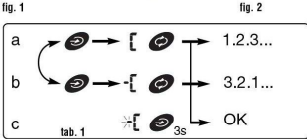
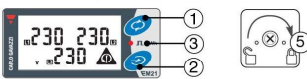


EM21 72D "3-phase Energy Meter"



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■ Front panel and value setup (fig. 1)

In the **measurement mode**: press the key 1 to scroll the measurement pages; press the key 2 to scroll the information pages of the instrument. Holding the button 2 pressed for at least 3 sec., you access parameter programming and setting.

In the **programming mode**: press the key 1, to scroll the menus or increase/decrease the values to be set up. With button 2 you can enter the submenu and change the value change mode from positive to negative or vice versa according to the logic indicated in table 1: a, pressing button 2, the letter C appears in the bottom row, indicating the possibility to change the values increasing them by means of button 1, b, pressing again button 2, C appears in the bottom row, indicating the possibility to decrease the values by means of button 1, c. To confirm the selected value, hold button 2 pressed until the mark - of letter C disappears. This way, the value is confirmed.

The **frontal red LED** (3, fig. 1) flashes proportionally to the active imported energy consumption.

Wrong phase sequence indicator (4, fig. 1), the hazard triangle is displayed in case of wrong phase sequence (L2-L1-L3, L1-L3-L2).

■ PROGRAMMING BLOCK

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 as shown in figure 2 point 5.

■ BASIC PROGRAMMING AND RESET

To enter the complete programming mode, press the key 2 for at least 3 sec. (fig. 1). Entering the programming mode, all the measurements and control functions are inhibited. During this phase the flashing of the LED has not to be considered.

01 PASS?: entering the right password (default value is 0) allows accessing the main menu.

02 CnG PASS: it allows changing the password.

03 APPLIC: it allows selecting the pertinent application. A: active positive energy meter (measuring of active positive energy and some minor parameters); B: active and reactive positive energies meter (measuring of energies active and reactive positive with some minor parameters); C: showing of all the electrical variables available.

04 SYS: it allows selecting the electrical system. 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.

05 UT rAtio: VT ratio (1.0 to 60.0k). Example: if the connected VT primary is 5kV and the secondary is 100V, the VT ratio to be set is 50 (that is 5000/100).

06 Ct rAtio: CT ratio (1.0 to 60.0k). Example: if the connected CT primary is 3000A and the secondary is 5A, the CT ratio is 600 (that is: 3000/5).

07 PuLSE: selects the pulse weight (kWh per pulse; programmable from 0.001 to 9.99).

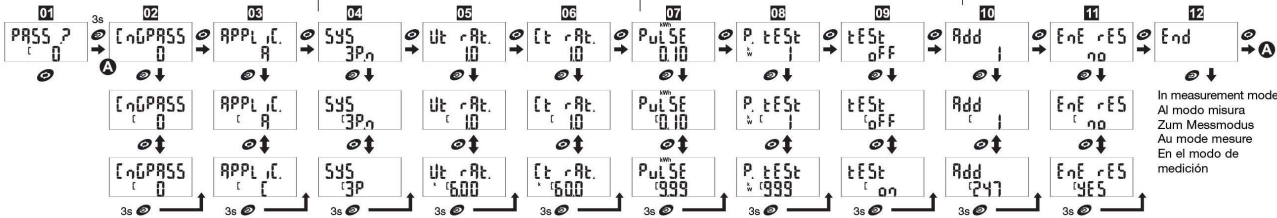
08 P. tESt: sets the simulated power value (kW) to which a proportional pulse sequence according to "PULSE" corresponds. The function is active until you remain within the menu.

09 tESt OFF: activated on the pulse output when ON (for "APPLIC" C only).

