AEM35 User Manual

Installation and user instructions

Three-phase energy analyser for indirect connection (5A or 0.333V) with Modbus or pulse interface

The analyser measures active and reactive energy, summing or separating imported energy from exported energy. It displays the main electrical parameters, including THD, calculated neutral current and running hours. Current measurements by external current transformers and voltage measurements either direct or by potential transformers. Equipped with a pulse output and optionally with RS485 Modbus port. It measures four DIN modules, with removable LCD display unit allowing the same unit to be used either DIN-rail or panel mounted and to be used as a transducer without the display.

Features

Power	Self-power supply from 40 to 480VAC (45-65Hz).
Consumption	≤2VA/1W
Nominal current (In)	Transformer primary current corresponding to 5A secondary output (AEM35) or 0.333 V secondary output (AEM35V)
Maximum current (continuing)	1.2 In
Start-up current	0.01 A
Nominal voltage	230 V LN, 400 V LL ac
Voltage range	160 to 240 V LN ac, 277 to 415 V LL ac
Frequency	45-65Hz
Accuracy class	Active energy: Class 1 (EN62053-21) Reactive energy: Class 2 (EN62053-23)

Environmental specifications

Working temperature	From –25 to +55 °C/from –13 to +131 °F
Storage temperature	From –30 to +70 °C/from –22 to +158 °F

Output Specifications

Pulse output	Programmable from 0.01 to 9.99 kWh per pulses
Pulse duration	TOFF ≥120ms, according to EN62052-31 TON selectable (30 ms or 100 ms) according to EN62053-31
Modbus RS485 port output	Modbus RTU protocol

*NOTE: to set output parameters, see **Parameters menu (Fig. 27)**.*

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LED specifications

	Proportionate to the result of CT/Primary current and VT ratios:		
	Weight (kWh/pulse)	**CT * VT (AEM35)**	**Primary current * VT (AEM35V)**
Pulse weight	0.001	< 7	< 35.0
	0.01	≥ 7.0 < 70	≥ 35.0 and <350.0
	0.1	≥ 70 < 700	350.0 and <3500.0
	1	≥ 700.0	≥ 3500.0
Max Frequency	16Hz		
Colour	Red		

General features

Terminals	2.4 x 3.5 mm, Min./Max. screws tightening torque: 0.4 Nm / 0.8 Nm
Protection degree	Front: IP40, terminals: IP20
Dimensions	See **Fig. 28**.

Cleaning

Use a slightly dampened cloth to clean the instrument display; do not use abrasives or solvents.

Service and warranty

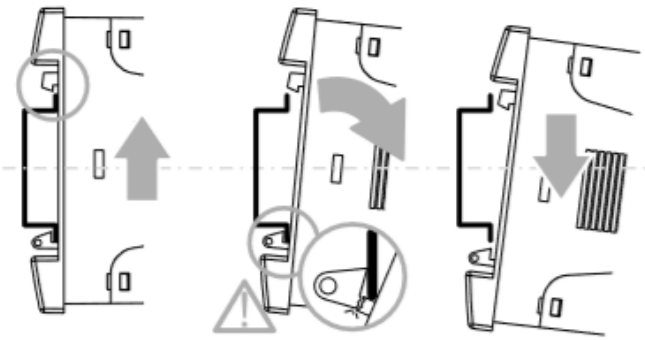
In the event of malfunction, fault or for information on the warranty, contact ELCOMPONENT Ltd.

General warnings

DANGER! Live parts. Heart attack, burns and other injuries. Disconnect the power supply and load before installing the analyser. The energy analyser should only be installed by qualified/authorised personnel.

Intended use: measurement of electrical parameters, indoor use. Use it in installations with overvoltage cat. III or lower.

These instructions are an integral part of the product. They should be consulted for all situations tied to installation and use. They should be kept within easy reach of operators, in a clean place and in good conditions.



Pay attention when removing the instrument from the DIN rail in order to avoid breakage of the support.

Excessive rotation of the instrument to remove it, might break the support as shown in the figure. We suggest extracting downwards.

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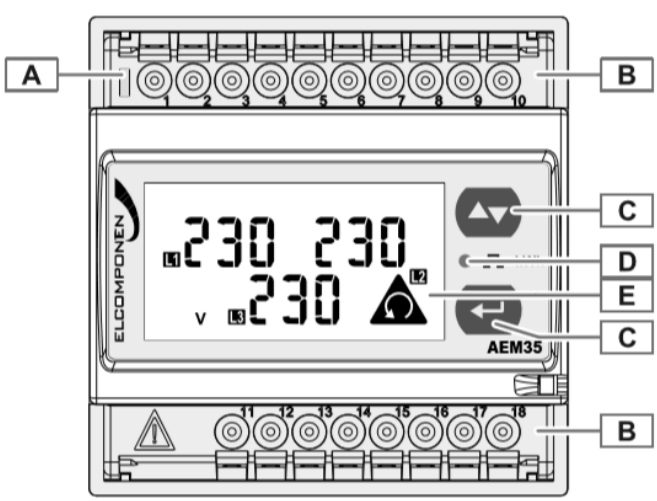
Product (Fig.1)	
Area	**Description**
A	Green LED: • steady: the instrument is power supplied • blinking: the instrument is power supplied and is communicating by serial port.
B	Current, voltage, output and communication connection terminals
C	Command keys
D	Red LED: • blinking: pulses proportional to energy being measured (pulse weight: see **Features**).
E	LCD display (no backlight)

