

Three-phase multifunction instrument with 1 or 2 "Easy Connect" inputs

Codes: MF961ORFCDT – MF961ORFCMT
MF962ORFCDT – MF962ORFCMT

Model: NEMO 96 EC



ROG630M2	ROG1600M2	ROG3200M2	ROG6300M2
∅ 50mm	∅ 100mm	∅ 150mm	∅ 240mm



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1. USE

The multifunction instrument, flush mounting 96x96, has a quick connector for the connection of the Rogowski type current coil trio (630A/ 1600A/ 3200A/ 6300A versions).

The measuring instrument with 4 dials, suitable for 3N-3E and 3-3E networks.

2. GAMMA

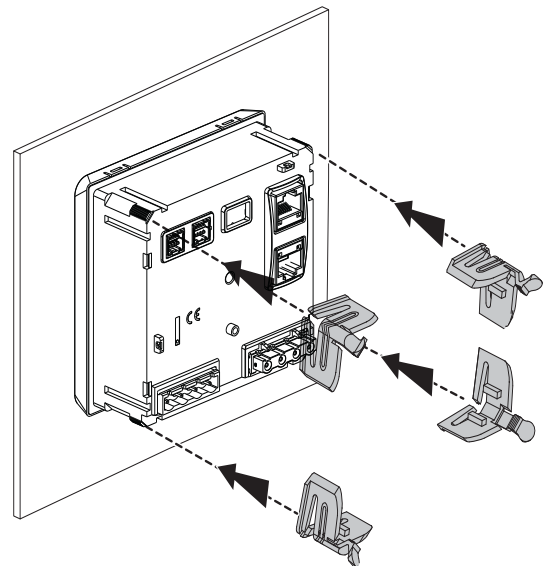
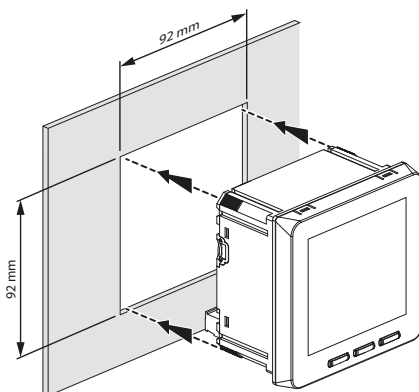
Item Code	I Inputs	Output	Digital Inputs	Voltage Range
MF961ORFCDT	1	Modbus	4 Tariffs	V-N/V-V: 3x230/ 3x400±15% V-V: 3x230 ±15%
MF962ORFCDT	2			
MF961ORFCMT	1	Mbus		
MF962ORFCMT	2			

Code	Rogowski Openable Coils			Cable length (m)	Diameter (mm)
	Input (A)	Min. Current (A)	Max. Current (A)		
ROG630M2	630	12,5	750	2	50
ROG1600M2	1600	32,5	1950	2	100
ROG3200M2	3200	65,0	3900	2	150
ROG6300M2	6300	125,0	7500	2	240
Code				Cable length (m)	Quantity
ROGETM1	-	-	-	1	x 3 max.
ROGETXM3	-	-	-	3	x 1 max.

3. INSTALLATION

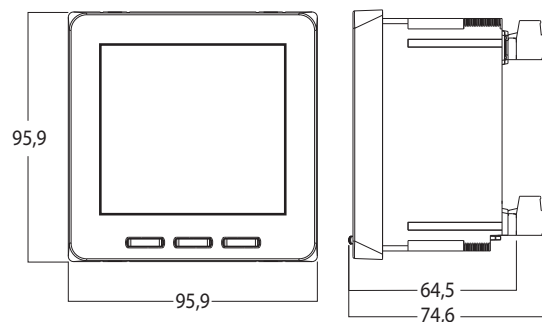
Fixing:

