N13 METER OF POWER NETWORK PARAMETERS

- Measurement of power network parameters in 3 or 4-wire balanced or unbalanced systems.
- Tetraquadrant energy measurement.
- Calculation and display of the neutral wire current.
- Measurement of voltage and current harmonics up to the 25th.
(available through the RS-485 interface).
- Indications taking into consideration values of programmed ratio.
- Digital transmission to the master system through the RS-485 MODBUS interface.
- Configurable alarm output.
- Retransmission of any measured quantity through the analog output.
- Battery support of configuration data and watt-hour meters’ states at supply decays.

**EXAMPLE OF APPLICATION**

**INPUT:**

AC

**OUTPUTS:**

-20...20 mA

**GALVANIC ISOLATION:**

MODBUS Password protection

Password

LP Config Program

THD WizPar Program

Supply

AC

-20...20 mA

**FEATURES:**

MODBUS Password protection

Password

LP Config Program

THD WizPar Program

Supply

**MEASURED VALUES AND CALCULATED BY THE METER**

<table>
<thead>
<tr>
<th>Measured value</th>
<th>Single-phase parameters</th>
<th>Three-phase parameters</th>
<th>Intrinsic error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase voltage</td>
<td>( U_1, U_2, U_3 )</td>
<td>( \pm (0.2% \text{ m.v. + 0.1% range}) )</td>
<td></td>
</tr>
<tr>
<td>Phase-to-phase voltage</td>
<td>( U_{12}, U_{23}, U_{31} )</td>
<td>( \pm (0.2% \text{ m.v. + 0.1% range}) )</td>
<td></td>
</tr>
<tr>
<td>Single-phase current</td>
<td>( I_1, I_2, I_3 )</td>
<td>( \pm (0.2% \text{ m.v. + 0.1% range}) )</td>
<td></td>
</tr>
<tr>
<td>Mean phase current</td>
<td>( I )</td>
<td>( \pm (0.2% \text{ m.v. + 0.1% range}) )</td>
<td></td>
</tr>
<tr>
<td>Active power</td>
<td>( P_1, P_2, P_3 )</td>
<td>( P )</td>
<td>( \pm (0.5% \text{ m.v. + 0.2% range}) )</td>
</tr>
<tr>
<td>Reactive power (inductively, capacitive)</td>
<td>( Q_1, Q_2, Q_3 )</td>
<td>( Q )</td>
<td>( \pm (0.5% \text{ m.v. + 0.2% range}) )</td>
</tr>
<tr>
<td>Apparent power</td>
<td>( S_1, S_2, S_3 )</td>
<td>( S )</td>
<td>( \pm (0.5% \text{ m.v. + 0.2% range}) )</td>
</tr>
<tr>
<td>Active energy (total, input, output)</td>
<td>( \text{EnP} (\text{EnP}_I, \text{EnP}_e) )</td>
<td>( \text{EnP} )</td>
<td>( \pm (0.5% \text{ m.v. + 0.2% range}) )</td>
</tr>
<tr>
<td>Reactive energy (inductively, capacitive)</td>
<td>( \text{EnQ} (\text{EnQ}_I, \text{EnQ}_C) )</td>
<td>( \text{EnQ} )</td>
<td>( \pm (0.5% \text{ m.v. + 0.2% range}) )</td>
</tr>
<tr>
<td>Apparent energy</td>
<td>( \text{EnS} )</td>
<td>( \pm (0.5% \text{ m.v. + 0.2% range}) )</td>
<td></td>
</tr>
<tr>
<td>Power factor cos ( \varphi )</td>
<td>( \text{PF}_1, \text{PF}_2, \text{PF}_3 )</td>
<td>( \text{PF} )</td>
<td>( \pm 1% \text{ m.v. \pm 2c} )</td>
</tr>
<tr>
<td>Power factor tg ( \varphi )</td>
<td>( \text{tg}_1, \text{tg}_2, \text{tg}_3 )</td>
<td>( \text{tg} )</td>
<td>( \pm 1% \text{ m.v.} )</td>
</tr>
<tr>
<td>Current distortion factor</td>
<td>( \text{THD}<em>{i_1}, \text{THD}</em>{i_2}, \text{THD}_{i_3} )</td>
<td>( \text{THD}_{i} )</td>
<td>( \pm 5% \text{ m.v. \pm 2c} )</td>
</tr>
<tr>
<td>Voltage distortion factor</td>
<td>( \text{THD}<em>{v_1}, \text{THD}</em>{v_2}, \text{THD}_{v_3} )</td>
<td>( \text{THD}_{v} )</td>
<td>( \pm 5% \text{ m.v. \pm 2c} )</td>
</tr>
<tr>
<td>Frequency</td>
<td>( F )</td>
<td></td>
<td>( \pm 0.5% \text{ m.v.} )</td>
</tr>
<tr>
<td>15 min. mean power</td>
<td>( P_{av} )</td>
<td></td>
<td>( \pm (0.5% \text{ m.v. + 0.2% range}) )</td>
</tr>
<tr>
<td>Current in the neutral wire</td>
<td>( I_n )</td>
<td></td>
<td>( \pm (0.2% \text{ m.v. + 0.1% range}) )</td>
</tr>
</tbody>
</table>

