



ND30 - METER OF POWER NETWORK PARAMETERS

ND30IoT - METER OF POWER NETWORK PARAMETERS FOR IoT APPLICATIONS

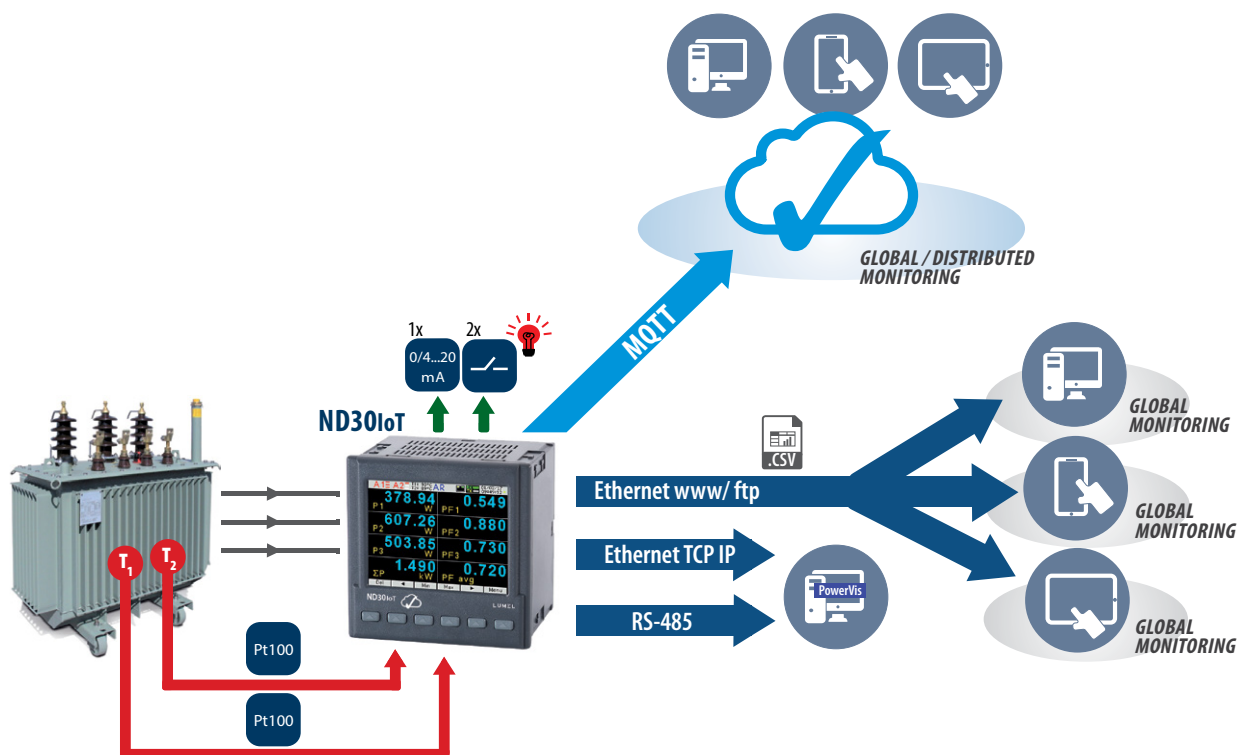
- **Measurement** of 54 power network parameters, including **current and voltage harmonics up to 63rd** in 1-phase 2-wire or 3-phase 3 or 4-wire balanced and unbalanced systems.
- **The MQTT protocol is ideal for communication in distributed acquisition systems data - IoT applications (ND30IoT).**
- **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 vies, 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)**



