

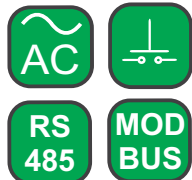
# ND1 3-PHASE POWER QUALITY ANALYSER

## FEATURES:

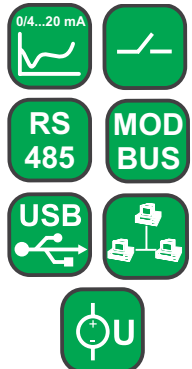


- Measurement and recording of over 300 electric energy quality parameters acc. to EN 50160 standard.
- Operation in 3 or 4-wire, 3-phase, balanced or unbalanced power networks.
- Analysis of current and voltage harmonics up to the 51 st.
- Configurable archives of actual values and event recording.
- Data archiving on a CompactFlash card - memory up to 4 GB.
- Web Server, FTP Server.
- Interfaces: RS-485 (Modbus Slave, Modbus Master), Ethernet 10 Base-T (Modbus TCP/IP Server) and USB.
- Colour touch screen: LCD TFT 5.7", 320 x 240 pixels.
- Users friendly interface based on Windows®CE.
- IP65 protection grade from the frontal side.
- Recording of operator's messages.
- Synchronization of RTC clock with the NTP time server.

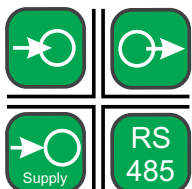
## INPUTS:



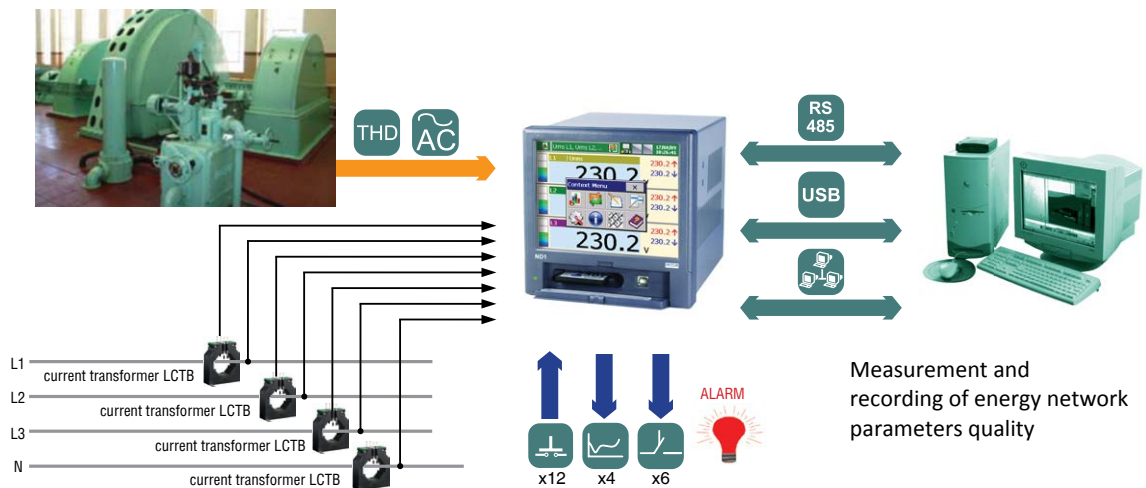
## OUTPUTS:



## GALVANIC ISOLATION:



## EXAMPLE OF APPLICATION



## MEASUREMENT, VISUALIZATION AND RECORDING OF OVER 300 PARAMETERS OF 3-PHASE BALANCED OR UNBALANCED POWER NETWORK

- phase voltages:  $U_1, U_2, U_3$  and phase currents:  $I_1, I_2, I_3$
- phase-to-phase voltages:  $U_{12}, U_{23}, U_{31}$
- 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:  $tg\phi_1, tg\phi_2, tg\phi_3$
- mean phase-to-phase voltage:  $U_s, U_{mf}$
- current in neutral wire and mean 3-phase current:  $I_0, I_s$
- active, reactive and apparent 3-phase power:  $P, Q, S$
- mean 3-phase power factors:  $PF, tg\phi$
- frequency  $f$  and frequency deviation
- 15 minutes' mean active power: **PAV**
- active, reactive and apparent 3-phase energy: **EnP, EnQ, EnS**
- **THD** for voltage and phase current,
- **harmonics** for current and phase voltage **up to 51 st!**
- **storage of min and max values**
- recording of dips and voltage decays
- monitoring of run function
- voltage asymmetry
- flicker parameters: **PST, PLT**

