**ND30** - METER OF POWER NETWORK PARAMETERS

**ND30iot** - METER OF POWER NETWORK PARAMETERS FOR IOT APPLICATIONS

- Measurement of 54 power network parameters, including current and voltage harmonics up to 51st, in 1-phase 2-wire or 3-phase 3 or 4-wire balanced and unbalanced systems.
- The MQTT protocol is ideal for communication in distributed acquisition systems data - IOT applications (ND30iot).
- Graphical color display: LCD TFT 3,5”, 320 x 240 pixels, fully configurable by a user (10 views, 8 parameters in each).
- Additional 2 pages for harmonics presentation and 1 dedicated page for visualization in the form of an analog meter.
- Indications include the values of programmed ratios.
- Memory of minimum and maximum values.
- 2 configurable alarm outputs.
- Optional: analog output 0/4...20 mA and 2 PT 100 inputs (eg. for measurement of transformer temperature).
- Archiving of up to 32 measured parameters in the internal memory 8 GB (option).
- Digital output RS-485 - MODBUS protocol.
- Modern and user-friendly Ethernet interface 10/100 BASE-T (option):
  - protocol: MODBUS TCP/IP, HTTP, FTP,
  - protocol: MQTT (ND30iot),
  - services: www server, ftp server, DHCP client.
- Programming of parameters using free eCon software.
- Battery backup RTC.
- Overall dimensions: 96 x 96 x 77 mm.
ND30, ND30IoT - METER OF POWER NETWORK PARAMETERS

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 $I_1$, $I_2$, $I_3$
- active phase powers: $P_1$, $P_2$, $P_3$
- reactive phase powers: $Q_1$, $Q_2$, $Q_3$
- apparent phase powers: $S_1$, $S_2$, $S_3$
- active power factors: $PF_1$, $PF_2$, $PF_3$
- reactive/active power factors: $tg\varphi_1$, $tg\varphi_2$, $tg\varphi_3$
- active, reactive and apparent 3-phase power: $P$, $Q$, $S$
- mean 3-phase power factors: $PF$, $tg\varphi$
- frequency $f$
- mean 3-phase voltage: $U_{\text{mean}}$

- mean phase-to-phase voltage: $U_{\text{mean}}$
- mean 3-phase current: $I_{\text{mean}}$
- 15, 30, 60 minutes’ mean active power: $P_{\text{demand}}$
- mean apparent power $S_{\text{demand}}$
- average current $I_{\text{demand}}$
- active, reactive and apparent 3-phase energy: $EnP$, $EnQ$, $EnS$
- active, reactive and apparent energy from external counter: $EnPE$
- total harmonic content coefficients for phase voltages and currents $\text{THD}_1$, $\text{THD}_2$, $\text{THD}_3$, $\text{THD}_p$, $\text{THD}_q$, $\text{THD}_r$ and for 3-phase voltages and currents $\text{THD}_{12}$, $\text{THD}_{23}$, $\text{THD}_{31}$
- harmonics for current and phase voltage up to 51 st!
- temperature (2 x Pt100 input)

EXAMPLE OF APPLICATION
# TECHNICAL DATA

## MEASURING RANGE

| Measured value                      | Measuring range                          | L1   | L2   | L3   | Σ    | Class (*) / Basic error
|-------------------------------------|------------------------------------------|------|------|------|------|------------------------
| Current 1/5 A 1 A–                  | 0.010..1.200 A (tr U=1)                  | -    | -    | -    | -    | Class 0.2
|                                     | 0.050..6.000 A (tr U=1)                  |      |      |      |      |                        |
|                                     | ...20.00 kV (tr U=1)                     |      |      |      |      |                        |
| Voltage L-N 57.7V– 230V– 400V–     | 5.7..21.5 V (tr U=1)                     | -    | -    | -    | -    | Class 0.2
|                                     | 23.0..276 V (tr U=1)                     |      |      |      |      |                        |
|                                     | 40.0..480 V (tr U=1)                     |      |      |      |      |                        |
|                                     | ...480.0 kV (tr U=1)                     |      |      |      |      |                        |
| Voltage L-L 100 V– 400 V– 690V–    | 10.0..120.0 V (tr U=1)                   | -    | -    | -    | -    | Class 0.5
|                                     | 40.0..480 V (tr U=1)                     |      |      |      |      |                        |
|                                     | 69.0..830 V (tr U=1)                     |      |      |      |      |                        |
|                                     | ...830.0 kV (tr U=1)                     |      |      |      |      |                        |

