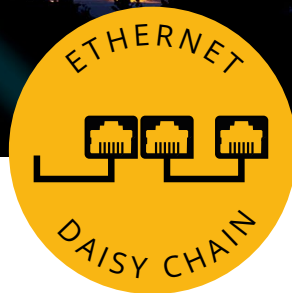


LUMEL



ND31U

POWER NETWORK METER

WITH ETHERNET DAISY CHAIN
AND MQTT (IIoT), BACNET/IP
OR MODBUS TCP/IP PROTOCOLS

FEATURES

- Measurement of 54 power network parameters, including current and voltage harmonics up to 63rd in 1PW2, 1P3W split phase, 3P3W or 3P4W balanced and unbalanced systems:
 - 120/240 V Split-phase 180°,
 - 3 x 120/208 V,
 - 3 x 400/690 V three-phase Y/Δ 120°
- **Ethernet Daisy Chain Topology.**
- Programmable choice of communication protocols: MQTT, BACnet / IP lub MODBUS TCP/IP.
- Modern and user-friendly BACnet/IP interface.
- High accuracy class (0.2S for active energy).
- Graphical color display: LCD 3.5" typu TFT, 640 x 480 pixels, fully configurable by a user.
- **Time-of-Use function (ToU)** for monitoring energy consumption in individual tariffs according to a user-defined schedule
- 14 predefined screens designed for intuitive operation, including harmonics display, analog-style meter visualization, and a demand power screen useful for forecasting power consumption.
- Memory of minimum and maximum values.
- 2 configurable alarm outputs.
- Supervisory relay mode for alarm outputs.
- Analog output 0/4...20 mA for retransmission of the measured value and Pt 100 input (eg. for measurement of transformer temperature).
- Digital output RS-485 - MODBUS protocol.
- Archiving of up to 32 measured parameters in the internal memory 8 GB.
- Modern and user-friendly Ethernet interface 10/100 BASE-T:
 - protocol: MODBUS TCP/IP, HTTP, FTP,
 - protocol: MQTT,
 - protocol: BACnet/IP,
 - services: www server, ftp server, DHCP client, NTP server,
 - Daisy Chain communication 2 x RJ45; 10/100 Mbit/s; 10Base-T / 100Base-TX.
- Programming of parameters using free eCon software.
- Overall dimensions: 96 x 96 x 77 mm.

ETHERNET DAISY CHAIN - ONE CABLE, MANY CONNECTIONS

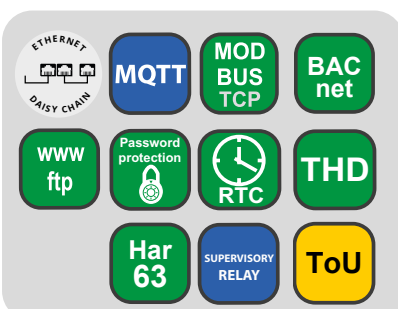
The **ND31U** is equipped with **2 x RJ45 Ethernet ports** that support daisy chain topology — enabling serial connection of Ethernet devices without the need for network switches between them.

What does this mean in practice?

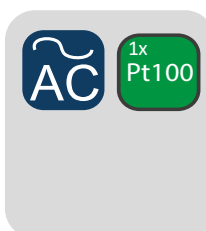
- Saves panel space — no need to install industrial switches,
- Reduces cabling and hardware costs — only one connection between devices,
- Faster installation and fewer errors — simplified wiring,
- Easy system expansion — new devices can be added without modifying the existing infrastructure,
- Improved cabinet organization — fewer cables result in a cleaner setup.



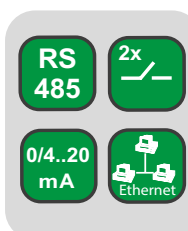
FEATURES



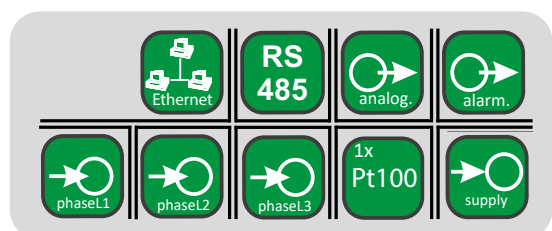
INPUTS



OUTPUTS



GALVANIC ISOLATION



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_U, THD_I
- harmonics for current and phase voltage up to 63rd!
- temperature (1 x Pt100 input)

EXAMPLE OF APPLICATION

MEASUREMENT OF SMT LINES PARAMETERS.

