



## ND30 - METER OF POWER NETWORK PARAMETERS

## ND30IoT - METER OF POWER NETWORK PARAMETERS FOR IoT APPLICATIONS

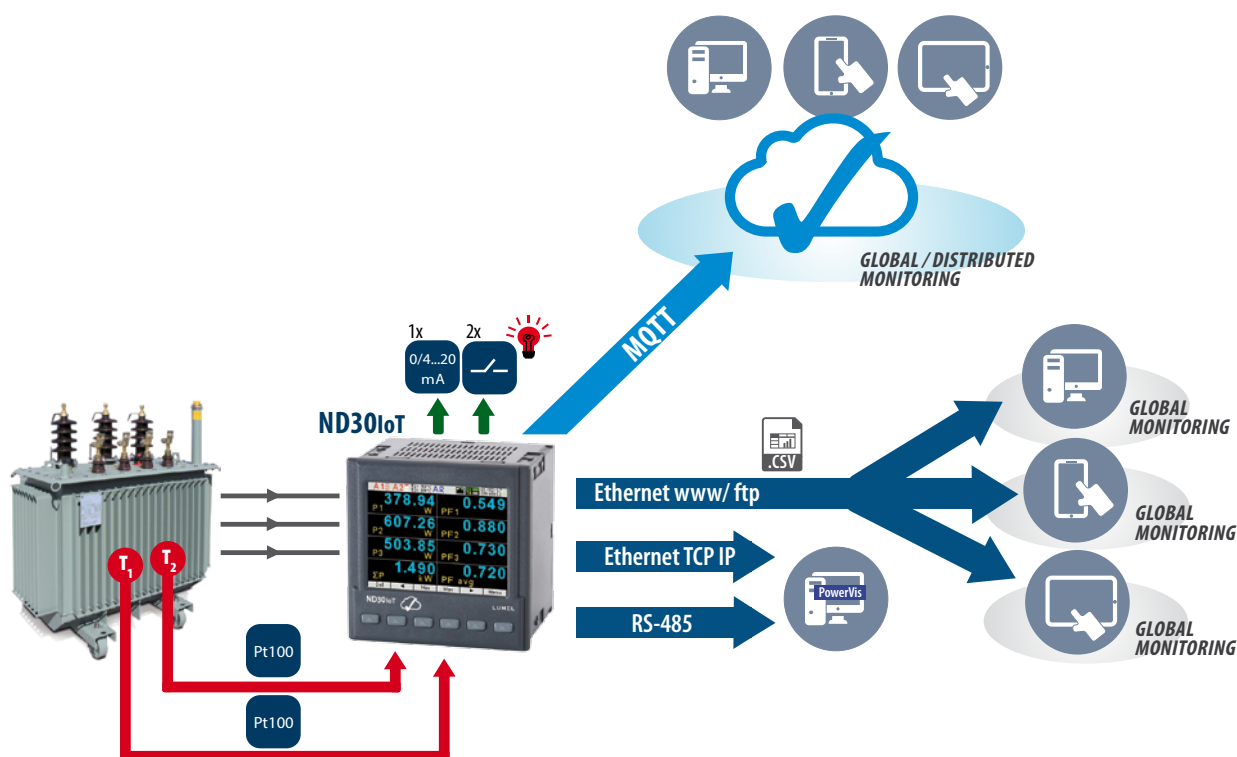
- **Measurement** of 54 power network parameters, including **current and voltage harmonics up to 63rd** in 1-phase 2-wire or 3-phase 3 or 4-wire balanced and unbalanced systems.
- **The MQTT protocol is ideal for communication in distributed acquisition systems data - IoT applications (ND30IoT).**
- **High accuracy class (0.2S for active energy).**
- **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), 2 galvanically isolated binary inputs 0/5...24V d.c.
- 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.
- **Supervisory relay mode for alarm outputs (ND30 and ND30IoT)**
- **MQTT protocol (for ND30)**



