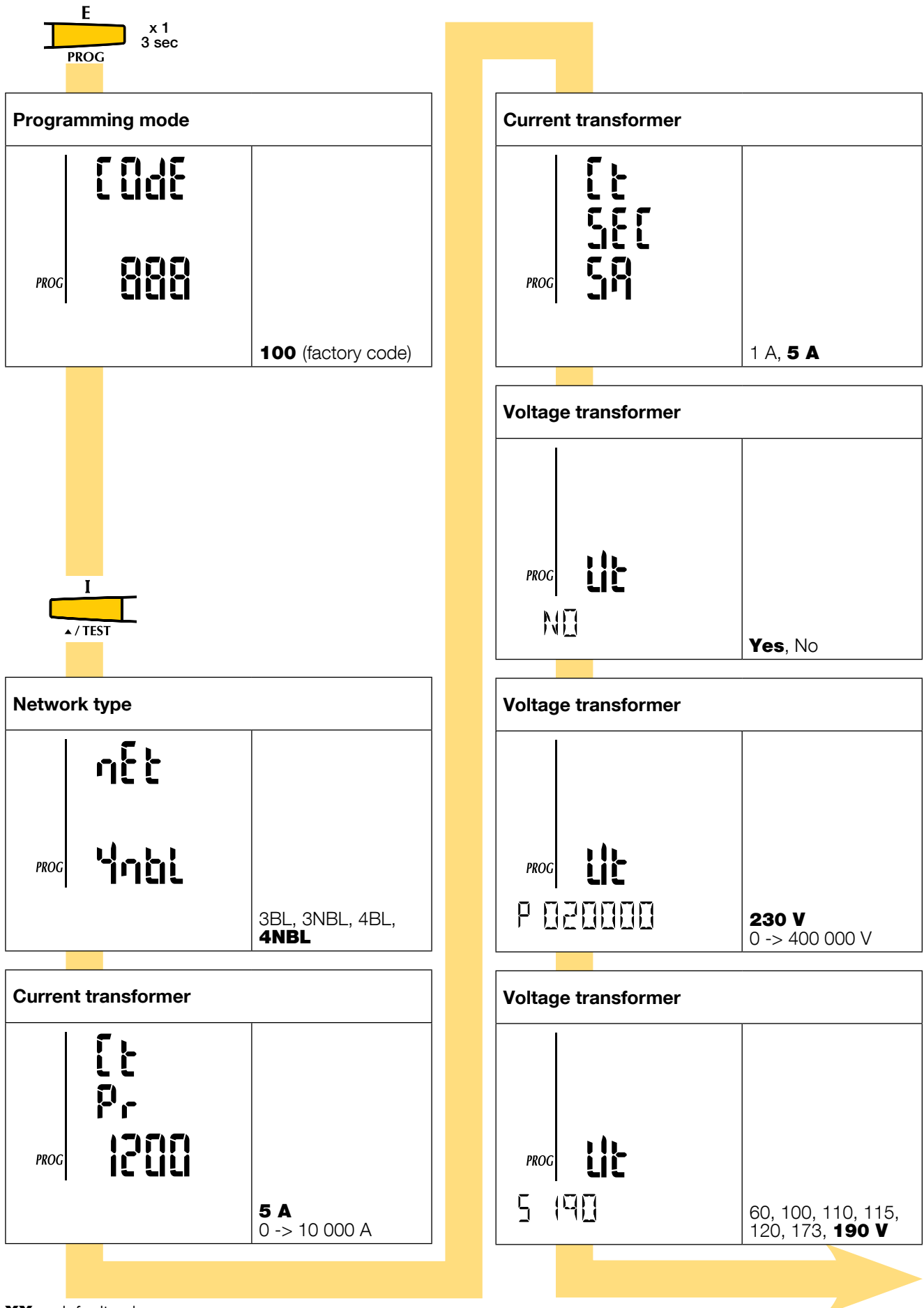
7.5. Programming mode overview

By pressing "E/PROG" button for 3 seconds, device will enter the programming mode. Default code is: 100.

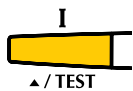
Different screens are accessed by pressing "PROG":



7.6. Detailed view of the programming menu



XX = default value



Max. current integration time	
	20, 30, 60, 2, 5, 8, 10, 15 min

Current max reset	
	Yes, No

Max. power integration time	
	20, 30, 60, 2, 5, 8, 10, 15 min

Pulse meter reset	
	Yes, No

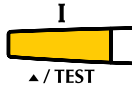
Active / reactive energy reset	
Yes, No	

Input type (IN)	
	<i>No: no activation</i> <i>Puls: pulse</i> <i>cd: status change</i> No, puls, cd

Power max reset	
	Yes, No

Output type (OUT)	
	<i>Ea: active energy</i> <i>Er: reactive energy</i> <i>Alarm: status change if alarm</i> EA, ER, Alarm

