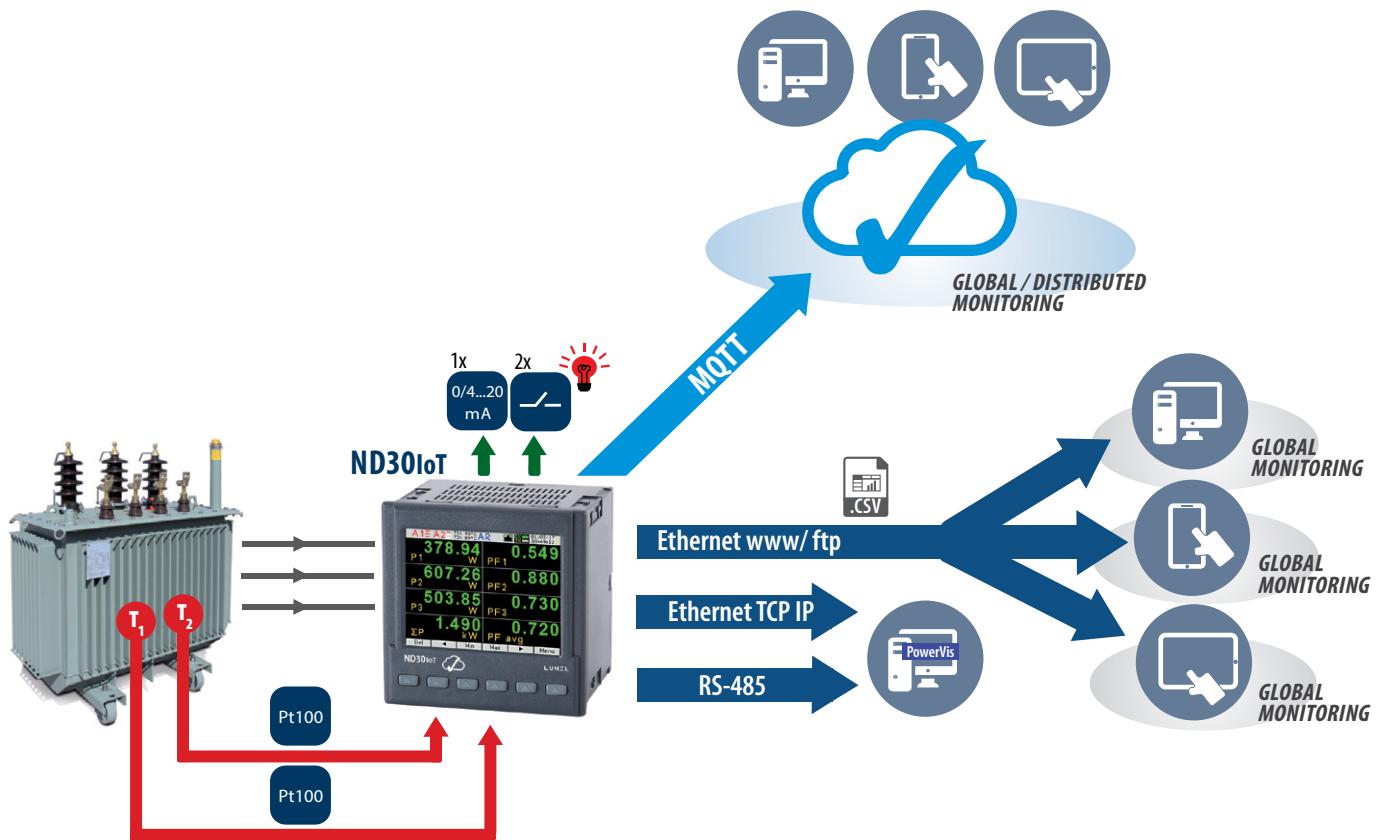




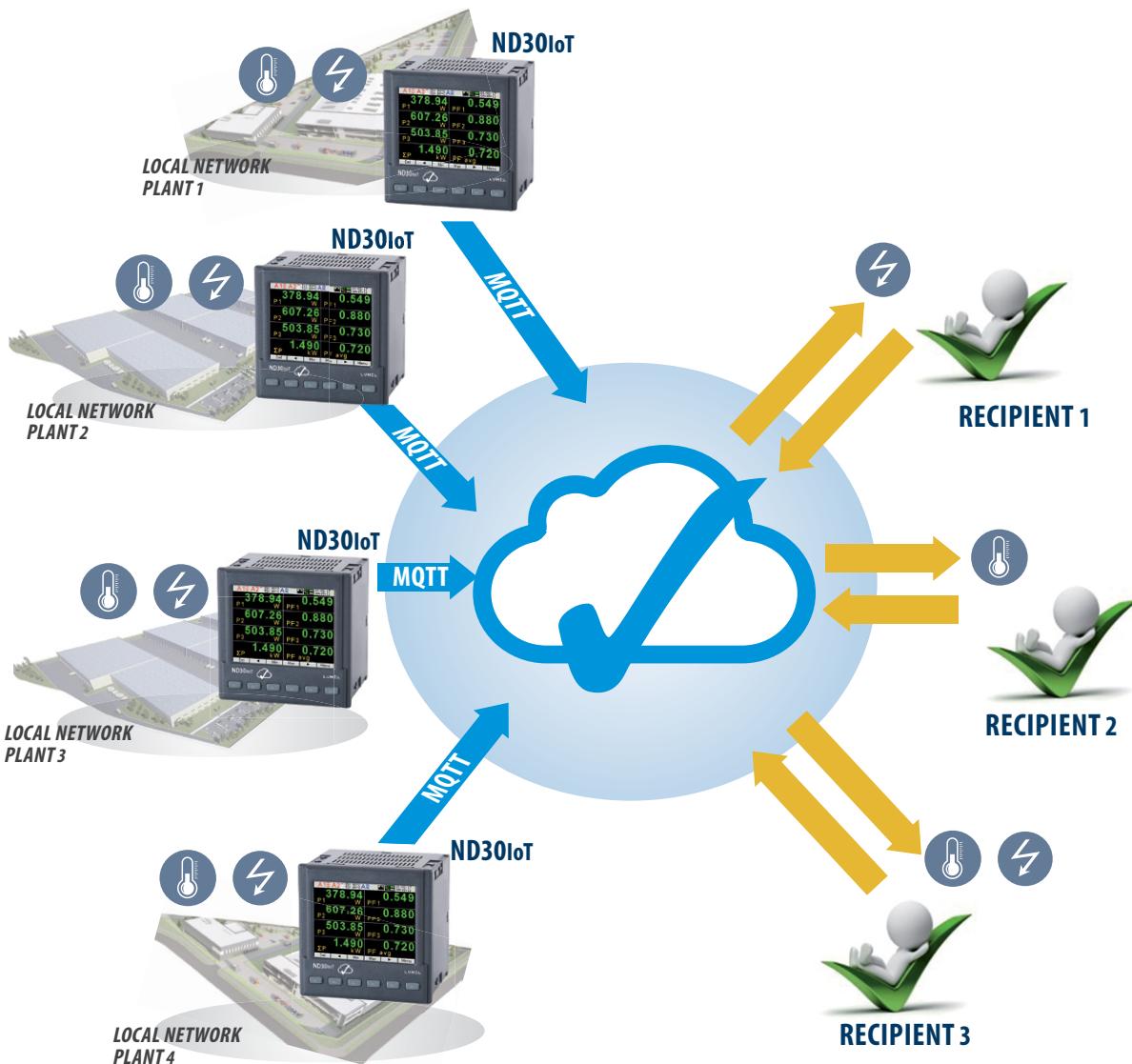
ND30 - METER OF POWER NETWORK PARAMETERS ND30IoT - METER OF POWER NETWORK PARAMETERS FOR IoT APPLICATIONS

- 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 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).
- 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.

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: $\text{PF}_1, \text{PF}_2, \text{PF}_3$
- reactive/active power factors: $\text{tg}\varphi_1, \text{tg}\varphi_2, \text{tg}\varphi_3$
- active, reactive and apparent 3-phase power: P, Q, S
- mean 3-phase power factors: $\text{PF}, \text{tg}\varphi$
- 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: E_nP, E_nQ, E_nS
- active, reactive and apparent energy from external counter: E_nPE
- total harmonic content coefficients for phase voltages and currents $\text{THD}_{U1}, \text{THD}_{U2}, \text{THD}_{U3}, \text{THD}_{I1}, \text{THD}_{I2}, \text{THD}_I$ and for 3-phase voltages and currents $\text{THD}_U, \text{THD}_I$
- harmonics for current and phase voltage up to 51 st!
- temperature (2 x Pt100 input)