On solid panel door, opening 92x92 mm



4. DIMENSIONS

Housing: flush mounting 96x96mm



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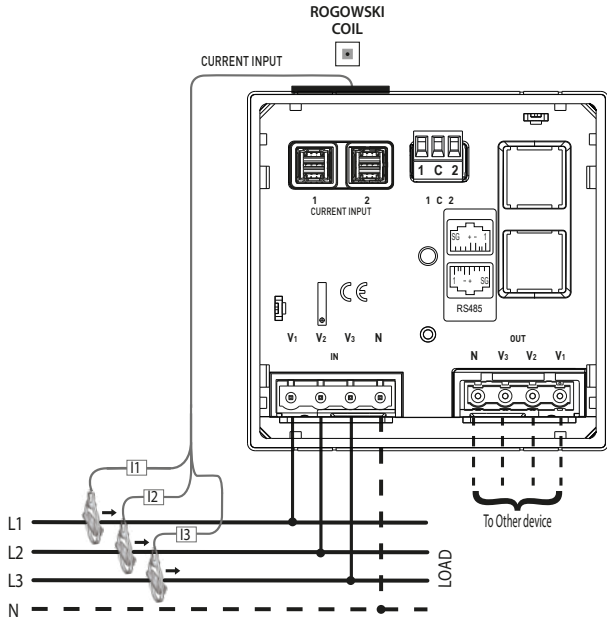
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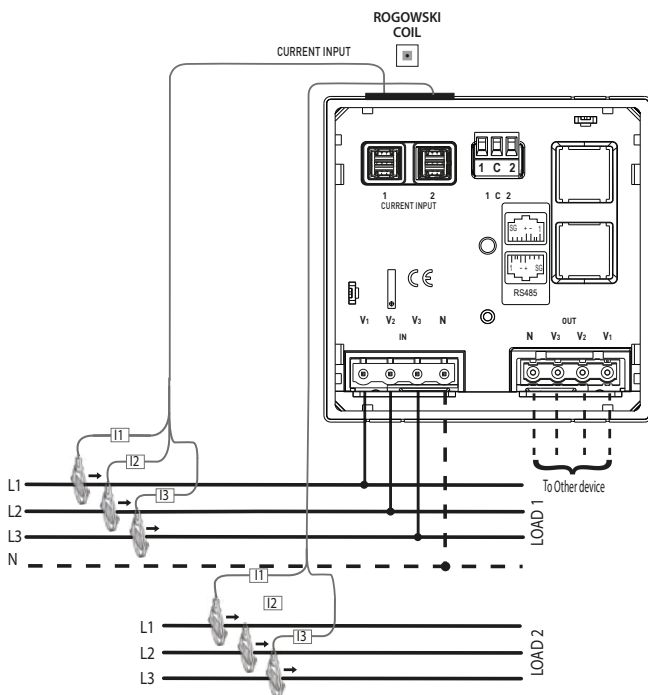
5. CONNECTIONS

Connection diagrams:

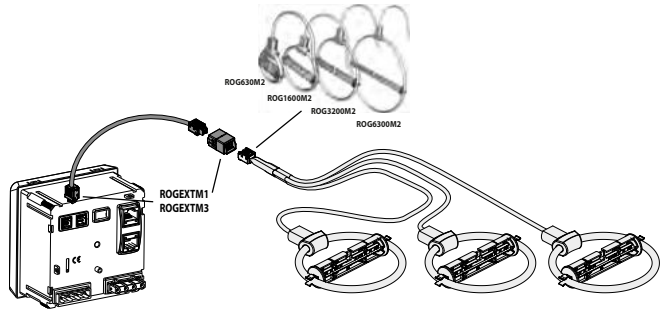
- 4 wires three-phase networks (3N3E; 3-3E) with 3 Rogowski coils:



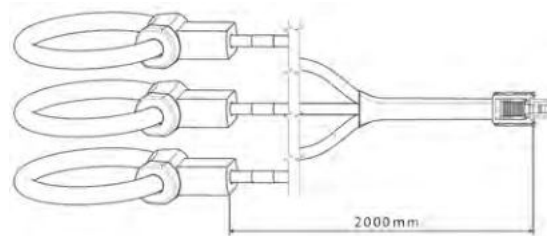
- Diagram with 2 coils:



5. CONNECTIONS



- Rogowski sensor – Cable length

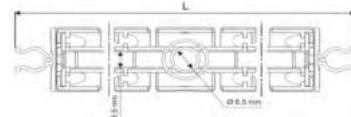
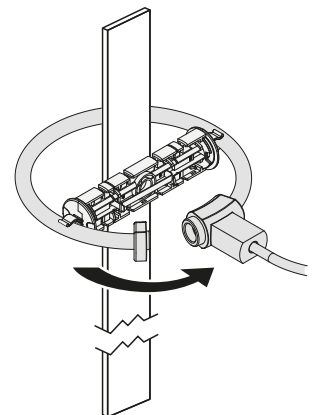