1



Note: In separate package, cap seals for terminals

Display (Fig.2)	
Area	**Description**
A	Unit of measure area
B	Signal area:
	In case of wrong phase sequence
	Phase to phase voltage L1-2, L2-3, L3-1
	System values

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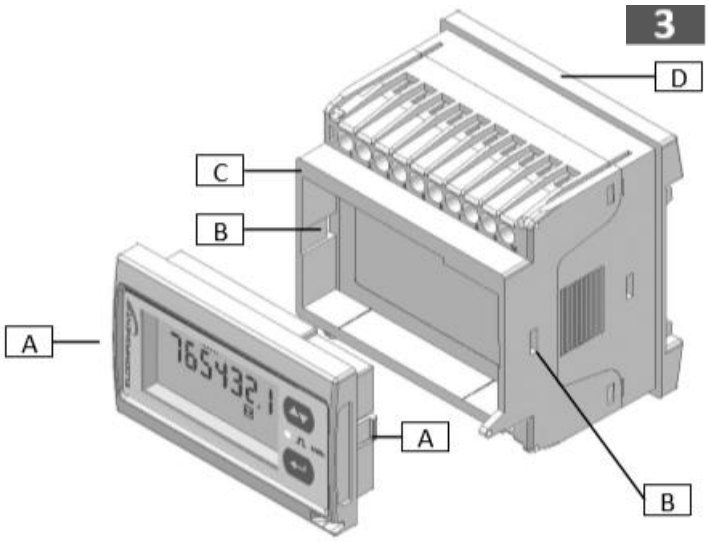
Procedure for adapting the mounting (Fig. 3)

It is possible to convert the type of instrument installation, from DIN to Panel (72x72) or vice versa, thanks to the special removable front panel. The instrument without the front panel will have the function of a transducer.



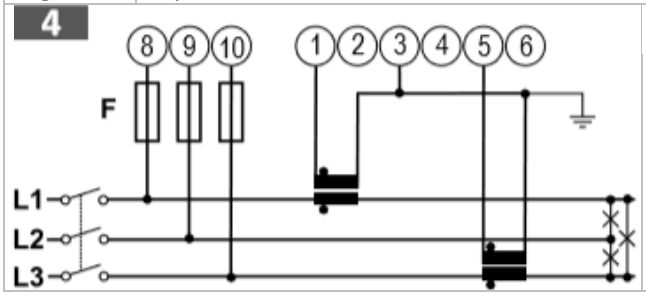
The table below advises the conversion process:

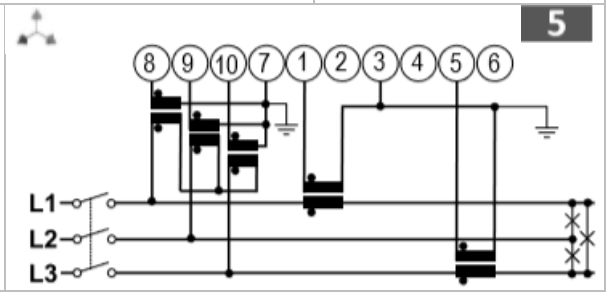
Step	Action
1	Unclip, using a screwdriver of appropriate size, the spring tabs (total of two) A pushing them from the slots B.
2	Pull out the display unit
3	Insert the display unit into the side desired, according to the type of montage: C- DIN rail D- panel 72x72

Note: the package includes two mounting brackets for panel mounting of the instrument

ARON connection diagrams, AEM35 only.

Diagram	Description	SyS selection (Fig. 26)
Fig. 4	3-ph, 3-wire, unbalanced load, 2-CT connections. F=315 mA	3P
Fig. 5	3-ph, 3-wire, unbalanced load, 3-VT/PT and 2-CT connections	3P





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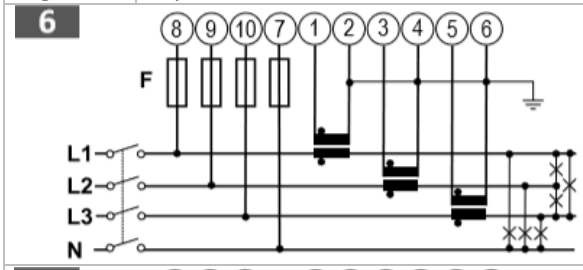
Connection diagrams, all models.

