**N10 / N10A METER OF NETWORK PARAMETERS**

**FEATURES:**
- Measurement and conversion of power network parameters in 3 or 4-wire, balanced or unbalanced systems.
- Measurement and visualization of several scores of power network quantities and current and voltage harmonics (up to the 25 th).
- Indications taking into consideration programmed ratio values.
- Storage of minimal and maximal values.
- Backlit units of all quantities.
- Programmable number of pages and selection of displayed quantities on each of the 20 pages.
- Configurable analog outputs (N10-1, N10A-3) and alarm outputs (N10-3, N10A-1).
- Digital RS-485 output – MODBUS protocol.
- Impulse input to count the consumption of various medium (N10).
- Battery support of configuration data and counter state at supply decay.

**EXAMPLE OF APPLICATION**

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**MEASUREMENT AND VISUALIZATION OF POWER NETWORK PARAMETERS**

- phase voltages $U_1$, $U_2$, $U_3$
- phase-to-phase voltages $U_{12}$, $U_{23}$, $U_{31}$
- phase currents $I_1$, $I_2$, $I_3$
- phase active powers $P_1$, $P_2$, $P_3$
- phase reactive powers $Q_1$, $Q_2$, $Q_3$
- phase apparent powers $S_1$, $S_2$, $S_3$
- phase active power factors $P_1$, $P_2$, $P_3$
- phase reactive power factors $P_1$, $P_2$, $P_3$
- phase active power of active and apparent powers $P_1$, $P_2$, $P_3$

- frequency $f$
- mean phase voltage $U_{av}$
- mean phase-to-phase voltage $U_{av}$
- mean 3-phase current $I_{av}$
- mean active power e.g., 15 min. $P_{15}$
- 3-phase active, reactive and apparent energy $E_{nP}$, $E_{nQ}$, $E_{nS}$
- total harmonic distortion factors for phase voltages and phase currents $THD_U$, $THD_Q$, $THD_S$
- harmonics of phase voltages and currents – up to the 25 th

**GALVANIC ISOLATION:**

**INPUTS:**
- phase voltages $U_1$, $U_2$, $U_3$
- phase-to-phase voltages $U_{12}$, $U_{23}$, $U_{31}$
- phase currents $I_1$, $I_2$, $I_3$
- phase active powers $P_1$, $P_2$, $P_3$
- phase reactive powers $Q_1$, $Q_2$, $Q_3$
- phase apparent powers $S_1$, $S_2$, $S_3$
- phase active power factors $P_1$, $P_2$, $P_3$
- phase reactive power factors $P_1$, $P_2$, $P_3$

**OUTPUTS:**
- frequency $f$
- mean phase voltage $U_{av}$
- mean phase-to-phase voltage $U_{av}$
- mean 3-phase current $I_{av}$
- mean active power e.g., 15 min. $P_{15}$
- 3-phase active, reactive and apparent energy $E_{nP}$, $E_{nQ}$, $E_{nS}$
- total harmonic distortion factors for phase voltages and phase currents $THD_U$, $THD_Q$, $THD_S$
- harmonics of phase voltages and currents – up to the 25 th

**MEASUREMENT PARAMETERS AND MEASURING RANGES**

<table>
<thead>
<tr>
<th>Measured parameter</th>
<th>Indication range</th>
<th>Intrinsic error</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage $U_1$</td>
<td>100 V (Ku = 1)</td>
<td>± (0.2% m.v + 0.1% of range)</td>
<td>Ku = 1...4000</td>
</tr>
<tr>
<td></td>
<td>400 V (Ku = 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>for Ku = 1...4000 kV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current $I_1$</td>
<td>1.000 A (Ki = 1)</td>
<td>± (0.2% m.v + 0.1% of range)</td>
<td>Ki = 1...2000</td>
</tr>
<tr>
<td></td>
<td>5.000 A (Ki = 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>for Ki = 1...20.00 kA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active power $P$</td>
<td>0.0...(-)1999.9 W (Wh) for Ku = 1, Ki = 1</td>
<td>± (0.5% m.v + 0.2% of range)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-)1999.9 MW (MWh)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean active power $P$</td>
<td>Active energy $E_{nP}$, $E_{nP}$</td>
<td>± (0.5% m.v + 0.2% of range)</td>
<td></td>
</tr>
<tr>
<td>Apparent power $S$</td>
<td>0.0...(-)1999.9 VA (VAr) for Ku = 1, Ki = 1</td>
<td>± (0.5% m.v + 0.2% of range)</td>
<td></td>
</tr>
<tr>
<td>Apparent energy $E_nS$, $E_nS$</td>
<td>0.0...1999.9 MVA (MVAr)</td>
<td>± (0.5% m.v + 0.2% of range)</td>
<td></td>
</tr>
<tr>
<td>Reactive power $Q$</td>
<td>0.0...(-)1999.9 VA (VAr) for Ku = 1, Ki = 1</td>
<td>± (0.5% m.v + 0.2% of range)</td>
<td></td>
</tr>
<tr>
<td>Reactive energy $E_nQ$, $E_nQ$</td>
<td>0.0...1999.9 MVAr (MVAr)</td>
<td>± (0.5% m.v + 0.2% of range)</td>
<td></td>
</tr>
<tr>
<td>Active power factor $Pf_1$</td>
<td>-1.00...0.00...1.000</td>
<td>± 1% m.v ± 2c</td>
<td>Pf = P/S (power factor)</td>
</tr>
<tr>
<td>Coefficient $tgfi$ (ratio of reactive power to active power)</td>
<td>-99.9...0...99.9</td>
<td>± 1% m.v ± 2c</td>
<td>error in the range -9.99...0...9.99</td>
</tr>
<tr>
<td>Frequency $f$</td>
<td>15.0...500.0 Hz</td>
<td>± 0.5% m.v</td>
<td></td>
</tr>
<tr>
<td>THD $U$, THD $I$</td>
<td>0.2...200%</td>
<td>± 5% m.v ± 2c</td>
<td>error in the range 10...120% $U$, $I$, 47.5...52 Hz</td>
</tr>
</tbody>
</table>

