

# 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](http://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

Chek 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

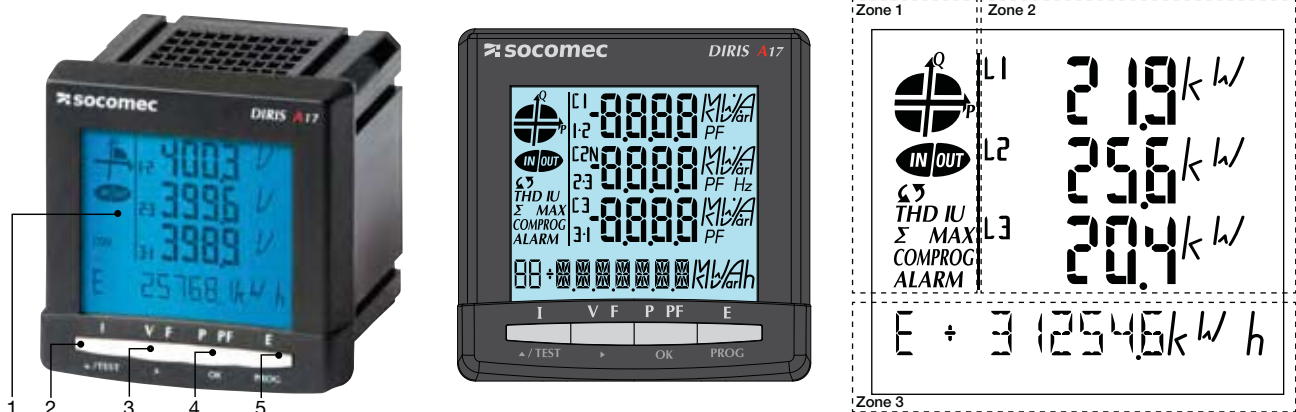
Multifunction meters - PMD\*

- 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)

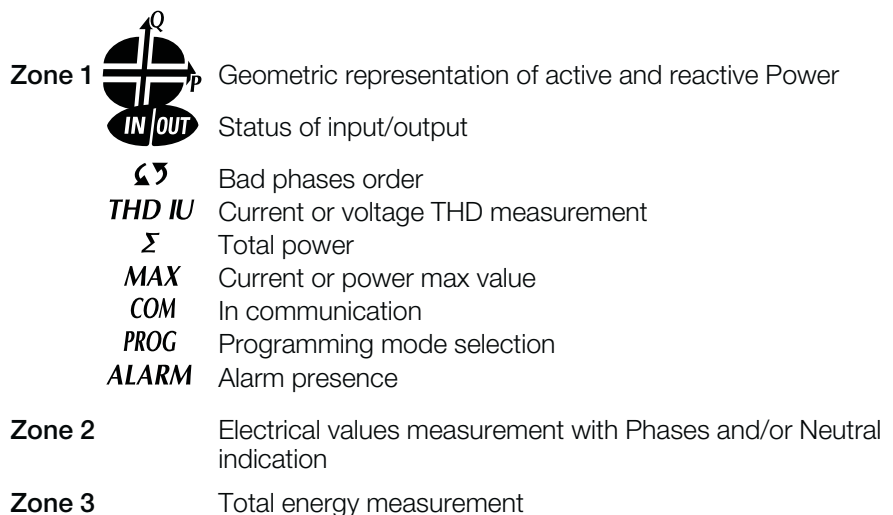
Description	Reference
<b>DIRIS A17 with pulse output</b>	4825 0101
<b>DIRIS A17 with RS485 Modbus communication</b>	4825 0102
<b>DIRIS A17 with RS485 Modbus communication and THD</b>	4825 0103

\*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.



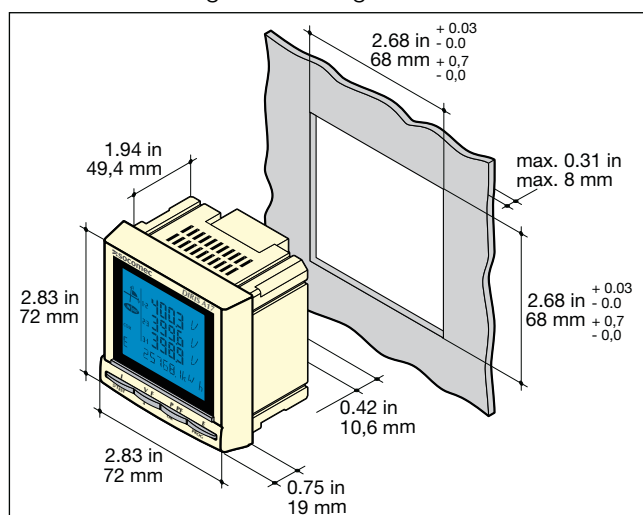
## 5. INSTALLATION

### 5.1. Recommendation

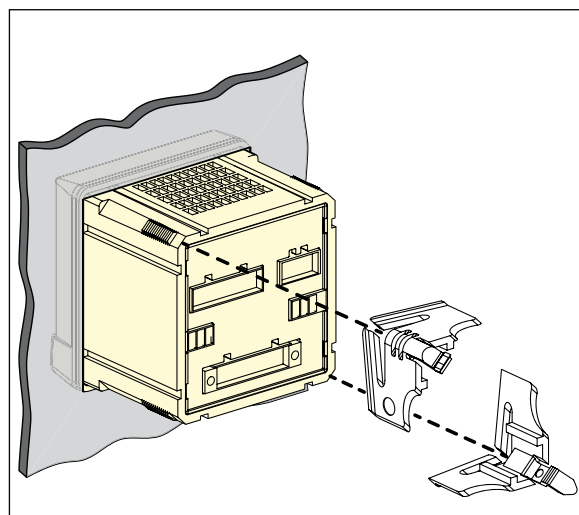
- avoid proximity to systems which generate electromagnetic interference,
- avoid vibrations with accelerations in excess of 1 G for frequencies below 60 Hz.

### 5.2. Cut-out diagram

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

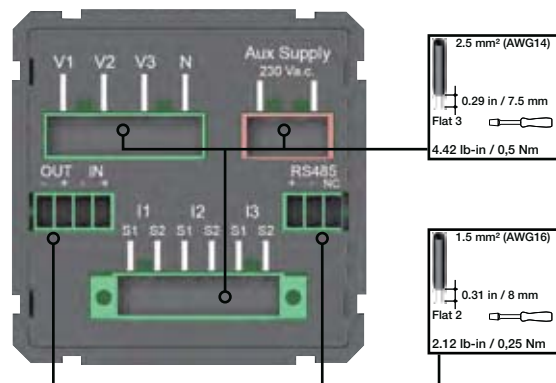


- Two fixing clips are used to fix the device to the panel.