PROMOTIC SCADA WITH POWER GUARD FUNCTION

GLOBAL/ DISTRIBUTED MONITORING

COLLECTING DATA FROM THE PRODUCTION LINES TO THE CLOUD, ENABLING PARAMETER MONITORING FROM ANYWHERE IN THE WORLD AND REMOTE DECISION-MAKING.

GLOBAL MONITORING

REAL-TIME PREVIEW OF MEASURED PARAMETERS

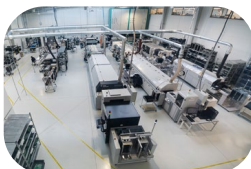
LOCAL MONITORING

CALCULATION OF LINE OPERATING TIMES AND PERFORMANCE OF ENERGY CONSUMPTION ACCOUNTS. OPTIMISATION OF THE PRODUCTION LINES THROUGH PARAMETER ANALYSIS.

PROMOTIC SCADA WITH POWER GUARD FUNCTION

ETHERNET DAISY CHAIN

SMT LINES



L1
L2
L3



MQTT

Ethernet www

Modbus TCP/IP

RS-485

ND31U

ND31U

ND31U

TECHNICAL DATA

MEASURING RANGE

Measured value	Measuring range	L1	L2	L3	Σ	Class
Current I/S 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 120 V~ 400 V~	12.000 .. 24.000 .. 144.000 V 40.000 .. 80.000 .. 480.000 V ... 1920.0 kV	•	•	•		0.2 (EN 61557-12)
Voltage L-L 208 V~ 690 V~	20.800 .. 41.600 .. 249.000 V 69.000 .. 138.000 .. 830.000 V ... 1999.0 kV (tr_U ≠ 1)	•	•	•		0.5 (EN 61557-12)
Active power P	-19999 MW .. 0,000 W 19999 MW (tr_U ≠ 1, tr_I ≠ 1)	•	•	•	•	0.5 (EN 61557-12)
Reactive power Q	-19999 MVar .. 0,000 Var 19999 MVar (tr_U ≠ 1, tr_I ≠ 1)	•	•	•	•	1 (EN 61557-12)
Apparent power S	0.000 .. 1999,9 VA 19999 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				•	0.2S (EN 62053-22)
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 $U_{h2} \dots U_{h63}$ and current $I_{h2} \dots I_{h63}$	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)	1 x Pt100, 2-wire, measuring range -50...400°C, basic error 0.5 %

DIGITAL INTERFACE

Interface type	Transmission protocol	Remarks
Ethernet Daisy Chain (2 x RJ45) Ethernet 10/100 Base-T	Modbus TCP, HTTP, FTP	WWW server, FTP server, DHCP client, NTP server
	MQTT	
	BACnet/IP	BACnet Standardized Device Profile (Annex L): BACnet Application Specific Controller (B-ASC); BACnet Interoperability Building Blocks (BIBB) Support (Annex K in BACnet Addendum 135d): DS-RP-B, DS-WP-B, DS-RPM-B, DM-DOB-B, DM-DCC-B, DM-RD-B; Binding methods support: Receive Who-Is, send I-Am (BIBB, DM-DDB-B); Receive Who-Has, send I-Have (BIBB DM-DOB-B)
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

EXTERNAL FEATURES

Readout field	graphic color display LCD TFT 3,5", 640 x 480 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

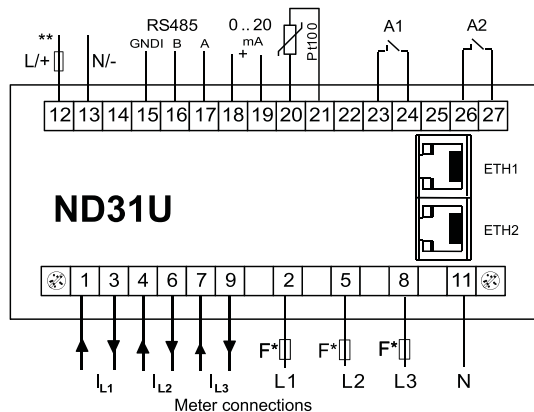
RATED OPERATING CONDITIONS

Supply voltage	85...300 V a.c. (50/60 Hz), 90...300 V d.c.	power consumption ≤ 6 VA
Power consumption	in voltage circuit ≤ 0.5 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, $\tan\phi$	frequency 45...50...60...100 Hz, sinusoidal (THD $\leq 8\%$)
Power factor	-1...0...1	
Preheating time	5 min.	
Ambient temperature	-10...23...55°C, class K55 acc. to EN61557-12	
Humidity	0...40...60...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 COMPATIBILITY REQUIREMENTS

