

AROS

DIGITAL MULTIMETER

Edition: mar 07

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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.

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
- always use an appropriate voltage detection device to confirm the absence of voltage
- put all mechanisms, door and covers back in place before energising the device
- always supply the device with the correct rated voltage

Failure to take these precautions could cause serious injuries.

Risk of device damaging

Check the following:

- voltage of the auxiliary power
- frequency of the distribution system (50 or 60 Hz)
- maximum voltage across the voltage-input terminals, (V1, V2, V3 and VN) 500V AC phase-to-phase or 289V AC phase-to-neutral
- maximum current on the current-input terminals (I1, I2 and I3) not higher than 6A.

PRELIMINARY OPERATIONS

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

Check the following points as soon as you receive the package:

- the packing is in good condition,
- the product has not been damaged during transit,
- the product reference number conforms to your order,
- the package contains the product fitted with a pull-out terminal block,
- the package includes the operating instructions.

PRESENTATION

1. Key-pad with 4 dual-function keys (display or programming)
2. Backlit LCD display
3. Phase
4. Values
5. Unit
6. Activity indicator on the communication bus
7. Energy metering indication



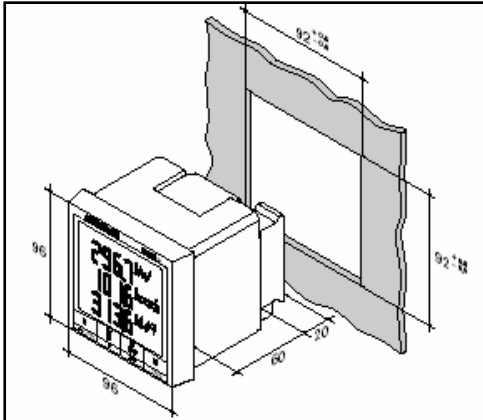
INSTALLATION

Recommendations:

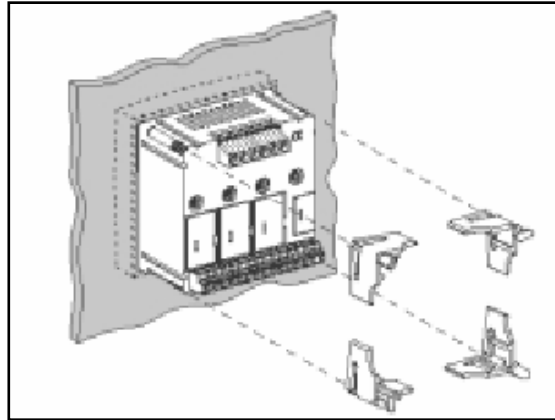
- avoid proximity to systems which generate electromagnetic interference
- avoid vibrations with accelerations in excess of 1 G for frequencies below 60 Hz.

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Cut-out diagram



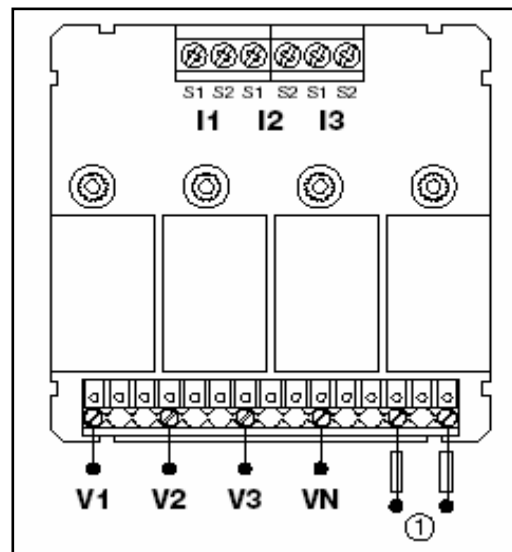
Mounting



Connection

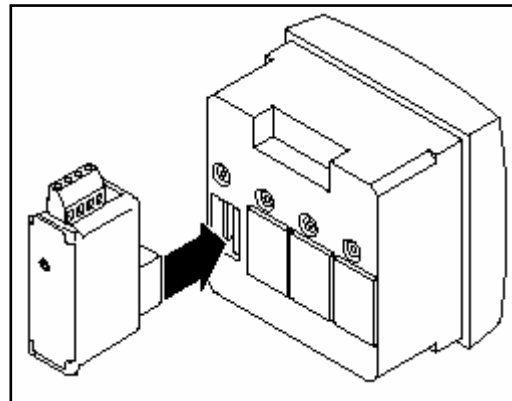
The maximum coupling torque for each screw is 0.4 Nm.
Each CT's secondary winding must be be shortcircuited when disconnecting the instrument.