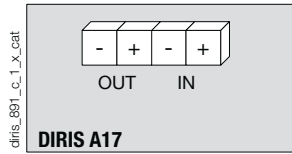
### 5.3. Terminals

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.



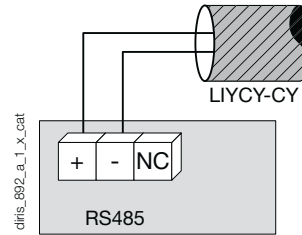
## 5.4. Connections

### 5.4.1. Connection (input / output)



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

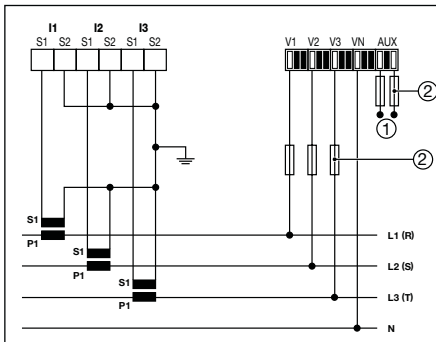
### 5.4.2. Communication connection



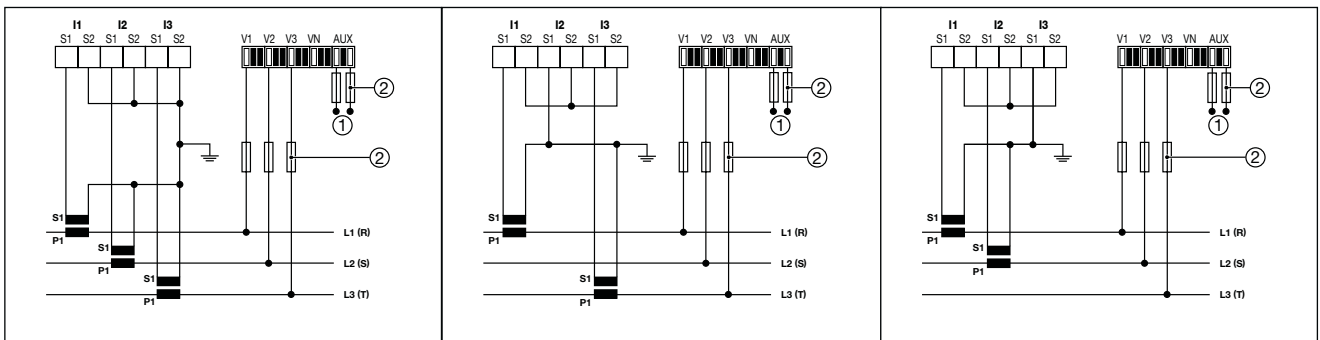
NC: not connected. can be used for shield continuity.

### 5.4.3. Network connections

#### 5.4.3.1. Unbalanced three-phase network (4NBL)

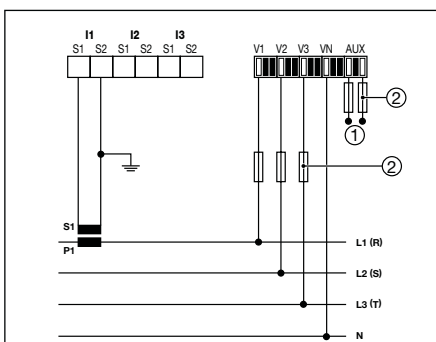


#### 5.4.3.2. Unbalanced three-phase network (3NBL)

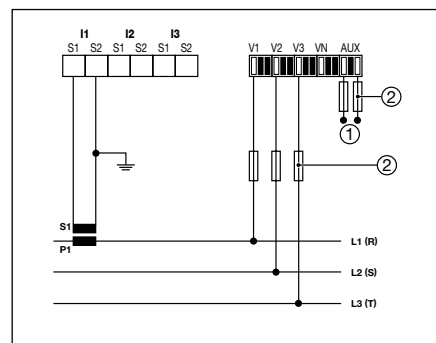


The solution with 2 CTs with the 2nd and 3rd phase current calculated via vectorial summation, results in an 0.5% reduction in phase accuracy.

#### 5.4.3.3. Balanced three-phase network (4NBL)



#### 5.4.3.4. Balanced three-phase network (3NBL)



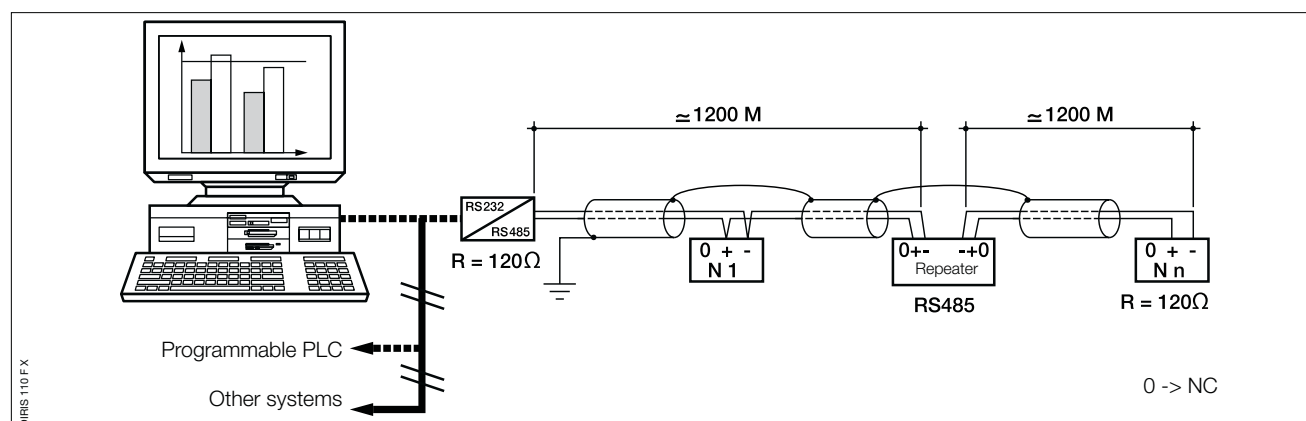
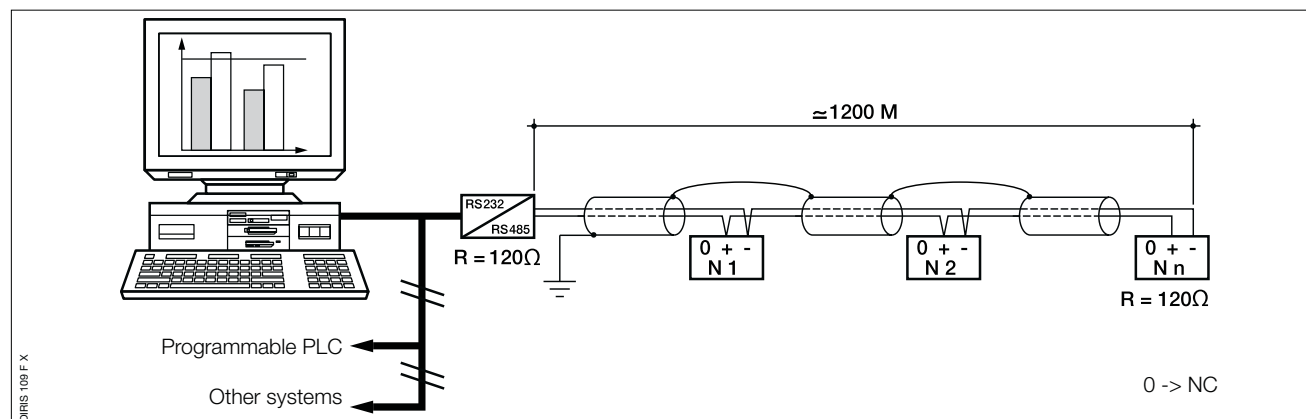
## 6. Communication MODBUS®