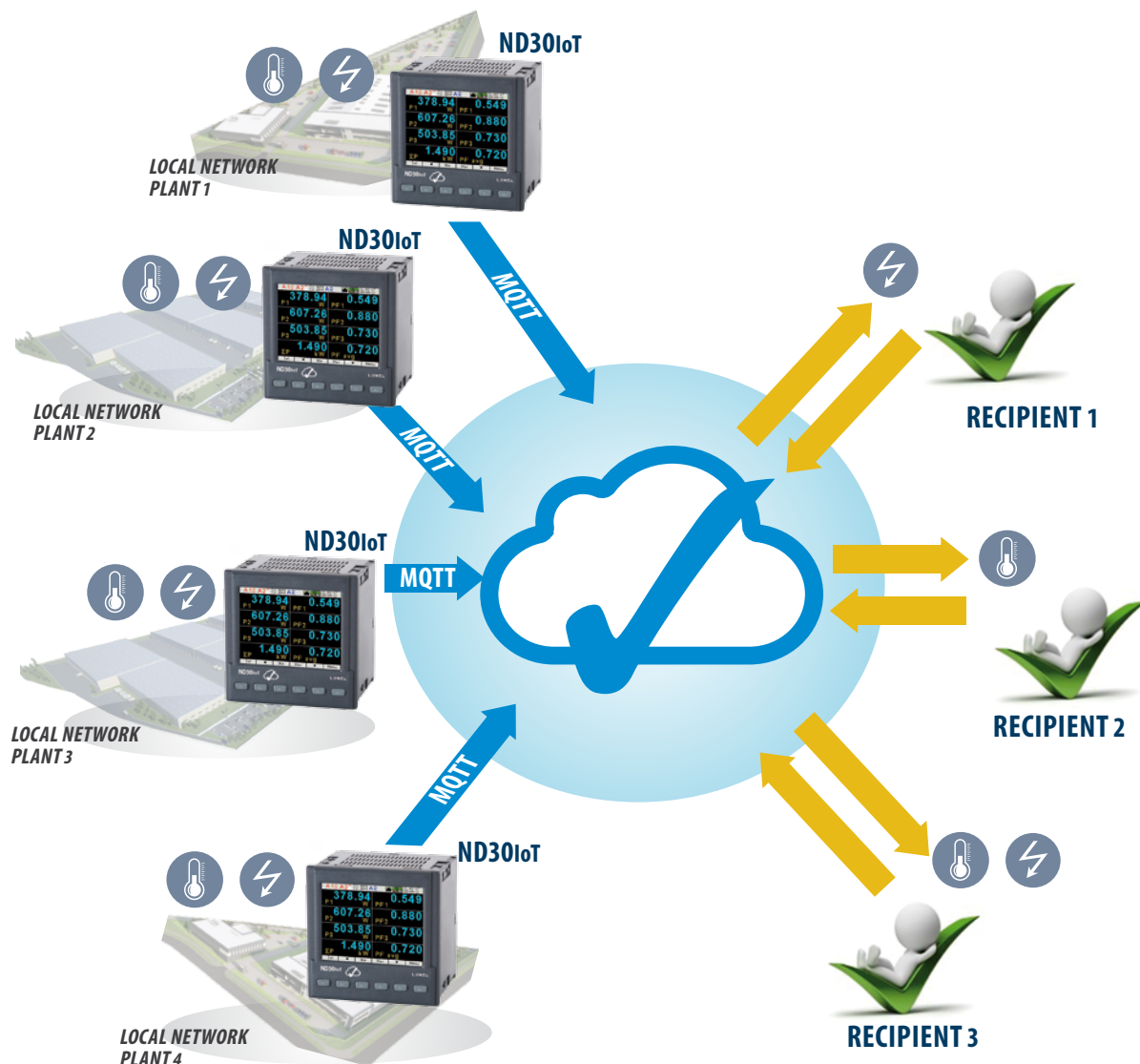
### Remarks:

- New features available from 1.07 firmware version.
- To make functions active, order appropriate licence key – details in ordering code.
- Functions can be also activated on the devices which have been already installed on the facility after software upgrade.