XX = default value



Alarm type	
ALAr tYPE 1 PROG	Value alarm I, In, P , Q, S, Capacitive PF, Inductive PF, THDI, THDU, THDV, cd

Alarm delay	
ALAr tENP 600 PROG	2,4 sec 0.01 -> 99.9 sec

Alarm high threshold	
ALAr Ht 1330 PROG	237 0 -> 9999

Output (OUT) activation in case of alarm	
ALAr no PROG	Yes, No

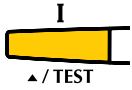
Alarm low threshold	
ALAr Lt 0459 PROG	223 0 -> 9999

Pulse output energy value	
PULS VAL 100 PROG	0: 0.1 kWh/kvarh 1: 1 kWh/kvarh 2: 10 kWh/kvarh 3: 100 kWh/kvarh 4: 1000 kWh/kvarh 5: 10000 kWh/ kvarh

Alarm hysteresis threshold	
ALAr Hyst 15 PROG	1% 0% -> 99%

Pulse output duration value	
PULS dur 200 PROG	100 -> 900 msec

XX = default value



Communication	
PROG	<div style="text-align: center;"> <p>CON</p> <p>Adr</p> <p>123</p> </div> <p><i>Product address on MODBUS network</i></p> <p>1 -> 247</p>

Backlit	
PROG	<div style="text-align: center;"> <p>bAC</p> <p>Lit</p> <p>Std</p> </div> <p><i>Standard: remains ON</i> <i>Auxiliary: switches OFF after a few seconds</i></p> <p>Standard, Auxiliary</p>

Communication	
PROG	<div style="text-align: center;"> <p>CON</p> <p>bds</p> <p>96</p> </div> <p><i>Baud Rate</i></p> <p>1.2, 2.4, 4.8, 9.6, 19.2, 38.4 kbaud</p>

Program password	
PROG	<div style="text-align: center;"> <p>PASS</p> <p>CHG</p> <p>250</p> </div> <p>100 0 -> 999</p>

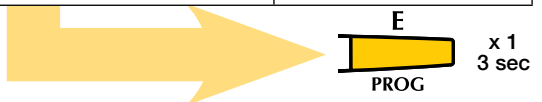
Communication	
PROG	<div style="text-align: center;"> <p>CON</p> <p>PAR</p> <p>no</p> </div> <p><i>Parity</i></p> <p>No, Even, Odd</p>

Serial number	
PROG	<div style="text-align: center;"> <p>3 13 1</p> <p>6 10 1</p> <p>00 12</p> </div>

Communication	
PROG	<div style="text-align: center;"> <p>CON</p> <p>StOP</p> <p>1</p> </div> <p><i>Stop bit</i></p> <p>1, 2</p>

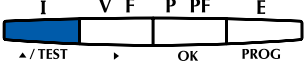
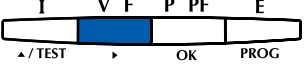
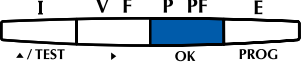
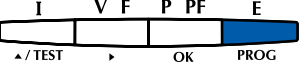
Software version	
PROG	<div style="text-align: center;"> <p>SOFT</p> <p>U 104</p> </div>