This length can be extended to 5 metres maximum with the extension cable + connector (2 m Rogowski cable and up to 3 m extension cable)

- **ROGEXTM1, ROGEXTM3:**
Extension cable for Rogowski coils

Item code	Length (mm)
ROGEXTM1	1000
ROGEXTM3	3000

Item code	Length (mm)
ROG630M2	79
ROG1600M2	123
ROG3200M2	173
ROG6300M2	263



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6. OPERATING DATA

6.1 ELECTRIC DATA

For all the MF961ORFCDT – MF962ORFCDT – MF961ORFCMT – MF962ORFCMT codes the reference capacity (I_{ref}) can be programmed based on the selected Rogowski:

Current capacity	I_{min}	I_{ref}	I_{max}
630	12,5A	250A	750A
1600	32,5A	650A	1950A
3200	65A	1300A	3900A
6300	125A	2500A	7500A

V1,V2,V3,N voltages:

- Three-phase voltage: V-N/ V-V : 3x230 /3x400 ±15%
- V-V: 3x230 ±15%

Maximum section of the cables that can be connected to the V1,V2,V3,N terminals:

Terminals	Without bush	With bush
Rigid wire	0,05 + 1,5 mm ²	0,05 + 2,5 mm ²
Flexible wire	0,05 + 1,5 mm ²	0,05 + 2,5 mm ²

Self-powered (terminals V and N):

- Rated frequency: 50/60Hz
- Operating frequency: 45...65Hz
- Self consumption: ≤ 2.5VA @230 Vac

Maximum dissipated thermal power for the thermal dimensioning of the panels: ≤ 5W

6.2 MECHANICAL DATA

Screw terminals:

- Max external dimensions: 24mm
- Stripping lengths for input cable and bus 5mm; 7.5mm for in/out voltages

Screw head:

- Voltage connection terminals (V1, V2, V3, N) with COMBI screws (slotted/ PH1 Phillips head); slotted head screws for terminals (N, V3, V2, V1) .
- Terminal boards in the upper part of the multifunction (input and bus): screws with countersunk head with hexagon socket

Recommended torque:

- Voltage connection terminals (V1, V2, V3, N): 0.5Nm
- Voltage connection terminals (N, V3, V2, V1): 0.5Nm
- Tariff and communication terminal boards (Modbus or Mbus): 0.2 Nm

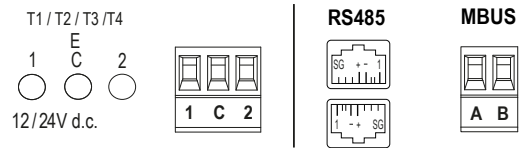
Necessary tools:

- For BUS version terminals, use a 2.5mm flat screwdriver; for voltage terminals, use a 3.5mm slotted screwdriver and/or a PH1 Phillips screwdriver

7. GENERAL FEATURES (continues)

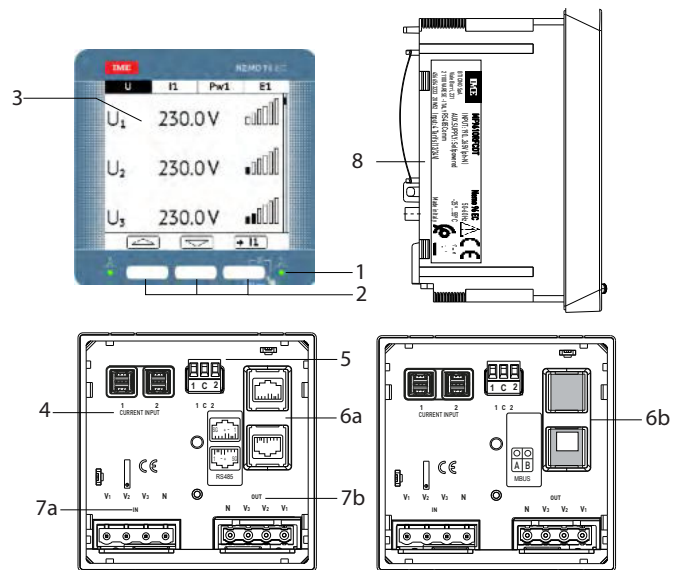
Marking of communication outputs and tariff inputs:

- by indelible tampography



Front marking:

- Indelible digital print.



