LUMEL
EVERYTHING COUNTS

NEW!


# ND40

## - POWER NETWORK ANALYZER / RECORDER

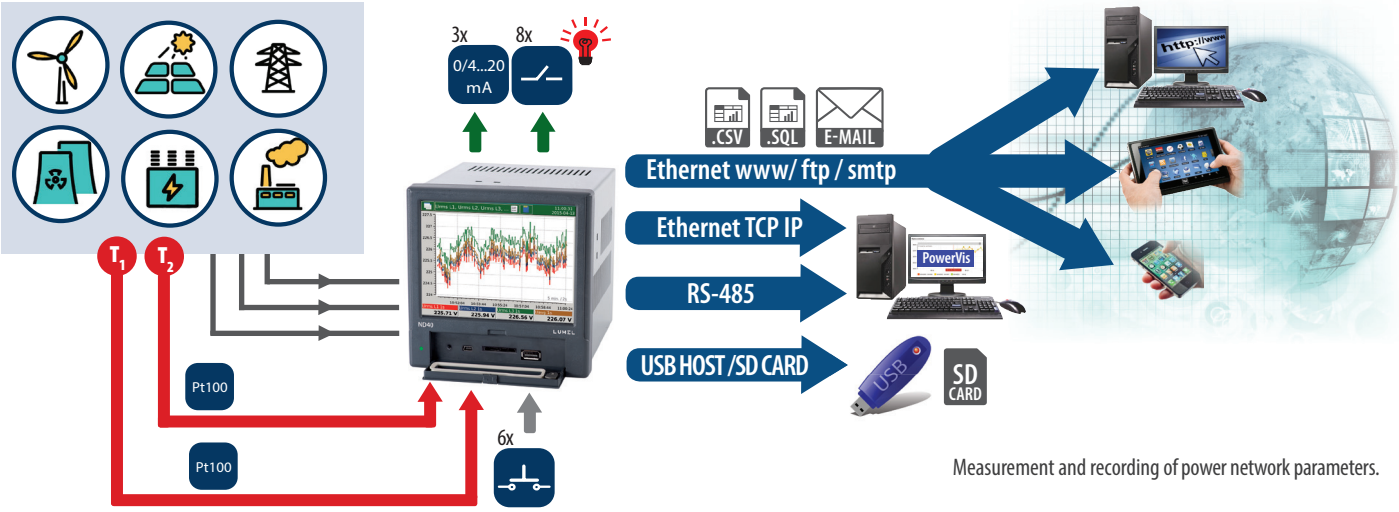
- Measurement and recording of over 500 electric energy quality parameters acc. to EN 50160, EN 61000-4-30, EN 6100-4-7 standards.
- Measuring class A - for 3 second aggregation. 10 minute and 2 hour aggregation - class S.
- Operation in 3 or 4-wire, 3-phase, balanced or unbalanced power networks.
- Analysis of current and voltage harmonics up to the 51 st for class I (acc. to EN 61000-4-7).
- Configurable archives of actual values and event recording.
- Data archiving on an SD card - memory up to 32 GB.
- E-mail messages in case of alarm occurs,
- Web Server, FTP Server.
- Interfaces: RS-485 Modbus Slave, Ethernet 100 Base-T (Modbus TCP Server), USB Device & Host.
- Colour touch screen: LCD TFT 5.6", 640 x 480 pixels.
- IP65 protection grade from the frontal side.
- Synchronization of RTC clock with the NTP time server.

CLASS A

Electrical Safety CAT III

CE

## EXAMPLE OF APPLICATION




Measurement and recording of power network parameters.