XX = default value

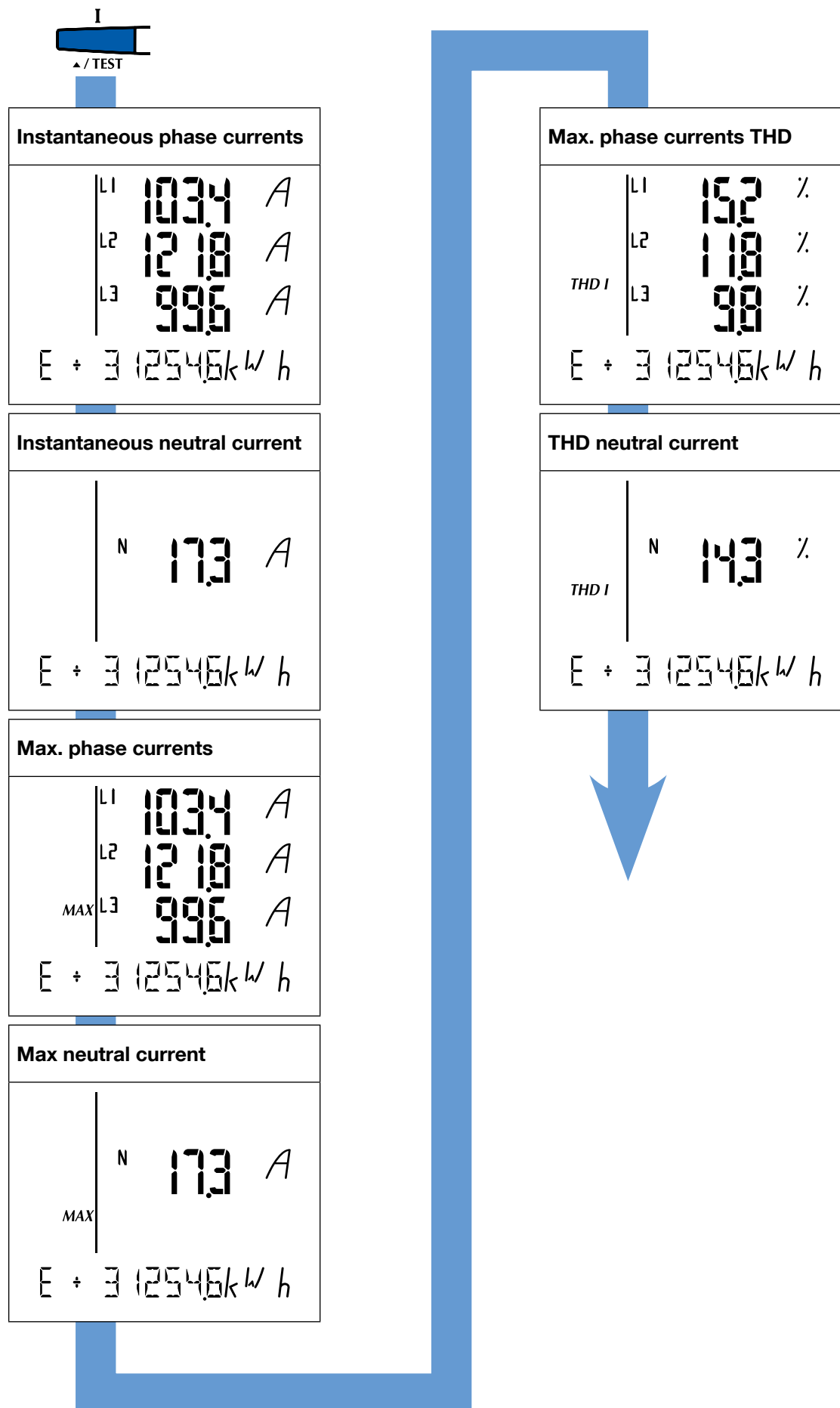


8. Use

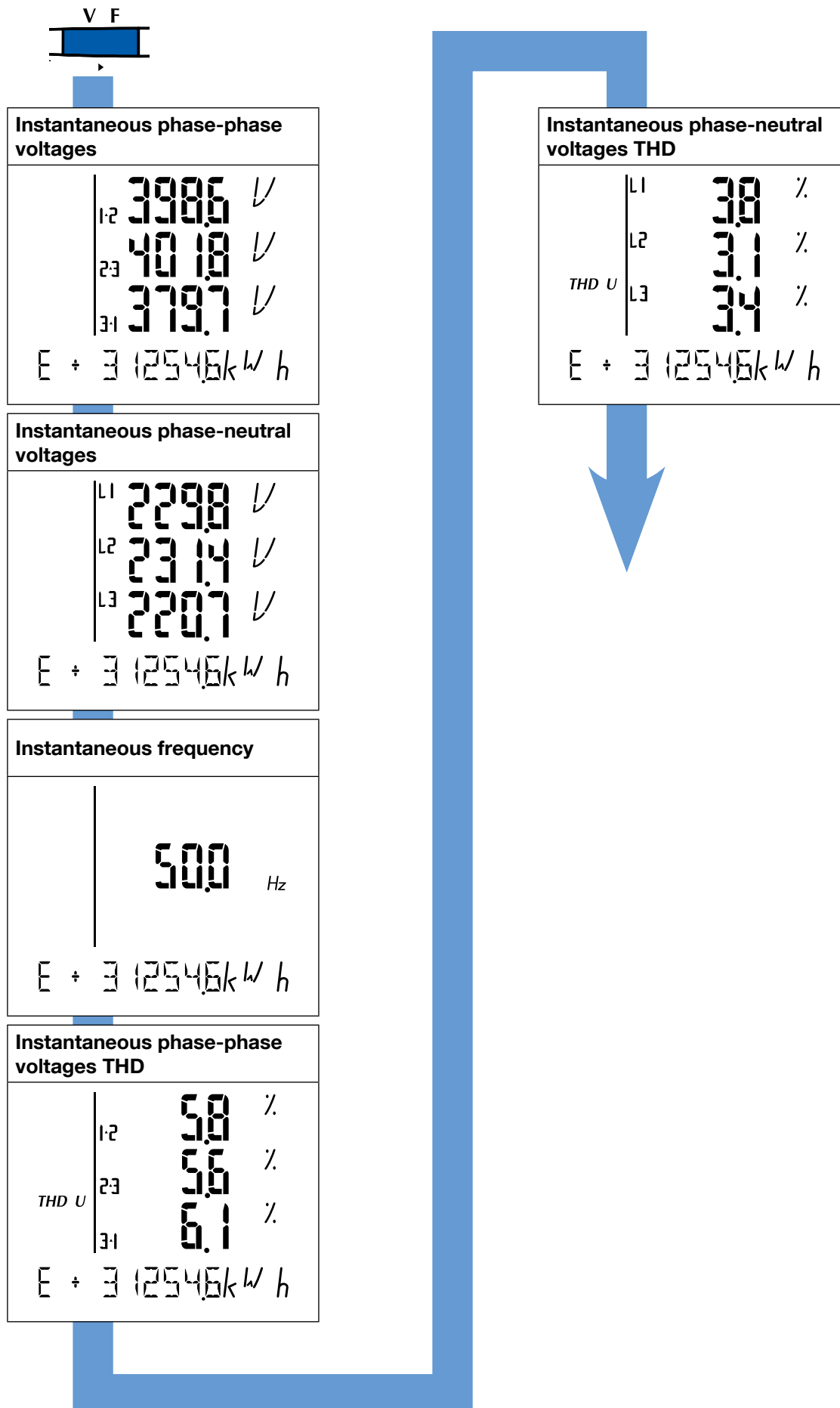
The measurement values are accessible via dedicated buttons: **Current, Voltage, Power and Energy**. By pressing the appropriate button several times all the measurement relative to this button can be displayed. All the available measurements are described in the following diagram:

Current	Voltage	Power	Energy
			
<p>Instantaneous phase currents</p> <hr/> <p>Instantaneous neutral current</p> <hr/> <p>Max. phase currents</p> <hr/> <p>Max neutral current</p> <hr/> <p>Max. phase currents THD</p> <hr/> <p>THD neutral current</p>	<p>Instantaneous phase-phase voltages</p> <hr/> <p>Instantaneous phase-neutral voltages</p> <hr/> <p>Instantaneous frequency</p> <hr/> <p>Instantaneous phase-phase voltages THD</p> <hr/> <p>Instantaneous phase-neutral voltages THD</p>	<p>Total powers - imported/exported active, - imported/exported reactive - apparent</p> <hr/> <p>Instantaneous active power per phase</p> <hr/> <p>Instantaneous reactive power per phase</p> <hr/> <p>Instantaneous apparent power per phase</p> <hr/> <p>Maximum active, reactive and apparent power</p> <hr/> <p>Total power factor</p> <hr/> <p>Instantaneous power factor per phase</p>	<p>Import active energy</p> <hr/> <p>Import reactive energy</p> <hr/> <p>Apparent energy</p> <hr/> <p>Export active energy</p> <hr/> <p>Export reactive energy</p> <hr/> <p>Pulse meter connected to the input</p>

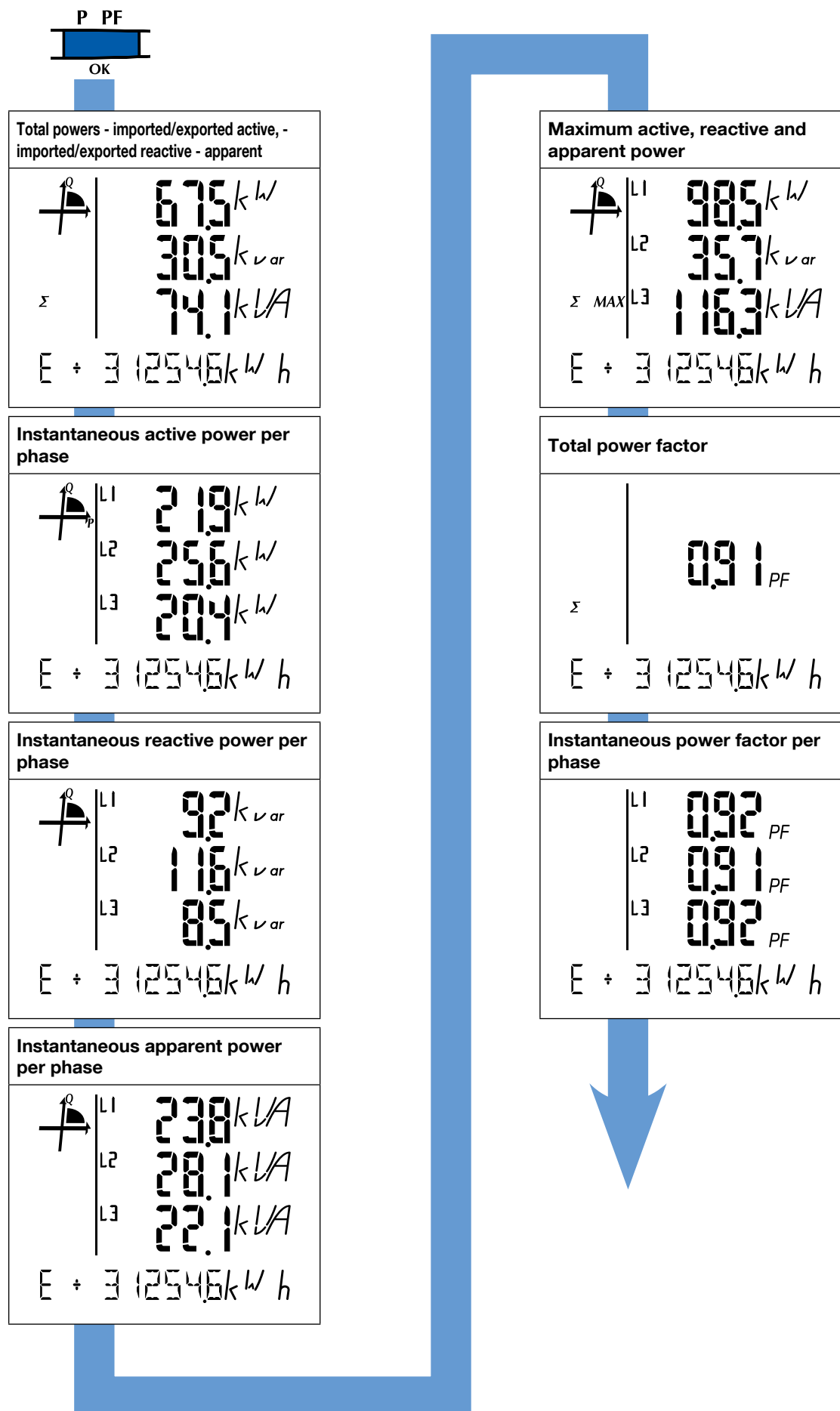
8.1. Detailed view of the "Current" menu