Diagram	Description	SyS selection (Fig. 26)
Fig. 6	3-ph, 4-wire, unbalanced load, 3-CT connection. F=315 mA	3P.n
Fig. 7	3-ph, 4-wire, unbalanced load, 3-CT and 3-VT/PT connections	3P.n
Fig. 8	3-ph, 3-wire, unbalanced load, 3-CT connection. F=315 mA	3P
Fig. 9	3-ph, 3-wire, unbalanced load, 3-CT and 2-VT/PT connections	3P
Fig. 10	3-ph, 3 or 4-wire, balanced load, 1-CT connection. F=315 mA	3P.1
Fig. 11	3-ph, 3-wire, balanced load, 1-CT and 2-VT/PT connection	3P.1
Fig. 12	2-ph, 3-wire, 2-CT connection. F=315 mA	2P
Fig. 13	2-ph, 3-wire, 2-CT and 2-VT/PT connections	2P
Fig. 14	1-ph, 2-wire, 1-CT connection. F=315 mA	1P
Fig. 15	1-ph, 2-wire, 1-CT and 1-VT/PT connection	1P

6



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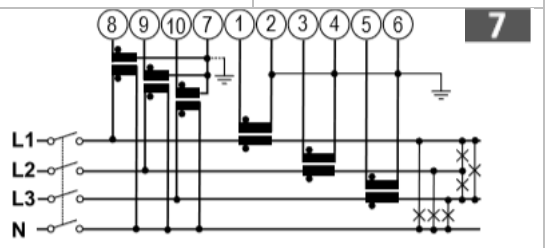

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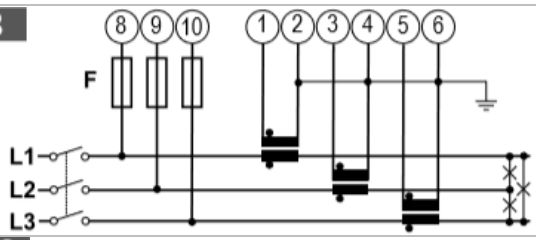

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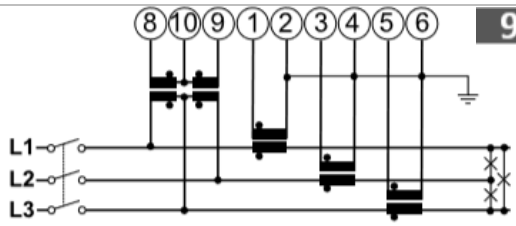

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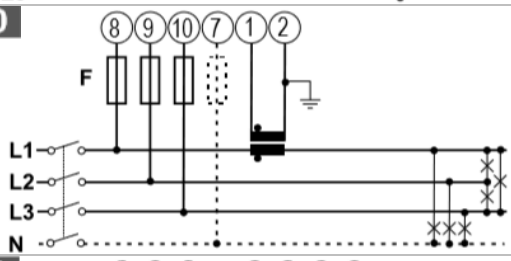

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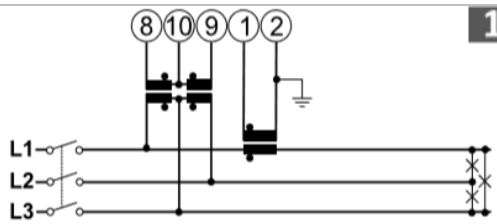

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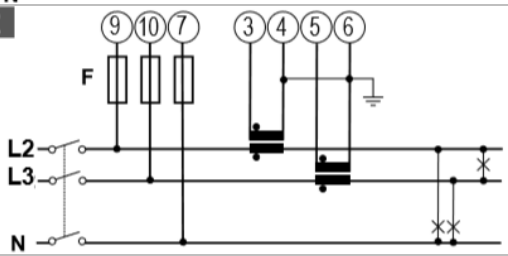

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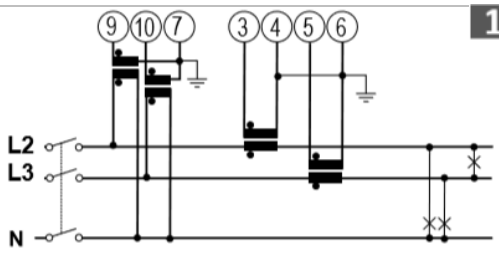

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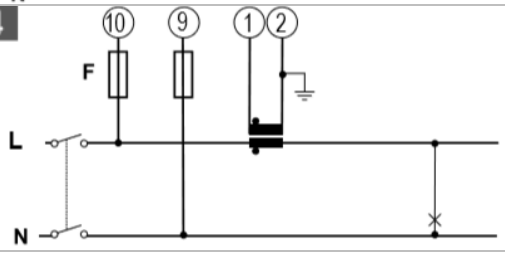