## 5 instruments in 1:



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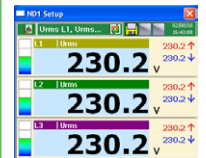
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ul. Sulechowska 1  
65-022 Zielona Góra  
POLAND  
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| INPUTS  |   |   |                                   |
|---|---|---|-----------------------------------|
| Kind of input   | Measuring range   | Parameters  | Basic error                       |
| Voltage input   | 57.7/100 V, 230/400 V or 400/690 V  | 0.05...1.2 Un   | ± 0.2%                            |
| Current input   | 1 A or 5 A  | 0.005...1.2 In  | ± 0.2%                            |
| Logic input   | 12 inputs: 0/5...24 V d.c.  | switch frequency up to 50 Hz                                      |                                   |
| OUTPUTS   |   |   |                                   |
| Kind of output  | Properties  |   |                                   |
| Analog output   | • 4 programmable current outputs of 0/4...20 mA, load resistance < 500 Ω                              |   |                                   |
| Relay output  | • 6 programmable electromagnetic relays, voltageless NOC contacts, load capacity: 250 V a.c./1 A a.c. |   |                                   |
| Output to supply object transducers                     | • 2 outputs of 24 V d.c./30 mA  |   |                                   |
| DIGITAL INTERFACES                                      |   |   |                                   |
| Interface type  | Properties  |   |                                   |
| RS-485  | 2 interfaces: MODBUS Slave and Master, baud rate: 300...256000 bit/s, transmission mode ASCII/RTU     |   |                                   |
| USB   | Device V.1.1, USB-B socket  |   |                                   |
| Ethernet  | 10 Base-T, RJ45 socket, Modbus Slave TCP/IP   |   |                                   |
| RATED OPERATING CONDITIONS                              |   |   |                                   |
| Supply voltage  | 85...253 V a.c. (40...50...400) Hz or 90...300 V d.c.<br>18...30 V d.c. (custom-made version)         | Power consumption ≤ 30 VA   |                                   |
| Ambient temperature                                     | Work: 0...23...50°C   | Storage: - 20...60°C  |                                   |
| Relative humidity                                       | < 70%   | Condensation inadmissible   |                                   |
| Reaction against  | supply decays<br>supply recovery  | Data and device state preservation<br>Continuation of device work |                                   |
| Short term load (5s)                                    | 2 Un (max. 1000 V)  | 10 In   |                                   |
| Casing protection grade                                 | From frontal side: IP 65  | From terminal side: IP20  |                                   |
| Safety requirements                                     | Installation category: II<br>Pollution grade: 2   | EN 61010-1  |                                   |
| Maximum phase-to-earth operating voltage                | From the measuring system, relays and supply: 500 V<br>For RS-485 and USB interfaces: 50 V            |   |                                   |
| MEASURING RANGES AND ADMISSIBLE BASIC CONVERSION ERRORS |   |   |                                   |
| Measuring quantity                                      | Range   | Basic error   | Remarks                           |
| Voltage U   | 57.73 / 100.0 V (Ku = 1)<br>230.0 / 400.0 V (Ku = 1)<br>400.0 / 690.0 V (Ku = 1)<br>400.0 kV (Ku ≠ 1) | ± 0.2 %   | Ku = 1...4000                     |
| Current I   | 1.000 A (Ki = 1)<br>5.000 A (Ki = 1)<br>100.0 kA (Ki ≠ 1)   | ± 0.2 %   | Ki = 1...20000                    |
| Active power P<br>Mean active power Pav                 | 0.0... (-) 6000,0 W<br>999.00 MW (Ku ≠ 1, Ki ≠ 1)   | ± 0.5 %   |                                   |
| Apparent power S  | 0.0...6000.0 VA<br>999.00 MVA (Ku ≠ 1, Ki ≠ 1)  | ± 0.5 %   |                                   |
| Reactive power Q  | 0.0...(-) 6000.0 var<br>999.00 Mvar (Ku ≠ 1, Ki ≠ 1)  | ± 0.5 %   |                                   |
| Active power factor PF                                  | -1.000...0...1.000  | ± 0.5 %   | PF = Power Factor = P/S           |
| Coefficient tg φ  | -10.00...0...10.00  | ± 1 %   | Ratio of active power to reactive |
| φ angle between U and I                                 | -180°...180°  | ± 0.5 %   | Evaluated from the power triangle |
| Frequency f   | 45.00...66.00 Hz  | ± 0.1 %   |                                   |
| THD U, THD I<br>Harmonics U, I (up to 51)               | 0...200.0 %<br>0...100.0 %  | ± 2 %   | Error in the range 10...120 % U,I |
| PST, PLT  | 0..20   | ± 0.5 %   | in range of 0.05..35 Hz           |
| Active energy EnP                                       | 0...(-) 99 999 999,9 kWh  | ± 0.5 %   |                                   |
| Reactive energy EnQ                                     | 0... (-) 99 999 999,9 kvarh   | ± 0,5 %   |                                   |