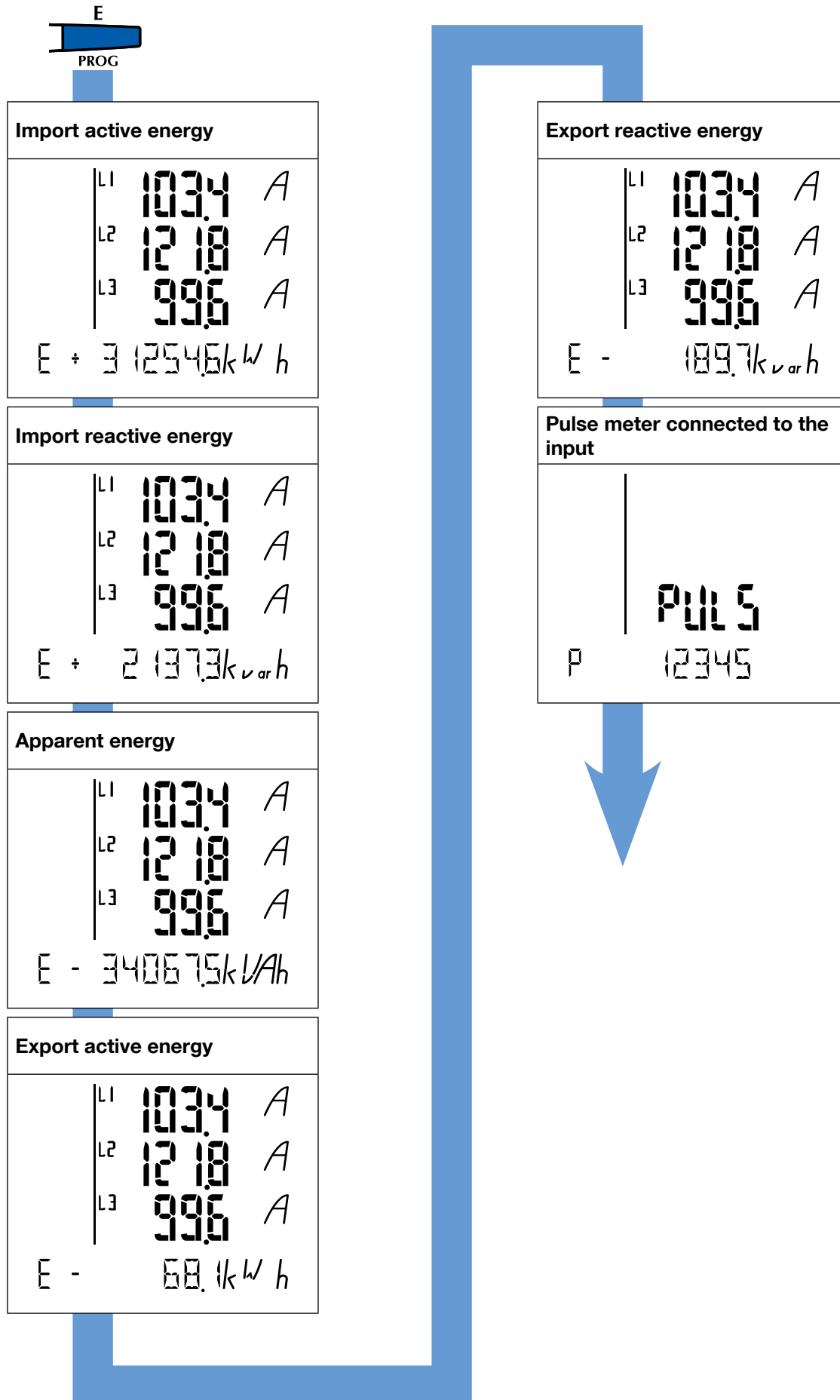
8.2. Detailed view of the "Voltage" menu