10 Add.: serial address: from 1 to 247 (with "IS" option only).

11 EnE rES: reset of all the meters (for "APPLIC" C only).

12 End: it allows exiting the programming mode by pressing the key 2 (see fig. 1).



In measurement mode
Al modo misura
Zum Messmodus
Au mode mesure
En el modo de medición

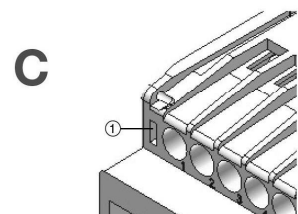
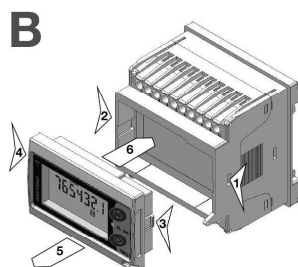
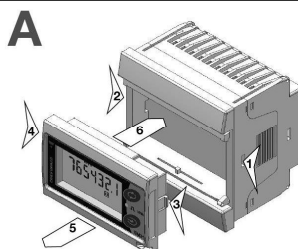
	<p>In case of wrong phase sequence. In caso di sequenza fasi errata. Bei falscher Phasenfolge. En cas de séquence phases erronée. En caso de secuencia de fase incorrecta.</p>
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System values.
Valori di sistema.
Systemwerte.
Valeurs de système.
Valores del sistema.

Serial communication address.

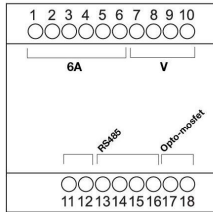
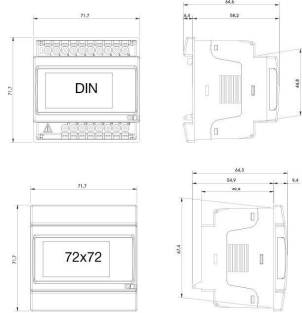
APPLIC:	A	B	C		B	C		A	B	C		C		C		C		C		C
Measuring pages. Pagine di misura. Målsiden. Pages de mesure. Páginas de medida.																				
Available variables only with RS485. Variabili disponibili solo da RS485. Vorhandene Variablen nur mit RS485. Variables disponibles seulement avec RS485. Variables disponibles sólo con RS485.	V L-N sys, V L-L sys, VA sys, VA L1, VA L2, VA L3, var L1, var L2, var L3, W L1, W L2, W L3.																			

■ **Green LED, fig. C 1**
If the instrument is used as converter, that is without display unit, the green LED shows that the instrument is powered, if the LED flashes, it shows that the instrument is connected to the serial network and is communicating.

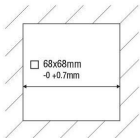


EM21 72D "3-phase Energy Meter"

IN/OUT



F=315mA



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6A System type selection 3P.n

[1]- 3-ph, 4-wire, unbalanced load, 3-CT connection.
[2]- 3-ph, 4-wire, unbalanced load, 3-CT and 3-VI/PT connections

6A System type selection 3P

[3]- 3-ph, 3-wire, unbalanced load, 3-CT connection.
[4]- 3-ph, 3-wire, unbalanced load, 3-CT and 2-VI/PT connections

[5]- 3-ph, 3-wire, unbalanced load, 2-CT connections

[6]- 3-ph, 3-wire, unbalanced load, 2-VI/PT and 2-CT connections (ARON).

6A System type selection 3P.1

[7]- 3-ph, 3-wire, balanced load, 1-CT connection (if the neutral is available the voltage connection can be realized to only 2-wire VL1 and N).

[8]- 3-ph, 3-wire, balanced load, 1-CT and 2-VI/PT connection.

6A System type selection 2P

[9]- 2-ph, 3-wire, 2-CT connection.

[10]- 2-ph, 3-wire, 2-CT and 2-VI/PT connections

6A System type selection 1P

[11]- 1-ph, 2-wire, 1-CT connection.

