POWER NETWORK PARAMETER METER
N13 TYPE

APPLICATION

The N13 panel power network parameter meter is a digital instrument destined to measure all basic parameters in three-phase three-wire or three-phase four-wire, balanced or unbalanced electrical power networks, with the simultaneous display of measured quantities and the digital transmission of their values and their conversion into an analogue standard signal.

It can be employed in data acquisition networks or can be used as a single meter instead of many different meters used till now: ammeters, voltmeters, wattmeters, warmeters, frequency meters, phase meters and others.

This parameter meter enables the control and optimization of power electronic devices, systems and industrial installation.

N13 type meter ensures the measurement and the monitoring of:

- rms a.c. voltage and a.c. current,
- neutral wire current,
- active, reactive and apparent power,
- active, reactive and apparent energy,
- different power factors,
- THD for phase voltages (available through RS485),
- THD for phase currents (available through RS485),
- frequency, average active power (e.g. 15 min).

The value of each measured quantity can be transmitted to the master system through the RS-485 interface.

The LPCon program is destined for the configuration of the N13 meter. One must connect the meter through the PD10 converter, to the PC computer

The value of each chosen quantity can be additionally transmitted by means of a standard current signal, the relay output can be used to signal exceedings of chosen quantities.

Measurements are carried out by the sampling method of voltage and current signals.

TECHNICAL DATA

Network configuration	three-phase , 3-wire or 4-wire balanced or unbalanced
Measuring ranges	See table 1
Supply	85... 253 V d.c. or a.c. 40... 400 Hz
Display field	4 × 4 LED digits, 10 mm high red or green displays

Outputs:

- analogue output	1 analogue programmed output: -20... 0...+20 mA selected from the keyboard, accuracy: 0.2%
- relay output	1 relay output, voltageless make contacts load capacity: 250 V a.c./ 0.5 A a.c.

Power consumption:

- supply circuit	≤ 12 VA
- voltage circuit	≤ 0.5 VA
- current circuit	≤ 0.1 VA
Serial interface	RS-485
Transmission protocol	MODBUS ASCII and RTU

Meter reaction to decays and supply recovery:

- data and meter state preservation during supply decays (battery support)
- work continuation after supply recovery

Protection degree ensured by the housing:

- frontal side	IP 40
- terminal side	IP 10

Reference conditions and nominal operating conditions:

- input signal	0...0.01...1.2 In 0...0.01...1.2 Un; for voltage, current, frequency, power 0...0.02...1.2 In 0...0.07...1.2 Un; for Pf and tgφ coefficents, frequency 15...45...65...500 Hz; sinusoidal (THD ≤ 8%)
- power factor	- 1...0...1
- supply	85... 253 V d.c. or a.c. 40... 400 Hz
- admisible peak factor:	
- current	2
- voltage	2
- ambient temperature	0...23...55°C
- storage temperature	- 20°C... +70°C
- relative air humidity	25...95% (no condensation)
- external magnetic field	0...40...400 A/m
- short duration overload (5 sec):	
- voltage inputs	2 Un (max.1000 V)
- current inputs	10 In
- working position	any
- warm-up time	5 minutes

Additional errors in % of the basic error:

- from the frequency of input signals	< 50%
- from the ambient temperature changes	< 50%/10°C

Electromagnetic compatibility:

- immunity	acc. EN 61000-6-2
- emission	acc. EN 61000-6-4
Safety requirements	acc. EN 61010-1
- insulation ensured by the housing	dual
- insulation between circuits	basic
- installation category	III
- pollution degree	2
- max. working voltage	600 V
Weight	400 g
Overall dimensions	96 × 96 × 70.5 mm
Panel cut-out dimensions	$91^{+0.5}$ x $91^{+0.5}$

LUMEL S.A., ul. Sulechowska 1, 65-022 Zielona Góra, Poland / tel.: +48 68 329 53 02, +48 68 329 53 04, fax: +48 68 325 40 91 / e-mail:export@lumel.com.pl / www.lumel.com.pl