8.3. Detailed view of the "Power" menu



8.4. Detailed view of the "Energy" menu



9. Connection test function

During the test, the DIRIS must have current and voltage for each of the phases.

In addition to this, the function recognises the PF of the installation as being between $0.6 < PF < 1$. If the PF of the installation is not within this range, this function cannot be used.

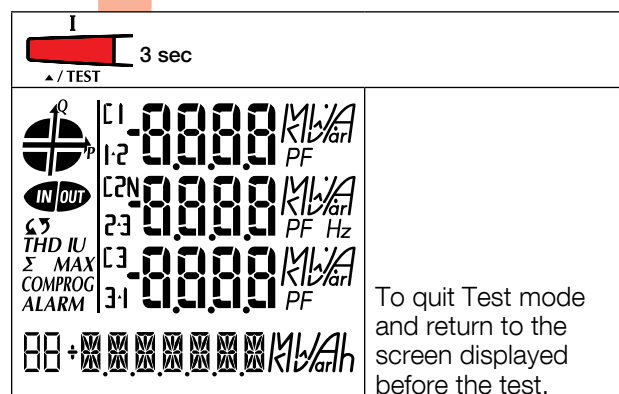
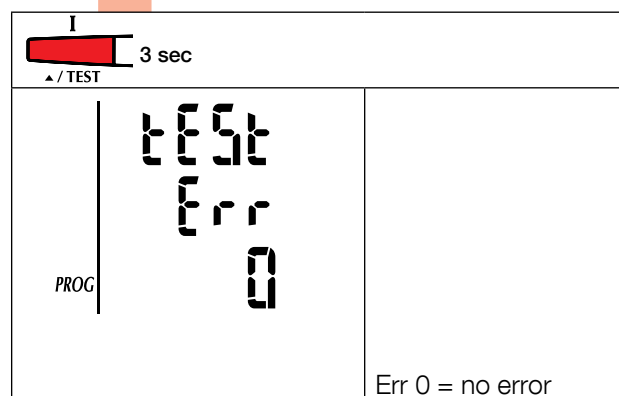
- In 4 BL / 3 BL, only the connection of the CTs is controlled.
- In 4NBL and 3NBL the connection as a whole is controlled.

- Err 0 = no error
- Err 1 = CT phase 1 inverted
- Err 2 = CT phase 2 inverted
- Err 3 = CT phase 3 inverted
- Err 4 = V1 and V2 voltages inverted
- Err 5 = V2 and V3 voltages inverted
- Err 6 = V3 and V1 voltages inverted

- Errors 1, 2 and 3 must be corrected manually by reversing CT connections.
- Errors 4, 5 and 6 must be corrected manually by modifying voltage connections.

First test operation

Press the TEST button for 3 seconds. The error indication is displayed on the screen.



I 3 sec
▲ / TEST

	The screen displays the error number.
--	---------------------------------------

V F 1 x

	To automatically change the TC current, change the value NO to YES.
--	---

P PF 1 x
OK

	Err 0 = no error
--	------------------

I 3 sec
▲ / TEST

	To quit Test mode and return to the screen displayed before the test.
--	---



10. Assistance

Causes	Solutions
Backlight switched off	Check backlight configuration
Voltages displayed = 0 V or incorrect	Verify the connections and the CT configuration.
Currents displayed = 0 A or incorrect	Verify the connections Verify the CT configuration
Powers and power-factor (PF)	Use the test connection function (see page 23)
Phases missing on Display	Check the network configuration (see page 11)
I/O are not operating	Check power supply 8 - 30VDC

11. Electrical and Technical characteristics

Type	Panel mounting
Dimensions W x H x D	72 x 72 x 60 mm
Case degree of protection	IP30
Front degree of protection	IP52
Display type	backlit LCD display
Terminal block type	fixed or plug-in
Voltage and other connection cross-section	0.2 ... 2.5 mm ²
Current connection cross-section	0.5 ... 6 mm ²
Weight	400 g

Current measurement (TRMS)

Via CT with primary up to	9 999 A
Via CT with secondary	1 or 5 A
Measurement range	0 ... 11 kA
Input consumption	0.6 VA
Measurement updating period	1 s
Accuracy at 50 Hz	0,5 %
Accuracy at 60 Hz	1 %
Permanent overload	6 A
Intermittent overload	10 I _n for 1 s