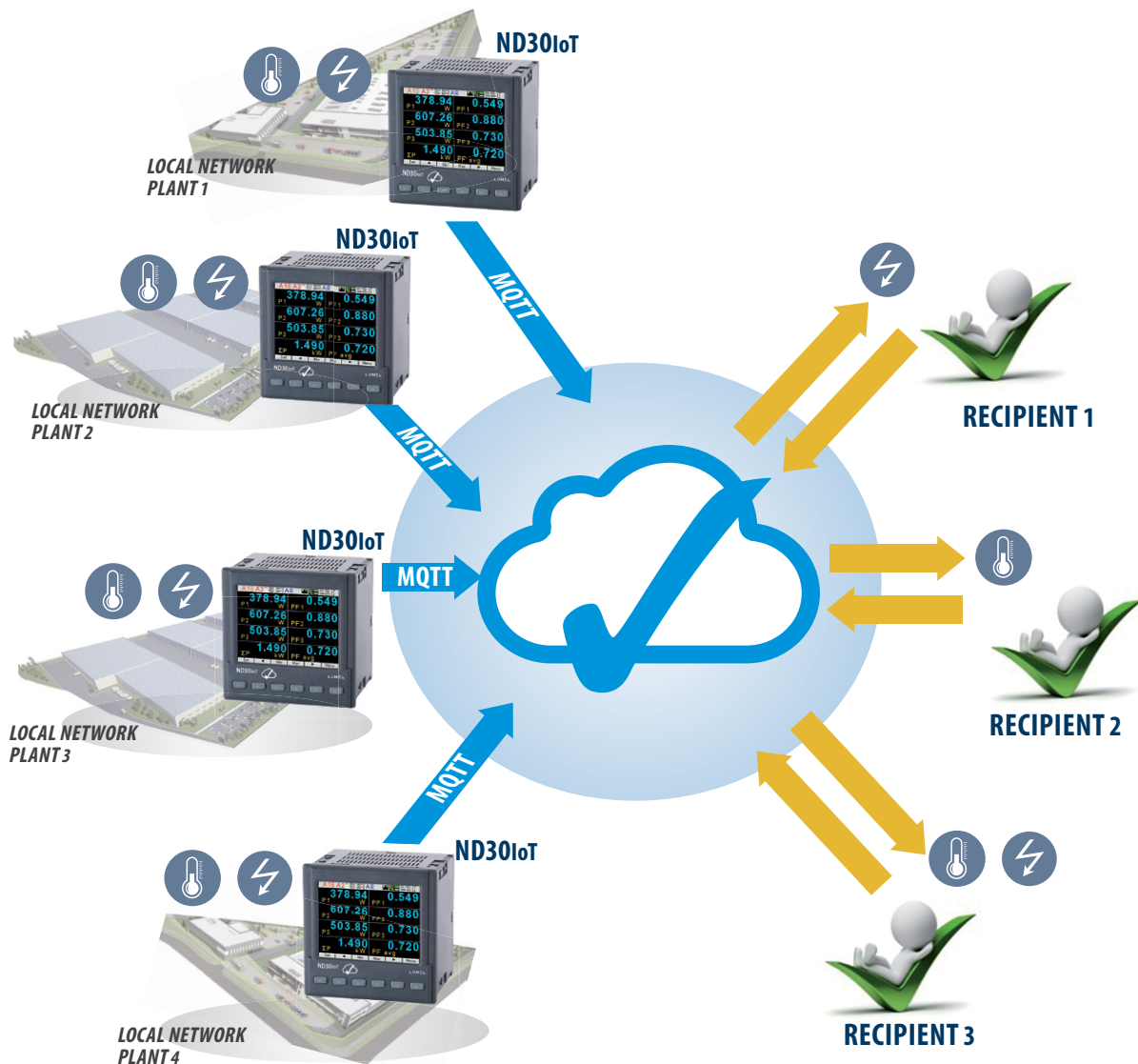
Remarks:

- 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



EXAMPLE OF APPLICATION



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 _I ≠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 _U ≠1)	•	•	•		0.5 (EN 61557-12)
Active power P	-19999 MW .. 0,000 W19999 MW (tr _U ≠1, tr _I ≠1)	•	•	•	•	0.5 (EN 61557-12)
Reactive power Q	-19999 MVar .. 0,000 Var19999 MVar (tr _U ≠1, tr _I ≠1)	•	•	•	•	1 (EN 61557-12)
Apparent power S	0.000 .. 1999,9 VA19999 MVA (tr _U ≠1, tr _I ≠1)	•	•	•	•	0.5 (EN 61557-12)
Active energy EnP (imported or exported)	0.000 .. 99 999 999,999 kWh				•	0.25 (EN 62053-22)
Reactive energy EnQ (inductive or capacitive)	0.000 .. 99 999 999,999 kWh				•	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 _{h2} ...U _{h63} and current I _{h2} ... I _{h63}	0.0 ..100.0 %	•	•	•		II (IEC61000-4-7)

tr_I - Current transformer ratio = Transformer primary current / Current transformer secondary current

tr_U - 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

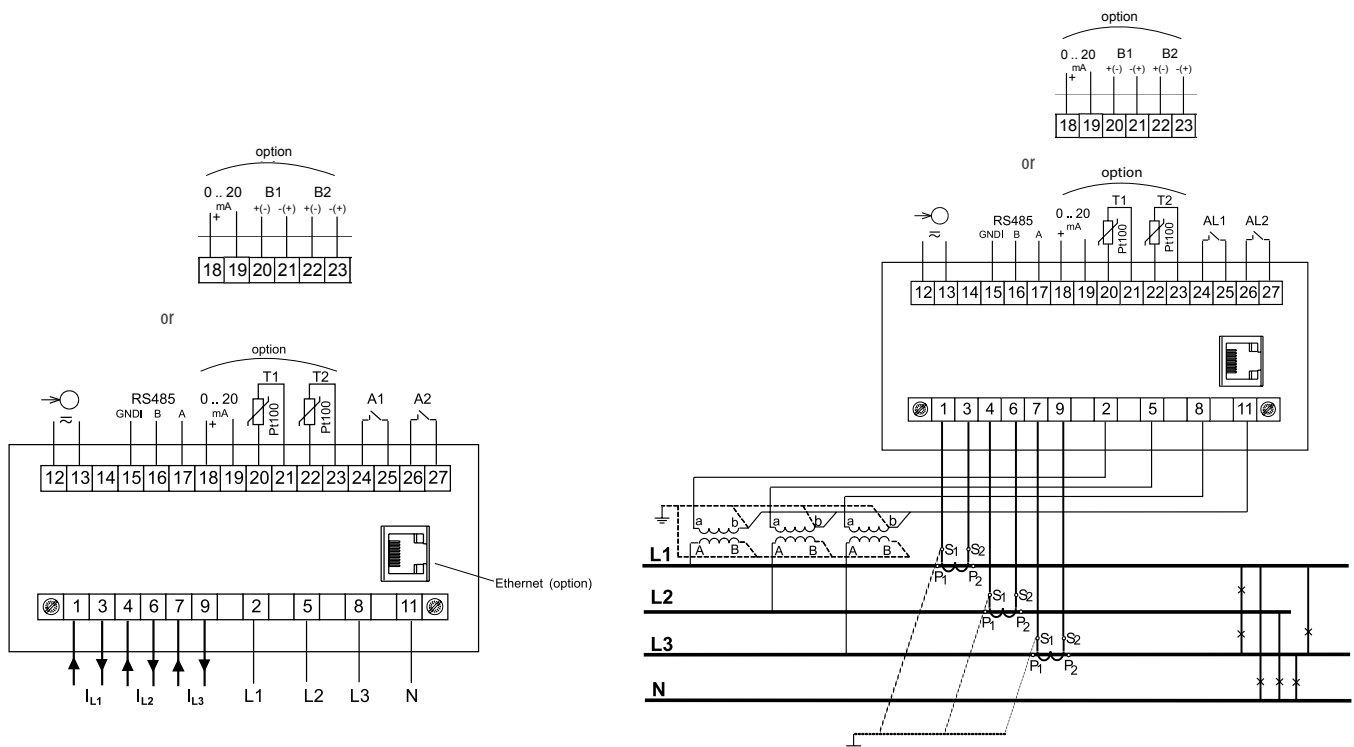
RATED OPERATING CONDITIONS

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"> 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