## 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  $I_1, I_2, I_3$
- 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:  $tg\phi_1, tg\phi_2, tg\phi_3$
- active, reactive and apparent 3-phase power:  $P, Q, S$
- mean 3-phase power factors:  $PF, tg\phi$
- frequency  $f$
- mean 3-phase voltage:  $U_s$
- mean phase-to-phase voltage:  $U_{mf}$
- mean 3-phase current:  $I_s$
- 15, 30, 60 minutes' mean active power:  $P_{demand}$
- mean apparent power  $S_{demand}$
- average current  $I_{demand}$
- 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  $THD_{U1}, THD_{U2}, THD_{U3}, THD_{I1}, THD_{I2}, THD_{I3}$  and for 3-phase voltages and currents  $THD_V, THD_I$
- harmonics for current and phase voltage up to 63rd!
- temperature (2 x Pt100 input)

FEATURES	INPUTS	OUTPUTS	GALVANIC ISOLATION

## TECHNICAL DATA

### MEASURING RANGE

Measured value	Measuring range	L1	L2	L3	Σ	Class
Current I/5 A 1 A~ 5 A~	0.002 ..0.100..1.200 A 0.010 ..0.500.. 6.000 A ...100.00 kA (tr <sub>I</sub> ≠1)	•	•	•		0.2 (EN 61557-12)
Voltage L-N 57.7 V~ 110 V~ 230 V~ 400 V~	5.700..11.500 ..70.000 V 11.000 ..22.000 ..132.00 V 23.000..46.000 .. 276.00 V 40.000..80.000 .. 480.00 V ...1920.0 kV	•	•	•		0.2 (EN 61557-12)
Voltage L-L 100 V~ 190 V~ 400 V~ 690 V~	10.000 ..20.000..120.00 V 19.000 ..38.000 ..228.00 V 40.000 ..80.00 .. 480.00 V 69.000..138.00 .. 830.00 V ...1999.0 kV (tr <sub>U</sub> ≠1)	•	•	•		0.5 (EN 61557-12)
Active power P	-19999 MW .. 0,000 W .. ..19999 MW (tr <sub>U</sub> ≠1, tr <sub>I</sub> ≠1)	•	•	•	•	0.5 (EN 61557-12)
Reactive power Q	-19999 MVar .. 0,000 Var .. ..19999 MVar (tr <sub>U</sub> ≠1, tr <sub>I</sub> ≠1)	•	•	•	•	1 (EN 61557-12)
Apparent power S	0.000 .. 1999,9 VA .. ..19999 MVA (tr <sub>U</sub> ≠1, tr <sub>I</sub> ≠1)	•	•	•	•	0.5 (EN 61557-12)
<b>Active energy EnP (imported or exported)</b>	0.000 .. 99 999 999,999 kWh				•	<b>0.2S (EN 62053-22)</b>
Reactive energy EnQ (inductive or capacitive)	0.000 .. 99 999 999,999 kVarh				•	1 (EN 61557-12)
Apparent energy EnS	0.000 .. 99 999 999,999 kVAh				•	0.5 (EN 61557-12)
Active power factor PF	-1.00 ..0 ..1.00	•	•	•	•	1 (EN 61557-12)
Coefficient tg (ratio of reactive power to active power)	-999.99...-1.20 .. 0 .. 1.20...999.99	•	•	•	•	1
Frequency f	45.00...65.000... 100.00 Hz				•	0.1 (EN 61557-12)
Total harmonic distortion of voltage THDU and current THDI	0.0 ..100.0 %	•	•	•	•	5 (EN 61557-12)
Amplitudes of the voltage U <sub>h2</sub> ...U <sub>h63</sub> and current I <sub>h2</sub> ... I <sub>h63</sub>	0.0 ..100.0 %	•	•	•		II (IEC61000-4-7)

tr<sub>I</sub> - Current transformer ratio = Transformer primary current / Current transformer secondary current  
tr<sub>U</sub> - Voltage transformer ratio = Transformer primary voltage / Voltage transformer secondary voltage