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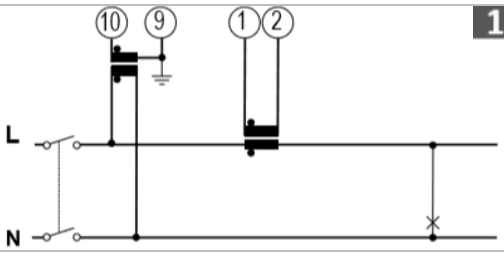

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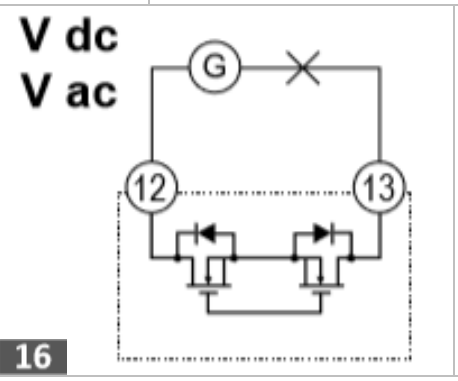
Connection diagrams, all models.

Diagram	Description
Fig. 16	Opto-mosfet static output
Fig. 17	RS485 Modbus with Master *Note: additional instruments with RS485 are connected in parallel. The serial output must only be terminated on the last network device connecting terminals **B+** and **T**. For connections longer than 1000 m or networks with more than 160 instruments, use a signal repeater.*
Fig. 18	REMEMBER: in case of use of Current Sensors with the secondary output of 0,333V use AEM35V models only connected as shown in **figure 18**.
Fig. 19	REMEMBER: in case of use of Rogowski Current Sensors, use AEM35V models only connected as shown in figure.



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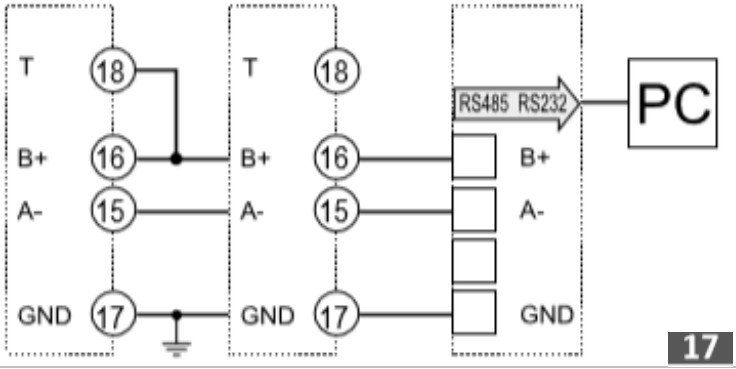

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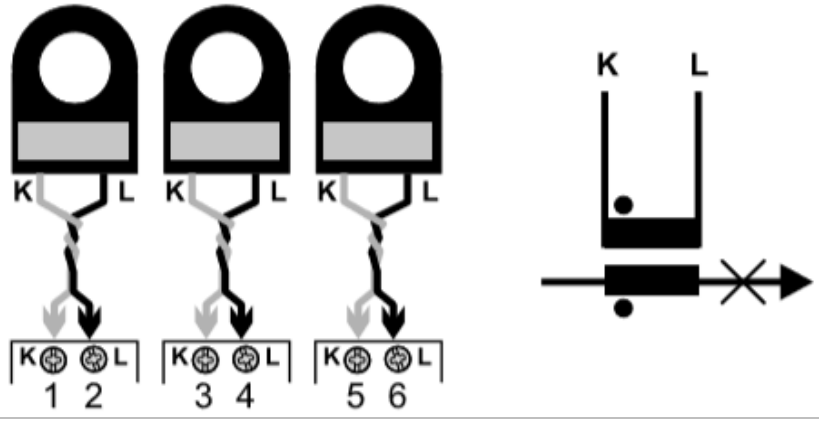

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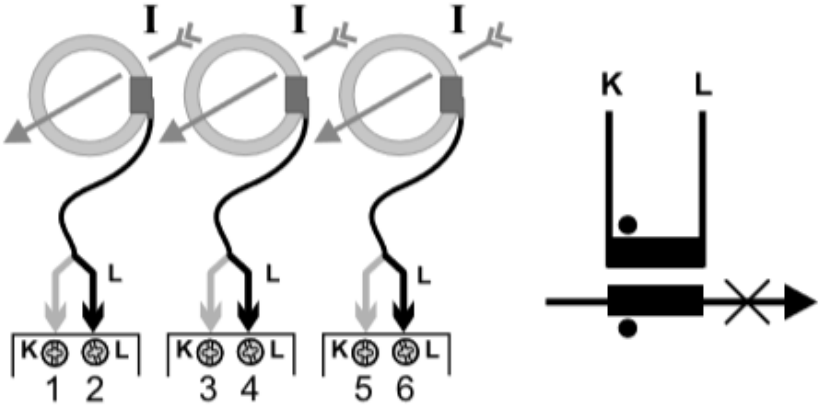