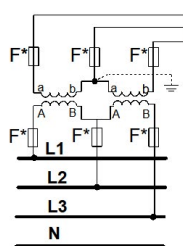
Electromagnetic compatibility	noise immunity	acc. to EN 61000-6-2, EN IEC 61326-1
	radio-frequency common mode: • level 2: 0.15...1 MHz • level 3: 1 MHz...80 MHz	
Isolation between circuits	noise emissions	acc. to EN 61000-6-4, EN IEC 61326-1
	basic	acc. to EN 61010-1
Pollution level	2	acc. to EN 61010-1
Overvoltage category OVC	III	for voltage to earth up to 300V
	II	for voltage to earth up to 600V
Maximal phase-to-earth voltage	• for supply circuit and relay outputs 300 V • for measuring input 500 V • for circuits of RS-485, Ethernet, analog outputs: 50 V	acc. to EN 61010-1
Altitude a.s.l.	< 2000 m	

CONNECTION DIAGRAMS

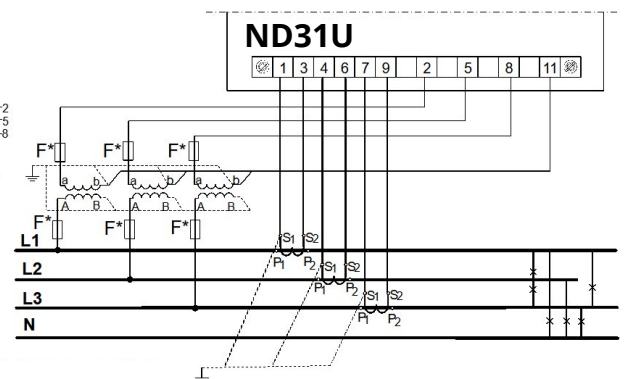


* Fuses must be provided by the customer

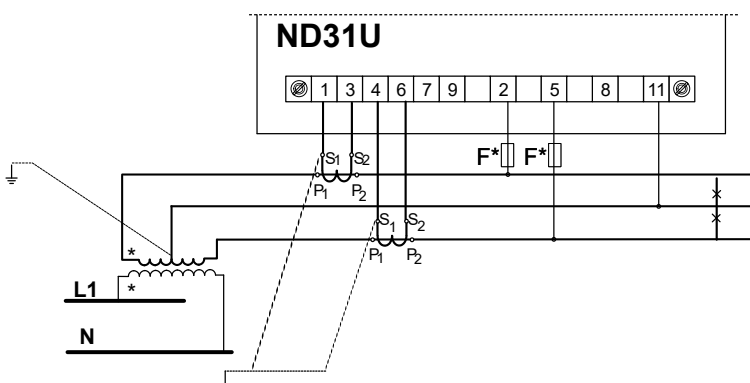
**Connection of supply voltage



* Fuses must be provided by the customer



Description of meter connections strips



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

* Fuses must be provided by the customer.

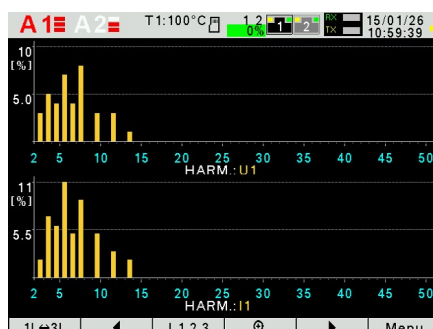
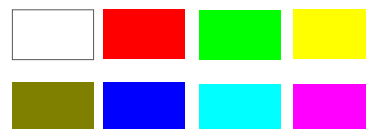
Measurement in 1-phase 3-wire network

