IME

Via Travaglia, 7 - 20094 Corsico (MI) - ITALY
Telephono: +39 02 44 878.1 – Fax: +39 02 45 86 76 63

NEMO 96 EA,
Network and Power Quality Analyzer

Cat. N°:
MFQ96021 / MFQ96022

Contents **Pages**

1. DESCRIPTION - USE

Multifunction Measuring Device.
Measures the main electrical quantities of a single-phase or three-phase network.
The insertion is done by measuring current transformers (CT).
Network and Power Quality Analyzer device 96x96 with memory embedded to save real time data energy data and power quality data of the network and have access to all events in period of time.
Others specific values like flikers, dips, swells, RVC (rapid voltage change) insure a real supervision of the quality of the power distribution answering to EN50160 standard.
Recommended to commercial and industrial applications.

2. RANGE

. Cat. N° MFQ96021 / MFQ96022:
Multifunction measuring device, 96x96mm for installation on a door or full panel.
The device can be equipped with several add-on modules to expand
Its functionality. (see§ 8)

Dimensions:
. Device: 96x96 mm
. Mounting cutout: 92x92 mm

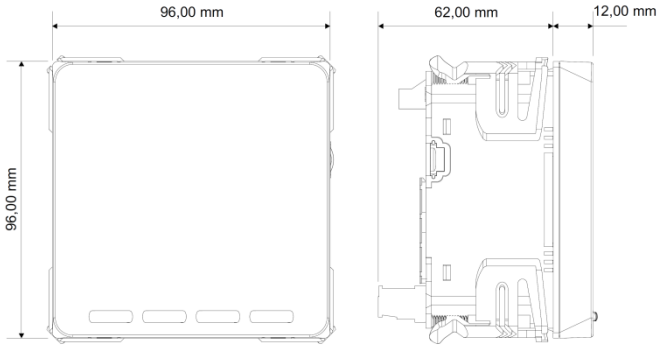
Auxiliary supply:
MFQ96021: 80 ÷ 265 V~, 45 ÷ 65 Hz, 110 ÷ 300 Vd.c
MFQ96022: 11 ÷ 60 Vd.c.
. Protected against reverse polarity

Rated current:
. Rated current, In: 1 A or 5 A (via external current transformer x/1 A or x/5 A)
. Max, current, Imax: 1,2 In
x/1 A: 1,2 A
x/5 A: 6 A

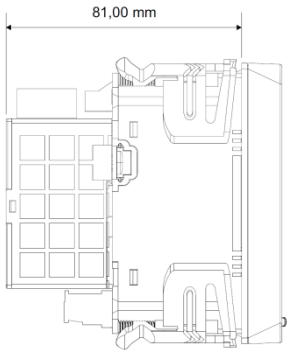
Insertion rated voltages:
. Un: 80÷690 V~ (phase/phase)
. Un: 50÷400 V~ (phase/neutral)

Rated frequency:
. fn: 50 Hz
. Admitted variation: 45 ÷ 65 Hz

3. OVERALL DIMENSIONS

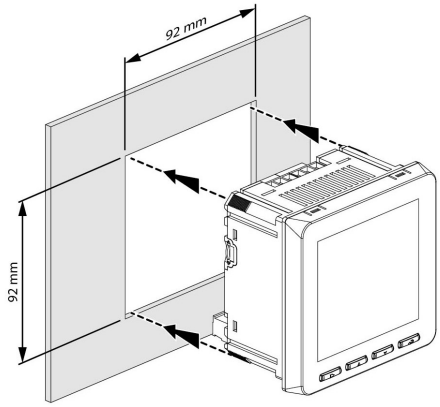


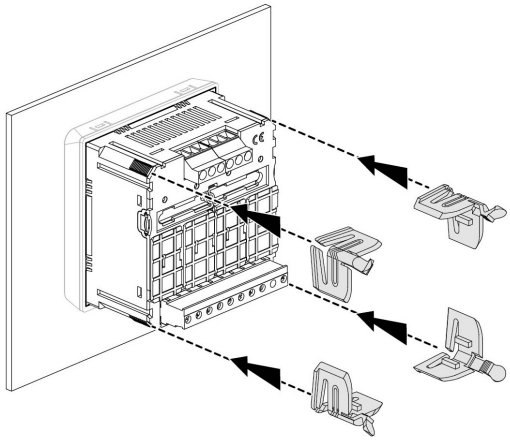
. with add-on modules



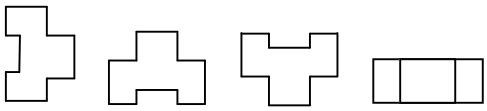
4. FIXING - CONNECTION

Fixing:
. On door or full panel
. Cutout 92x92 mm





Operating position:
. Vertical Horizontal Upside down On the side



Screw terminals:
. Terminal depth: 8 mm.
. Stripping length: 8 mm

Screw head:
. Screw slotted (CTs terminals)
. Mixed, slotted and Philips (Voltage measurement inputs and auxiliary supply)

Recommended tightening torque:
. CTs terminals (I_1, I_2, I_3): 1 Nm.
. Voltage measurement terminals (U_1, U_2, U_3, N), Auxiliary supply (Aux.): 0,6 Nm.