## MEASUREMENT AND VISUALIZATION OF POWER NETWORK PARAMETERS

**Aggregated values for 3 seconds, 10 minutes and two hours:**

- phase voltages $U_1$, $U_2$, $U_3$, $U_{123}$avg
- phase current $I_1$, $I_2$, $I_3$, $I_{123}$avg
- active phase powers $P_1$, $P_2$, $P_3$, $\Sigma P_{123}$, $P_{123}$avg
- reactive phase powers $Q_1$, $Q_2$, $Q_3$, $\Sigma Q_{123}$, $Q_{123}$avg
- apparent phase powers $S_1$, $S_2$, $S_3$, $\Sigma S_{123}$, $S_{123}$avg
- active power factors $PF_1$, $PF_2$, $PF_3$, $PF_{123}$avg
- power factor distortion $dPF_1$, $dPF_2$, $dPF_3$, $dPF_{123}$avg
- reactive/active power factors $tg\varphi_1$, $tg\varphi_2$, $tg\varphi_3$, $tg\varphi_{123}$avg
- phase-to-phase voltages $U_{12}$, $U_{31}$, $U_{23}$, $U_{123}$avg
- current in neutral wire $I_n$
- the angle between the voltage and current $\varphi_1$, $\varphi_2$, $\varphi_3$, $\varphi_1$, $\varphi_{123}$avg (degrees and radians)
- voltage phase-to-phase angle $\sphericalangle U_{12}$, $\sphericalangle U_{31}$, $\sphericalangle U_{23}$, $\sphericalangle U_{123}$avg

**Other parameters:**

- frequency (aggregation for 1 and 10 seconds)
- temperature/ resistance values (two channels)
- Demand values: P, Q , S , U , I (15-minute, 30-minute or 1 hour).
- energy: active imported/exported, reactive imported/exported and apparent. All energies are calculated for each phase and 3-phase parametres.
- factors: THD, THDS, THDG, PWHD. Calculated for currents and voltages of each phase and 3-phase parameters.
- harmonics from 1 up to 51st for each phase of currents and voltages
- the half wave voltage of each phase
- recording of dips, swells and overvoltages
- storage of minimun and maximum of measured values.

# ND40 - POWER NETWORK ANALYZER / RECORDER

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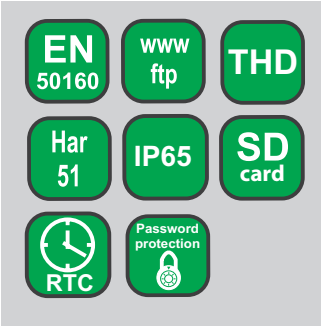
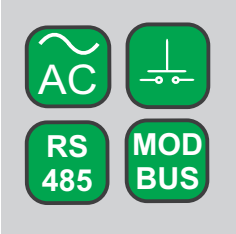
EVERYTHING COUNTS

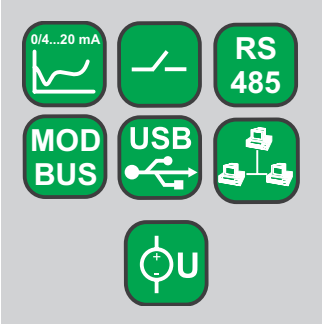
## FEATURES



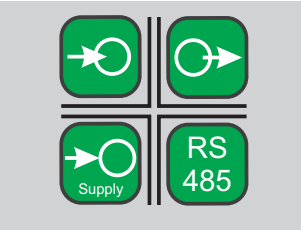

## INPUTS




## OUTPUTS




## GALVANIC ISOLATION




# TECHNICAL DATA

## INPUTS

| Input type | Measuring range | Parameters | Basic error |
|---|---|---|---|
| Voltage input | 230/400 V | 0.05..1.2 Un | ± 0.1% |
| Current input | 1A or 5A | 0.005..1.2 In | ± 0.1% |
| Logic input | 6 logic inputs: 0/5..24 V d.c. | switching frequency up to 50 Hz | |

## OUTPUTS

| Output type | Properties |
|---|---|
| Analog output | 3 programmable current outputs 0/4...20 mA, load resistance < 500 Ω |
| Relay output | 8 programmable electromagnetic relays, voltageless NO contacts, load capacity 250 V a.c./1 A a.c. |

## DIGITAL INTERFACES

| Interface type | Properties |
|---|---|
| RS-485 | 2 interfaces: MODBUS Slave and Master, baud rate 300. . . 115200 bit/s, transmission mode ASCII/RTU |
| USB | 2 interfaces: Device & Host, USB v.2.0 |
| Ethernet | 10 Base-T, RJ45 socket, Modbus TCP Server |