- ① Aux: 110 ... 400 V AC
120 ... 350 V DC
- ② Fuse: 0.5 A gG / BS 88 2A gG



Module options

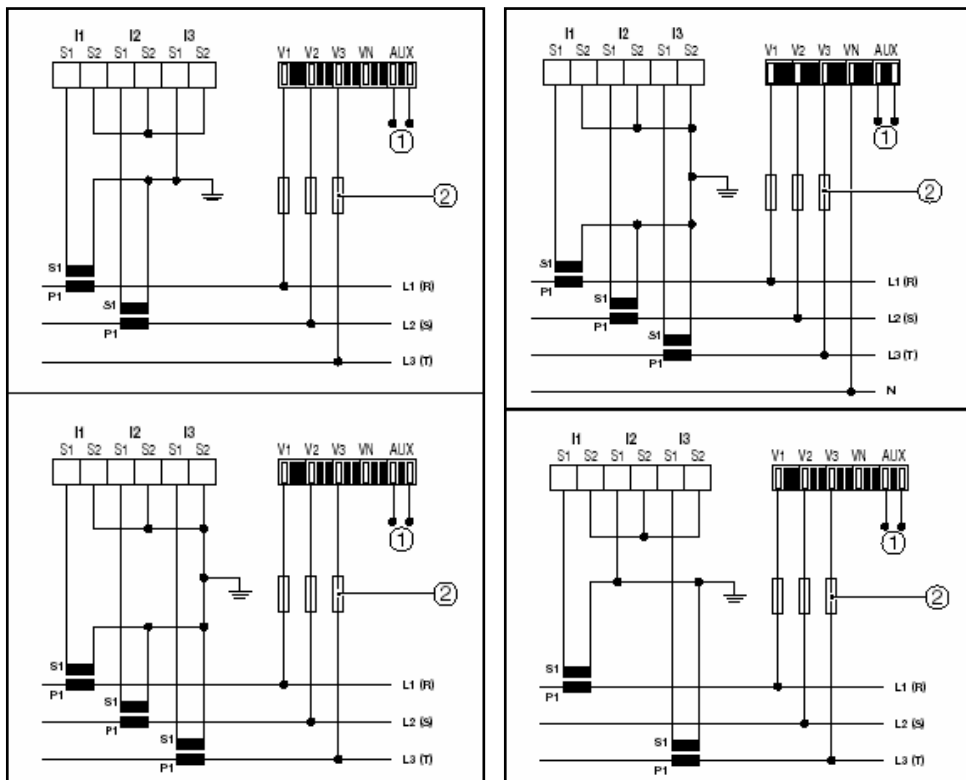
- RS485 serial link with JBUS/MODBUS® Protokoll (38 400 bauds max)
- Combining with active, reactive energy metering of one configurable impulse output (kWh, kvarh)



Unbalanced three-phase network (3NBL/4NBL)

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

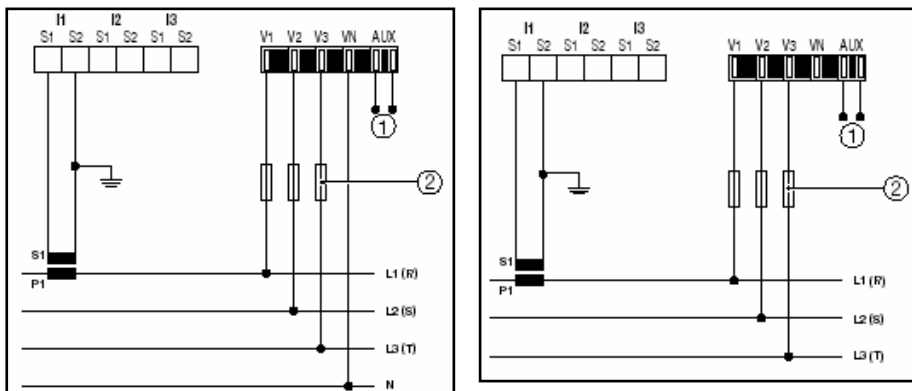
- ① Aux: 110 ... 400V_{AC}
120 ... 350V_{DC}
- ② Fuse: 0.5A gG/BS88
2A gG



Balanced three-phase network (3BL/4BL)

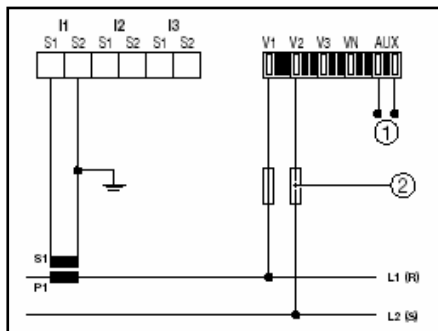
The solution using one CT, with the 3rd phase current calculated via vector summation, results in a 0.5% reduction in phase accuracy.