[12]- 1-ph, 2-wire, 1-CT and 1-VI/PT connection

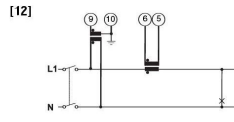
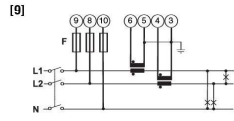
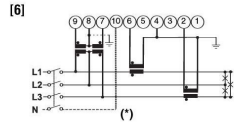
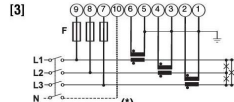
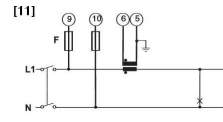
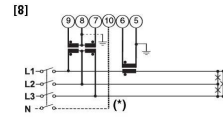
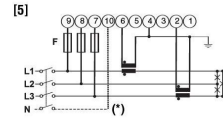
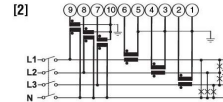
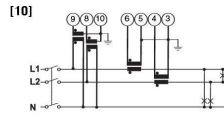
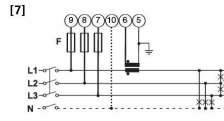
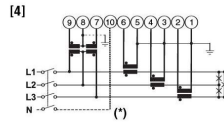
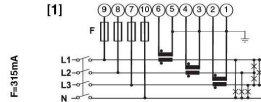
Static output and serial port

[13]- Opto-mosfet static output

[14]- RS485 connection - 2 wires [a]- last instrument,

[b]- instrument 1...n, [c]- RS485/RS232 transducer.

(*) NOTE: For a correct power supply of the instrument, the neutral must always be connected.



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■ SAFETY PRECAUTIONS



Read carefully the instruction manual. If the instrument is used in a manner not specified by the producer, the protection provided by the instrument may be impaired.
Maintenance: make sure that the connections are correctly carried out in order to avoid any malfunctioning or damage to the instrument. To keep the instrument clean, use a slightly damp cloth; do not use any abrasives or solvents. We recommend to disconnect the instrument before cleaning it.