4. PREPARATION - CONNECTION *(continued)*

Tools required:
. CTs terminals: flat screwdriver 5 mm
. Voltage measurement and aux. supply terminals: flat screwdriver 3,5 mm or screwdriver PHO
. For fixing the device: no tools need

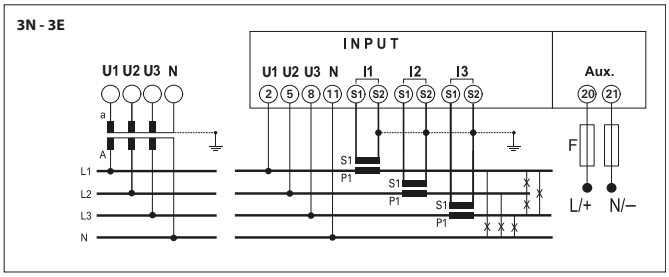
Connectable section:
. Copper cables.
. CTs Terminals

	Without ferrule	With ferrule
Rigid cable	0,05 to 6 mm²	-
Flexible cable	0,05 to 4 mm²	0,05 to 4 mm²

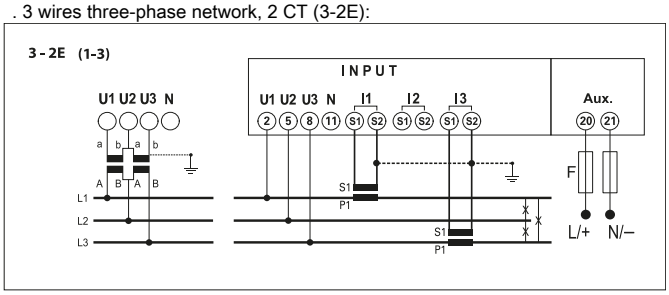
. **Other terminals**

	Without ferrule	With ferrule
Rigid cable	0,05 to 4 mm²	-
Flexible cable	0,05 to 2,5 mm²	0,05 to 2,5 mm²

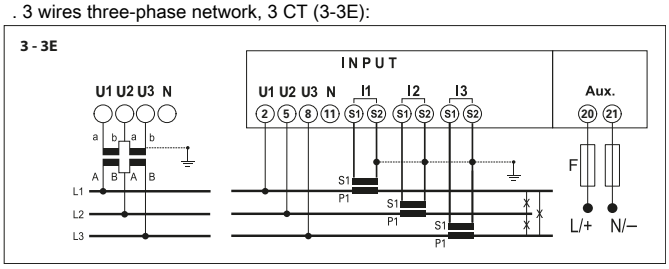
Wiring diagrams:
. 4 wires three-phase network, 3 CT (3N-3E):



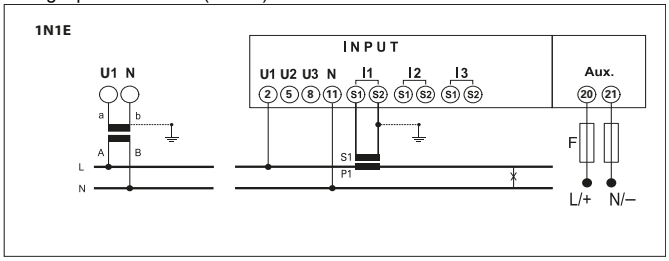
. 3 wires three-phase network, 2 CT (3-2E):



. 3 wires three-phase network, 3 CT (3-3E):



. single phase network (1N-1E):

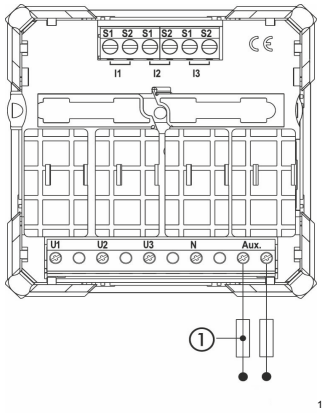


For all other wiring diagrams refer to the instruction sheet.