### ADDITIONAL INPUTS

Input type	Properties
Input Pt100 (T1, T2) - option	2 x Pt100, 2-wire, -50...400°C, basic error 0.5 %
Binary inputs - option	0 V d.c. – binary input inactive, 5...24 V d.c. – binary input active

### DIGITAL INTERFACE

Interface type	Transmission protocol	Remarks
RS-485	Modbus RTU 8N2,8E1,8O1,8N1	Address 1..247 baud rate: 4.8, 9.6, 19.2 38.4, 57.6, 115.2 kbit/s
	Modbus TCP,HTTP,FTP	
Ethernet 10/100 Base-T -option	MQTT	WWW server, FTP server, DHCP client

## EXTERNAL FEATURES

Readout field	graphic color display LCD TFT 3,5", 320 x 240 pixels	
Overall dimensions	96 x 96 x 77 mm	mounting hole 92.5 x 92.5 mm
Weight	0.3 kg	
Protection grade	from frontal side: IP65	from terminal side: IP20

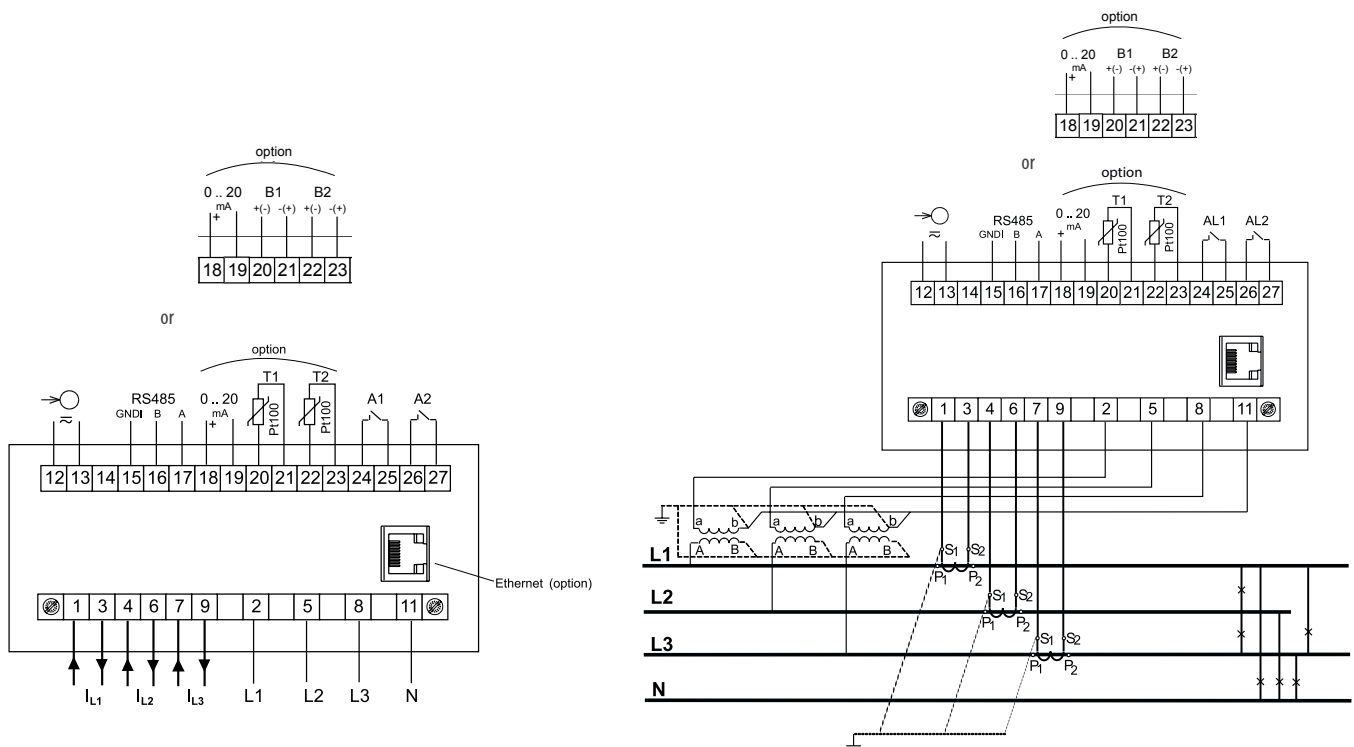
## RATED OPERATING CONDITIONS

Supply voltage	→ 85...253 V a.c. (40...50...400 Hz), 90...300 V d.c. or 20...40 V a.c., 20...60 V d.c.	power consumption ≤ 6 VA
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,	frequency 45...50...60...100 Hz, sinusoidal (THD ≤ 8%)
Power factor	-1...0...1	
Preheating time	5 min.	
Ambient temperature	-10...23...55°C, class K55 acc. to EN61557-12	