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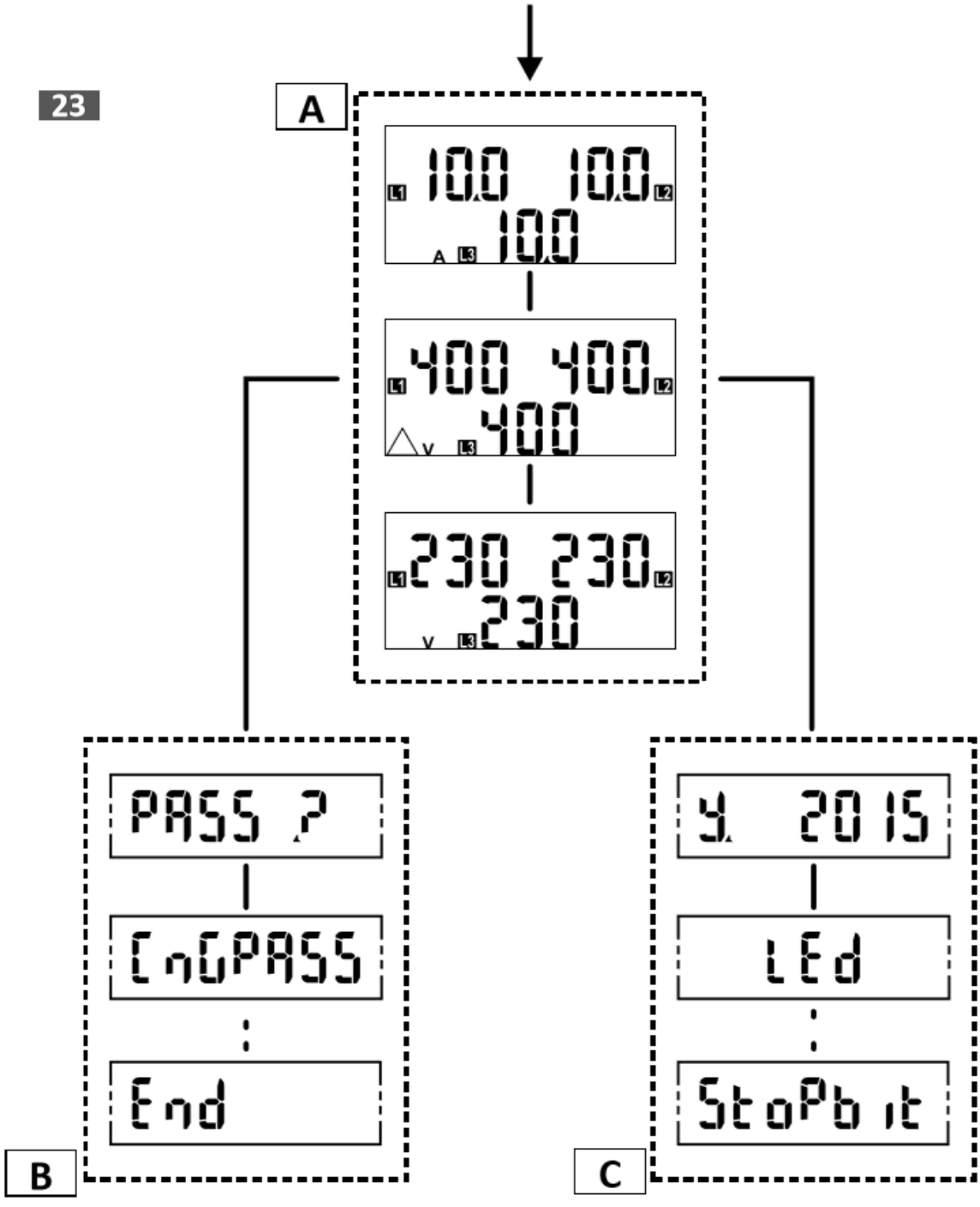
Menu map (Fig. 23)

Area	Function
A	Measurement menu. Measurements displayed by default when turned on. Pages are characterised by the reference unit of measure.
B	Parameter menu. Parameter settings pages. Require login password.
C	Information menu. The pages display information and set parameters without having to enter a password.