- ① Aux: 110 ... 400V_{AC}
120 ... 350V_{DC}
- ② Fuse: 0.5A gG/BS88
2A gG



Two-phase network (2BL)

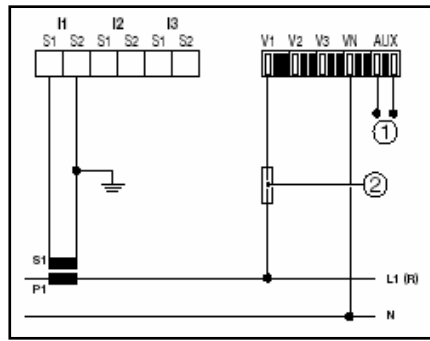
- ① Aux: 110 ... 400V_{AC}
120 ... 350V_{DC}
- ② Fuse: 0.5A gG/BS88
2A gG



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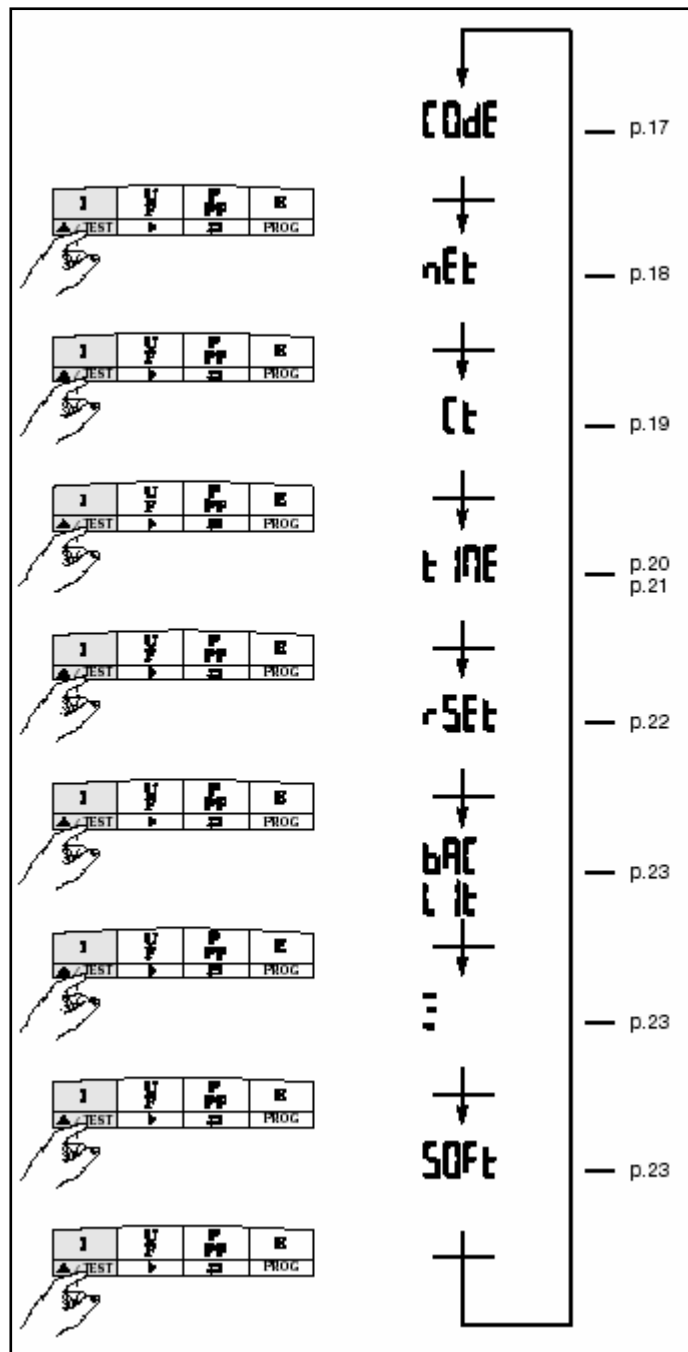
Single-phase network (1BL)

- ① Aux: 110 ... 400V_{AC}
120 ... 350V_{DC}
- ② Fuse: 0.5A gG/BS88
2A gG



PROGRAMMING

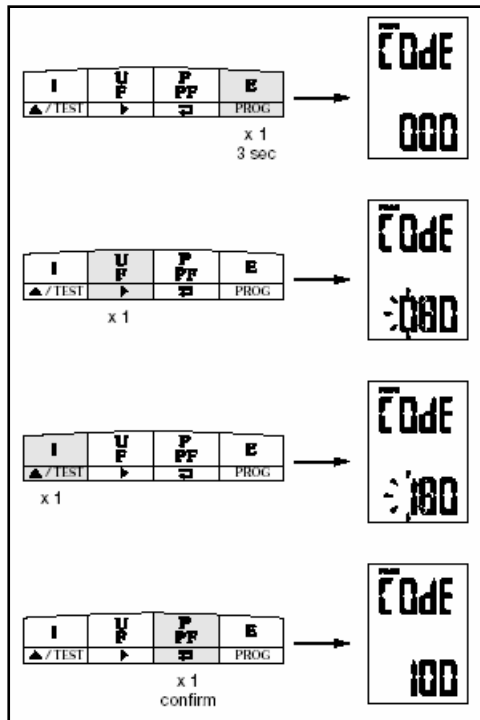
Programming menu



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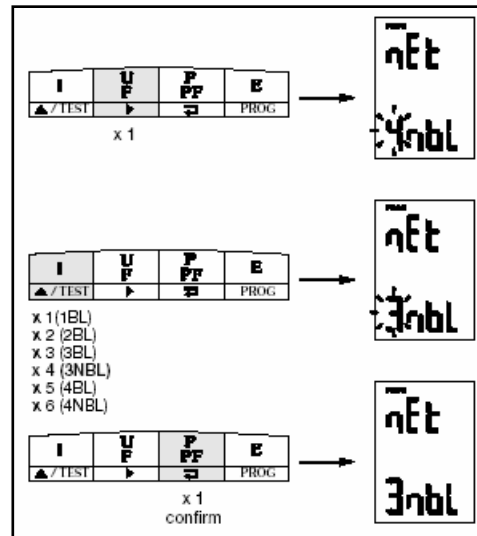
Access to programming mode