### Active power

**P**: average active power
-1999.9 W
-1999.9 MW (tr U=1 tr I=1)

### Reactive power

**Q**: average reactive power
-1999.9 Var
-1999.9 MVar (tr U=1 tr I=1)

### Apparent power

**S**: average apparent power
1999.9 VA
1999.9 MVA (tr U=1 tr I=1)

### Active energy

**E**: active energy
-1999.9 Wh
-1999.9 MWh (tr U=1 tr I=1)

### Reactive energy

**Q**: reactive energy
-1999.9 VAr
-1999.9 MVA (tr U=1 tr I=1)

### Apparent energy

**S**: apparent energy
1999.9 VAh
1999.9 MVAh (tr U=1 tr I=1)

### Active power factor

**Pf**: active power factor
-0.00..+1.00

### Coefficient

**tg φ**: coefficient of power to active power
-1.20..+1.20

### Frequency

**f**: frequency
45.00..65.00 Hz

### Total harmonic distortion

**THDU** and current **THDi**

**U**: voltage
0.0..100.0 %

**I**: current
0.0..100.0 %

### Gallvanic isolation

- **RS-485**: Ethernet
- **AC**: Analog alarm
- **Pt100**: Pt100 temperature sensor
- **THD**: Total harmonic distortion

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**Inputs**

- **Input Pt100 (T1, T2)**
- **2x Pt100, 2-wire, -50...400°C, basic error 0.5 %**

**Outputs**

- **RS-485**: Modbus RTU8N2,8E1,8O1,8N1
  - Address 1..247
  - Baud rate: 4.8, 9.6, 19.2, 38.4, 57.6, 115.2 kbit/s

- **Ethernet 10/100 Base-T**: Modbus TCP, HTTP, FTP, WWW server, FTP server, DHCP client
  - MQTT
**ND30, ND30IoT - METER OF POWER NETWORK PARAMETERS**

### External Features

- **Readout field**: graphic color display LCD TFT 3.5", 320 x 240 pixels
- **Overall dimensions**: 96 x 96 x 77 mm
- **Weight**: 0.3 kg
- **Protection grade**: from frontal side: IP65, from terminal side: IP20

### Rated Operating Conditions

- **Supply voltage**: 85...353 V a.c. (40...60...400 Hz), 90...300 V d.c. or 20...40 V a.c., 20...50 V d.c.
- **Power consumption**: in voltage circuit ≤ 0.2 VA, in current circuit ≤ 0.1 VA
- **Input signal**: 0...0.1...1.2 In; 0.1...0.2...1.2 Un for current, voltage, PF, tgφ
- **Power factor**: -1...0...1
- **Preheating time**: 5 min.
- **Ambient temperature**: -10...23...55°C, class Ke5 acc. to EN61557-12
- **Humidity**: 0...40...65...99% without condensation
- **Operating position**: any
- **External magnetic field**: ≤ 40...400 A/m d.c., ≤ 3 A/m a.c. 50/60 Hz
- **Short-term overload**: voltage input: 2 Un (5 sec.), current input 50 A (1 sec.)
- **Admissible crest factor**: current: 2, voltage: 2
- **Additional error (in % of the intrinsic error)**: from ambient temperature change: < 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 acc. to EN 61010-1
- **Isolation between circuits**: basic acc. to EN 61010-1
- **Pollution level**: 2 acc. to EN 61010-1
- **Installation category**: III acc. to EN 61010-1
- **Maximal phase-to-earth voltage**: for supply circuit and relay outputs 300 V, for measuring input 500 V, for circuits of RS-485, Ethernet, pulse input and output, analog outputs: 50 V acc. to EN 61010-1
- **Altitude a.s.l.**: < 2000 m