## RATED OPERATING CONDITIONS

| | | | |
|---|---|---|---|
| **Supply voltage** | 85 V..240 V a.c., 40...400Hz | 90 V..320 V d.c. | power consumption: 15 VA, 35 VA (when loading) |
| **Ambient temperature** | work: 0 up to 50°C | | storage: - 20...50°C |
| **Relative humidity** | < 75% | | Condensation inadmissible |
| **Reaction against** | supply decays | | Data and device state preservation |
| | supply recovery | | Continuation of device work |
| **Short term load (5s)** | 2 Un (max. 1000 V) | | 10 In |
| **Casing protection grade** | IP 65 | | |
| **Safety requirements** | Installation category III | | EN 61010-1 |
| | Pollution grade 2 | | |
| **Maximum phase-to-earth operating voltage** | RS485, temperature/resistance input, USB: 50V | | EN 61010-1 |
| | measuring circuit, relays, supply: 300 V | | |

## MEASURING RANGES AND ADMISSIBLE BASIC CONVERSION ERRORS

| Measuring quantity | Measurement method | Range | Basic error |
|---|---|---|---|
| Voltage U RMS | **U RMS**<br>averaged values:<br>1 s class: B<br>3 s class: A<br>10 min class: S<br>2 hrs class: S | U RMS L-N (150% Un)<br>Un = 230 V - 23.0..46..345.0 V (Ku=1)<br>..480.0 kV (Ku≠1)<br>U RMS L-L (150% Un):<br>Un = 400 V - 40.0..80.. 600.0 V (Ku=1)<br>..1020.0 kV (Ku≠1) | **class A** acc. to EN 61000-4-30:2008<br>**U RMS L-N**<br>(10% Udin - 150% Udin): ±0.1% Udin. |
| Current I RMS | **I RMS**:<br>averaged values:<br>1 s class: B<br>3 s class: A<br>10 min class: S<br>2 hrs class: S | **I RMS (150% In)**:<br>In = 1 A - 0.010..0.1..1.5 A (Ki=1)<br>In = 5 A - 0.050..0.5..7.5 A (Ki=1)<br>..480.0 kA (Ki≠1) | **I RMS**<br>(10% In - 150% In): ±0.1% of measurement |
| Frequency | Class S<br>appointed from 10 or 12 cycles in 200 ms. | 42.5 up to 57.5 Hz for 50 Hz a.c. of supply<br>51.0 up to 69.0 Hz for 60 Hz a.c. of supply | Class S acc. to EN 61000-4-30:2008<br>±0.050 Hz |
| | **Class A**<br>appointed from 100 or 120 cycles in 10 s. | | **Class A** acc. to EN 61000-4-30:2008<br>±0.010 Hz |
| Active, reactive and apparent power | **Active power:**<br>Measured every 10 cycles (50 Hz) or 12 cycles (60 Hz)<br>**Reactive power:**<br>appointed from apparent and active power.<br>**Apparent power:**<br>appointed from value U RMS and I RMS. | Depends on voltage and actual ratio value. | acc. to EN 61557-12:<br><br>Active power: ± 0.5% Pn<br>Reactive power: ± 1% Qn<br>Apparent power: ± 0.5% Sn |

