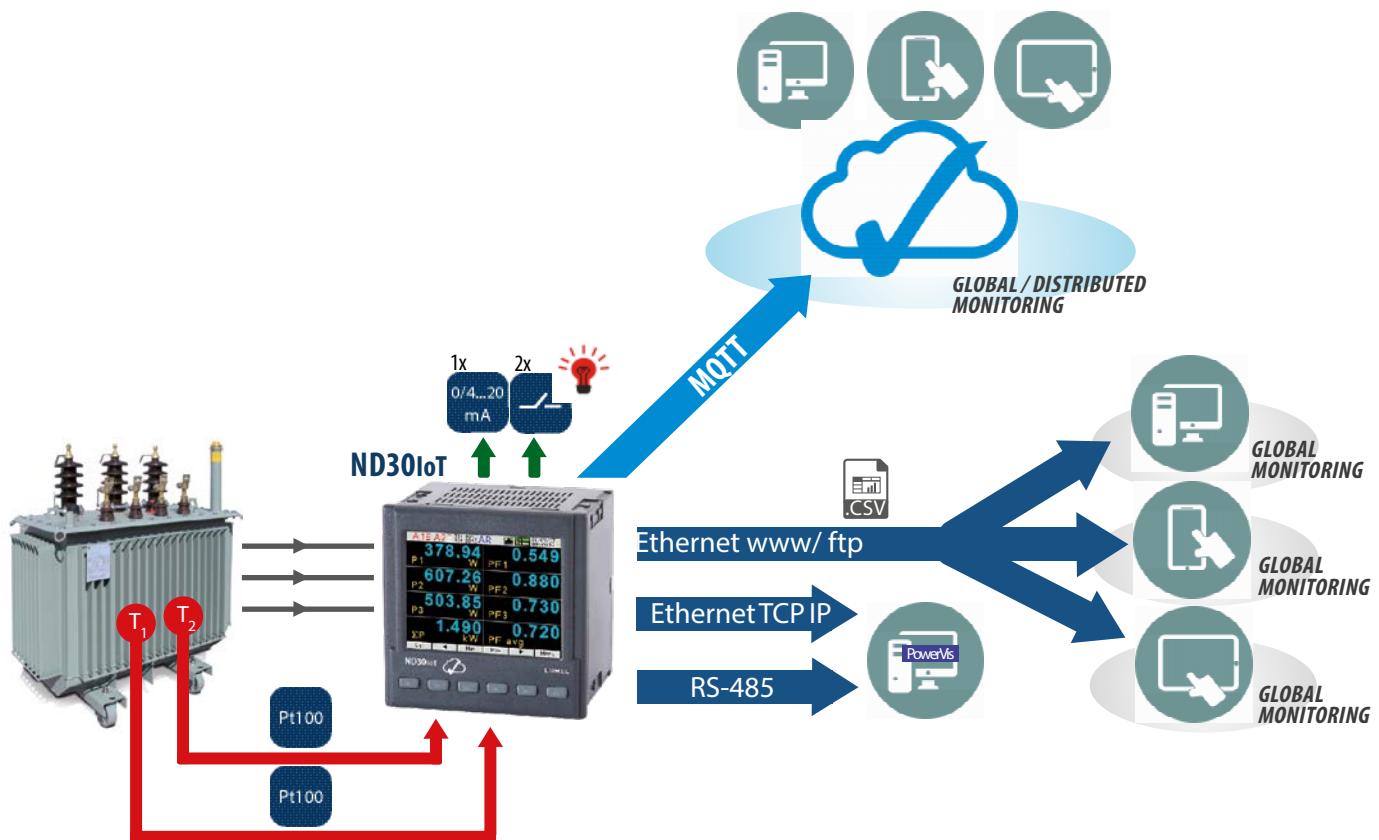




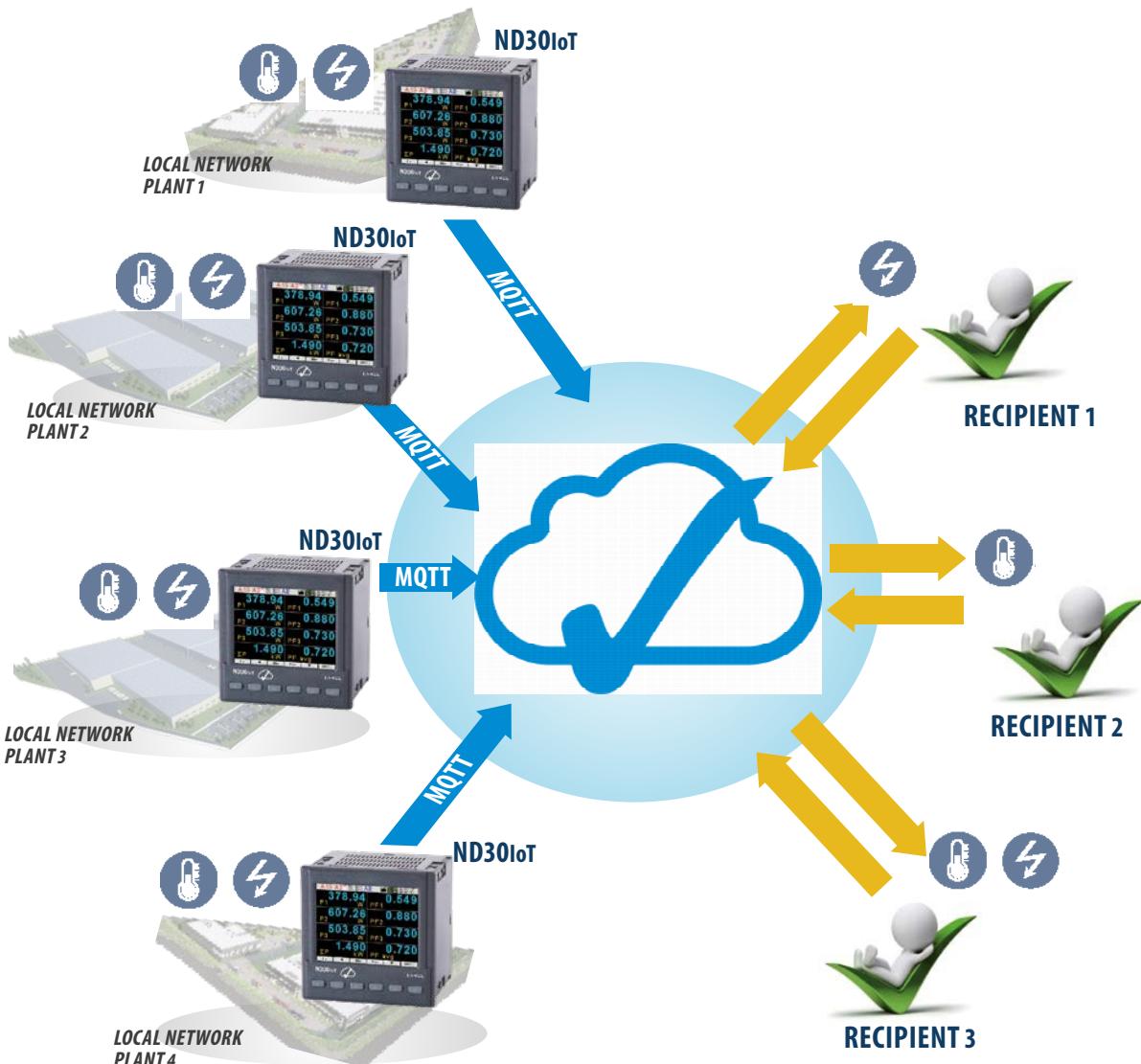
## ND30 - METER OF POWER NETWORK PARAMETERS ND30IoT - METER OF POWER NETWORK PARAMETERS FOR IoT APPLICATIONS

- 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:  $PF_1, PF_2, PF_3$
- 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:  $PF, \text{tg}\varphi$
- 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:  $P_{\text{demand}}$
- 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  $\text{THD}_{U1}, \text{THD}_{U2}, \text{THD}_{U3}, \text{THD}_{I1}, \text{THD}_{I2}, \text{THD}_I$  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)