Where: Ku - ratio of voltage transformer, Ki - ratio of current transformer, m.v - measured value, c - the least significant display digit

**INPUTS**

- Input type
- Properties
- Reactive impulse input
  - 0/24 V d.c. ±50% (N10 type)
**Outputs**

- **Relay output**
  - 3 relays, voltageless NO contacts, load capacity 250 V a.c./0.5 A a.c. (N10 type)
  - 1 relay, voltageless NO contacts, load capacity 250 V a.c./0.5 A a.c. (N10A type)

- **Analog output**
  - 1 output: 0...20mA (4...20mA), programmable, accuracy 0.5% (N10 type)
  - 3 outputs: -5...5mA, programmable, accuracy 0.2% (N10A type)

- **Reactive impulse input**
  - 0...2 Hz, 12...50V d.c. (5...20mA) (N10 type)

**Digital Interface**

- **Type of interface**
  - Transmission protocol: MODBUS RTU and ASCII
  - Mode: 8N2, 8E1, 8O1, 7E1, 7O2
  - Baud rate: 0.3; 0.6; ..., 19.2; kbit/s

**External Features**

- **Readout field**
  - 4 x 5 LED digits
  - red or green color, 14 mm

- **Overall dimensions**
  - 144 x 144 x 77 mm
  - Panel cut-out: 138+0.5 x 138+0.5 mm

- **Weight**
  - 0.8 kg

- **Protection grade**
  - from frontal side: IP40
  - from terminal side: IP10

**Rated Operating Conditions**

- **Supply voltage**
  - 85...250 V a.c. (40...400 Hz) or d.c.
  - power input ≤ 12 VA

- **Power input**
  - in voltage circuit ≤ 0.5 VA
  - in current circuit ≤ 0.1 VA

- **Input signal**
  - 0...0.01...1.2 In; 0...0.01...1.2 Un
  - for current, voltage, frequency, power and energy:
    - 0.1...1.2 In; 0.1...1.2 Un; 47...52 Hz for THD U, THD I and harmonics
    - 0...0.02...1.2 In; 0...0.07...1.2 Un for power factors Pf, tge;
    - frequency 15...45...65...500 Hz
    - sinusoidal signal (THD ≤ 8%)

- **Power factor**
  - -1...0...1

- **Preheating time**
  - 5 min.

- **Temperature**
  - ambient 0...23...55°C

- **Humidity**
  - 25...95%

- **Operating positions**
  - any

- **External magnetic field**
  - 0...40...400 A/m

- **Short duration overload (5 s)**
  - voltage input: 2Un (max. 1000 V)
  - current input: 10 IN

- **Admissible peak factor**
  - voltage: 2
  - current intensity: 2

- **Additional error (in % of the intrinsic error)**
  - from frequency of input signals: <50%
  - from ambient temperature changes: <50%/10°C

**Safety and Compatibility Requirements**

- **Electromagnetic compatibility**
  - noise immunity: acc.to EN 61000-6-2
  - noise emissions: acc.to EN 61000-6-4

- **Isolation insured by the casing**
  - double

- **Isolation between circuits**
  - basic

- **Polution level**
  - 2

- **Installation category**
  - III

- **Maximal phase-to-earth voltage**
  - 600V

- **Altitude a.s.i.**
  - < 2000 m

**Connection Diagram**

- Indirect measurement in a four-wire network
- Semi-indirect measurement in a 4-wire network

**Ordering**

- **N10 / N10 A**
  - X X X X X XX X

<table>
<thead>
<tr>
<th>Input current IN:</th>
<th>X X X X X</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input phase voltage Un: 100 V</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Digital output:</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>without interface:</td>
<td>0</td>
</tr>
<tr>
<td>with RS-485 interface:</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display:</th>
<th>red</th>
<th>green</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>1</td>
<td>2</td>
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<tr>
<th>Supply voltage:</th>
<th>85...250 V d.c. or a.c., 40...400 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version:</td>
<td>standard</td>
</tr>
<tr>
<td>Acceptance tests:</td>
<td>without additional quality requirements</td>
</tr>
<tr>
<td>acc.to customer’s request*</td>
<td>8</td>
</tr>
</tbody>
</table>

*Order example: The code: N10 - 2 1 1 2 0 00 7 means:
  1. N10 - network parameter of N10 type
  2. Input range: 1.5 A
  3. Input voltage: 1000 V
  4. Current input: 10 IN
  5. Power factor: 0.1...0.8...1 VA
  6. Noise immunity: acc.to EN 61000-6-2
  7. Noise emissions: acc.to EN 61000-6-4

PD10 - Interface converter

ND1 - Analyser

For more information about LUMEL’S products please visit our website: [www.lumel.com.pl](http://www.lumel.com.pl)