### 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](http://www.socomec.com/en/documentation-diris-a17)



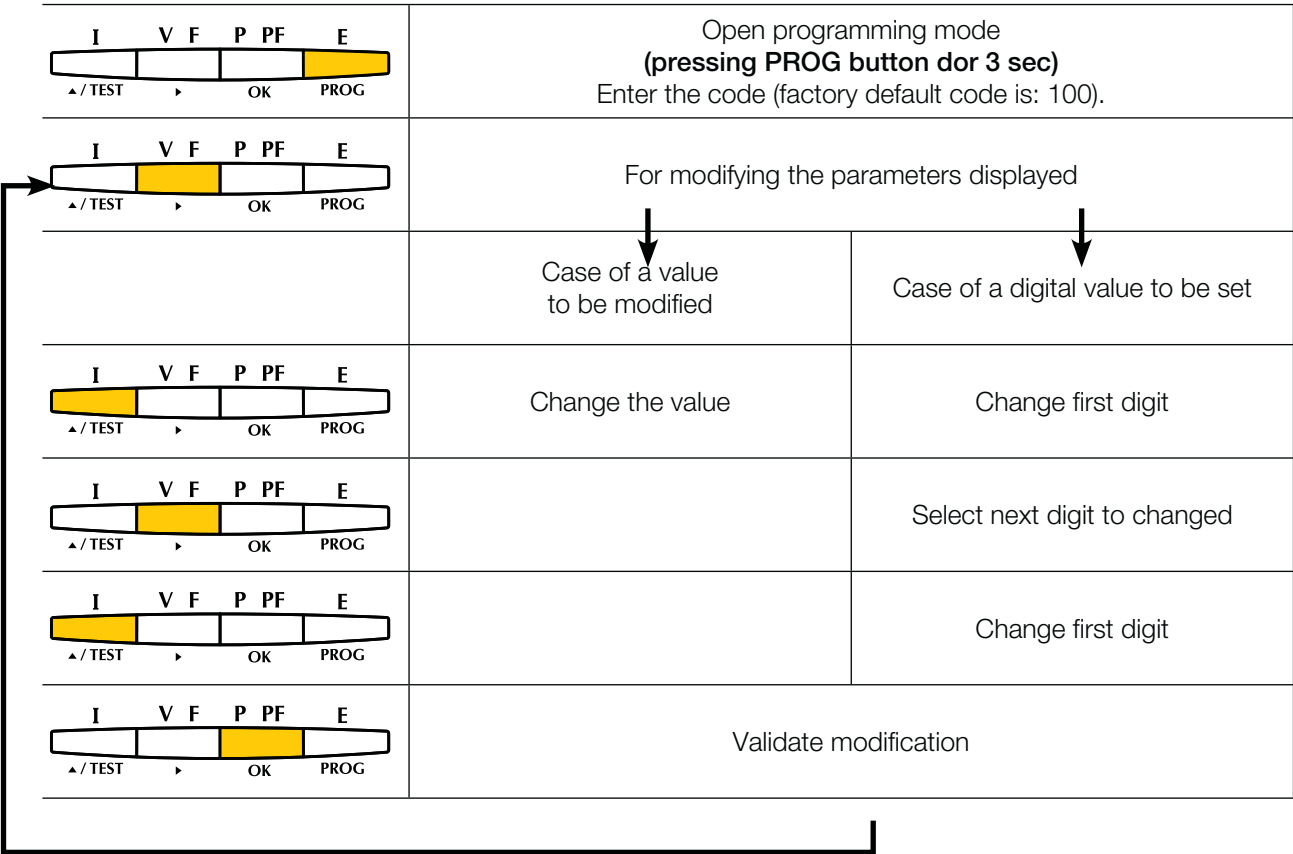


# 7. Programming

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.