Humidity	0...40...65...95%	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 COMPABILITY 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
Polution level	2	acc. to EN 61010-1
Installation category	III	acc. to EN 61010-1
Maximal phase-to-earth voltage	<ul style="list-style-type: none"> <li>for supply circuit and relay outputs 300 V</li> <li>for measuring input 500 V</li> <li>for circuits of RS-485, Ethernet, pulse input and output, analog outputs: 50 V</li> </ul>	acc. to EN 61010-1
Altitude a.s.l.	< 2000 m	

## CONNECTION DIAGRAMS



Description of meter connections strips

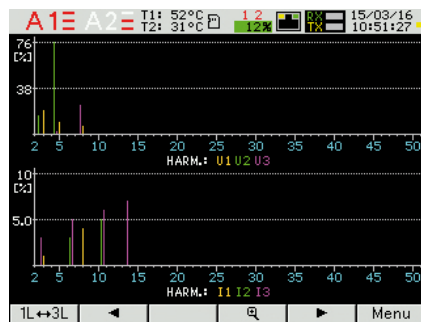
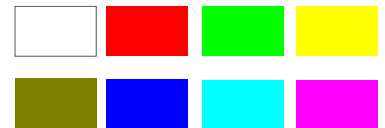
Indirect measurement in 4-wire network - connection of input signals

## DISPLAING 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



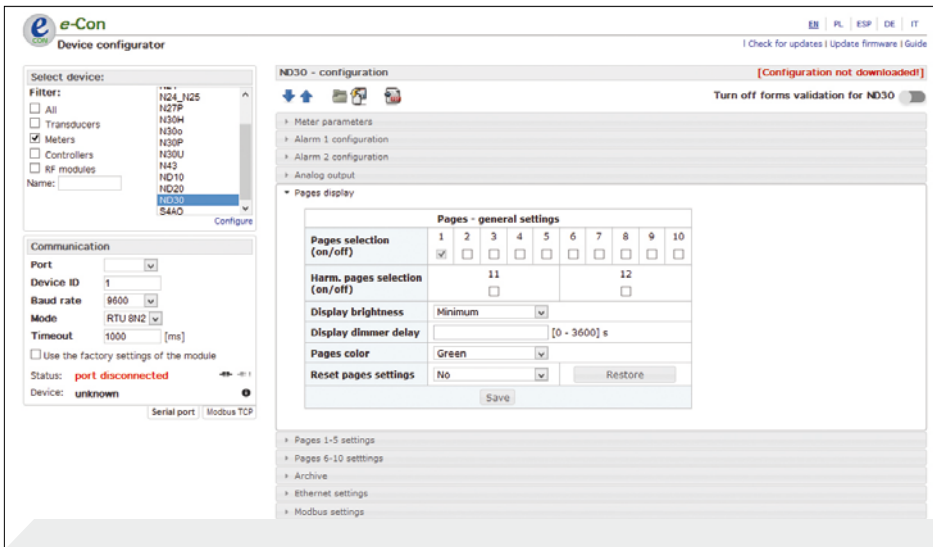
presentation in the form of analog meter view with min/max preview for display value and zoom function



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

## METER CONFIGURATION WITH FREE eCON SOFTWARE



ability to configure and update ND30IoT, ND30 with free eCon software (via RS-485 or Ethernet\* interface)