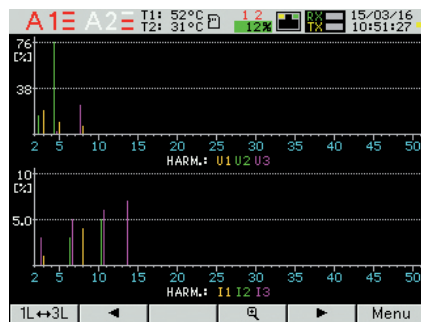
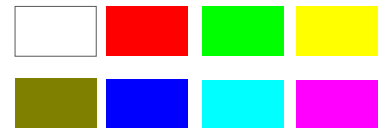
Indirect measurement in 4-wire network - connection of input signals

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



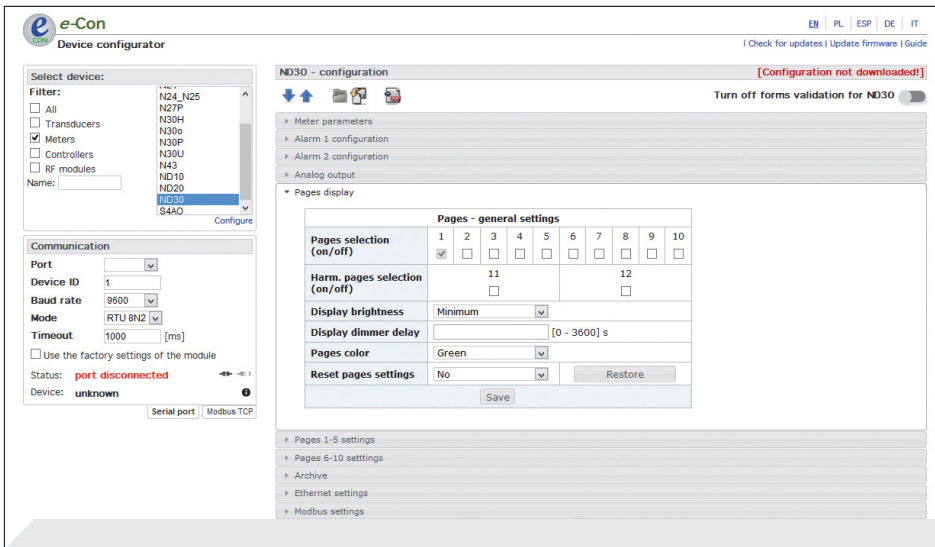
presentation in the form of analog meter view with min/max preview for display value and zoom function



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

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

Page 1

U12	378.040	V	I1	1.005	A
U23	383.467	V	I2	2.105	A
U31	392.184	V	I3	1.805	A
f	49.999	Hz	I avg	1.638	A

Page 2

U12	378.040	V	ΣP	843.787	W
U23	383.467	V	ΣQ	725.969	var
U31	392.184	V	ΣS	1125.615	VA
U123	384.564	V	PF avg	0.778	

Page 3

ΣP	843.787	W	P DMD	843.795	W
ΣQ	725.969	var	S DMD	1125.611	VA
I avg	1.638	A	I DMD	1.638	A
tg avg	0.810		PF avg	0.778	

Page 4

THDU12	43.049	%	THD I1	4.100	%
THDU23	43.359	%	THD I2	5.784	%
THDU31	22.461	%	THD I3	10.879	%

Page 5

ΣP	843.787	W	EnP+	21.661	GWh
ΣQ	725.969	var	EnP-	2786.344	MWh
ΣS	1125.615	VA	EnQ L	13.761	Mvarh
En S	24.854	GVAh	EnQ C	12.036	Mvarh