| Measuring quantity | Measurement method | Range | Basic error |
|---|---|---|---|
| Active imported/exported energy,<br>reactive imported/exported energy,<br>apparent energy | Measured every 10 cycles (50 Hz) or 12 cycles (60 Hz).<br><br>Separate measurement for exporten, imported **active and reactive energy**. | Depends on voltage and actual ratio value. | acc. to EN 61557-12:<br><br>Active power: ± 0,5%<br>Reactive power: ± 1%<br>Apparent power: ± 2% |
| Active power factor,<br>Power distortion factor | Active power factor :<br>depends on U RMS, I RMS and active power.<br>Power distortion factor depends on THD I. | -1,000 .. 0 .. 1,000 | Power factor PF ± 0.01%<br>Power distortion factor PFdist ± 0.05% |
| Harmonics of voltages and current | acc. to EN 61000-4-7:2007, up to 51st harmonic<br>Window: 10 cycles<br>(for 50 Hz), 12 cycles<br>(for 60 Hz). FFT: 4096 points | Voltage harmonics: 0.00 .. 100.00 %<br>Current harmonics: 0.00 .. 100.00 % | Voltage harmonics – class II<br><br>± 5% Urdg if Urdg > 1%<br>± 0.05% Un if Urdg < 1%<br><br>Current harmonics – class II<br><br>± 5% Urdg if Urdg > 3%<br>± 0.5% Un if Urdg < 3% |
| THD U, THD I, THDG U, THDG I, THDS U, THDS I,<br>PWHD U, PWHD I | acc. to EN 61000-4-7:2007, up to 51st harmonic<br>Window: 10 cycles<br>(for 50 Hz), 12 cycles<br>(for 60 Hz). FFT: 4096 points | THD U: 0.00 .. 100.00 %<br>THD I: 0.00 .. 100.00 %<br>THDG U: 0.00 .. 100.00 %<br>THDG I: 0.00 .. 100.00 %<br>THDS U: 0.00 .. 100.00 %<br>THDS I: 0.00 .. 100.00 %<br>PWHD U: 0.00 .. 100.00 %<br>PWHD I: 0.00 .. 100.00 % | THD U: ±5% (50/60Hz)<br>THD I: ±5% (50/60Hz)<br>THDG U: ±5% (50/60Hz)<br>THDG I: ±5% (50/60Hz)<br>THDS U: ±5% (50/60Hz)<br>THDS I: ±5% (50/60Hz)<br>PWHD U: ±5% (50/60Hz)<br>PWHD I: ±5% (50/60Hz) |

where:
- Ku - voltage transformer ratio
- Ki - current transformer ratio
- Udin - declared input voltage
- Urdg, Irdg - measurement values
- Un, In, Pn, Qn - nominal values

## EXAMPLES OF MEASURING DATA PRESENTATION

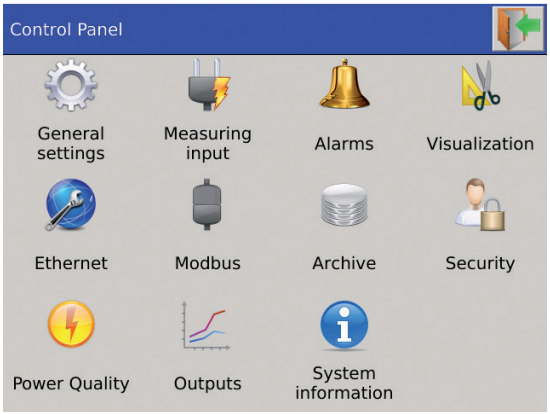
**Various forms of data display:**

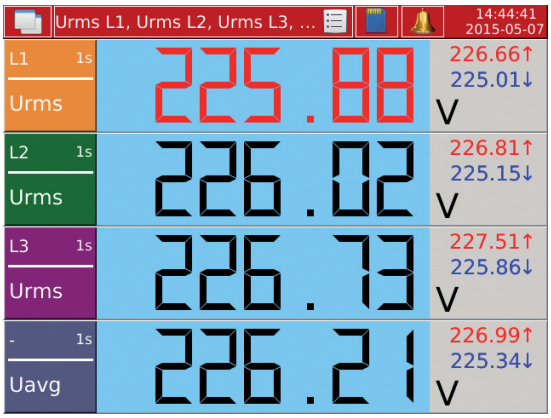
- **digital display**
- **analog view,**
- **bargraphs,**
- **vector diagrams**
- **trends**
- **energy meter**
- **harmonics analysis**
- **energy meter.**

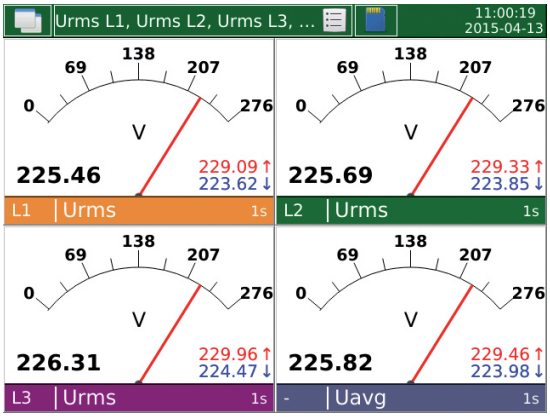
Screen system log files.