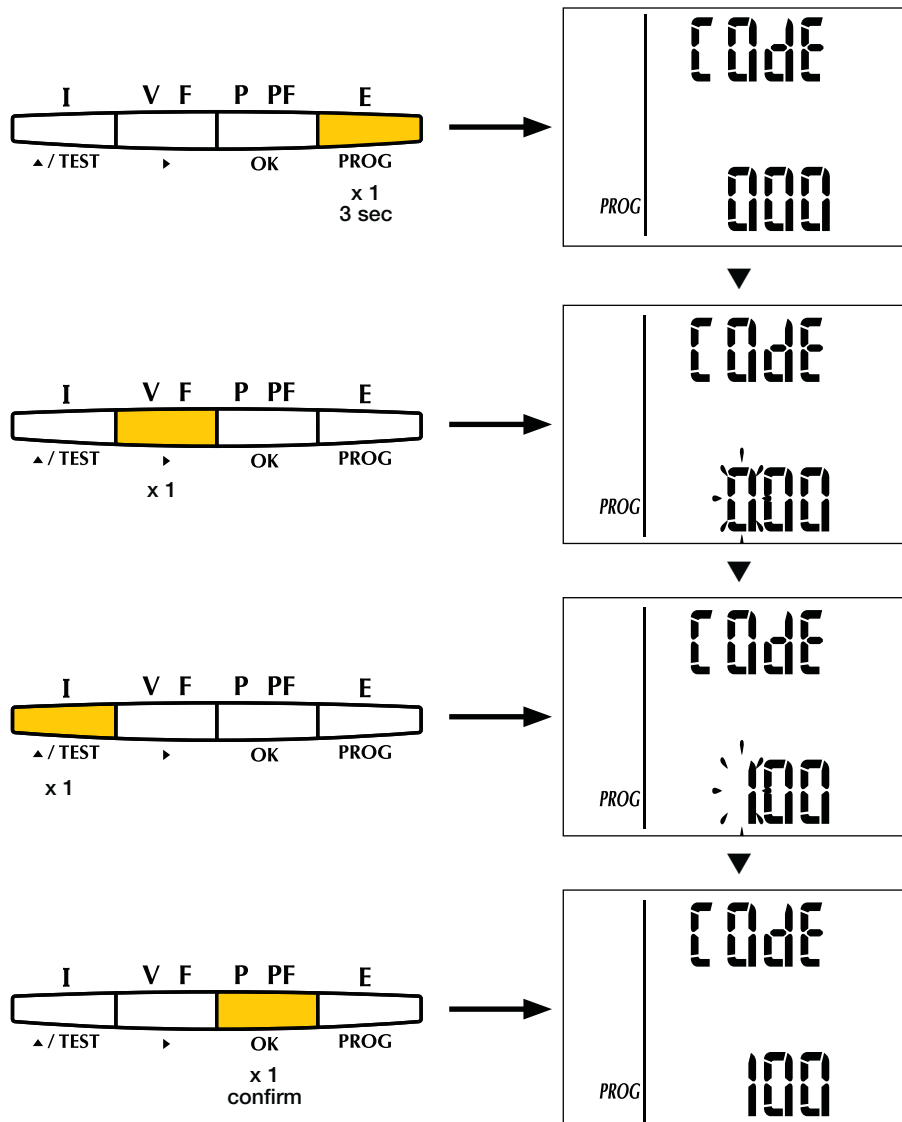
## 7.1. Navigation principle

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.



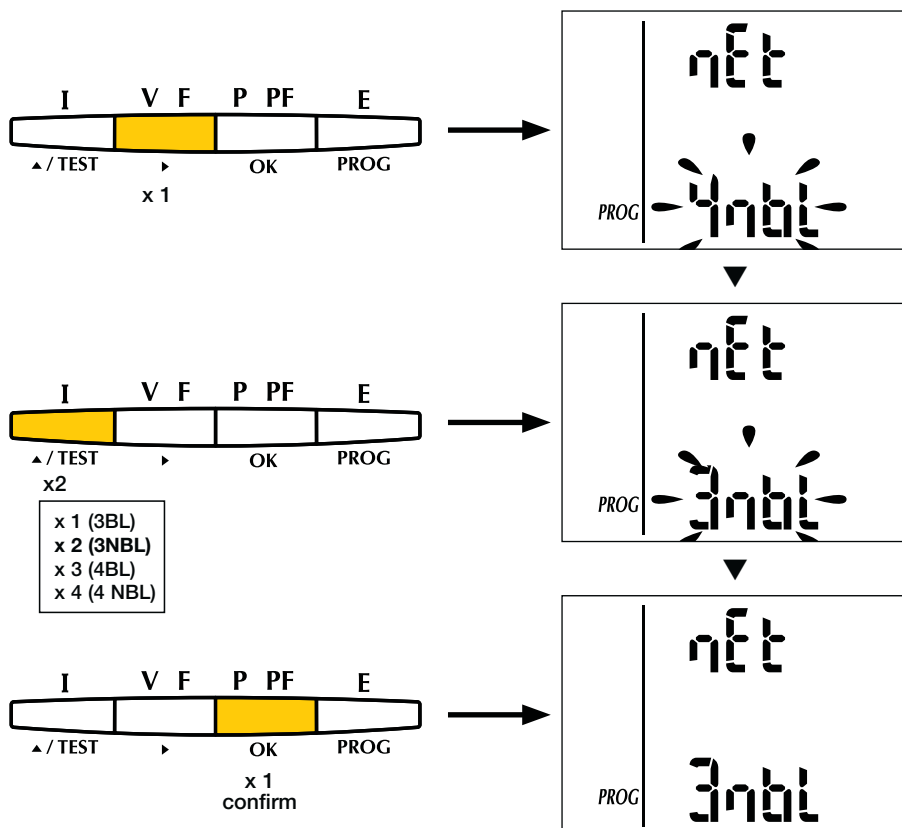
If the entered code is the right one, device will enter programming mode successfully and remains in this mode until user finishes the session by pressing "PROG" button for 3 seconds.

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"

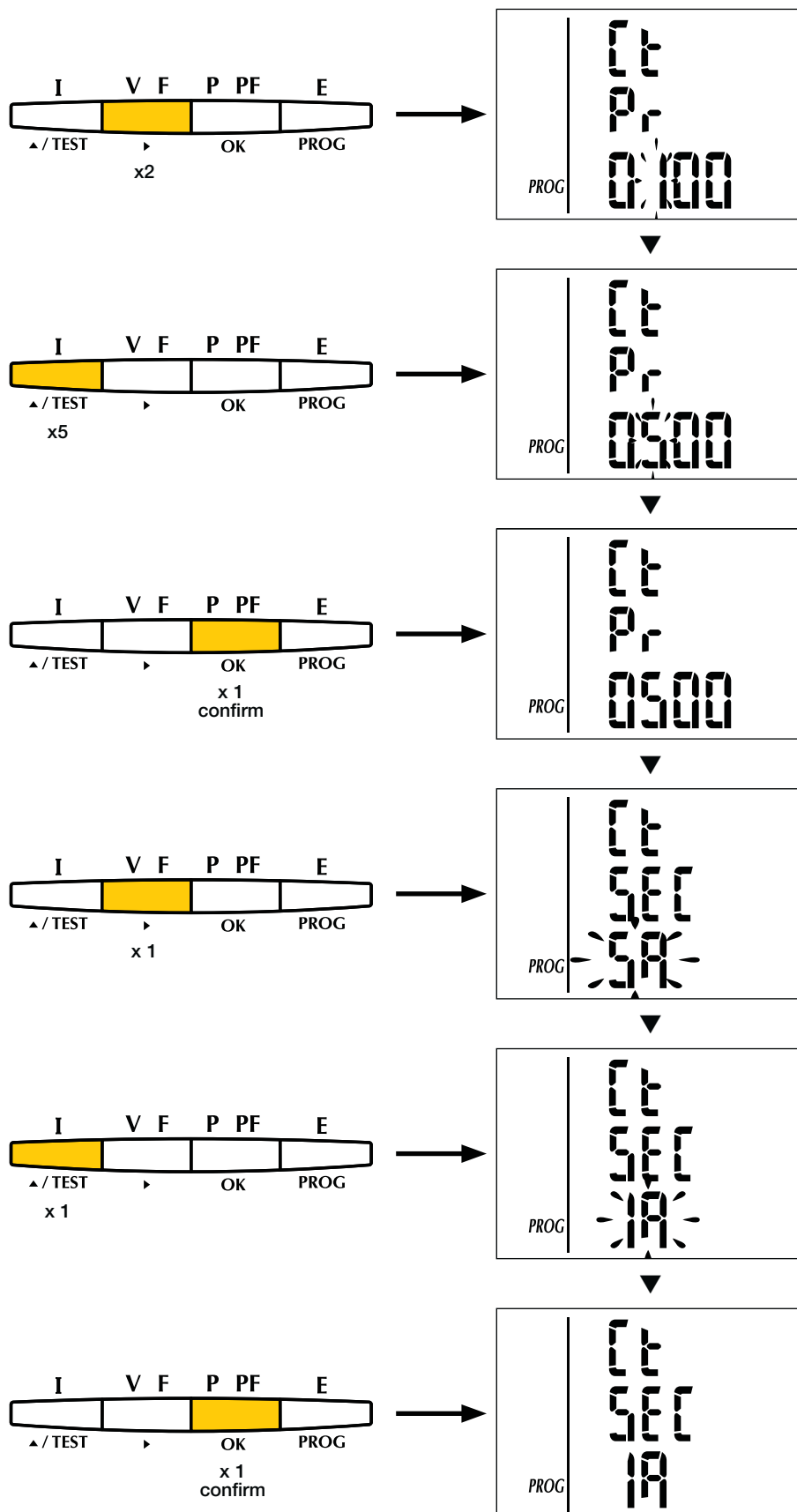
In this example, network change from 4NBL to 3NBL:



## 7.4. Example: choice of current transformer

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

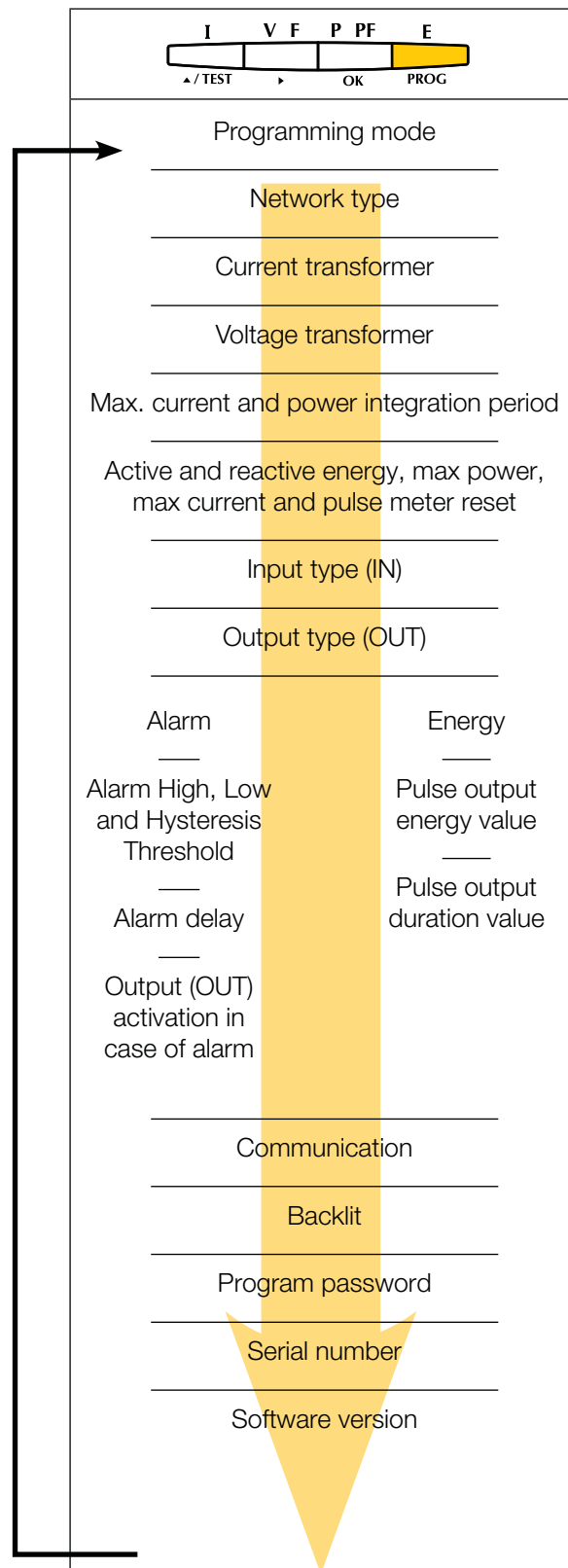
Example: ratio change to 500/1.