1. Metrological LED
2. Keypad with 3 multifunction pushbuttons
3. Graphic display
- 4.1 / 2 current input
5. Tariff inputs
- 6a. RJ45 connection for Modbus RTU
- 6b. Mbus communication
- 7a. Inputs voltages
- 7b. Output voltages
8. Product label

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7. GENERAL FEATURES

Display e LED metrologico :

- Graphic, backlit, 3.5 inches (256x240 dots).
- Reading points: 10,000 4 digits (digit height 5 mm)
- Energy measure: 9 digit meter (digit height 5 mm)
- Resolution: automatic
- Decimal point: automatic
- Update time: 1sec.

Rogowski inputs	Energy Resolution	Wh/imp.
630A	1kWh/kvarh/kVAh	10
1600A	1kWh/kvarh/kVAh	25
3200A	1kWh/kvarh/kVAh	50
6300A	0,01MWh/Mvarh/MVAh	100

Display of the value and programming:

- By means of the front keypad, 3 pushbuttons (see the user manual).
- Access protected by identification code (**predefined code 1000**)

Measurements and precision in conformity with EN/IEC 61557-12

- Current: cl.1
- Voltage: cl.0.5
- Frequency: $\pm 0,1$ Hz
- Instantaneous total active power, phase, average value and max. average value: cl.1
- Instantaneous total reactive power, phase, average value and max. average value: cl.2
- Instantaneous total apparent power, phase, average value and max. average value: cl.1
- Power Factor: cl.1
- Total and partial active energy, tariff, phase, positive and negative cl.1
- Total and partial reactive energy, tariff, phase, positive and negative cl.2
- Apparent energy cl.1

The above classes are guaranteed by maintaining the centring, between Rogowski sensor and primary conductor, with the appropriate accessories provided and a harmonic content within the limits of the EN/IEC 61557-12 standard

Harmonic analysis (THD): value and graphic

- Up to the 15th harmonic

Average power:

- Measurement: apparent, reactive, active power
- Calculation: moving average, on the selected period
- Average time: 3/5/8/10/15/20/30/60min
- Load Profile (power load curve), diagram of the last 24 recorded average power values

Average time set | Curve interval

3 min	72 min
5 min	2 hours
60 min	24 hours

Resettable meter:

- Counting of operating hours and minutes
- 7-figure resolution (5 for the hours + 2 for the minutes)
- Maximum display: 99999.99
- Programmable value: 0...50% Pn (Positive active power)

7. GENERAL FEATURES (continues)

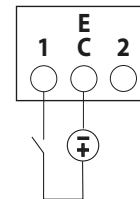
Digital input

- The digital input allows switching the energy counting on 4 tariffs
- 3 input terminals with common point (1 - C - 2)

Maximum section that can be connected to the terminals:

Terminals	Without bush	Without bush
Rigid wire	0,2 + 1 mm ²	0,2 + 1 mm ²
Flexible wire	0,2 + 1 mm ²	0,2 + 1 mm ²

- Rated voltage: 12-24Vdc, 10mA Max.



Features of the ModBus communication port

- Programmable addresses: from 1 to 247 (5*)
- Communication speed: 4.8 – 9.6 – 19.2* – 38.4 kbps
- Parity bit: none, even*, odd
- Stop bit: 1
- Galvanically isolated with respect to the measurement inputs
- Standard RS485 3 wires, Half-Duplex on RJ45 connector –
- Modbus® RTU protocol
- Response time: ≤ 200 ms
- 120 Ω terminating resistor inside the instrument (it can be set in the SETUP menu, default value: none*)
- **MF961ORFCDT**: Programmable address from 1 to 247
- **MF962ORFCDT**: Programmable address from n = 1 to n = 246 for first input measurements and address n+1 (automatically assigned) for second input measurements

Features of the MBus communication port:

- Standard: EN 13757
- Transmission: serial asynchronous
- N° of bit: 8
- Parity bit: fixed even
- Communication speed: 300-600-1.200-2.400* - 4.800-9.600bit/s
- No. of primary address: 0*...250
- **MF961ORFCMT**: Programmable primary address from 0* to 250
- **MF962ORFCMT**: Programmable primary address from 0 to 250
- N° of secondary address 0...99.999.999
- **MF961ORFCMT**: Programmable secondary address from 0 to 99999999
- **MF962ORFCMT**: Programmable secondary address from 0 to 99999999
- Load MBus:1
- Galvanically isolated with respect to the measurement inputs
- Transferred measurements: see communication protocol