5. GENERAL CHARACTERISTICS

Front face marking:
. Marking by screen printing:

Terminals Marking:
. By permanent ink pad printing.



[1] F: 1A gG

Display:
. Type: LCD back lighted
. Resolution: automatic adjustment of the display resolution for the decimal digits and for the engineering units as a function of the transformation ratio of the external current transformers (kTA[1]) and, if any, if the external voltage transformers (kTV[2])

[1] kTA= external CTs ratio (ex800A/5A, kTA = 160).
[2] kTV = external VT ratio (ex. 600V / 100V, kTV = 6). For direct connection kTV =1. In the example, kTA x kTV =160 x 6 =960.

. Refresh time on display: 1.1 sec
. Refresh time on communication gate: < 0.3 sec
. Automatic backlight reduction, after 20 sec. of keyboard inactivity

Measuring sensors operating range:
. Max. VT primary voltage: 300 kV
. Max CTs primary current: 50 kA (CT = x/5A), 10 kA (CT = x/1A)
. Max. product kTA x kTV = 2.000.000 (CT = x/5A) and 10.000.000 (CT = x/1A)

Note: Changing one of the parameters kTA or kTV in the setup menu of the device, all the energy registers.

kTA x kTV	MAXIMUM DISPLAY	RESOLUTION
1…9,9	999 999,99 kWh/kvarh	10Wh / varh
10…99,9	9 999 999,9 kWh/kvarh	100Wh / varh
100…999,9	99 999 999 kWh/kvarh	1kWh / kvarh
1000…9999	999 999,99 MWh/Mvarh	10kWh / kvarh
10000…99999	9 999 999,9 MWh/Mvarh	100kWh / kvarh
> 100000	99 999 999 MWh/Mvarh	1MWh / Mvarh

5. GENERAL CHARACTERISTICS *(continued)*

Count starting time:
. t < 5 sec (IEC/EN 61557-12).

Value display and Programming:
. Using front keyboard, 4 keys (refer to user manual).

Measured quantities and Accuracy class:
. Current:
phase: I1, I2, I3 (accuracy class0,5);
neutral: IN (accuracy class 2);
. Voltage (accuracy 0.5):
phase/phase: U12, U23, U31;
phase/neutral: V1N, V2N, V3N.
. Frequency (accuracy 0,5)
. Power:
instantaneous active total power, phase, average value and max. average value (accuracy 0,5);
instantaneous reactive total power, phase, average value and max. average value (accuracy 1);
instantaneous apparent total power, phase, average value and max. average value (accuracy 1);
. Power factor (accuracy 0.5).
. Crest Factor: (I,U)
. Phase shift
Vfn - Vfn (3N3E) Vff - Vff (3-3E)
If - If
If - Vf
. Energy:
total and partial active energy, positive and negative (accuracy class 0.5);
total and partial reactive energy, positive and negative (accuracy class 1).
. THD:
voltages THD: V1, V2, V3 or U12, U23, U31;
currents THD: I1, I2, I3;
. Harmonic analysis:
Voltages: odd harmonics up to 9 th or 25th (programmable on display);
odd and even harmonics up to 40 th (via communication RS485)
Currents: odd harmonics up to 9 th or 25th (programmable on display);
odd and even harmonics up to 40 th (via communication RS485)
. PQA (class S)
Dips, Interruption, Swells, RVC's, SVC's
Time stamp, Duration, Residual voltages
Voltages Unbalance
Pinst (flicker)

Memory:
The NEMO 96 EA has embedded not volatile memory of 8Mbytes capable to save up to:

1 4 Mbytes dedicated to Real Time datas
2 3,9Mbytes dedicated to Energy datas
3 100kbytes for PQA datas (i.e.Dips, Interruptions, Swells, RVCs)

All datas saved in "circular list" way with newest one the substitute the oldest. The depths of saving depends on the saving intervaland, for Real Time datas, on how many datasi t have to save.
All datas are saved with time stamp (Instant of time in which the data has been saved) in order to have a trace of data saved.

All datas are availables via communication (Modbus module deliver with devices) by free software IDM evo (download possible on IME website www.imeitaly.com)

5. GENERAL CHARACTERISTICS *(continued)*

Plastic material:
. Self-extinguishing polycarbonate.

Ambient operating temperature:
. Min. = - 5 °C Max. = + 55 °C.

Ambient storage temperature:
. Min. = - 25 °C Max. = + 70 °C.

Device protection:
. Recommended fuse 1 A type gG

Protection Index:
. Protection index of terminals against solid and liquid bodies (wired device): IP 20 (IEC/EN 60529).
. Protection index of the front face against solid and liquid bodies: IP 54 (IEC/EN 60529).