DISPLAING OF MEASUREMENT PARAMETERS

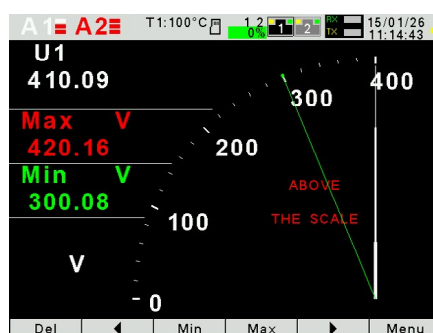
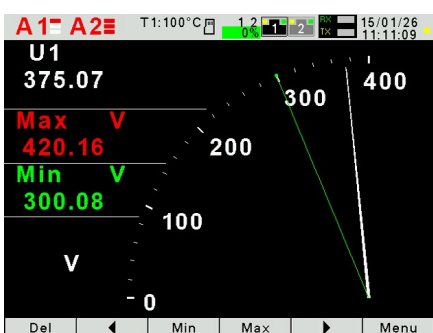


up to 10 programmable screens
(8 parameters per page);
ability to change color for all screens

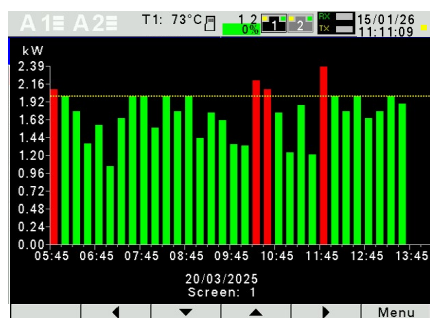
Available colors for digital indications:



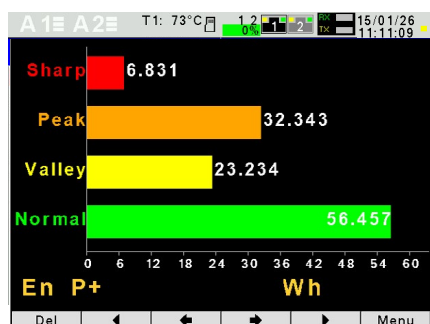
two screens dedicated to harmonics;
indication of individual harmonic
for voltages and currents (up to 51st);
bargraph presentation for all harmonics
with zoom function



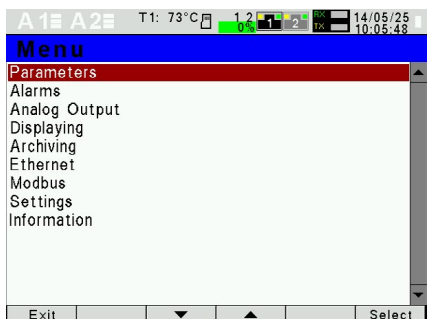
presentation in the form of analog
meter view with min/max preview
for display value and zoom function



Contracted power representation (Max Demand) in W, kW or MW, which can be used for forecasting power consumption.

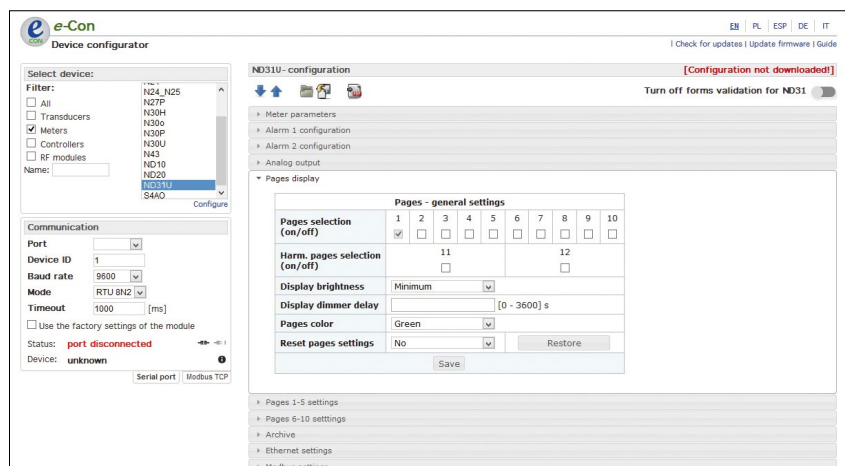


Current energy consumption in four tariffs Sharp/Peak/Valley/Normal in 12 user-defined seasons and 14 schedules