* Factory data

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7. GENERAL FEATURES

Recommendations:

For the device protection against overloads and short circuits, it is recommended to use a thermal-magnetic circuit breaker

Protection class:

- Protection index of terminals against direct contacts:
IP 20 (IEC/EN 60529);
- Protection index of the front face against direct contacts:
IP 54 (IEC/EN 60529);
- Class II: front panel with cover plate;
- Protection class against mechanical impacts IK03 (IEC/EN 62262)

Resistance to vibrations:

- Vibration: from 5 to 150Hz width 0,15mm/1g
- Shock: 19g / 16msec

Housing material:

Self-extinguishing Polycarbonate, reinforced 10% Glass fibre;
Identification according to ISO 11469: >PC-GF10-FR<;
GWFI IEC 60965-2-12 (§1.6mm): 960°C;
Flame rating UL 94 / IEC 60695_11_10 (1.6/3.2 mm): V0;

Operating temperatures:

- Tmin. = - 20 °C; Tmax. = + 60 °C.

Room storage temperatures:

- Tmin. = - 25 °C; Tmax. = + 70 °C

Weight: 0,250Kg

Packaged volume: 1.27 dm³.

Room: mechanical M1 – electric E2

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8. CONFORMITY AND CERTIFICATIONS

Insulation

- Measurement categories: III (according to EN-61010)
- Level of pollution: 2
- Insulation voltage, U_i : 300V, Phase-Neutral

Dielectric rigidity:

- Power supplies/ Outputs: 3kV / 50Hz / 1min
- Housing / Terminals: 4kV / 50Hz / 1min

Pulse:

- Power supplies: 6.3kV / 1.2 – 50µsec / 0.5J

In compliance with the standards:

- Precision class: Active energy class 1 (EN/IEC 62053-21)
- Precision class: Class 2 reactive energy (EN/IEC 62053-23)
- Electromagnetic compatibility: Tests in accordance with EN/IEC 62052-11 / EN 61326-1
- Precision class according to IEC/EN61557-12
- 2014/35/UE 2014/30/UE

Respecting the environment – Conformity with the CEE directives:

- Compliance with the 2100/65/EU Directive, as modified by the 2015/863 Directive (RoHS 2), on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
- Conformity with the REACH Regulation (1907/ 2006): at the date of publication of this document no substance in the annex XIV is found in these products.
- RAEE Directive (2012/19/EU: the sale of this product includes a contribution to the appointed environmental bodies of each European country in charge of handling, at the end of their life, the products falling within the scope of the EU Directive on Electric and Electronic Equipment Waste.

Plastic materials:

- Plastic materials without Halogens.
- Part marking according to standards ISO 11469 and ISO 1043.

Packaging:

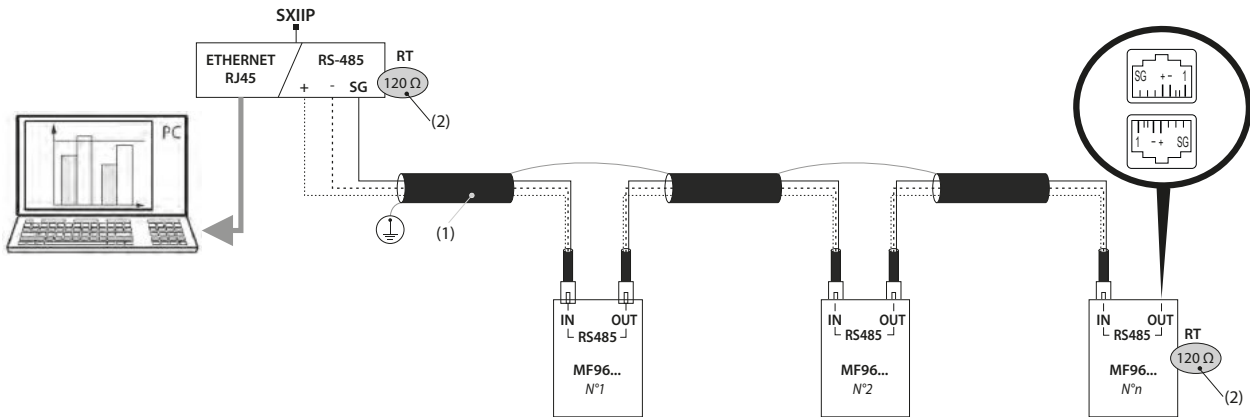
- Packaging designed and produced in accordance with Decree 98-638 of 20/07/1998 and directive 94/62/CE.