FEATURES	INPUTS	OUTPUTS	GALVANIC ISOLATION

TECHNICAL DATA

MEASURING RANGE

Measured value	Measuring range	L1	L2	L3	Σ	Class (*) / Basic error (*) class relative to the measured value acc. to EN61557-12
Current 1/5 A 1 A~ 5 A~	0.010 .. 0.100 .. 1.200 A (tr_l=1) 0.050 .. 0.500 .. 6.000 A (tr_l=1) ... 20.00 kA (tr_l ≠ 1)	.	.	.		Class 0.2
Voltage L-N 57.7 V~ 230 V~ 400 V~	5.7 .. 11.5 .. 70.0 V (tr_U=1) 23.0 .. 46 .. 276.0 V (tr_U=1) 40.0 .. 80 .. 480.0 V (tr_U=1) ... 480.0 kV (tr_U ≠ 1)	.	.	.		Class 0.2
Voltage L-L 100 V~ 400 V~ 690 V~	10.0 .. 20 .. 120.0 V (tr_U=1) 40.0 .. 80 .. 480.0 V (tr_U=1) 69.0 .. 138 .. 830.0 V (tr_U=1) ... 830.0 kV (tr_U ≠ 1)	.	.	.		Class 0.5
Active power P _d , average active power P _{dt}	.. (-)1999.9 W .. (-)1999.9 MW (tr_U ≠ 1, tr_l ≠ 1)	.	.	.	.	Class 0.5
Reactive power Q _d	.. (-)1999.9 Var .. (-)1999.9 MVar (tr_U ≠ 1, tr_l ≠ 1)	.	.	.	.	Class 1
Apparent power S _d , average apparent power S _{dt}	..1999.9 VA ..1999.9 MVA (tr_U ≠ 1, tr_l ≠ 1)	.	.	.	.	Class 0.5
Active energy EnP (imported or exported)	.. (-)1999.9 Wh .. (-)1999.9 MWh (tr_U ≠ 1, tr_l ≠ 1)				.	Class 0.5 ¹⁾
Reactive energy EnQ (inductive or capacitive)	.. (-)1999.9 Varh .. (-)1999.9 MVarh (tr_U ≠ 1, tr_l ≠ 1)				.	Class 1
Apparent energy EnS	.. 1999.9 VAh ..1999.9 MVAh (tr_U ≠ 1, tr_l ≠ 1)				.	Class 0.5
Active power factor PF _d	-1.00 .. 0 .. 1.00	.	.	.	.	± 0.01 of basic error
Coefficient tgφ _d (ratio of reactive power to active power)	-1.20 .. 0 .. 1.20	.	.	.	.	± 0.01 of basic error
Frequency f	45.00 .. 65.00 Hz				.	Class 0.1
Total harmonic distortion of voltage THDU and current THDI	0.0 .. 100.0 %	.	.	.	.	Class 5 50 / 60 Hz
Amplitudes of the voltage U _{h1} .. U _{h50} , and current I _{h1} ... I _{h50}	0.0 .. 100.0 %	.	.	.		Class 5 50 / 60 Hz

tr_l, tr_U – ratio of current and voltage transformer

¹⁾ Class 0.5 S acc. to EN 62053-22

INPUTS

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

DIGITAL INTERFACE

Interface type	Transmission protocol	Remarks
RS-485	Modbus RTU 8N2,8E1,8O1,8N1	Address 1..247
Ethernet 10/100 Base-T - option	Modbus TCP,HTTP,FTP 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

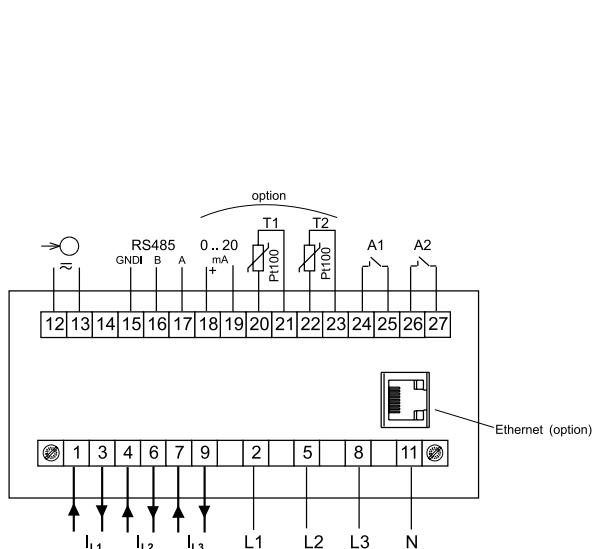
RATED OPERATING CONDITIONS

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...65 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