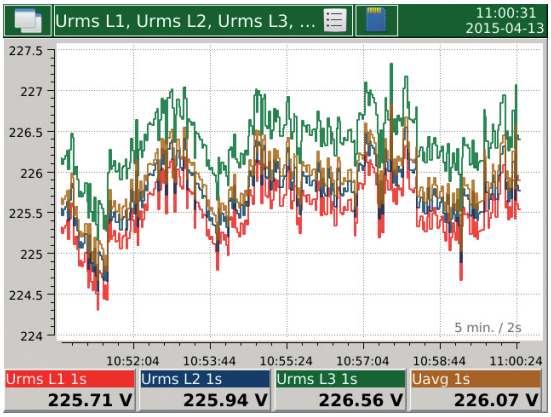
Screens log alarms.

Control panel.

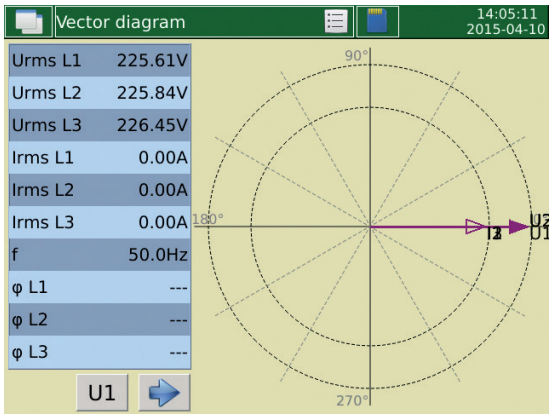


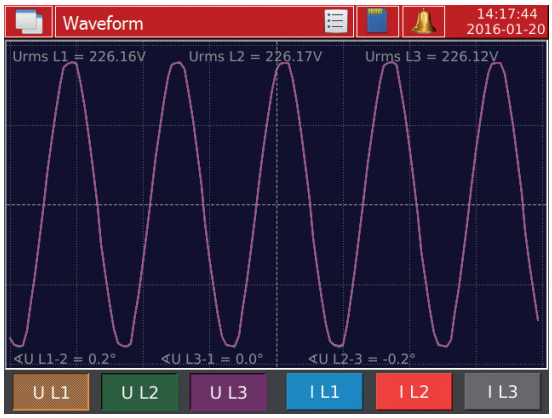



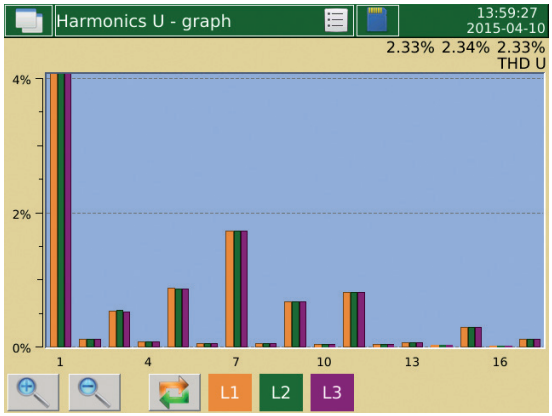



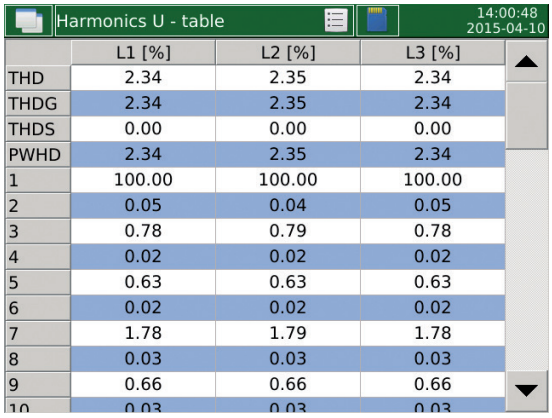



## EXAMPLES OF MEASURING DATA PRESENTATION

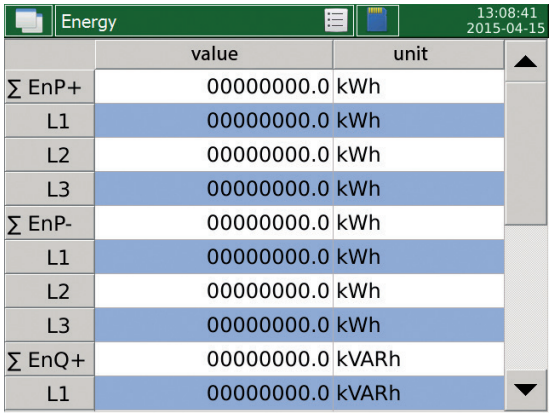


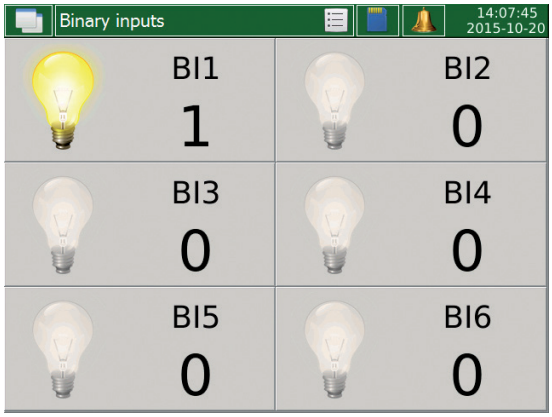



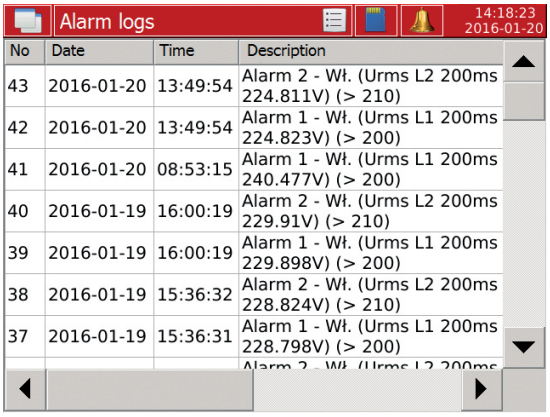




| | L1 [%] | L2 [%] | L3 [%] |
|---|---|---|---|
| THD | 2.34 | 2.35 | 2.34 |
| THDG | 2.34 | 2.35 | 2.34 |
| THDS | 0.00 | 0.00 | 0.00 |
| PWHD | 2.34 | 2.35 | 2.34 |
| 1 | 100.00 | 100.00 | 100.00 |
| 2 | 0.05 | 0.04 | 0.05 |
| 3 | 0.78 | 0.79 | 0.78 |
| 4 | 0.02 | 0.02 | 0.02 |
| 5 | 0.63 | 0.63 | 0.63 |
| 6 | 0.02 | 0.02 | 0.02 |
| 7 | 1.78 | 1.79 | 1.78 |
| 8 | 0.03 | 0.03 | 0.03 |
| 9 | 0.66 | 0.66 | 0.66 |
| 10 | 0.03 | 0.03 | 0.03 |