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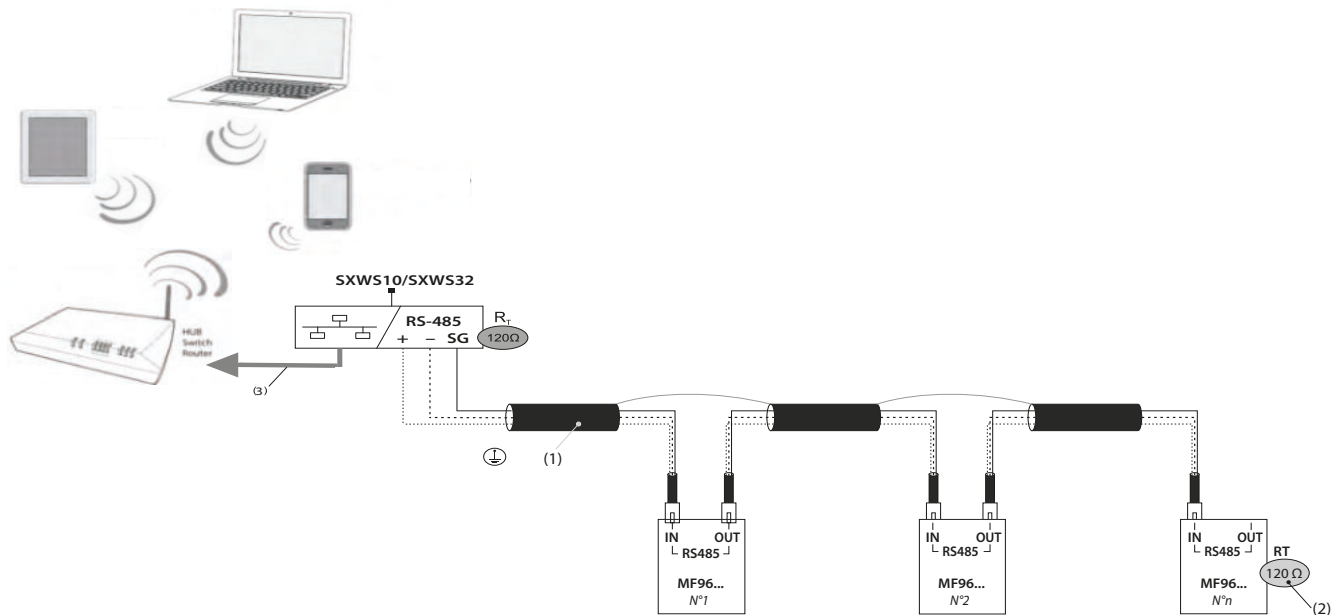
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9. COMMUNICATION

RS485 Modbus wiring diagram:

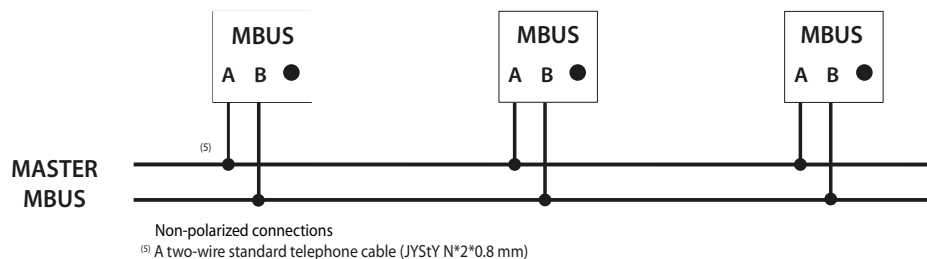


RS485 Modbus wiring diagram with Mini Web Server:



- (1) RS485: Required use of Belden 9842 or Belden 3106A wire (or equivalent) for a maximum bus length of 1000 m, or Category 6 wire (FTP or UTP) for a maximum length of 50 m
- (2) 120Ω terminating resistor inside the instrument (it can be set in the SETUP menu)
- (3) Ethernet: Cat. 6 (FTP/UTP)
- (4) The “SG” terminal must never be connected to the earth

Mbus wiring diagram:



Communication tables

- The MODBUS and MBUS communication protocols are available on the <http://www.imeitaly.com> site.