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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

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ORDERING CODE

Meter ND30	X	X	X	X	XX	X	X
Input voltage (phase/phase-to-phase) Un:							
3 x 57.7/ 100 V, 3x 230/ 400 V	1						
3 x 110/ 190 V, 3 x 400/ 690 V	2						
Additional outputs /inputs:							
2 relays	1						
2 relays, 1 analog output, 2 inputs PT100	2						
2 relays, 1 analog output, 2 isolated binary inputs	3						
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		
supervisory relay						SR	
custom-made*							XX
Language:							
Polish/English							M
other*							X
Acceptance tests:							
without additional quality requirements							0
with an extra quality inspection certificate							1
with an extra calibration certificate							2
acc.to customer's request							X

* only after agreeing with the manufacturer

ORDERING WAY OF ADDITIONAL FUNCTIONS (SUPERVISORY RELAY, MQTT PROTOCOL)

Ordering code	Description of the license key
LKEY WXND30MQ	activation of the MQTT protocol in ND30
LKEY WXND30SR	activation of the supervisory relay function in ND30
LKEY WXND30MS	activation of the MQTT protocol and the supervisory relay function in ND30

Important: When ordering, please provide the meter's execution code and serial number ND30. It is placed on the meter's nominal plate, in the configuration menu in the Information mode (see below - figure 1) or on the bar in the eCon program (Fig.2)

Order example:

The code: **ND30_122100M0** means:

ND30 - meter ND30

1 - input voltage 3 x 57.7/ 100 V, 3x 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.

00 - standard version

M - Polish/ English language version

0 - without additional quality requirements.

Meter ND30IoT	X	X	2	X	XX	X	X
Input voltage (phase/phase-to-phase) Un:							
3 x 57.7/ 100 V, 3x 230/ 400 V	1						
3 x 110/ 190 V, 3 x 400/ 690 V	2						
Additional outputs /inputs:							
2 relays	1						
2 relays, 1 analog output, 2 inputs PT100	2						
2 relays, 1 analog output, 2 isolated binary inputs	3						
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 protocol						MQ	
supervisory relay + MQTT protocol							MS
Language:							
Polish/ English							M
other*							X
Acceptance tests:							
without additional quality requirements							0
with an extra quality inspection certificate							1
with an extra calibration certificate							2
acc.to customer's request*							X

* only after agreeing with the manufacturer

ORDERING WAY OF ADDITIONAL FUNCTIONS (SUPERVISORY RELAY)

Ordering code	Description of the license key
LKEY WXND30IOTMS	activation of the supervisory relay function in ND30IoT

Important: When ordering, please provide the meter's execution code and serial number ND30IoT. It is placed on the meter's nominal plate, in the configuration menu in the Information mode (see below - figure 1) or on the bar in the eCon program (Fig.2)

Order example:

The code: **ND30IoT_1221MQM0** means:

ND30IoT - meter ND30IoT

1 - input voltage 3 x 57.7/ 100 V, 3x 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

M - Polish/ English language version

0 - without additional quality requirements.