Voltage measurements (TRMS)

Direct measurement between phases	69 ... 690 VAC
Direct measurement between phase and neutral	40 ... 400 VAC
VT primary	400 000 VAC
VT secondary	60, 100, 110, 173, 190 VAC
Input consumption	≤ 0.1 VA
Measurement updating period	1 s
Accuracy at 50 Hz	0,5 %
Accuracy at 60 Hz	1 %
Permanent overload	800 VAC

Power measurement

Measurement updating period	1 s
Accuracy at 50 Hz	1 %
Accuracy at 60 Hz	2 %

Power factor measurement

Measurement updating period	1 s
Accuracy at 50 Hz	0,5 %
Accuracy at 60 Hz	1 %

Frequency measurement

Measurement range	45 ... 65 Hz
Measurement updating period	1 s
Accuracy	0,1 %

Energy accuracy

Active (as per IEC 62053-21) at 50 Hz	Class 1
Active (as per IEC 62053-21) at 60 Hz	Class 2
Reactive (according to IEC 62053-23)	Class 2

Operating conditions

Operating temperature	- 10 ... + 55 °C
Storage temperature range	- 20 ... + 85 °C
Relative humidity	95 %

Auxiliary power supply

Alternating voltage	220 ... 277 VAC
AC tolerance	± 15 %
Frequency	50 / 60 Hz
Consumption	3 VA

Digital pulse and control input

Number	1
Type of power supply	Optocoupler 8 to 30 VDC
Minimum signal width	10 ms
Minimum duration between 2 pulses	18 ms

Communication

Link	RS485
Type	2 ... 3 half duplex wires
Protocol	MODBUS RTU
MODBUS® speed	1200 ... 38400 bauds

Pulse, alarm and control output

Number	1
Type of power supply	Optocoupler 8 to 30 VDC
Minimum signal width	10 ms
Minimum duration between 2 pulses	18 ms
Type of optocoupler	IEC 62053-31 Class A (5 ... 30 VDC)
Pulse weight	100 Wh, 1 kWh, 10 kWh, 100 kWh, 1000 kWh, 10000 kWh
Pulse length	100 ms, 200 ms, 300 ms, ..., 900 ms

12. According to IEC 61557-12

IEC 61557-12 Edition 1 (08/2007) COMPLIANCE

Performance criteria	
PMD classification	SD
Temperature	K55

CHARACTERISTICS OF THE FUNCTIONS

Symbol for functions	Measurement range	Operational performance class
P	10% to 120% I _n	1
Qa, Qv	10% to 120% I _n	1
Sa, Sv	10% to 120% I _n	1
Ea	0 to 99999999 kwh	1
Era, Erv	0 to 99999999 kwh	2
Eapa, Eapv	-	-
f	45 to 65 Hz	0,1
I	10% to 120% I _n	0,5
IN	-	-
INc	10% to 120% I _n	1
U	46 to 520Vac ph/ph	0,5
Pfa, Pfv	0.5 ind to 0.8 cap	0,5
Pst, Plt	-	-
Udip, Uswl	-	-
Utr, Uint	-	-
Unba, Unb	-	-
Un	-	-
THDu	Fn = 50Hz - ranks 1 to 31 Fn = 60Hz - ranks 1 to 31	1
THD-Ru	-	-
Ih	-	-
THDi	Fn = 50Hz - ranks 1 to 31 Fn = 60Hz - ranks 1 to 31	1
THD-Ri	-	-
Msv	-	-

13. Glossary of abbreviations

nEt	Type of network
4NBL	Unbalanced three-phase network, 4 wires with 3 CT
4BL	Balanced three-phase network, 4 wires with 1 CT
3NBL	Unbalanced three-phase network, 3 wires with 2 or 3 CT
3BL	Balanced three-phase network, 3 wires with 1 CT
Ct	Current transformer
MAX	Maximum average values
tIME 4I	Integration times for average and maximum current values
tIME P	Integration times for mean and maximum power values
rSET	Reset
MAX P	Active power maximum mean value
EA	Active energy (kWh)
ER	Reactive energy (kvarh)
AUX	Auxiliary supply
bACLIt	Backlit
SErI	Serial number
SOft	Software version
THD I1, I2, I3, In	Current harmonic distortion rate
THD U12, U23, U31	Phase-to-phase voltage harmonic distortion rate
THD V1, V2, V3	Phase-to-neutral voltage harmonic distortion rate
COM	Communication
ADR	Slave address
BDS	Communication speed (baud)
PAR	Communication frame parity
NO	Without parity
Even	Even parity
Odd	Odd parity
STOP	Frame-stop beep
1	1 stop bit
2	2 stop bits

Socomec worldwide

IN EUROPE

BELGIUM

UPS / Power Control & Energy Efficiency / Solar
Tel. +32 2 340 02 30
Fax +32 2 346 28 99
info.be@socomec.com