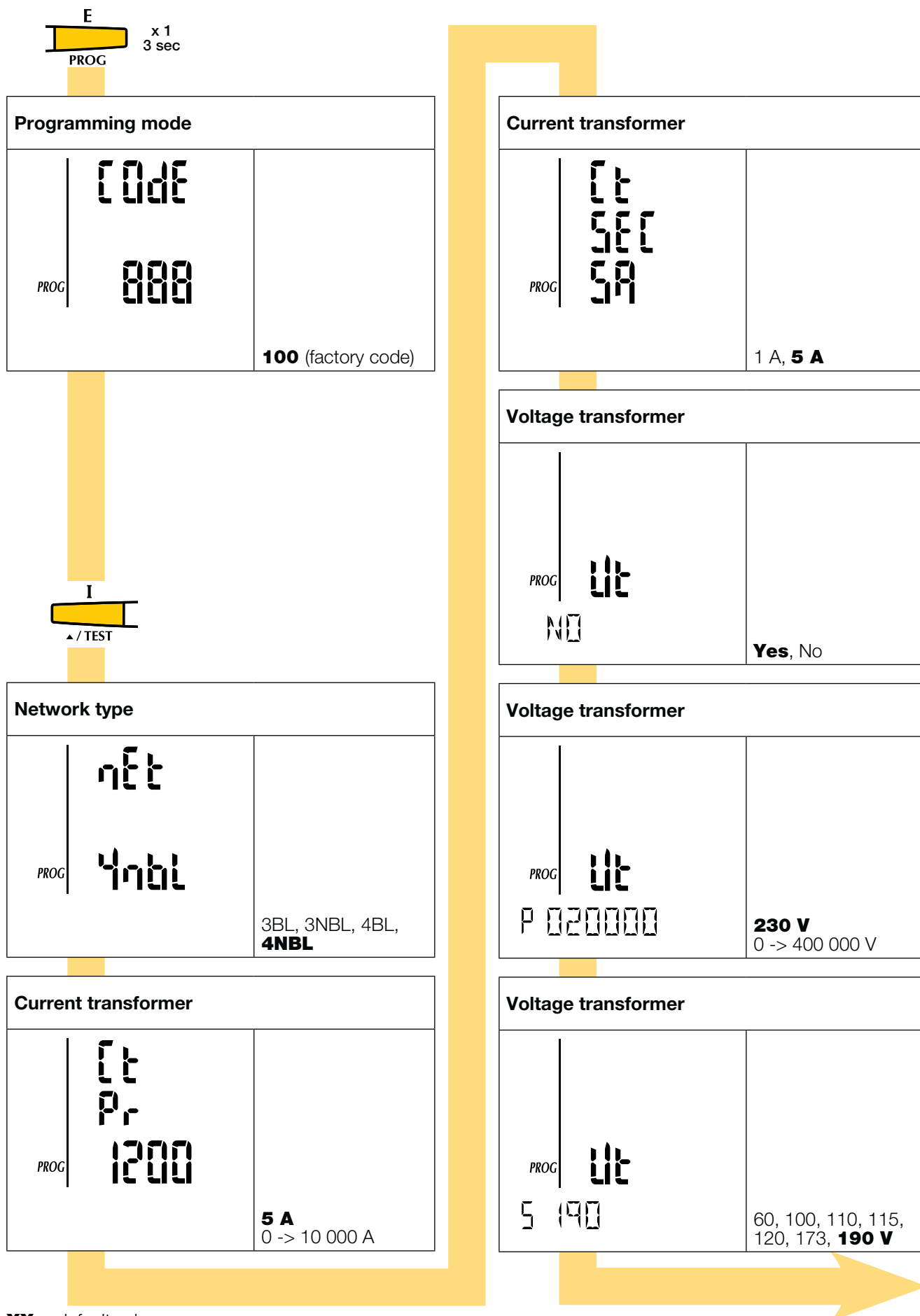
## 7.5. Programming mode overview

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





Max. current integration time	
<div> <div>▲ / TEST</div> <div> <div>PROG</div> <div> t ME 20 </div> </div> </div>	20, 30, 60, 2, 5, 8, 10, <b>15 min</b>

Max. power integration time	
<div> <div>▲ / TEST</div> <div> <div>PROG</div> <div> t ME P 10 </div> </div> </div>	20, 30, 60, 2, 5, 8, 10, <b>15 min</b>

Active / reactive energy reset		
<div><div></div><div>PROG</div></div>	<div><div>rSet</div><div>EA</div><div>n0</div></div>	<div><div>rSet</div><div>Er</div><div>n0</div></div> <div>Yes. <b>No</b></div>

Power max reset	
<div> <div>▲ / TEST</div> <div> <div>PROG</div> <div> r Set P n0 </div> </div> </div>	Yes, <b>No</b>

Current max reset	
<div> <div>▲ / TEST</div> <div> <div>PROG</div> <div> r Set 31 n0 </div> </div> </div>	Yes, <b>No</b>

Pulse meter reset	
<div> <div>▲ / TEST</div> <div> <div>PROG</div> <div> r Set PULS n0 </div> </div> </div>	Yes, <b>No</b>

Input type (IN)	
<div> <div>▲ / TEST</div> <div> <div>PROG</div> <div> In tYPE PULS </div> </div> </div>	<i>No: no activation</i> <i>Puls: pulse</i> <i>cd: status change</i> <b>No, puls, cd</b>

Output type (OUT)	
<div> <div>▲ / TEST</div> <div> <div>PROG</div> <div> Out tYPE EA </div> </div> </div>	<i>Ea: active energy</i> <i>Er: reactive energy</i> <i>Alarm: status change if alarm</i> <b>EA, ER, Alarm</b>

**XX** = default value



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

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

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

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

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

Output (OUT) activation in case of alarm		
PROG	ALAr no	Yes, <b>No</b>

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

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

**XX** = default value





Communication		
PROG	CON Adr 123	Product address on MODBUS network  <b>1</b> -> 247

Backlit		
PROG	bAC Lit Std	Standard: remains ON Auxiliary: switches OFF after a few seconds  Standard, <b>Auxiliary</b>

Communication		
PROG	CON bd5 96	Baud Rate  1.2, 2.4, 4.8, <b>9.6</b> , 19.2, 38.4 kbaud

Program password		
PROG	PASS CHG 250	<b>100</b> 0 -> 999

Communication		
PROG	CON PAR no	Parity  No, Even, <b>Odd</b>

Serial number		
PROG	3131 6101 0012	

Communication		
PROG	CON STOP 1	Stop bit  <b>1</b> , 2

Software version		
PROG	SOFT v104	

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

## 8.1. Detailed view of the "Current" menu



Instantaneous phase currents		
L1	103.4	A
L2	12.18	A
L3	99.6	A
E ÷ 3 1254.6 kWh		

Instantaneous neutral current		
N	17.3	A
E ÷ 3 1254.6 kWh		

Max. phase currents		
L1	103.4	A
L2	12.18	A
MAX L3	99.6	A
E ÷ 3 1254.6 kWh		

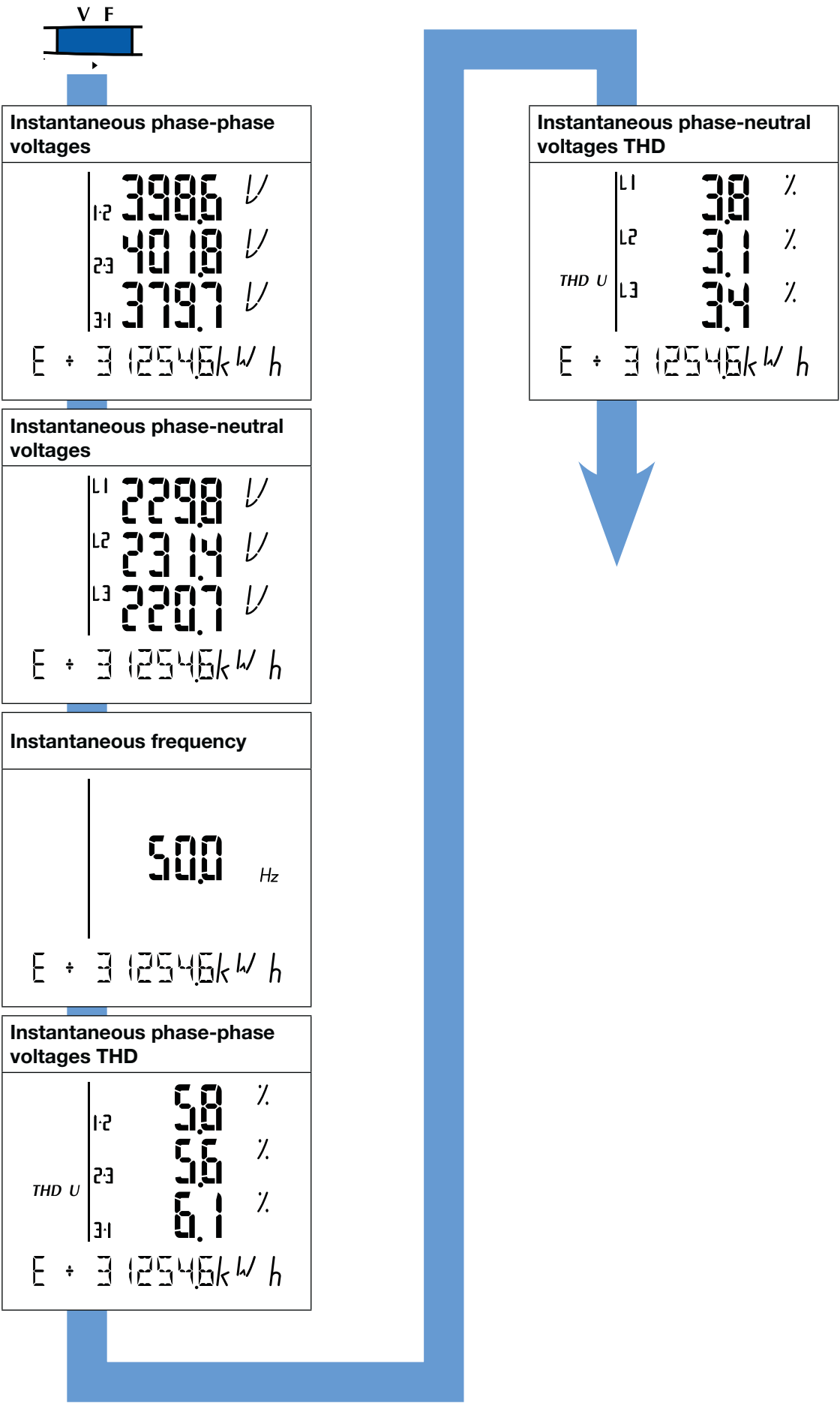
Max neutral current		
N	17.3	A
MAX		
E ÷ 3 1254.6 kWh		