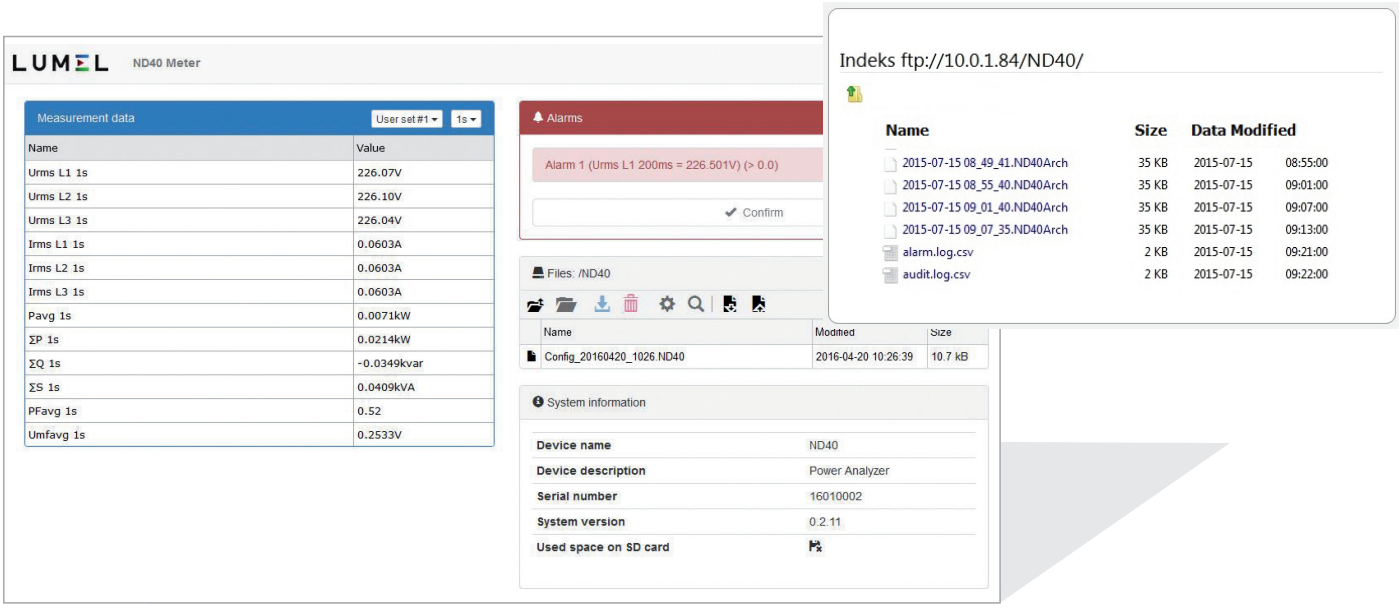

| | value | unit |
|---|---|---|
| ∑ EnP+ | 00000000.0 | kWh |
| L1 | 00000000.0 | kWh |
| L2 | 00000000.0 | kWh |
| L3 | 00000000.0 | kWh |
| ∑ EnP- | 00000000.0 | kWh |
| L1 | 00000000.0 | kWh |
| L2 | 00000000.0 | kWh |
| L3 | 00000000.0 | kWh |
| ∑ EnQ+ | 00000000.0 | kVARh |
| L1 | 00000000.0 | kVARh |