### Connection Diagrams

- **Description of meter connections strips**
- **Indirect measurement in 4-wire network - connection of input signals**
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### Displaying of Measurement Parameters

- **Up to 10 programmable screens** (8 parameters per page); ability to change color for all screens
- **Available colors for digital indications:**
  - 
  - 
  - 
  - 
  - 
  - 
  - 
  -

- **Two screens dedicated to harmonics; indication of individual harmonic for voltages and currents (up to 51st); bargraph presentation for all harmonics with zoom function**

- **Presentation in the form of analog meter view with min/max preview for display value and zoom function**

- **Easy to use and intuitive menu; information bar with status of: phase sequence, alarm outputs, temperature measurements*, archiving and memory*, Ethernet* and RS-485 interfaces, time and date**

* - availability of feature depends on hardware version of ND30IoT, ND30
REMOTE READOUT OF PARAMETERS THROUGH ETHERNET: WWW SERVER, FTP

WEB server* for remote reading of current measurement data; FTP server* for downloading archived CSV files

* - availability of feature depends on hardware version of ND30IoT, ND30

Harmonics numbers

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## ORDERING CODE

### Meter ND30

<table>
<thead>
<tr>
<th>Input voltage (phase/phase-to-phase) Un:</th>
<th>3 x 57.7/100 V, 3x 230/400 V</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 x 110/190 V, 3 x 400/690 V</td>
<td>2</td>
</tr>
</tbody>
</table>

### Additional outputs /inputs:

- 2 relays | 1 |
- 2 relays, 1 analog output, 2 inputs PT100 | 2 |

### Interface:

- RS-485 | 1 |
- RS-485 and Ethernet, internal memory | 2 |

### Supply:

- 85...253 V a.c., 90...300 V d.c. | 1 |
- 20...40 V a.c., 20...60 V d.c. | 2 |

### Version:

- standard | 00 |
- custom-made* | XX |

### Language:

- Polish   | P |
- English  | E |
- other*   | X |

### Acceptance tests:

- without additional quality requirements | 0 |
- with an extra quality inspection certificate | 1 |
- acc.to customer's request | X |

* only after agreeing with the manufacturer

### Order example:

The code: **ND30 - 1 2 2 1 00 E 0** means:

- **ND30** - meter ND30
- 1 - input voltage 3 x 57.7/100 V, 3 x 230/400 V
- 2 - 2 relays, 1 analog output, 2 inputs PT100
- 1 - supply: 85...253 V a.c., 90...300 V d.c.
- 00 - standard version
- E - user's manual in English
- 0 - without additional quality requirements.

### Meter ND30iot

<table>
<thead>
<tr>
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### Additional outputs /inputs:

- 2 relays | 1 |
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### Interface:

- RS-485 and Ethernet, internal memory | 2 |

### Supply:

- 85...253 V a.c., 90...300 V d.c. | 1 |
- 20...40 V a.c., 20...60 V d.c. | 2 |

### Version:

- MQTT | MQ |

### Language:

- Polish   | P |
- English  | E |
- other*   | X |

### Acceptance tests:

- without additional quality requirements | 0 |
- with an extra quality inspection certificate | 1 |
- acc.to customer's request* | X |

* only after agreeing with the manufacturer

### Order example:

The code: **ND30iot - 1 2 2 1 MQ E 0** means:

- **ND30iot** - meter ND30iot
- 1 - input voltage 3 x 57.7/100 V, 3 x 230/400 V
- 2 - 2 relays, 1 analog output, 2 inputs PT100
- 2 - RS-485 and Ethernet, internal memory
- 1 - supply: 85...253 V a.c., 90...300 V d.c.
- MQ - MQTT version
- E - user's manual in English
- 0 - without additional quality requirements.