5. GENERAL CHARACTERISTICS *(continued)*

Impulse withstand voltage:
. Supply / Measuring inputs
wave 1,2 / 50 µs 0,5 J: 6kV
alternating voltage 50 Hz / 1 min.: 3 kV
. All circuits / Earth
alternating voltage 50 Hz / 1 min.: 4 kV

Pollution degree:
. 2

Measure category:
. III

Average weight per device:
.0, 250 kg.

Volume when packed:
. 1,4 dm^3.

Consumption (without accessory modules)
. ≤ 2,5 VA (a.c. supply)
. ≤ 3,5 W (d.c. supply)

Thermal power dissipated:
. ≤ 5 W.

Phase sequence correction diagnostic:
. In the software of the device there is a specific functionality to detect and correct problems concerning voltage and / or current connections.
The “Testing connections” functions can be activated with a specific password for connections 3-2E, 3-3E e 3N-3E.
Conditions for the execution of the function:
- multifunction device NEMO 96 EA must have current and voltage on each phase and the neutral, if present, must be connected to the corresponding terminal “N”.
In addition, the test function requires:
- an electrical 120° three-phase system.
- a value of the power factor PF > 0,5 for 3N-3E and 3-3E or PF > 0,71 for 3-2E.
Vice-versa, the self-correction function can not be used:
- no crossings between cables connected to secondary of CTs (eg. TA phase 1 → terminals S1 and S2 of I1 and so on).

6. COMPLIANCE AND APPROVALS

Compliance to standards:

. Directive n° 2014/30/UE of the 26th February 2014 (EMC compatibility)
. Directive n° 2014/35/UE of the 26th February 2014 (Low voltage directive)
. Electromagnetic Compatibility:
emission according IEC/EN 61326-1, class B
immunity according IEC/EN 61326-1.
. Active energy accuracy class: 0,5 (E_a, IEC/EN 61557-12).
. Reactive energy accuracy class: 1 (E_{rv}, IEC/EN 61557-12).

Conformity table to IEC 61557-12 Edition 1 (08/2007)

Conformité IEC 61557-12 Edition 1 (08/2007)		
Caractéristiques du PMD		
Type de caractéristique	Valeurs caractéristiques possiblers	Autres caractéristiques complémentaires
Fonction d'evaluation de la qualité de l'alimentation	-	-
Classification des PMD	SD / SS	-
Température	K55	-
Humidité + Altitude	Standard conditions	-

6. COMPLIANCE AND APPROVALS *(continued)*

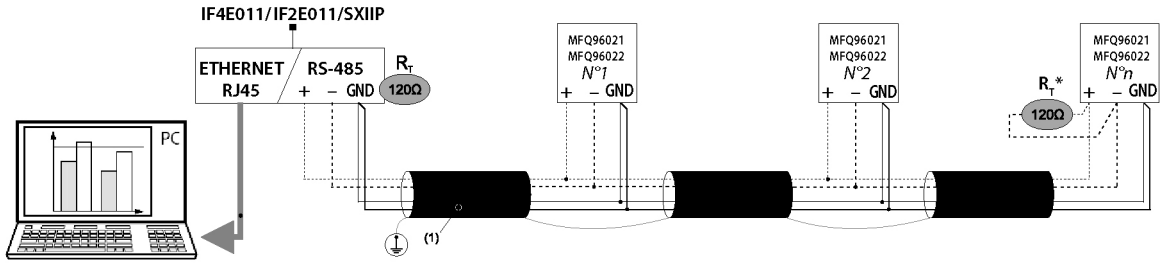
Conformity table to IEC 61557-12 Edition 1 (08/2007) *(continued)*

Characteristics of functions			
Function symbols	**Function performance class according to IEC 61557-12**	**Measuring range (1)**	**Other complementary characteristics**
P	0,5	0,01 ÷ 1,2 A (x/1 A) 0,05 ÷ 6 A (x/5 A)	
QA, QV	1	0,02 ÷ 1,2 A (x/1 A) 0,1 ÷ 6 A (x/5 A)	
SA, SV	1	0,02 ÷ 1,2 A (x/1 A) 0,1 ÷ 6 A (x/5 A)	
Ea	0,5	0 ÷ 99999999 MWh	
ErA, ErV	1	0 ÷ 99999999 Mvarh	
EapA, EapV	1	0 ÷ 99999999 Mvar	
f	0,5	45 ÷ 65 Hz	
I	0,5	0,2 ÷ 1,2 A (x/1 A) 0,5 ÷ 6 A (x/5 A)	
IN, INc	2	0,1 ÷ 1,2 A (x/1 A) 0,1 ÷ 6 A (x/5 A)	
U	0,5	30 ÷ 400 V (Ph/N) 50 ÷ 690 V (Ph/Ph)	
PFA, PFV	0,5	0,5 ind ÷ 0,8 cap	
Uh	2		
THDu	2		
Ih	2		
THDi	2		

(1) For the maintenance of the class declared according to the standard.