COdE = 100



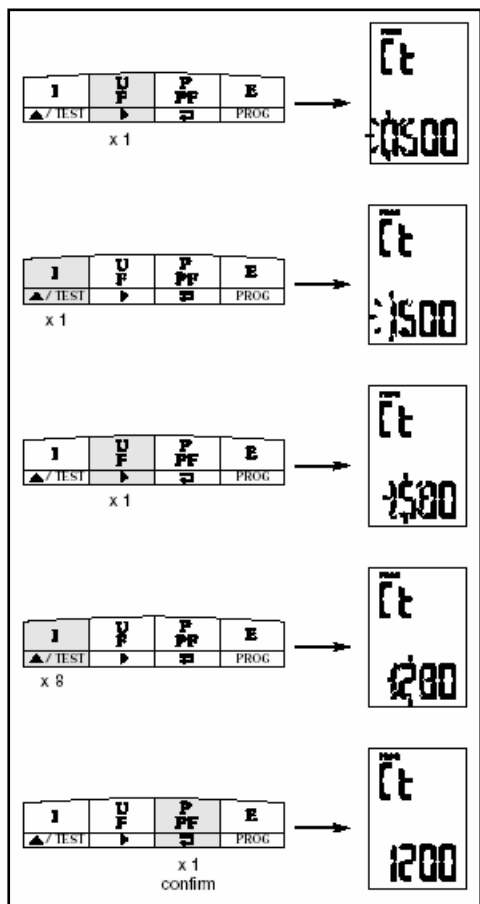
Network

Example: nEt = 3NBL



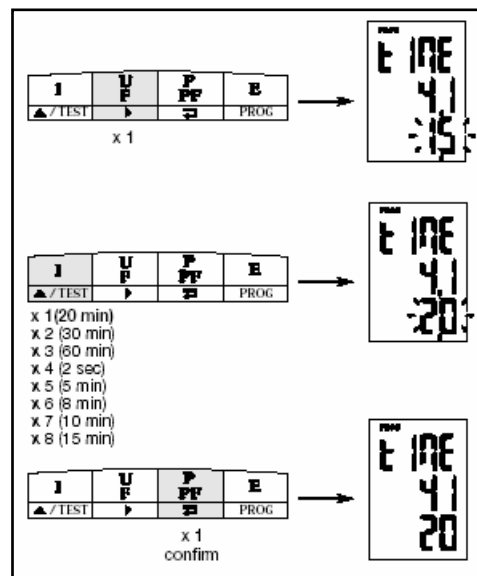
Current transformers

Example: Ct = 1200 /5A



Current integration time

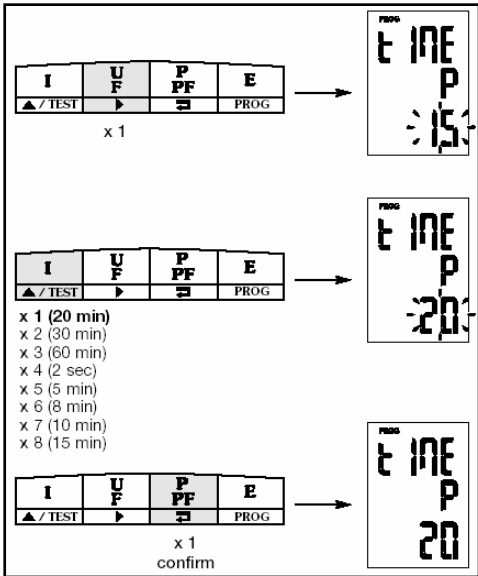
Example: tIME = 20 min



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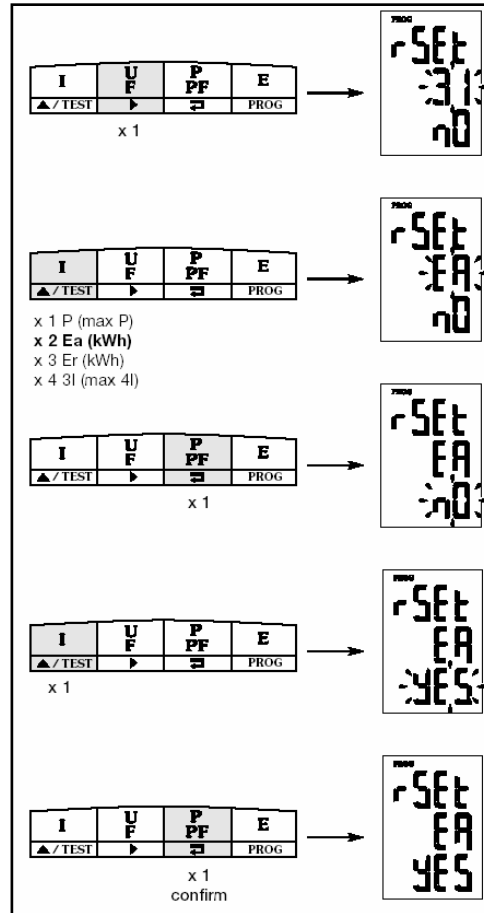
Active power integration time