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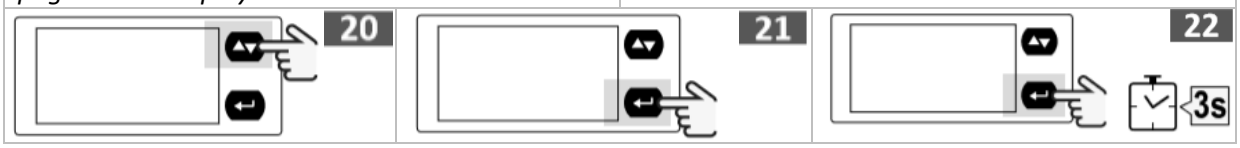
Commands (Fig. from 20 to 22)

Navigation		Parameter settings	
Operation	**Command**	**Operation**	**Command**
View the next measurement page	**Fig. 20**	Enter parameter setting	**Fig. 21**
Open the information menu	**Fig. 21**	Change between increase mode (C icon displayed) and decrease mode (-C icon displayed)	**Fig. 21**
View the next information page	**Fig. 21**		
Exit the information menu	**Fig. 20**	Increase value/view next option (C)	**Fig. 20**
Open the parameter menu	**Fig. 22**	Decrease value/view previous option (-C)	**Fig. 20**
Exit the parameter menu (info menu shown)	**Fig. 22 (page End)**	Confirm a value	**Fig. 22**
NOTE: after 120s of inactivity, the measurement page will be displayed.		*Note: hold the key for up to 2,5s*	



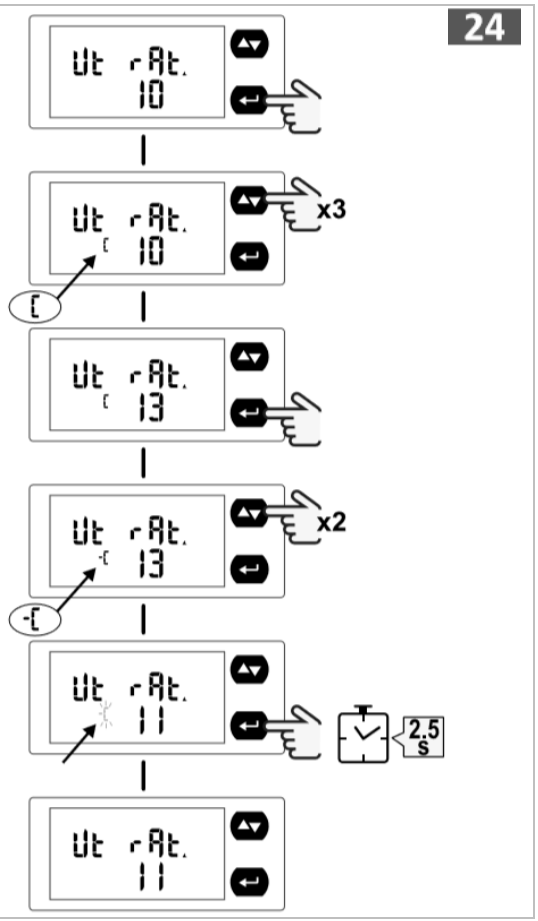
Setting a parameter (Fig. 24)

Procedure example:
How to set **Ut rat.=11** (passing the value 13).
NOTE: the first displayed value is the current one. Settings are applied when the value is confirmed.

The value is being edited if C or -C appears.

After 120s of inactivity on a value being set, the title page is displayed (P int in the figure) and C/-C disappears.

After further 120s, the measurement page is displayed.



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Measurement menu (Fig. 25)

The picture shows some available measure pages as example.

General measurement						
Measure	**Application (see also parameter menu "APPLiC")**					
Total kWh; kW sys	A	B	C	D	E	F
Total kvarh; kvar sys *Note*: in application F kvarh is calculated by both positive and negative kvar integration*		B	C	D	E	F*
PF sys; Hz		B	C	D	E	F
PF per phase, A, V LL, V LN, THD VLL, THD VLN, THD A, An, Working hours. *Note: to see the THD measure the THD function must be enabled*			C	D	E	F
Exported kWh (kWh-), working hours of exported kWh (h-)					E	

Available variables only via RS485

V LN sys, V LL sys, VA sys, VA L1, VA L2, VA L3, var L1, var L2, var L3, W L1, W L2, W L3.

Wrong wiring detection function (supporting the voltages/currents connections to the metering device).

Information menu (Fig. 26)

Available information pages for ALL MODELS			
Page	**Code**	**Description**	**Disp. values in the example (fig.26)**
01	y. xxx r.XX	Year of production and firmware release	Y 2017 (Year); r.A0 (revision)
02	Led	kWh per pulse	kWh 0.001 (kWh per pulse); LED
03	SyS	Type of system and type of connection	SYS 3P.n (system, see also **fig 6, 7**); 4W (4 Wires connection)
05	Ut rAt.	Voltage transformer ratio	10
06	PuLSE	Pulse output: kWh per pulse	0.10
07	Add	Serial communication address	2
08	PArity	Parity	No
09	bAud	Baud rate	115 kbps
10	bStop	Bit stop	1
11	SN	Secondary Address	1234567
Available information pages AEM35 ONLY			
Page	**Code**	**Description**	**Disp. values in the example (fig.26)**
04	Ct rAT.	Current transformer ratio	1.0
Available information pages for AEM35V ONLY			
Page	**Code**	**Description**	**Disp. values in the example (fig.26)**
	SEnSOR	Type of current sensor (Ct or RoG)	Ct
04	Ct Prin	Current sensor nominal primary current	90

Measurement faults

If the measured signal exceeds the admitted analyser limits, a specific message appears:

- **EEE blinking**: the measured value is out of limits
- **EEE on**: the measurement depends on a value that is out of limits

NOTE: active and reactive energy measurements are displayed but do not change.