FRANCE

UPS / Power Control & Energy Efficiency / Solar
Tel. +33 1 45 14 63 00
Fax +33 1 48 67 31 12
dcm.ups.fr@socomec.com

GERMANY

Power Control & Energy Efficiency
Tel. +49 7243 65292 0
Fax +49 7243 65292 13
info.scp.de@socomec.com
UPS
Tel. +49 621 71 68 40
Fax +49 621 71 68 444
info.ups.de@socomec.com

ITALY

Power Control & Energy Efficiency
Tel. +39 02 98 49 821
Fax +39 02 98 24 33 10
info.scp.it@socomec.com
Solar
Tel. +39 0444 598611
Fax +39 0444 598627
info.solar.it@socomec.com

UPS

Tel. +39 02 98 242 942
Fax +39 02 98 240 723
info.ups.it@socomec.com

NETHERLANDS

UPS / Power Control & Energy Efficiency / Solar
Tel. +31 30 760 0900
Fax +31 30 637 2166
info.nl@socomec.com

POLAND

Power Control & Energy Efficiency
Tel. +48 91 442 64 11
Fax +48 91 442 64 19
info.scp.pl@socomec.com
UPS
Tel. +48 22 825 73 60
Fax. +48 22 825 73 60
info.ups.pl@socomec.com

PORTUGAL

UPS / Solar
Tel. +351 261 812 599
Fax +351 261 812 570
info.ups.pt@socomec.com

ROMANIA

UPS / Power Control & Energy Efficiency / Solar
Tel. +40 21 319 36 88
Fax +40 21 319 36 89
info.ro@socomec.com

RUSSIA

UPS / Power Control & Energy Efficiency / Solar
Tel. +7 495 775 19 85
Fax +7 495 775 19 85
info.ru@socomec.com

SLOVENIA

UPS / Power Control & Energy Efficiency / Solar
Tel. +386 1 5807 860
Fax +386 1 561 11 73
info.si@socomec.com

SPAIN

UPS / Power Control & Energy Efficiency / Solar
Tel. +34 93 540 75 75
Fax +34 93 540 75 76
info.es@socomec.com

UNITED KINGDOM

Power Control & Energy Efficiency
Tel. +44 1462 440 033
Fax +44 1462 431 143
info.scp.uk@socomec.com
UPS
Tel. +44 1285 863 300
Fax +44 1285 862 304
info.ups.uk@socomec.com

TURKEY

UPS / Power Control & Energy Efficiency / Solar
Tel. +90 216 540 71 20-21-22
Fax +90 216 540 71 27
info.tr@socomec.com

IN ASIA PACIFIC

AUSTRALIA

UPS
Tel. +61 2 9325 3900
Fax +61 2 9888 9544
info.ups.au@socomec.com

CHINA

UPS / Power Control & Energy Efficiency
Tel. +86 21 52 98 95 55
Fax +86 21 62 28 34 68
info.cn@socomec.com

INDIA

Power Control & Energy Efficiency
Tel. +91 124 4027210
Fax +91 124 4562738
info.scp.in@socomec.com
UPS / Solar
Tel. +91 44 39215400
Fax +91 44 39215450 & 51
info.ups.in@socomec.com
info.solar.in@socomec.com

SINGAPORE

UPS / Power Control & Energy Efficiency
Tel. +65 6506 7600
Fax +65 64 58 7377
info.sg@socomec.com

THAILAND

UPS
Tel. +66 2 941 1644 7
Fax +66 2 941 1650
info.ups.th@socomec.com

VIETNAM

UPS
Tel. +84 8 3559 1220
Fax +84 8 3559 1221
info.ups.vn@socomec.com

IN MIDDLE EAST

UNITED ARAB EMIRATES

UPS / Power Control & Energy Efficiency / Solar
Tel. +971 4 29 98 441
Fax +971 4 29 98 449
info.ae@socomec.com

IN AMERICA

USA, CANADA & MEXICO

Power Control & Energy Efficiency
Tel. +1 617 245 0447
Fax +1 617 245 0437
info.us@socomec.com

OTHER COUNTRIES

NORTH AFRICA

Algeria / Morocco / Tunisia
info.naf@socomec.com

AFRICA

Other countries
info.africa@socomec.com

SOUTH EUROPE

Cyprus / Greece / Israel / Malta
info.se@socomec.com

SOUTH AMERICA

Tel. +34 93 540 75 75
info.es@socomec.com

MORE DETAILS

www.socomec.com/worldwide

HEAD OFFICE

SOCOMECC GROUP

S.A. SOCOMECC capital 10 816 800€
R.C.S. Strasbourg B 548 500 149
B.P. 60010 - 1, rue de Westhouse
F-67235 Benfeld Cedex - FRANCE
Tel. +33 3 88 57 41 41
Fax +33 3 88 74 08 00
info.scp.isd@socomec.com

www.socomec.com

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