Example: tIME = 20 min



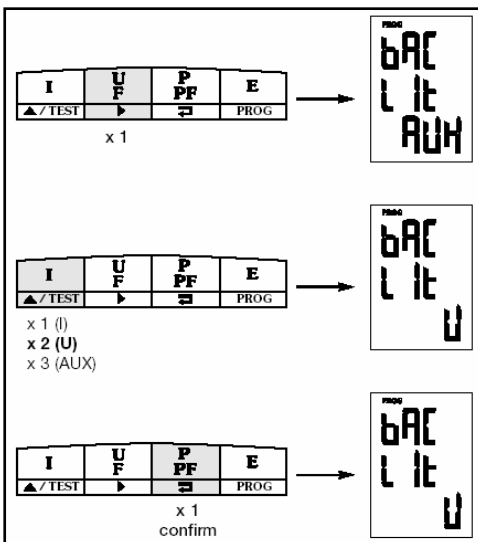
Reset to zero

Example: rSET = Ea



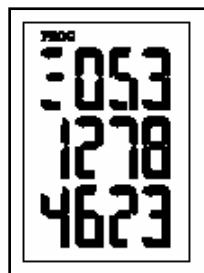
Backlit

Example: bACLIt = U



Serial number

Example: 05312784623

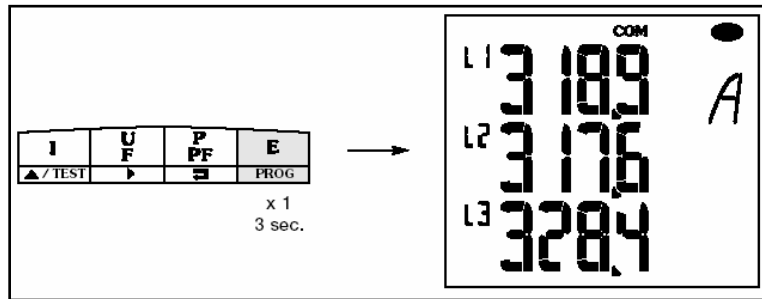


Software version

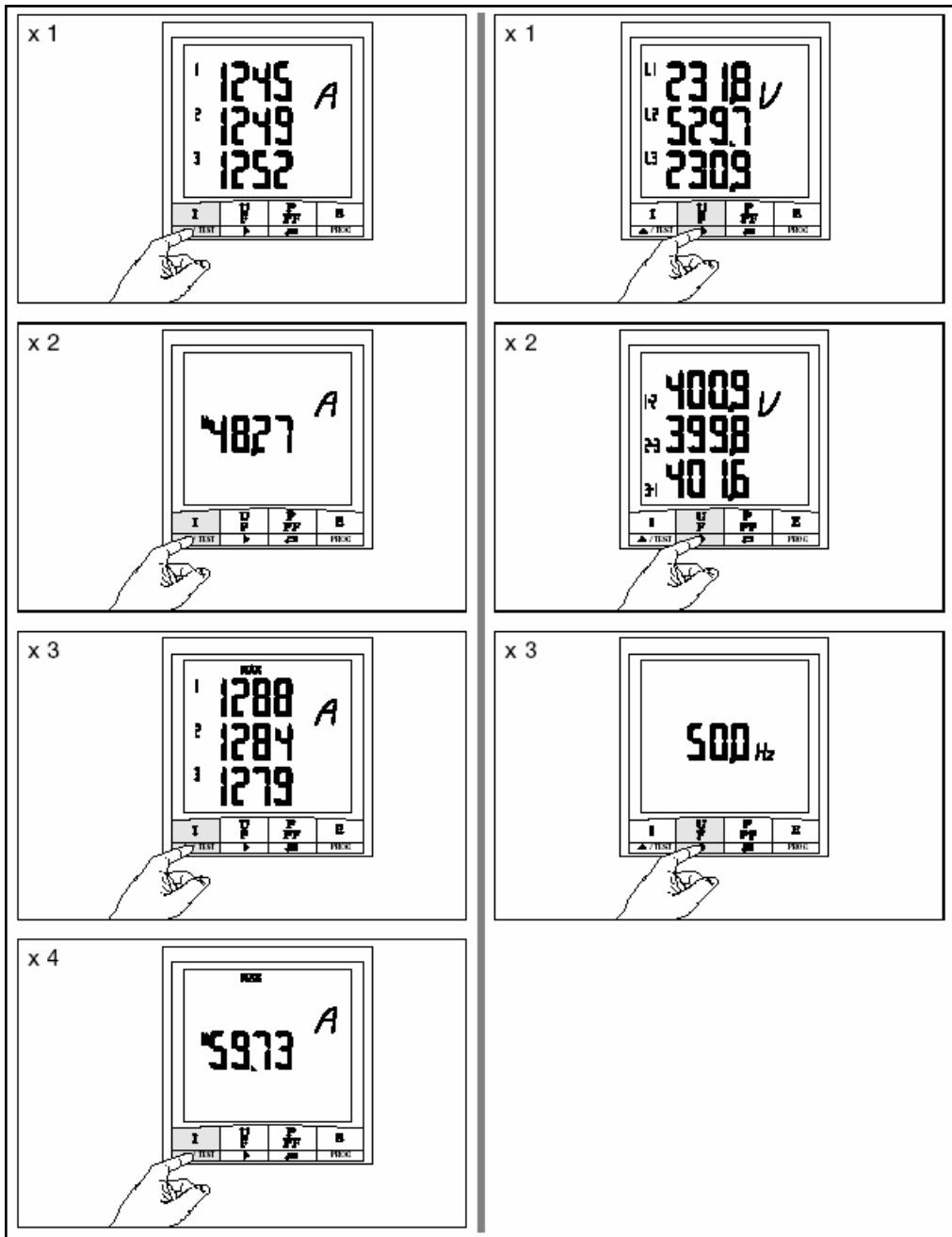


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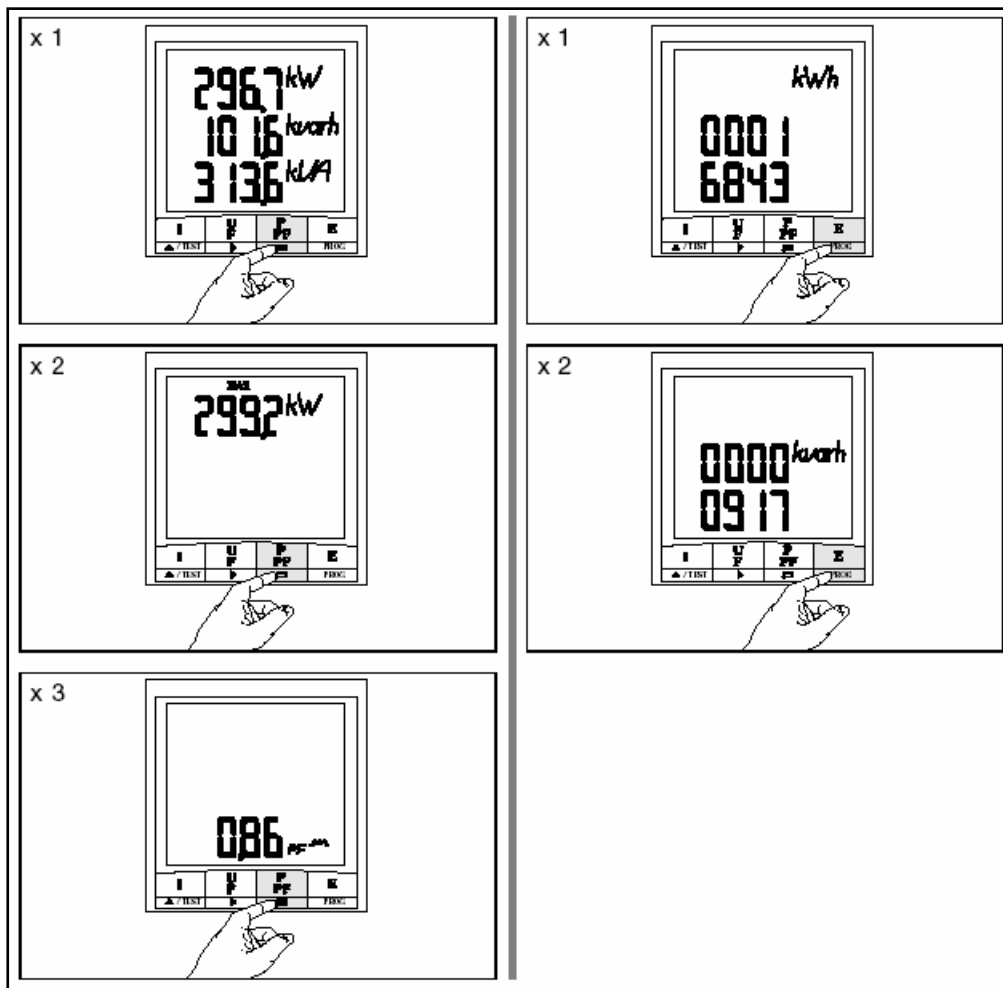
To quit programming