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Parameter menus (Fig. 27)

Available menus for ALL MODELS			
Page	**Description**	**Values**	
PASS	Enter current password	Current password.	
CnGPASS	Change password	Three digits (000–999)	
APPLiC.	Selects the pertinent application	A/ B/ C/ D/ E/ F	
SYS	System type	3Pn: 3-phase unbalanced with neutral; 3P: 3-phase unbalanced without neutral; 3P1: 3-phase balanced with or without neutral; 2P: 2-phase; 1P: single phase	
Ut rAt.	Voltage transformer ratio (VT)	1.0–999	
PuLSE	Selects the pulse weight	kWh per pulse, 0.01–9.99	
ton	Pulse duration (ON time in msec)	30-100	
P.tESt	Sets the simulated power value (kW), for the pulse output test. *Note: with APPLiC C, E, E, F only.*	1-999 kW. (The pulses frequency is according to the "PuLSE" weight selection)	
tESt	Activates the pulse output test when ON (the function is active until you remain within the menu). *Note: with APPLiC C, D, E, F only.*		
Add	Serial address	1–247	
bAud	Baud rate (kbps)	9,6/ 19,2/ 38,4/ 57,6/ 115,2	
PAritY	Parity	No or Even	
bStoP	Stop bit	1-2	
tHd	THD enabling	On: enabled / Off: disabled	
EnE rES	Reset of all the meters	No: cancels reset / Yes: enable reset	
End	It allows exiting the programming mode	-	
Available menu for AV5, AV6 ONLY			
Page	**Description**	**Values**	
Ct rAt.	Current transformer ratio (CT) *NOTE*: The maximum VT by CT ratio: 1187*	1.0–999*	
Available menu for MV5, MV6 ONLY			
Page	**Description**	**Values**	**"roG" values**
SEnSOr	Selects the used current sensor	Ct: current transformer/roG: Rogowski sensor	
Ct Prin	Current sensor nominal primary current NOTE*: the max value of the multiplication of primary current x VT ratio is 220000	10–9990*	1,00k, 2,00k, 4,00k

Blocking access to the parameter menu

It is possible to block the access to programming by means of a specific trimmer positioned on the rear of the removable display unit. Turn the trimmer clockwise up to its run end with the help of a suitable screwdriver.

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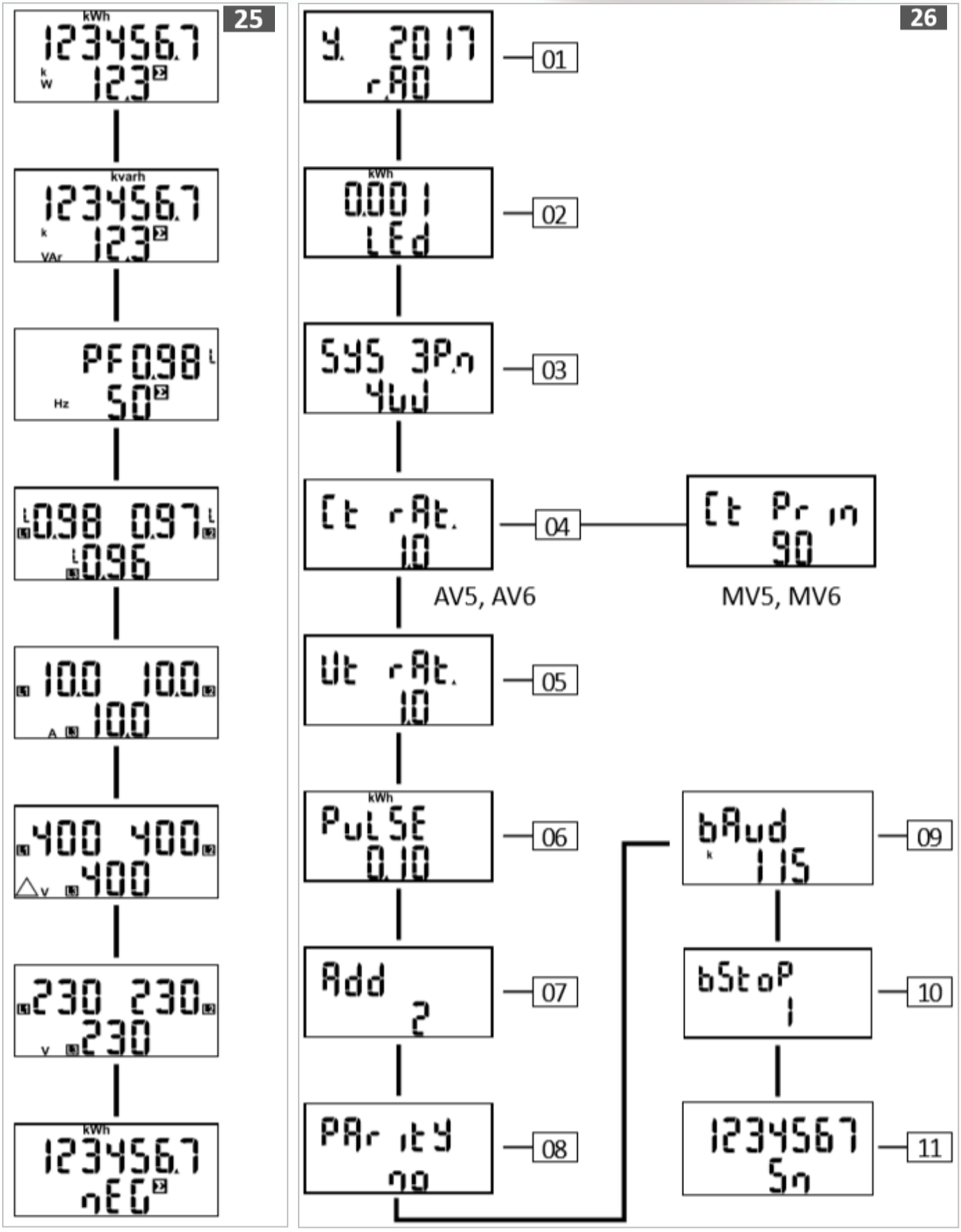