# ND30, ND30IoT - METER OF POWER NETWORK PARAMETERS



FEATURES	INPUTS	OUTPUTS	GALVANIC ISOLATION

## TECHNICAL DATA

### MEASURING RANGE

Measured value	Measuring range	L1	L2	L3	$\Sigma$	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 $P_i$ , average active power $P_{dt}$	.. (-)1999.9 W .. (-)1999.9 MW (tr_U≠1,tr_l≠1)	.	.	.	.	Class 0.5
Reactive power $Q_i$	.. (-)1999.9 Var .. (-)1999.9 MVar (tr_U≠1,tr_l≠1)	.	.	.	.	Class 1
Apparent power $S_i$ , 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 <sup>1)</sup>
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 $PF_i$	-1.00 .. 0 .. 1.00	.	.	.	.	± 0.01 of basic error
Coefficient $tg\phi_i$ (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 $U_{h1} \dots U_{h50}$ , and current $I_{h1} \dots I_{h50}$	0.0 .. 100.0 %	.	.	.		Class 5 50 / 60 Hz

tr\_l, tr\_U – ratio of current and voltage transformer

<sup>1)</sup> 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 8N2,8E1,801,8N1	Address 1..247
Ethernet 10/100 Base-T - option	Modbus TCP,HTTP,FTP MQTT	WWW server, FTP server, DHCP client

## EXTERNAL FEATURES

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

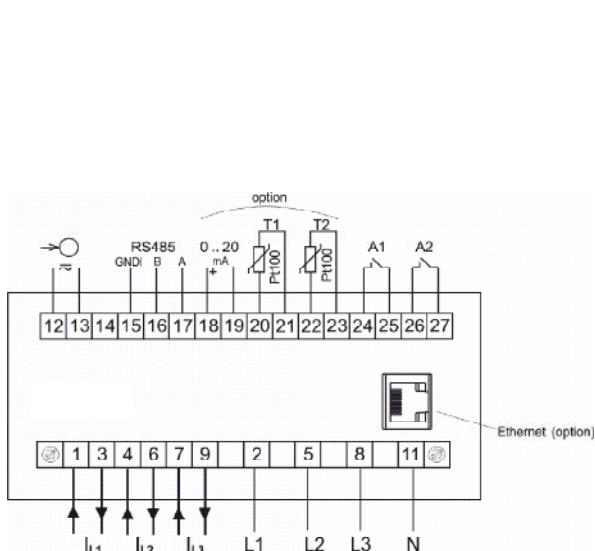
## RATED OPERATING CONDITIONS

<b>Supply voltage</b>	→ 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
<b>Power consumption</b>	in voltage circuit ≤ 0.2 VA	in current circuit ≤ 0.1 VA
<b>Input signal</b>	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%)
<b>Power factor</b>	-1...0...1	
<b>Preheating time</b>	5 min.	
<b>Ambient temperature</b>	-10...23...55°C, class K55 acc. to EN61557-12	
<b>Humidity</b>	0...40...65...95%	without condensation
<b>Operating position</b>	any	
<b>External magnetic field</b>	≤ 40...400 A/m d.c.	≤ 3 A/m a.c. 50/60 Hz
<b>Short-term overload</b>	voltage input: 2 Un (5 sec.)	current input 50 A (1 sec.)
<b>Admissible crest factor</b>	current: 2	voltage: 2
<b>Additional error (in % of the intrinsic error)</b>		from ambient temperature change: < 50% / 10°C