OPERATION

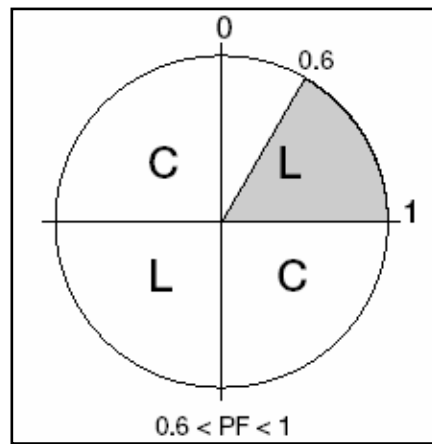
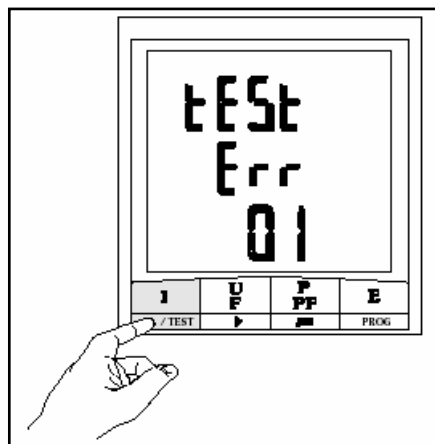


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CONNECTION TEST FUNCTION

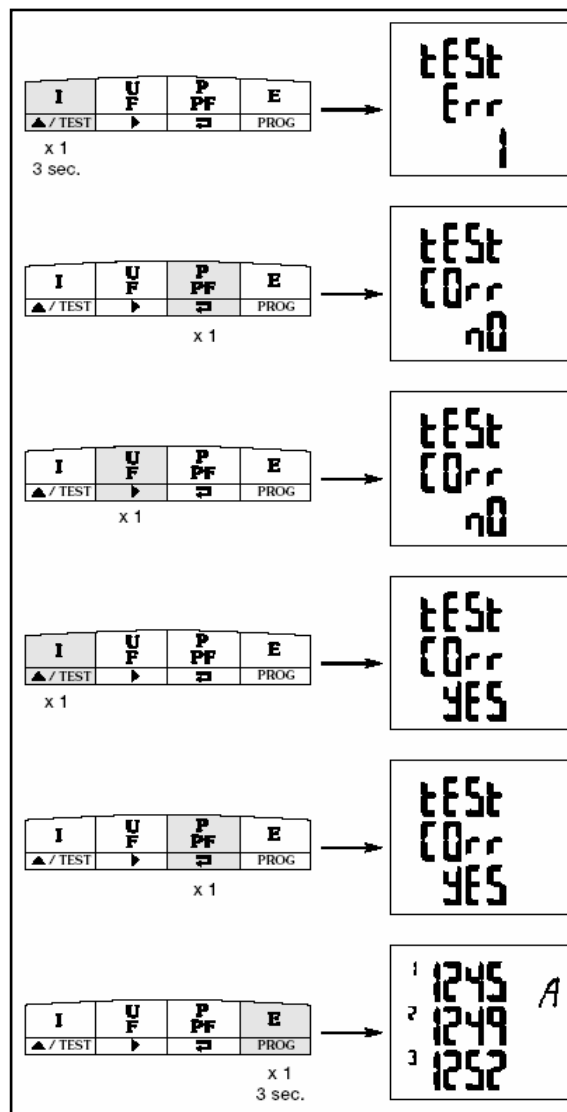
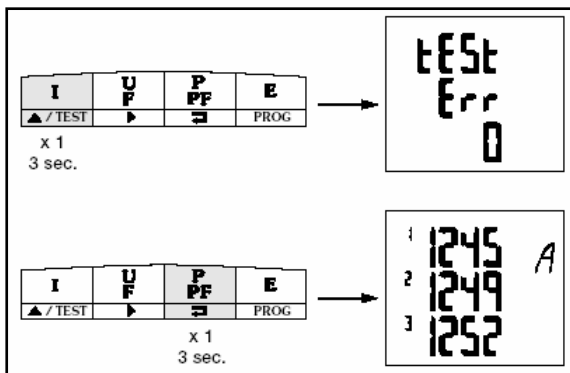
- Err 0 = no error
- Err 1 = CT phase 1 inverted
- Err 2 = CT phase 2 inverted
- Err 3 = CT phase 3 inverted
- Err 4 = V1 and V2 voltages inverted
- Err 5 = V2 and V3 voltages inverted
- Err 6 = V3 and V1 voltages inverted



Example: TEST Err 0

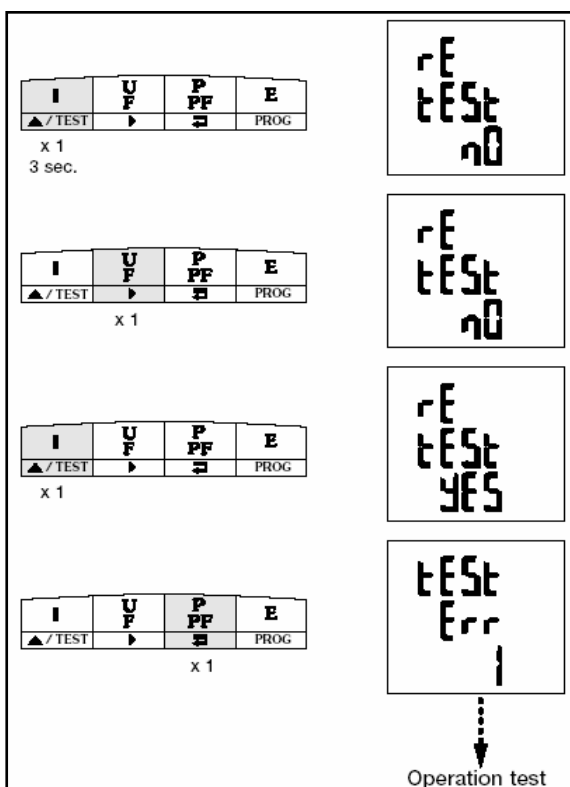
Example: TEST Err 1

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second test operation

NB: this operation does not hold account of the modifications carried out at the time of the first test.