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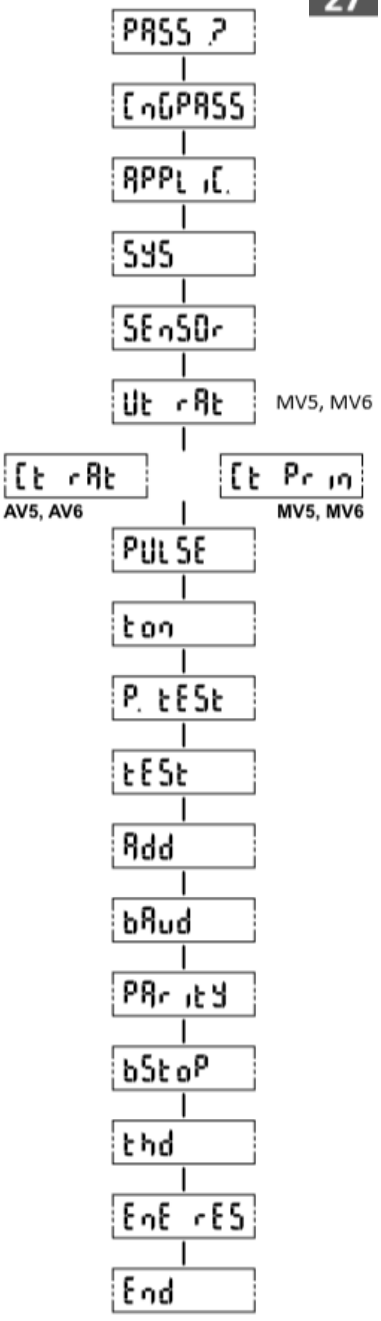

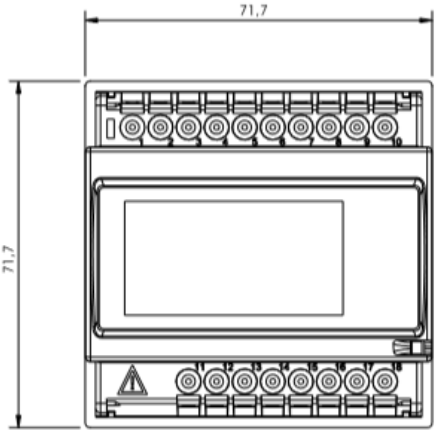

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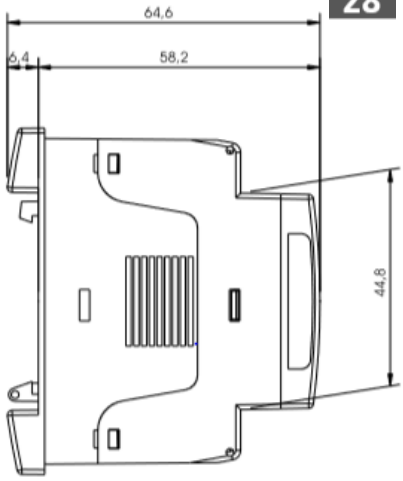

CE

- 2014/30/EU
- EN 61010-1
- EN 62053-21
- EN62052-11