\*- 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

## ORDERING CODE

Code	Description
<b>ND30IoT 1121MSMO</b>	Power network meter (MQTT) ND30IoT type Input current 1A/5A, X/1A, X/5A Input voltage 3x57.7/100V, 3x230/400V 2x relays, Ethernet and RS-485 interface, internal memory 8GB, supply 85-253V a.c. or 90-300V d.c., MQTT protocol, Supervisory relay, documentation and descriptions in Polish and English version, test certificate
<b>ND30IoT 2222MSMO</b>	Power network meter (MQTT) ND30IoT type Input current 1A/5A, X/1A, X/5A, Input voltage 3x110/190V, 3x400/690V 2x relays, 1x analog output 0-20mA, 2x Pt100 input Ethernet and RS-485 interface, internal memory 8GB, supply 20-40V a.c. or 20-60V d.c., MQTT protocol, Supervisory relay, documentation and descriptions in Polish and English version, test certificate
<b>ND30IoT 1221MSMO</b>	Power network meter (MQTT) ND30IoT type Input current 1A/5A, X/1A, X/5A, Input voltage 3x57.7/100V, 3x230/400V 2x wyj. relays, 1x wyj. analogowe 0-20mA, 2x wej. Pt100 Ethernet and RS-485 interface, internal memory 8GB, supply 85-253V a.c. or 90-300V d.c., MQTT protocol, Supervisory relay, documentation and descriptions in Polish and English version, test certificate
<b>ND30IoT 2221MSMO</b>	Power network meter (MQTT) ND30IoT type Input current 1A/5A, X/1A, X/5A, Input voltage 3x110/190V, 3x400/690V 2x wyj. relays, 1x wyj. analogowe 0-20mA, 2x wej. Pt100 Ethernet and RS-485 interface, internal memory 8GB, supply 85-253V a.c. or 90-300V d.c., MQTT protocol, Supervisory relay, documentation and descriptions in Polish and English version, test certificate
<b>ND30IoT 1122MSMO</b>	Power network meter (MQTT) ND30IoT type Input current 1A/5A, X/1A, X/5A, Input voltage 3x57.7/100V, 3x230/400V 2x relays, Ethernet and RS-485 interface, internal memory 8GB, supply 20-40V a.c. or 20-60V d.c., MQTT protocol, Supervisory relay, documentation and descriptions in Polish and English version, test certificate
<b>ND30IoT 2121MSMO</b>	Power network meter (MQTT) ND30IoT type Input current 1A/5A, X/1A, X/5A, Input voltage 3x110/190V, 3x400/690V 2x relays, Ethernet and RS-485 interface, internal memory 8GB, supply 85-253V a.c. or 90-300V d.c., MQTT protocol, Supervisory relay, documentation and descriptions in Polish and English version, test certificate