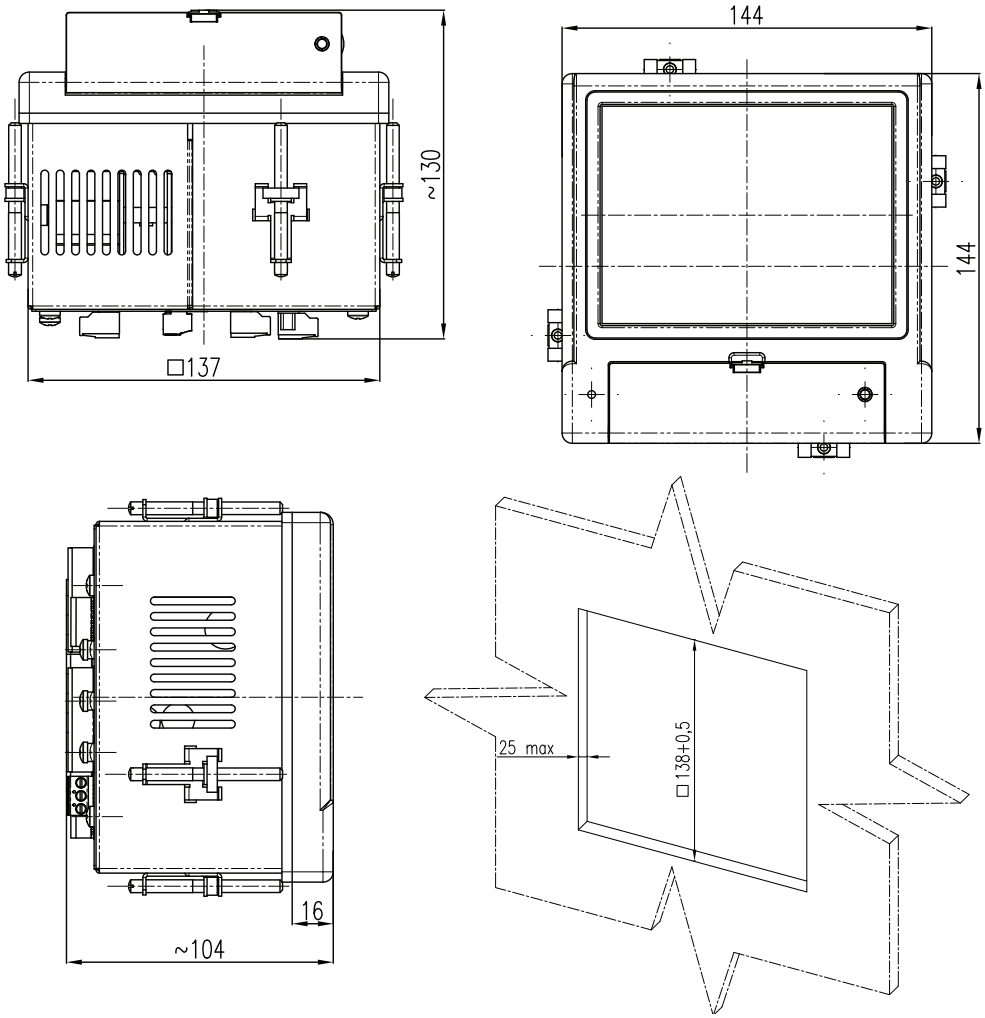




| No | Date | Time | Description |
|---|---|---|---|
| 43 | 2016-01-20 | 13:49:54 | Alarm 2 - Wł. (Urms L2 200ms 224.811V) (> 210) |
| 42 | 2016-01-20 | 13:49:54 | Alarm 1 - Wł. (Urms L1 200ms 224.823V) (> 200) |
| 41 | 2016-01-20 | 08:53:15 | Alarm 1 - Wł. (Urms L1 200ms 240.477V) (> 200) |
| 40 | 2016-01-19 | 16:00:19 | Alarm 2 - Wł. (Urms L2 200ms 229.91V) (> 210) |
| 39 | 2016-01-19 | 16:00:19 | Alarm 1 - Wł. (Urms L1 200ms 229.898V) (> 200) |
| 38 | 2016-01-19 | 15:36:32 | Alarm 2 - Wł. (Urms L2 200ms 228.824V) (> 210) |
| 37 | 2016-01-19 | 15:36:31 | Alarm 1 - Wł. (Urms L1 200ms 228.798V) (> 200) |

## ETHERNET: **WWW SERVER, FTP**




## DIMENSIONS AND ASSEMBLY



# ND40 - POWER NETWORK ANALYZER / RECORDER

LUMEL
EVERYTHING COUNTS

## ORDERING CODE

| Analyzer/recorder ND40 - | X | X | XX | X | X |
|---|---|---|---|---|---|
| **Class:** | | | | | |
| class S | 0 | | | | |
| class A/S | 1 | | | | |
| **Inputs / outputs:** | | | | | |
| whitout | | 0 | | | |
| 8 relay outputs | | 1 | | | |
| 6 logic inputs, 4 relay outputs | | 2 | | | |
| 6 logic inputs, 3 analog outputs | | 3 | | | |
| **Version:** | | | | | |
| standard | | | 00 | | |
| custom-made* | | | XX | | |
| **Language:** | | | | | |
| Polish | | | | P | |
| English | | | | E | |
| German | | | | D | |
| Russian | | | | R | |
| 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: **ND40 - 0 1 00 E 0** means:
**ND40** - analyzer/ recorder ND40
**0** - class S
**1** - 8 relay outputs
**00** - standard version
**E** - user's manual in English
**0** - without additional quality requirements.

## SEE ALSO:

**ND30** - power network meter with Ethernet and recording

**RE92** - dual loop controller

**P30U** - universal transducer of temperature and standard signals

**ND20** - power network meter

**N43** - rail mounted 3-phase power network meter

**P43** - 3-phase transducer of power network parameters

Current transformers from 5 A up to 6 kA

**PowerVis** - process visualization software

Free **eCON** software

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