Table 1

Measuring ranges	Range	Basic error	Remarks
Voltage U_i	57.7/100 V (Ku = 1) 230/400 V (Ku = 1) 400/690 V (Ku = 1) for Ku ≠ 1... 1,6 MV	± (0.2% m.v. + 0,1% zak.)	Ku = 1... 4000 (max 1.6 MV)
Current I_i	1.000 A (Ki = 1) 5.000 A (Ki = 1) for Ki ≠ 1... 45 kA	± (0.2% m.v. + 0,1% zak.)	Ki = 1... 9000 (max 45 kA)
Active power P_i **Mean active power P_{AV}** **Active energy EnP**	0.0... 999.9 W (Wh) for Ku ≠ 1, Ki ≠ 1 (-) 220 GW	± (0.5% m.v. + 0.2% zak.)	
Apparent power S_i **Apparent energy EnS**	0.0... 999.9 VA (VAh) for Ku ≠ 1, Ki ≠ 1 220 GVA	± (0.5% m.v. + 0.2% zak.)	
Reactive power Q_i **Reactive energy EnQ**	0.0... 999.9 Var (Varh) for Ku ≠ 1, Ki ≠ 1 (-) 220 GVar	± (0.5% m.v. + 0.2% zak.)	
Power active factor Pf_i	- 1.00... 0.00... 1.000	± 1% m.v. ± 2c	Pf = Power factor = P/S
Coefficent $t\varphi_i$ (reactive power/ active power)	- 99.9...0... 99.9	± 1% m.v. ± 2c	error in the range - 99.99...0...99.99
Frequency f	20.0... 500.0 Hz	± 0.5% m.v.	
THD U_i, THD I_i	0.5... 100%	± 5% m.v. ± 2c	-10% Un < Un < 12% Un In > 10% In 47...52 Hz

Where:
Ku: voltage transformer ratio
Ki: current transformer ratio
m.v.: measured value
c: the less significant display digit

ORDERING CODES

NETWORK PARAMETER METER N13	X	X	X	X	X	XX	X

Input current: In
1 A (X/1) **1**
5 A (X/5) **2**
on order* ..... **X**

Input phase/phase-to-phase voltage: Un
3 × 57.7/100 V **1**
3 × 230/400 V **2**
3 × 400/690 V **3**
on order* ..... **X**

Current analogue output:
without analogue output **0**
with a programmed output - 20... + 20 mA **1**

Digital output:
without interface **0**
with RS-485 interface **1**

Display:
red digits **1**
green digits **2**

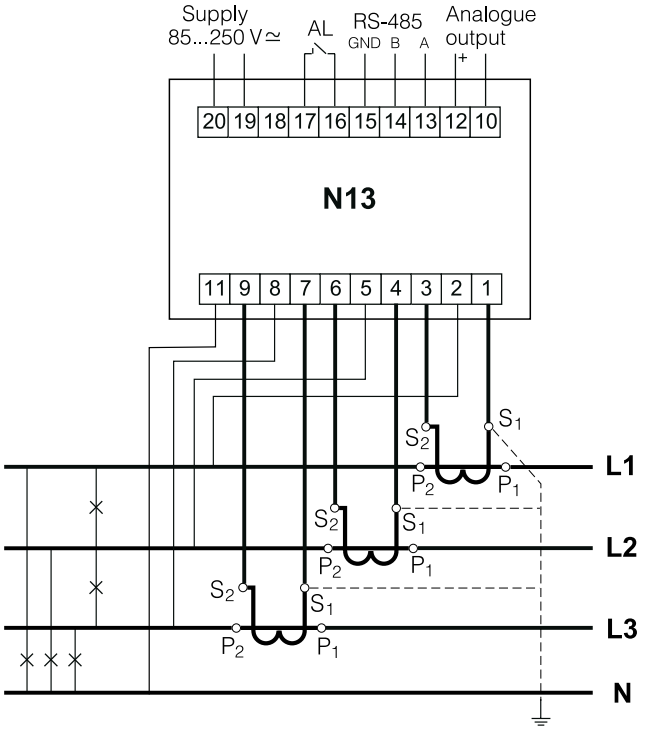
Kind of version:
standard **00**
custom-made ..... **XX**

Acceptance test:
without an extra quality inspection certificate **8**
with an extra quality inspection certificate **7**
acc user's agreement** ..... **X**

* After agreeing by the manufacturer
** The version numbering will be made by the manufacturer.

EXTERNAL CONNECTION DIAGRAM

Example of external connection for a half-intermediate measurement in a three-phase four-wire network.



Coding example:

The N13 2 2 1 1 2 00 7 code means:
input range: 5 A, input voltage: 3 × 230/400 V, with a programmed current analogue output: - 20... 20 mA, RS-485 interface, green digits, standard version, with an extra quality inspection certificate.

N13-19C

LUMEL S.A., ul. Sulechowska 1, 65-022 Zielona Góra, Poland / tel.: +48 68 329 53 02, +48 68 329 53 04, fax: +48 68 325 40 91 / e-mail:export@lumel.com.pl / www.lumel.com.pl