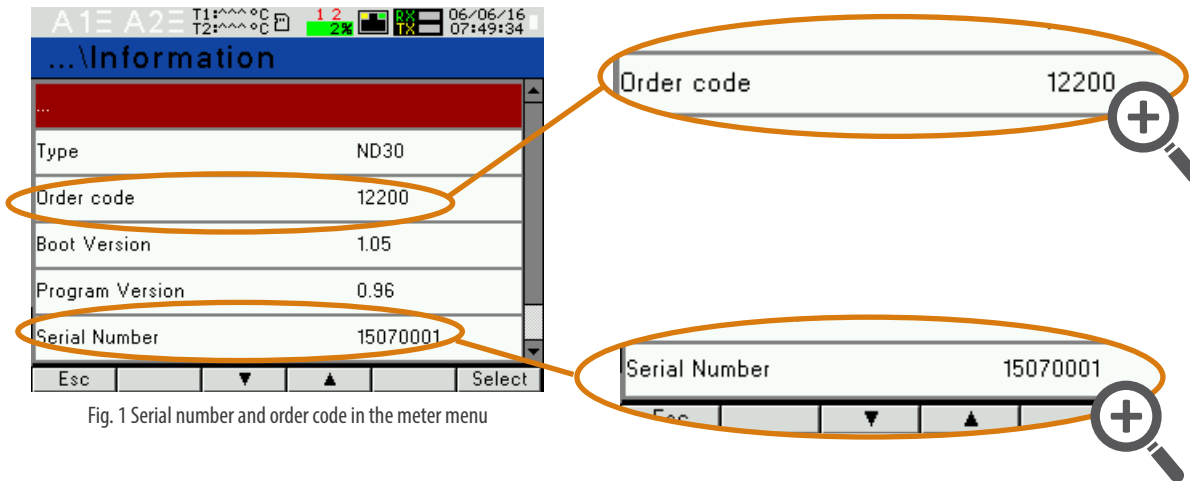


Fig. 1 Serial number and order code in the meter menu

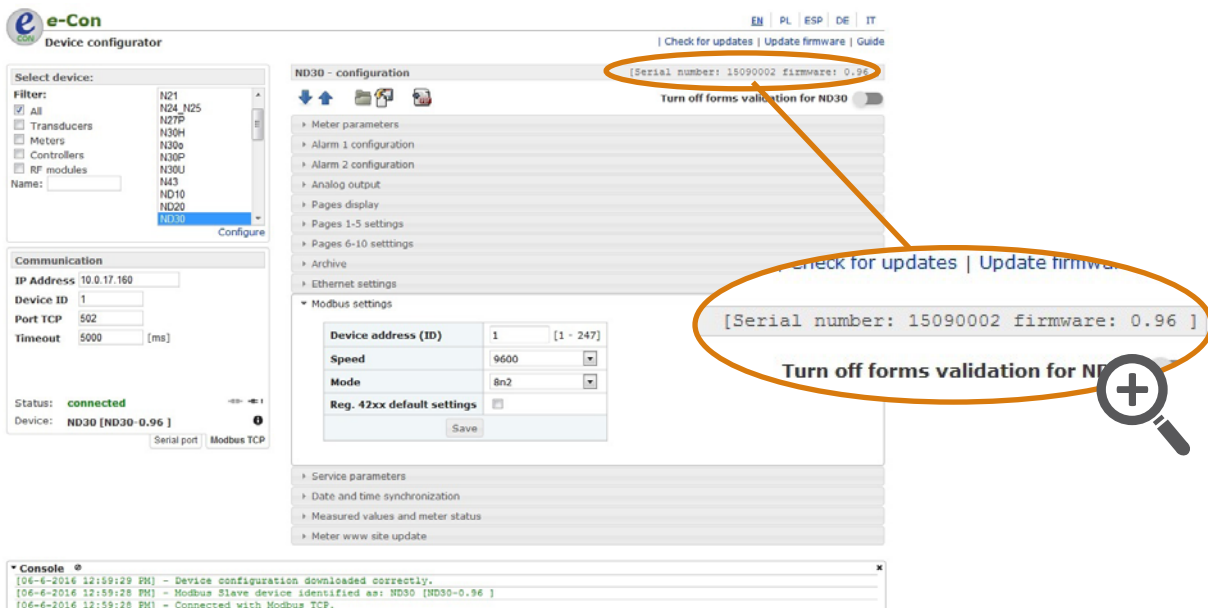


Fig. 2 Serial number in the eCon software bar

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ND30-19G\_ND30IoT-19C\_R1\_en



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EVERYTHING COUNTS

**LUMEL S.A.**  
ul. Ślubicka 4, 65-127 Zielona Góra, Poland  
tel.: +48 68 45 75 100, fax +48 68 45 75 508  
www.lumel.com.pl

**Technical support:**  
tel.: (+48 68) 45 75 143, 45 75 141, 45 75 144, 45 75 140  
e-mail: export@lumel.com.pl

**Export department:**  
tel.: (+48 68) 45 75 130, 45 75 131, 45 75 132  
e-mail: export@lumel.com.pl

**Calibration & Attestation:**  
e-mail: laboratorium@lumel.com.pl