ASSISTANCE

Device Switched off

Check auxiliary supply

Backlight switched off

Check backlight configuration in set up menu (p. 23)

Voltage = 0

Verify the connections

Current = 0 or incorrect

Verify the connections

Verify the configuration of CT's in set up

Powers and power-factor (PF)

Use the test connection function

Phases missing on Display

Check the Network configuration (in set up menu)

TECHNICAL CHARACTERISTICS

CASE

Dimensions: 96 x 96 x 60 mm or 96 x 96 x 80 mm with all optional modules (DIN 43700)
Connection: via 2.5mm² sectionable terminals (voltage and others) and 6mm² fixed terminals (current)
IP index: IP52 (front panel) and IP30 (case)
Weight: 400g

DISPLAY

Type: backlit LCD display

MEASUREMENTS

Three-phase (3 or 4 wires), two-phase (2 wire) and single-phase networks

VOLTAGE (TRMS)

Direct measurement: from 50 to 500VAC (phase/phase); from 28 to 289VAC (phase/neutral)
Permanent overload: 800VAC
Update period: 1 second

CURRENT (TRMS)

Via CT with: Primary: up to 9999A; Secondary: 5A
Min measuring current: 5mA
Input consumption: < 0.6VA
Display: from 0 to 11kA (1.1 times the primary value)
permanent overload: 6A
intermittent overload: 10In / 1 second
Update period: 1 second

POWER

Total: 0 to 11MW/Mvar/MVA
Update period: 1 second

FREQUENCY

Update period: from 45,0 to 65,0 Hz
1 second

MEASUREMENT ACCURACY

Current: 0.2% from 10 to 110% / In
Voltage: 0.2% from 140 to 700VAC
Power: 0.5% of full scale (-90° ÷ +90°)
Power factor: 0.5% for 0.5 < FP < 1
Frequency: 0.1% from 45 to 65Hz
Active energy metering: ±0.5% from 0.02 to 1,2In with PF = 0.5L or 0.8C (class 0.5S IEC 62053-22)
Reactive energy metering: ±2% from 0.1 to 1,2In with sinφ = 0.5 L or C (class 1 IEC 62053-23)

AUXILIARY SUPPLY

110 to 440VAC 50/60Hz: ±10%
120 to 350VDC: ±20%
Consumption: < 5VA

ACCURACY

Accuracy on active energy: IEC 62053-22 class 0.5S
Accuracy on reactive energy: IEC 62053-23 class 2

CE MARKING

Complies with:

- European directive on electromagnetic compatibility (EMC) no. 89/336/CEE dated 3 May 1989, modified by directive no. 92/31/CEE dated 28 April 1992 and by directive no. 93/68/CEE dated 22 July 1993.
- Low voltage directive no. 73/23/CEE dated 19 February 1973, modified by directive no. 93/68/CEE dated 22 July 1993.

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ELECTROMAGNETIC COMPATIBILITY

| | |
|---|---------------------------|
| Immunity to electrostatic discharges: | IEC 61000-4-2 - Level III |
| Immunity to radiated radio-frequency fields: | IEC 61000-4-3 - Level III |
| Immunity to electrical fast transients/bursts: | IEC 61000-4-4 - Level III |
| Immunity to impulse waves: | IEC 61000-4-5 - Level III |
| Immunity to conducted disturbances: | IEC 61000-4-6 - Level III |
| Immunity to power frequency magnetic fields: | IEC 61000-4-8 - Level III |
| Conducted and radiated emissions: | CISPR11 - Class A |
| Immunity to voltage dips and short interruptions: | IEC 61000-4-11 |

CLIMATE

| | |
|------------------------------|---|
| Operating-temperature range: | IEC 60068-2-1/IEC 60068-2-2 -10°C to +55°C |
| Storage temperature range: | IEC 60068-2-1/IEC 60068-2-2 -20°C to +85°C |
| Humidity: | IEC 60068-2-30 - 95% |
| Saline fog: | IEC 60068-2-52 - 2,5 % NaCl |

MECHANICAL CHARACTERISTICS

| | |
|----------------------------|--------------------|
| Vibration from 10 to 50 Hz | IEC 60068-2-6 - 2G |
|----------------------------|--------------------|

INSULATION

| | |
|----------------------------------|---|
| Installation category: | For systems up to 500 V AC (ph/ph) III |
| Degree of pollution: | 2 |
| Rated impulse withstand voltage: | IEC 60947-1 - V imp: 4 kV |
| Front face: | Class II |
| Electric security: | IEC 61010 |