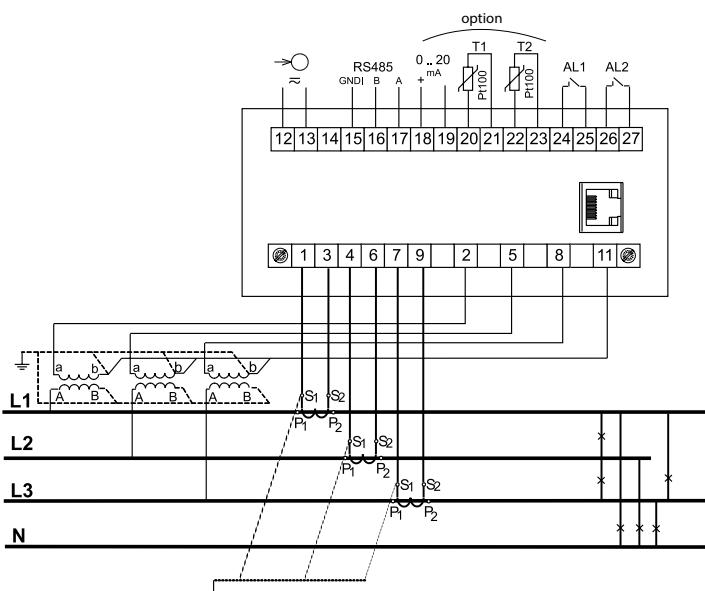
SAFETY AND COMPABILITY REQUIREMENTS

Electromagnetic compatibility	noise immunity noise emissions	acc. to EN 61000-6-2 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	• 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

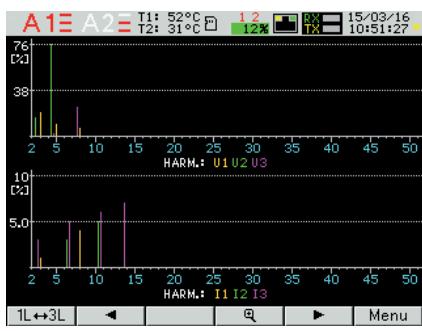


Description of meter connections strips



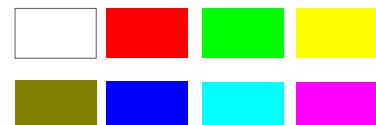
Indirect measurement in 4-wire network - connection of input signals

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

The screenshot shows the e-Con Device configurator software interface. On the left, there's a sidebar for 'Select device' with filters for All, Transducers, Meters, Controllers, and RF modules. It lists models like N24_N25, N27P, N30H, N30P, N30U, N43, ND10, ND20, ND30, and S4AO. Below this is a 'Communication' section with Port (set to Serial port), Device ID (1), Baud rate (9600), Mode (RTU 8N2), Timeout (1000 ms), and a checkbox for 'Use the factory settings of the module'. Status is shown as 'port disconnected' and Device as 'unknown'. On the right, the main window is titled 'ND30 - configuration' with a sub-section 'Pages display'. It shows a grid for selecting pages (1-12) and various settings like Display brightness (Minimum), Display dimmer delay (0-3600 s), Pages color (Green), and Reset pages settings. A 'Save' button is at the bottom. A note at the top right says '[Configuration not downloaded!]' and 'Turn off forms validation for ND30'.

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 THROUG ETHERNET: WWW SERVER, FTP

The screenshot shows the LUMEL 3-PHASE POWER NETWORK METER TYPE ND30 web interface. It displays five pages of data:

- Page 1:** Real-time measurements for phases U12, U23, U31, and frequency f. Values include 378.040 V, 383.467 V, 392.184 V, 49.999 Hz, etc.
- Page 2:** Power and reactive power values for phases U12, U23, U31, and total (U123). Values include 843.787 W, 725.969 var, 1125.615 VA, etc.
- Page 3:** Average current values for phases I avg and tg avg. Values include 1.638 A and 0.810 PF avg.
- Page 4:** Harmonic content for phases U12, U23, U31. Values include THD I1, THD I2, THD I3.
- Page 5:** Energy consumption and generation values for EnP+, EnP-, EnQ, and EnS. Values include 21.661 GWh, 2786.344 MWh, 13.761 Mvar, 24.854 GVAh.

On the right, there's a 'WWW SERVER' icon with a British flag and an 'FTP' icon. A note says 'WEB server* for remote reading of current measurement data; FTP server* for downloading archived CSV files'. Below the interface, a note states '*- availability of feature depends on hardware version of ND30iot, ND30'.

At the bottom, there's a 'Harmonics numbers' section with two bar charts showing harmonic content for phases U1, U2, U3 and I1, I2, I3. The top chart for U-harmonics has a y-axis from 0.0% to 76.1% and an x-axis from 2 to 27. The bottom chart for I-harmonics has a y-axis from 0.0% to 10.0% and an x-axis from 2 to 27. Both charts show a dominant harmonic at the 4th order.

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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						
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, 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

E - user's manual in English

0 - without additional quality requirements.

Meter ND30IoT -	X	X	2	X	MQ	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						
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, 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

E - user's manual in English

0 - without additional quality requirements.

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LUMEL
EVERYTHING COUNTS

LUMEL S.A.
ul. Sulechowska 1, 65-022 Zielona Góra, POLAND
tel.: +48 68 45 75 100, fax +48 68 45 75 508
www.lumel.com.pl

Export department:

tel.: (+48 68) 45 75 139, 45 75 233, 45 75 321, 45 75 386

fax: (+48 68) 32 54 091

e-mail: export@lumel.com.pl

ND30-19B_en