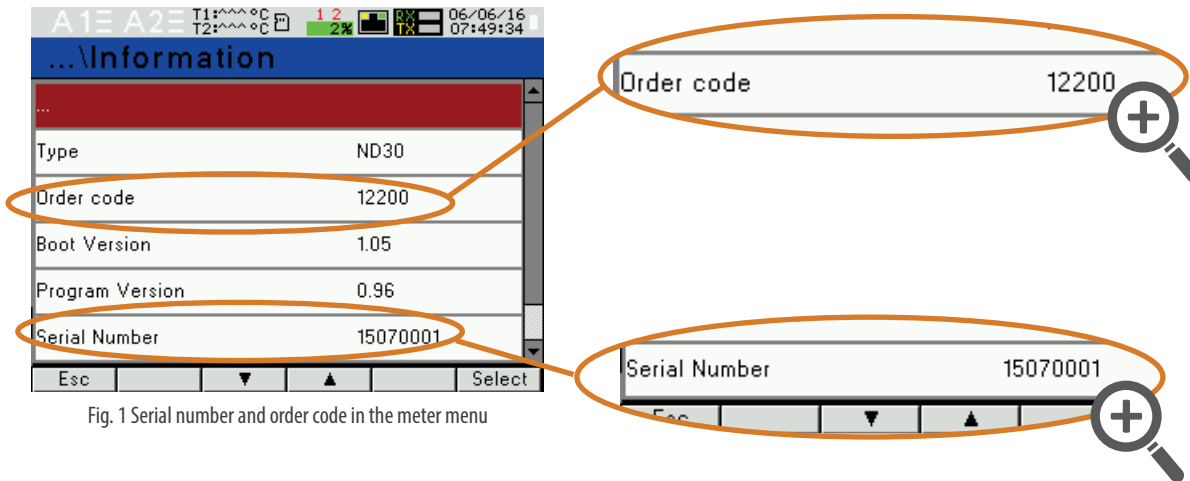


Fig. 1 Serial number and order code in the meter menu

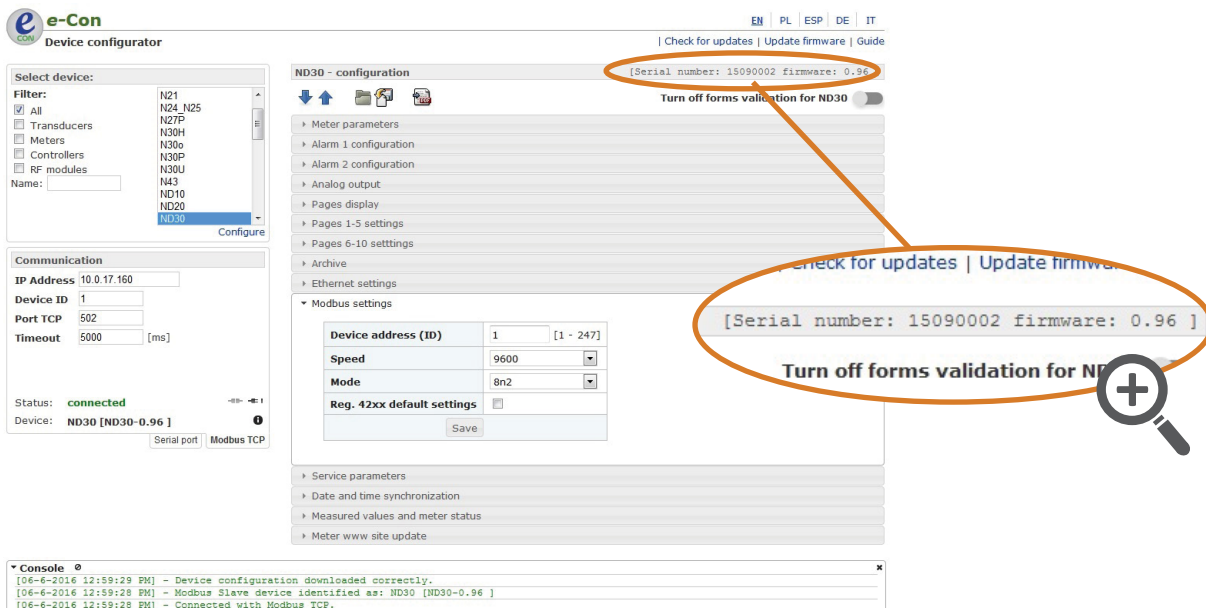


Fig. 2 Serial number in the eCon software bar

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ND30-19F_ND30IoT-19B_en



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EVERYTHING COUNTS

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