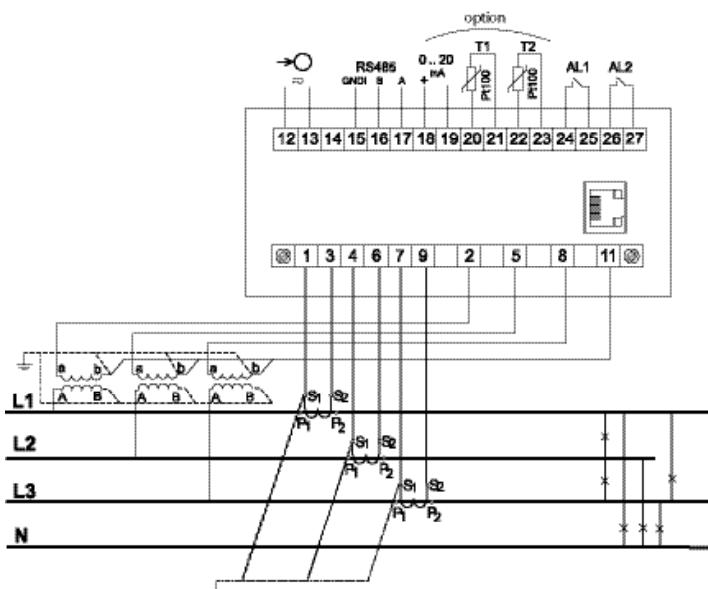
## SAFETY AND COMPABILITY REQUIREMENTS

<b>Electromagnetic compatibility</b>	noise immunity noise emissions	acc. to EN 61000-6-2 acc. to EN 61000-6-4
<b>Isolation insured by the casing</b>	double	acc. to EN 61010-1
<b>Isolation between circuits</b>	basic	acc. to EN 61010-1
<b>Polution level</b>	2	acc. to EN 61010-1
<b>Installation category</b>	III	acc. to EN 61010-1
<b>Maximal phase-to-earth voltage</b>	• 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
<b>Altitude a.s.l.</b>	< 2000 m	

## CONNECTION DIAGRAMS



Description of meter connections strips



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

# ND30, ND30IoT - METER OF POWER NETWORK PARAMETERS



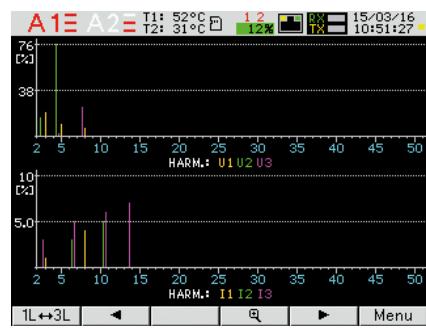
## DISPLAYING OF MEASUREMENT PARAMETERS

A1	A2	T1: 52°C	T2: 31°C	12%	TX	15/03/16	11:33:16
U1	V	I1	A				
<b>225.48</b>		<b>1.005</b>					
U2	V	I2	A				
<b>228.91</b>		<b>2.105</b>					
U3	V	I3	A				
<b>231.22</b>		<b>1.805</b>					
f	Hz	avg	A				
49.999		<b>1.638</b>					
Del	<	Min	Max	>	Menu		

A1	A2	T1: 131°C	T2: 329°C	12%	TX	15/03/16	13:04:26
ΣP	W	21 660 807.201					
ΣQ	var	2 786 343.635					
ΣS	kVA	1.126					
24 853 934.200		13 760.862					
En S	kVAh	12 035.698					
En Q+	kvarh						
Del	<	Min	Max	>	Menu		

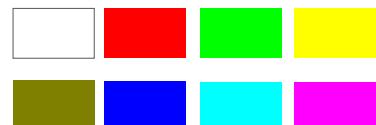
A1	A2	T1: 52°C	T2: 57°C	12%	TX	15/03/16	12:02:57
U1	V	S1	VA				
<b>225.48</b>		<b>226.57</b>					
I1	A	PF1					
<b>1.005</b>		<b>0.913</b>					
P1	W	tg1					
<b>206.88</b>		<b>0.447</b>					
Q1	var	f	Hz				
<b>92.387</b>		<b>49.999</b>					
Del	<	Min	Max	>	Menu		

A1	A2	T1: 49°C	T2: 53°C	12%	TX	22/09/15	13:36:31
U1	%	I1	%				
<b>0.905</b>		<b>0.905</b>					
U2	%	I2	%				
<b>0.905</b>		<b>0.903</b>					
U3	%	I3	%				
<b>0.903</b>		<b>0.903</b>					
<b>Har. 5</b>							
50160	<	▼	▲	►	Menu		



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

# ND30, ND30IoT - METER OF POWER NETWORK PARAMETERS



## METER CONFIGURATION WITH FREE eCON SOFTWARE

The screenshot shows the 'e-Con Device configurator' interface. On the left, a sidebar lists 'Select device:' filters for 'Meters' (checked) and other options like 'Transducers', 'Controllers', and 'RF modules'. Below this are communication settings: Port (dropdown), Device ID (1), Baud rate (9600), Mode (RTU BHZ), and Timeout (1000 ms). A note says 'Use the factory settings of the module'. Status is 'port disconnected' and Device is 'unknown'. On the right, the main window is titled 'ND30 - configuration' with a sub-section 'Pages - general settings'. It includes fields for 'Pages selection (on/off)' (checkboxes for pages 1-10), 'Harms pages selection (on/off)' (checkboxes for pages 11-12), 'Display brightness' (dropdown: Minimum, Low, Medium, High, Maximum), 'Display dimmer delay' (dropdown: 0-3600 s), 'Pages color' (dropdown: Green, Blue, Red, Yellow, Orange, Purple, Cyan, Magenta, Black), and 'Reset pages settings' (checkbox: No, Yes, Restore). 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 web interface for a 3-phase power network meter. At the top, there's a logo with 'LUMEL' and 'EVERYTHING COUNTS' and a small UK flag icon. Below it, the title '3-PHASE POWER NETWORK METER TYPE ND30' is displayed. The interface is divided into several sections:

- Page 1:** Shows three-phase voltages (U12, U23, U31) and currents (I1, I2, I3), frequency (f), and power factor (PF avg).
- Page 2:** Shows total power ( $\Sigma P$ ), reactive power ( $\Sigma Q$ ), apparent power ( $\Sigma S$ ), and PF avg.
- Page 3:** Shows energy consumption (EnP+) and generation (EnQ) in kWh and Mvarh.
- Page 4:** Shows THD values for each phase (THDU12, THDU23, THDU31) and their respective percentages.
- Page 5:** Shows three-phase voltages (U2, U3, U12, U31) and currents (I2, I3, I1, I31).
- Harmonics numbers:** Two stacked bar charts showing harmonic content for phases U1, U2, and U3. The top chart shows harmonics from 1 to 31, and the bottom chart shows harmonics from 11 to 31. A note above the charts says 'Harmonic U no : H18 U1=0.0 %, U2=0.0 %, U3=0.0 %'.
- Energy counters:** A section with four icons: Measure values, Energy counters, Ethernet, and a question mark. Below these are buttons for 'Min Max' and 'Min-max values'. Network information is also provided: IP: 10.0.0.69, Metric: 255.0.0.0, Gate: 10.10.10.200, DHCP: On.

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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

# ND30, ND30IoT - METER OF POWER NETWORK PARAMETERS



## ORDERING CODE

Meter ND30 -	X	X	X	X	XX	E	X
<b>Input voltage (phase/phase-to-phase) Un:</b>							
3 x 57.7 / 100 V, 3x 230 / 400 V	1						
3 x 110 / 190 V, 3 x 400 / 690 V	2						
<b>Additional outputs /inputs:</b>							
2 relays	1						
2 relays, 1 analog output, 2 inputs PT100	2						
<b>Interface:</b>							
RS-485		1					
RS-485 and Ethernet, internal memory		2					
<b>Supply:</b>							
85...253 V a.c., 90...300 V d.c.			1				
20...40 V a.c., 20...60 V d.c.			2				
<b>Version:</b>							
standard				00			
custom-made*				XX			
<b>Language:</b>							
English					E		
<b>Acceptance tests:</b>							
without additional quality requirements				0			
with an extra quality inspection certificate				1			
acc.to customer's request				X			

### 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.

\* only after agreeing with the manufacturer

Meter ND30IoT -	X	X	2	X	MQ	E	X
<b>Input voltage (phase/phase-to-phase) Un:</b>							
3 x 57.7 / 100 V, 3x 230 / 400 V	1						
3 x 110 / 190 V, 3 x 400 / 690 V	2						
<b>Additional outputs /inputs:</b>							
2 relays	1						
2 relays, 1 analog output, 2 inputs PT100	2						
<b>Interface:</b>							
RS-485 and Ethernet, internal memory		2					
<b>Supply:</b>							
85...253 V a.c., 90...300 V d.c.			1				
20...40 V a.c., 20...60 V d.c.			2				
<b>Version:</b>							
MQTT				MQ			
<b>Language:</b>							
English				E			
<b>Acceptance tests:</b>							
without additional quality requirements				0			
with an extra quality inspection certificate				1			
acc.to customer's request*				X			

### 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.

\* only after agreeing with the manufacturer

For more information about Lumel products  
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DISEÑOS Y TECNOLOGIA S.A.

Xarol, 6B P.I. Les Guixeres  
08915 Badalona - ESPAÑA  
tel.: +34 933 394 758, fax +34 934 903 145  
[www.ditel.es](http://www.ditel.es)

made in Poland by

LUMEL S.A.  
[www.lumel.com.pl](http://www.lumel.com.pl)

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