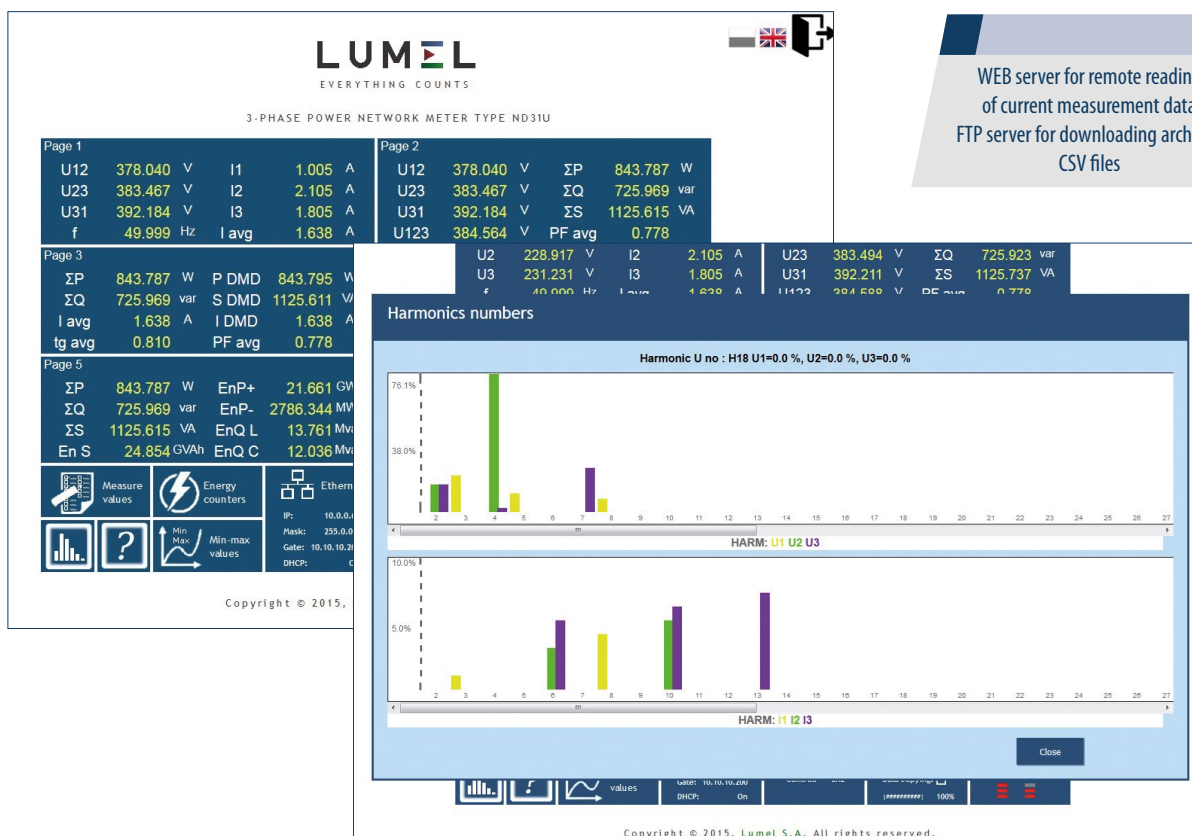
easy to use and intuitive menu; information bar with status of: phase sequence, alarm outputs, temperature measurements, archiving and memory, Ethernet and RS-485 interfaces, time and date

METER CONFIGURATION WITH FREE eCON SOFTWARE



ability to configure and update ND31U with free eCon software (via RS-485 or Ethernet interface)

REMOTE READOUT OF PARAMETERS THROUGH ETHERNET: WWW SERVER, FTP



ORDERING CODE

Meter ND31U			
2x relays, 1x analog output 0/4...20mA, 1x Pt100 input, RS-485, dual-port Ethernet, internal file system memory	X	X	XXXX
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	
Version			
standard			
custom made*			XXXX

* only by agreement with the manufacturer.

ORDER EXAMPLE, code **ND31U M 0** means:

ND31U – ND31U meter,
M – Polish-English language version,
0 – no additional requirements,
– standard version.

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45 75 131, 45 75 132
e-mail: export@lumel.com.pl

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