where:  
- \( K_v \): ratio of voltage transformer, \( K_i \): ratio of current transformer,  
- \( \text{m.v.} \): measured value, \( \text{range} \): measuring range, \( c \): the less significant display digit

**OUTPUTS**

<table>
<thead>
<tr>
<th>Kind of output</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay output</td>
<td>• voltageless NO contacts, load capacity: 250 V a.c./0.5 A a.c.</td>
</tr>
<tr>
<td>Analog output</td>
<td>• -20...20 mA, programmable, accuracy: 0.2%</td>
</tr>
</tbody>
</table>

**DIGITAL INTERFACE**

<table>
<thead>
<tr>
<th>Interface type</th>
<th>Transmission protocol</th>
<th>Mode</th>
<th>Baud rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-485</td>
<td>MODBUS RTU and ASCII</td>
<td>BN2, BE1, BS1, BS1, BS1, BS1, 701</td>
<td>4.8, 9.6, 19.2; kbit/s</td>
</tr>
</tbody>
</table>

Example of application WizPar Program
**N13 METER OF POWER NETWORK PARAMETERS**

### External Features
- **Readout field**: 4 x 4 LED digits, brightness control
- **Overall dimensions**: 96 x 96 x 70.5 mm
- **Weight**: 0.4 kg
- **Protection grade**: from frontal side: IP40, from terminal side: IP10

### Rated Operating Conditions
- **Supply voltage**: 85...253 V a.c. (40...400 Hz) or d.c.
- **Power input**: in the voltage circuit ≤ 0.5 VA, in the current circuit ≤ 0.1 VA
- **Input signal**:
  - 0...0.01...1.2 ln
  - 0...0.01...1.2 Un
  - 0...0.02...1.2 ln; 0...0.07...1.2 Un for power factors: PF, ηP
  - Frequency: 15...45...65...500 Hz
  - Sinusoidal (THD ≤ 8%)
- **Temperature**: ambient: 0...23...+55°C, storage: -20...+70°C
- **Humidity**: 25...95%
- **Operating position**: any
- **External magnetic field**: 0...40...400 A/m
- **Short duration overload (5 s)**:
  - Voltage input: 2 Un (max 1000 V)
  - Current input: 10 In
- **Admissible peak factor**:
  - Current: 2
  - Voltage: 2
- **Preheating time**: 5 min
- **Additional errors 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 ensured by the casing**: double
- **Isolation between circuits**: basic
- **Pollution level**: 2
- **Installation category**: III
- **Maximal phase-to-earth operating voltage**: 600V
- **Altitude above sea level**: < 2000 m

### Ordering

<table>
<thead>
<tr>
<th>N13 -</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
</tr>
</thead>
</table>
| Input current:
  - 1 A (X/1) |
  - 5 A (X/5) | 1 |
| Input voltage (phase/phase-to-phase):
  - 3 x 57.7/100 V |
  - 3 x 230/400 V |
  - 3 x 400/690 V | 1 |
| Current analog output:
  - Without analog output |
  - With a programmable output -20...+20 mA | 0 |
| Digital output:
  - Without interface |
  - With RS-485 interface | 0 |
| Display:
  - Red |
  - Green | 1 |
| Version:
  - Standard |
  - Custom-made* | 00 |

**Acceptance tests**:
- Without extra quality inspection requirements: 8
- With an extra quality inspection certificate: 7
- According to customers' request*: X

**Order example**: The code: N13 - 2 2 1 1 2 0 0 7 means:
- N13 - meter of network parameters of N13 type
- 2 - Input current: 5 A
- 2 - Input voltage: 3 x 230/400 V
- 1 - Programmable output: -20...+20 mA
- 0 - With RS-485 interface
- 1 - Display: green
- 00 - Standard version
- 7 - With an extra quality inspection certificate.

* after agreeing with the manufacturer

### Connection Diagrams
- **Semi-indirect measurement in a four-wire network**

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**See also:**
- Current transformers from 5 A to 6 kA.