7.COMMUNICATION

RS485 Wiring diagram:



(1) RS485: Prescribed use of Cable Belden 9842, Belden 3106A (or equivalent) for a maximum length of 1000 m, or Category 6 cable (FTP or UTP) for a maximum length of 50 m;
(*)Resistance not furnished

Modbus communication tables
. Modbus communication tables are available at www.imeitaly.com, typing “MFQ96021 / MFQ96022” in the search field

8.ADD-ON MODULES

Fixing:

Screw terminals:

. Terminal depth: 8mm

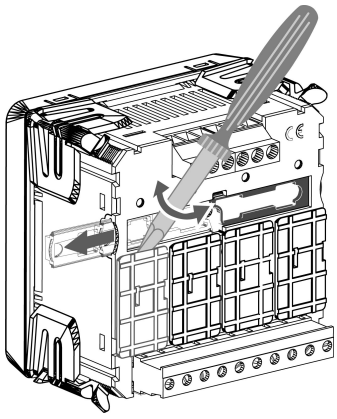
. Stripping length: 8mm

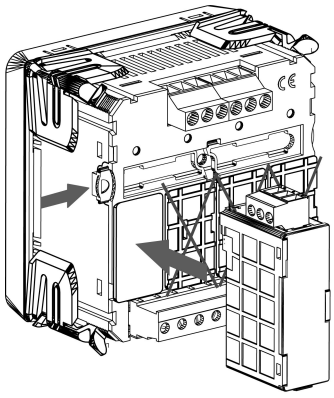
Screw head:

. Screw slotted

Recommendend tightening torque:

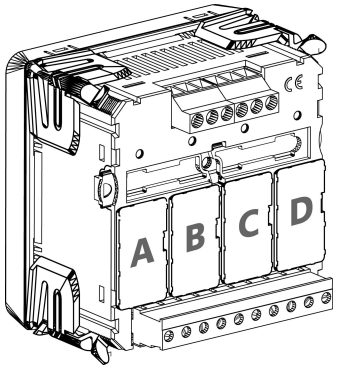
. 0.6Nm





Associability table:

Note: modules must be connected to NEMO 96 EA (not supplied).



IF96001 supplied to NEMO 96EA

Code	Description	N. Max.	Position				Firmware[1]	Technical data sheet
			A	B	C	D		
IF96001	RS485 Communication	1	•				1.101	NT675
IF96002	RS232 Communication	1	•				1.101	NT676
IF96003	2 energy pulse outputs	2	•	•	•	•	1.101	NT677
IF96004	2 analogue outputs 0/4...20mA	2			•	•	1.101	NT678
IF96005	2 alarms	2	•	•	•	•	1.101	NT679
IF96006	Neutral current	1			•		1.101	NT683
IF96010	I / O 2 inputs SPST - 2 Outputs SPST	2			•	•	1.101	NT702
IF96011	I / O 2 inputs 12-24Vcc - 2 Outputs SPST	2			•	•	1.101	NT703
IF96015	ETHERNET Communication	1	•				1.101	NT785
IF96016	Temperature Measure	1				•	1.101	NT810

[1]On the table is shown the firmware version of the meter which the supports the function of the extra module.
By using an IF96001 (RS485) or IF96002 (RS232) communication module it is possible to update the firmware version directly on field, with the help of a PC and the download software.

Tools required:

. For inputs terminals (terminals “15-16” and “17-18”): flat screwdriver 2,5 mm

. For outputs terminals (terminals “6-7” and “8-9” and “+-GND”): flat screwdriver 3,5 mm

. For fixing the modules to the measuring device: flat screwdriver max. 5 mm

Connectable section:

. Inputs terminals

. Copper cables.

	Without ferrule	With ferrule
Rigid cable	0,05 to 2,5 mm²	-
Flexible cable	0,05 to 1,5 mm²	0,05 to 1,5 mm²

. Outputs terminals

. Copper cables.

	Without ferrule	With ferrule
Rigid cable	0,05 to 4,5 mm²	-
Flexible cable	0,05 to 2,5 mm²	0,05 to 2,5 mm²