Max. phase currents THD		
L1	15.2	%
L2	1.18	%
THD I L3	9.8	%
E ÷ 3 1254.6 kWh		

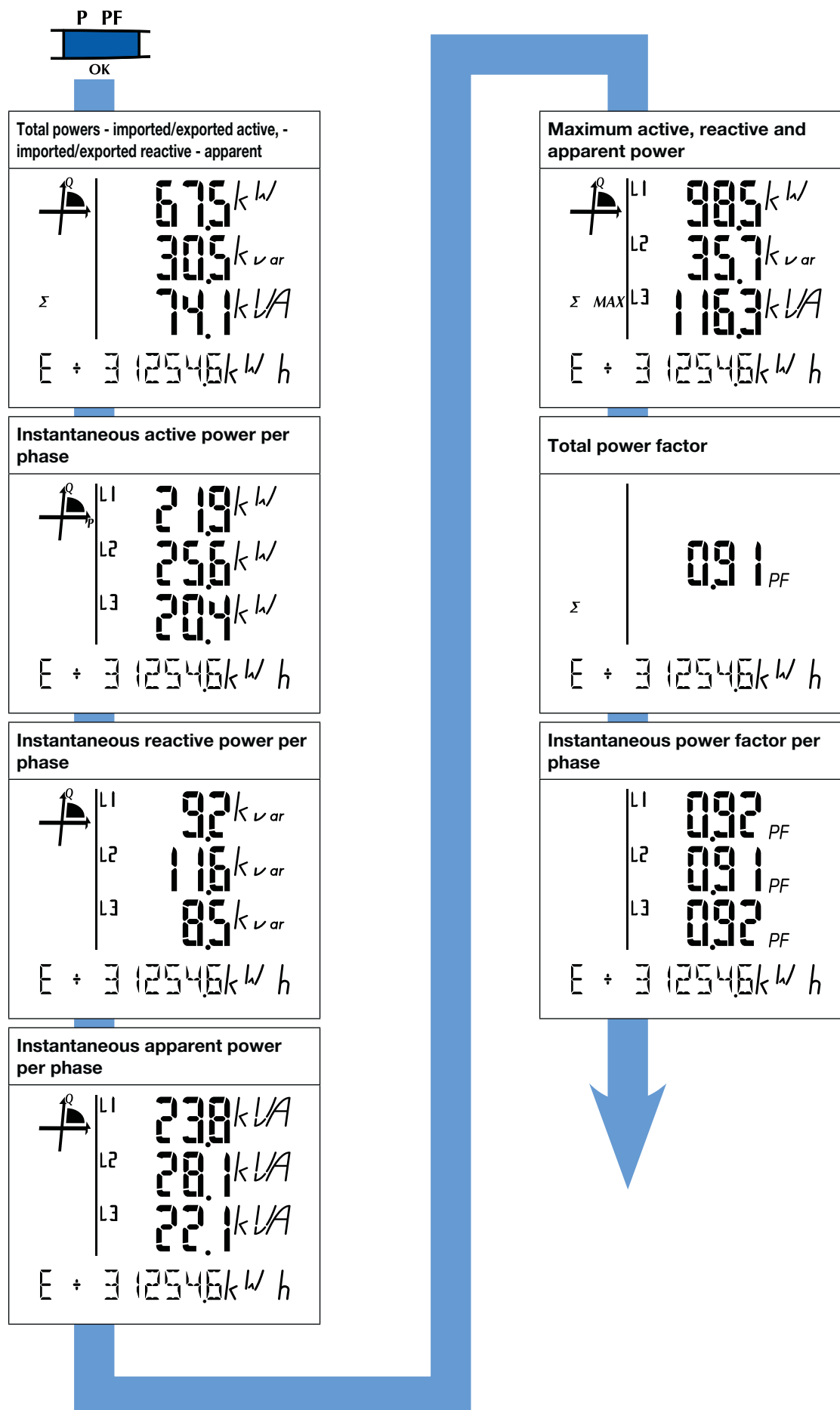
THD neutral current		
N	14.3	%
THD I		
E ÷ 3 1254.6 kWh		