■ TECHNICAL SPECIFICATIONS

Rated inputs: System type: 3. Current type: not isolated (shunt inputs). Note: the external current transformers can be connected to earth individually. Current range (by CT): AV5 and AV6: 5(6)A. The "1(6)A" range is available but not in compliance with the MID. Voltage (direct or by VT/PT): AV5: 400VLL; AV6: 120/230VLL.
Accuracy (Display + RS485) (@25°C ±5°C, R.H. <60%, 48 to 62 Hz): AV5 model In: 5A, Imax: 6A; Un: 160 to 260V/LN (277 to 450VLL). AV6 model In: 5A, Imax: 6A; Un: 40 to 144V/LN (70 to 250VLL). Current AV5, AV6 models: from 0.002In to 0.2In: ±(0.5% RDG +3DGT). From 0.2In to Imax: ±(0.5% RDG +1DGT). Phase-neutral voltage in the range Un: ±(0.5% RDG +1DGT). Phase-phase voltage in the range Un: ±(1% RDG +1DGT). Frequency Range: 45 to 62Hz; resolution: ±1Hz. Active power ±(1%RDG +2DGT). Power Factor ±(0.001+1%(<1.000 -1°F RDG)). Reactive power (2%RDG +2DGT). Energies kWh: class B according to EN50470-1-3 and class 1 according to EN52053-21; kvarh: class 2 according to EN52053-23. In: 5A, Imax: 6A; 0.1 In: 0.5A. Start up current: 10mA **Energy additional errors:** Influence quantities according to EN52053-21, EN50470-1-3, EN52053-23. **Temperature drift:** ≤200ppm/°C. **Sampling rate:** 1600 samples/s @ 50Hz, 1900 samples/s @ 60Hz. **Display refresh time:** 1 second. **Display:** 2 lines 1st line: 7-DGT, 2nd line: 3-DGT or 1st line: 3-DGT + 3-DGT, 2nd line: 3-DGT. Type LCD, h 7mm. Instantaneous variables read-out 3-DGT. Energies: imported, Total: 6+1DGT (or 7 DGT). Overload status EE indication when the value being measured is exceeding the "Continuous inputs overload" (maximum measurement capacity). Max. and Min. indication: Max. instantaneous variables: 999; energies: 999 999.9 or 9 999 999 (positive only). The negative energy is neither metered nor subtracted. Min. instantaneous variables: 0; energies 0.0. **LEDs.** Red LED (Energy consumption) 0.001 kWh by pulse if CT ratio x VT ratio is <7, 0.01 kWh by pulse if CT ratio x VT ratio is ≥7.0 <70.0; 0.1 kWh by pulse if CT ratio x VT ratio is ≥70.0 <700.0; 1 kWh by pulse if CT ratio x VT ratio is ≥700.0. Max frequency: 16Hz, according to EN50470-3. Green LED (on the terminal blocks side) for power on (steady) and communication status: RX-TX (in case of RS485 option only) blinking. **Measurements:** Method TRMS measurements of distorted wave forms. Coupling type: by means of external CTs. **Crest factor** in 5A ≤3 (15A max. peak). **Current Overloads:** continuous 6A, @ 50Hz. For 500ms 120A, @ 50Hz. **Voltage Overloads:** continuous 1.2 Un. For 500ms 2 Un. **Current input impedance** 5(6)A < 0.3VA. **Voltage input impedance:** self-power supply power consumption: <2VA. **Frequency** 45 to 65 Hz. **Key-pad:** two push buttons for variable selection and programming of the instrument working parameters. **Pulse output** Number of outputs 1. Type programmable from 0.01 to 9.99 kWh per pulses. Output connectable to the energy meters (kWh). Pulse duration ≥100ms < 120ms (ON), ≥120ms (OFF), according to EN52053-31. Output Static: opto-mosfet. Load V_{ON} 2.5 VAC/DC max. 70 mA. V_{OFF} 260 VAC/DC max. Insulation by means of optocouplers, 4000 VRMS output to measuring inputs. **RS485** type Multidrop, bidirectional (static and dynamic variables). Connections 2-wire. Max. distance 1000m, termination directly on the instrument. Addresses 247, selectable by means of the front keypad. Protocol MODBUS/RTU (RTU). Data: Dynamic (reading only) single phase and system values. Static (reading and writing). All the configuration parameters. Data format 1 start bit, 8 data bit, no parity, 1 stop bit. Baud-rate 9600 bits/s. Driver input capability 1/5 unit load. Maximum 160 transceivers on the same bus. Insulation by means of optocouplers, 4000 VRMS output to measuring input. **Transformer ratio:** VT (PT) 1.0 to 99.9 / 100 to 999 / 1.00k to 6.00k CT 1.0 to 99.9 / 100 to 999 / 1.00k to 9.99k / 10.0k to 60.0k. The maximum power being measured cannot exceed 210 MW calculated as maximum input voltage and current. The maximum VT by CT ratio is 48.600. For MID complaint applications the maximum power being measured is 25 MW. **Operating temperature** -25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C) according to EN52053-21 and EN52053-23. **Storage temperature** -30°C to +70°C (-22°F to 158°F) (R.H. <90% non-condensing @ 40°C) according to EN52053-21 and EN52053-23. **Installation category** Cat. III (IEC60664, EN60664). **Insulation (for 1 minute)** 4000 VRMS between measuring inputs and digital output. **Dielectric strength** 4000 VRMS for 1 minute. **Noise rejection** CMRR 100 dB, 48 to 62 Hz. **EMC** According to EN52052-11. Electrostatic discharges 15kV air discharge; Immunity to irradiated test with current: 10A/m from 80 to 2000MHz; Electrostatic fields test without any current: 30V/m from 80 to 2000MHz; Burst on current and voltage measuring inputs circuit: 4kV. Immunity to conducted disturbances 10V/m from 150KHz to 80MHz. Surge on current and voltage measuring inputs circuit: 6kV. Radio frequency suppression according to CISPR 22. **Standard compliance:** safety IEC60664, IEC61010-1 EN50664, EN61010-1 EN52052-11. Metrology EN52053-21, EN52053-23, MID annex MI-003. Pulse output DIN43864, IEC52053-31. Approvals: CE. **Connections:** Screw-type. Cable cross-section area: 2.4 x 3.5 mm. Min./Max. screws tightening torque: 0.4 Nm / 0.8 Nm. **Housing:** dimensions (WxHxD) 72 x 72 x 65 mm. Material Noryl PA66, self-extinguishing: UL 94 V-0. Mounting: panel and DIN-rail. **Protection degree:** front IP50. Screw terminals: IP20. **Weight:** approx. 400 g (packing included). **Self power supply** 18 to 260VAC (48-62Hz) (V.L.T.N.). **Power consumption:** ≤20VA/W