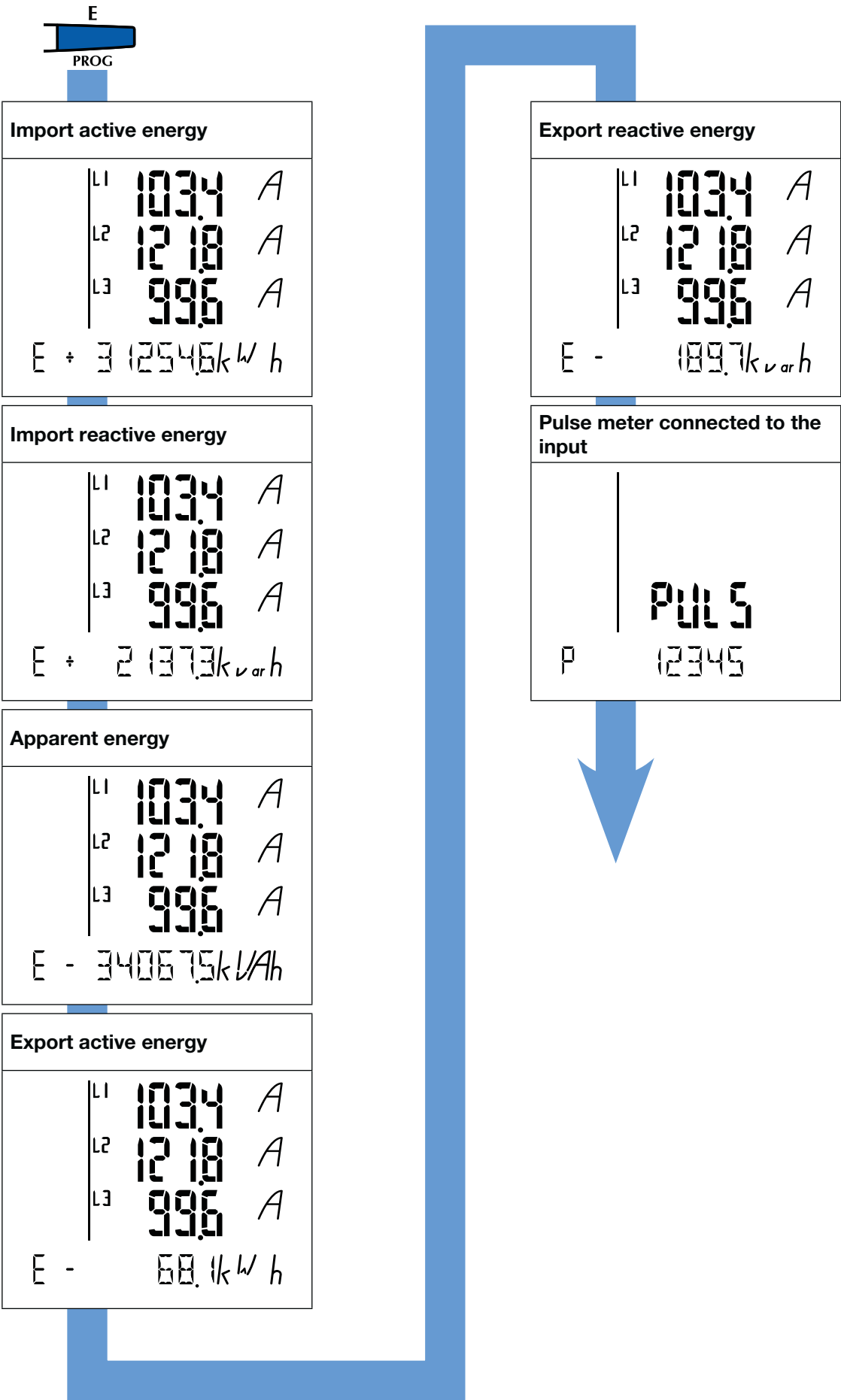
8.2. Detailed view of the "Voltage" menu



### 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.

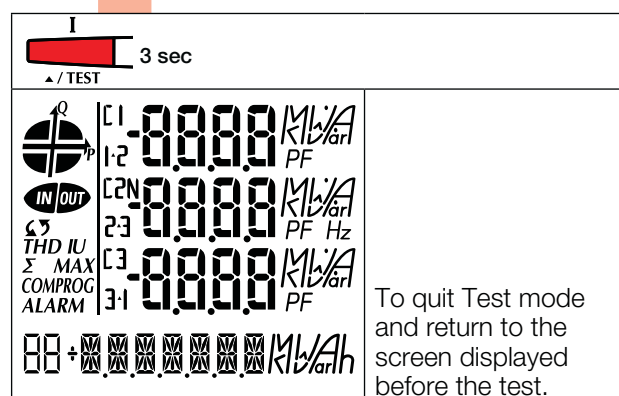
- In 4 BL / 3 BL, only the connection of the CTs is controlled.
- In 4NBL and 3NBL the connection as a whole is controlled.


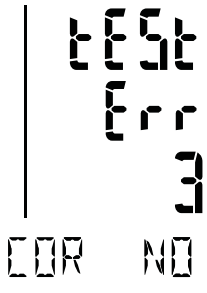
- Err 0 = no error
- Err 1 = CT phase 1 inverted
- Err 2 = CT phase 2 inverted
- Err 3 = CT phase 3 inverted
- Err 4 = V1 and V2 voltages inverted
- Err 5 = V2 and V3 voltages inverted
- Err 6 = V3 and V1 voltages inverted


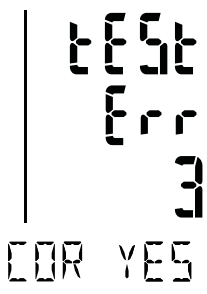
- Errors 1, 2 and 3 must be corrected manually by reversing CT connections.
- Errors 4, 5 and 6 must be corrected manually by modifying voltage connections.


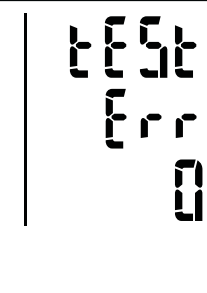
### First test operation


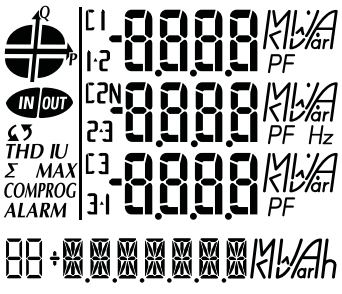
Press the TEST button for 3 seconds. The error indication is displayed on the screen.



 3 sec ▲ / TEST	
	The screen displays the error number.

 1 x ▶	
	To automatically change the TC current, change the value NO to YES.

 1 x OK	
	Err 0 = no error

 3 sec ▲ / TEST	
	To quit Test mode and return to the screen displayed before the test.





Second test operation

Note: this menu only appears if the test has already been done.

I

3 sec

▲ / TEST

test  
done

re TEST NO

To perform the test  
a second time

V F

1 x

▶

test  
done

re TEST YES

To start the second  
test, change the  
value to YES

P PF

1 x

OK

test  
Err  
0

Err 0 = no error

I

3 sec

▲ / TEST

IN/OUT

THD IU

Σ MAX

COMPROG

ALARM

C1

1-2

C2N

2-3

C3

3-1

-8888

-8888

-8888

-8888

-8888

KLVA

PF

KLVA

PF Hz

KLVA

PF


88

+

88888888

KLVAh

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

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DIRIS A17 - Ref.: 541 984 A 25

## 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 <sup>2</sup>
Current connection cross-section	0.5 ... 6 mm <sup>2</sup>
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 <sub>n</sub> for 1 s

## Voltage measurements (TRMS)

Direct measurement between phases	50 ... 500 VAC
Direct measurement between phase and neutral	28 ... 289 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

<b>Performance criteria</b>	
PMD classification	SD
Temperature	K55

### CHARACTERISTICS OF THE FUNCTIONS

Symbol for functions	Measurement range	Operational performance class
P	10% to 120% In	1
Qa, Qv	10% to 120% In	1
Sa, Sv	10% to 120% In	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% In	0,5
IN	-	
INc	10% to 120% In	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
bACLI	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

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