where:

|              |  |
|--------------|--|
| <b>Ku</b>    | voltage transformer ratio                        |
| <b>Ki</b>    | current transformer ratio                        |
| <b>THD U</b> | total coefficient of voltage harmonic distortion |
| <b>THD I</b> | total coefficient of current harmonic distortion |

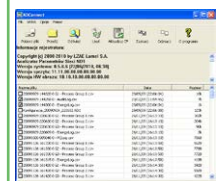
## TOOL SOFTWARE:



**ND1 Setup** - configuration of ND1 analyser on the PC computer.



**KD Check** - digital signature verification of files in csv format.



**KD Connect** - communication service with the analyser through USB interface.

**FTP Download** - automatization of the data importing process from the CF card.

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**Fax:** +48 68 32 54 091  
**e-mail:** export@lumel.com.pl

LUMEL S.A.  
ul. Sulechowska 1  
65-022 Zielona Góra  
POLAND  
**WWW.LUMEL.COM.PL**

# ND1 3-PHASE POWER QUALITY ANALYSER

## EXAMPLES OF MEASURING DATA PRESENTATION

### SEE ALSO:

**LPConfig**  
Free delivered LPConfig program for programming LUMEL's products. Available on our internet page.



Current transformers from 5 A do 6 kA.

### Various forms of data display:

- digital display,
- analog view,
- harmonic analysis,
- bargraphs,
- vector diagram of currents and voltages,
- shape of current and voltage run (oscilloscope),
- watt-hour meter,
- monitoring of binary states,
- tables and others.

### Manual and automatic switching between screens.

## SOFTWARE ND ARCHIVING

- Tools to analyse collected data
- Checking of data authenticity - verification of digital signature

**Results of file signature verification**

File verification: CORRECT!  
Data were not be modified.

- Measuring data: CORRECT
- Audit log: CORRECT
- Alarm log: lack of data
- Energy log: CORRECT
- Log of energy quality: CORRECT
- Log of dips and growths: lack of data

- Data presentation in tables and diagrams

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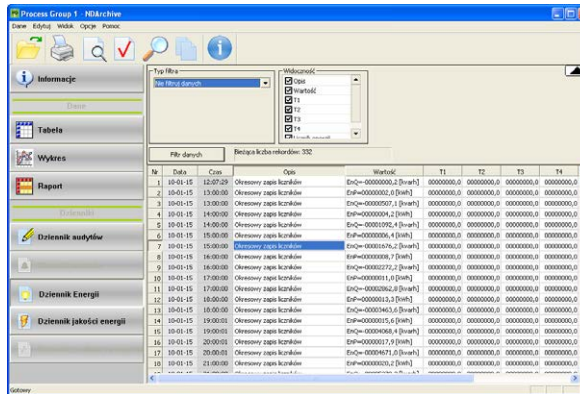
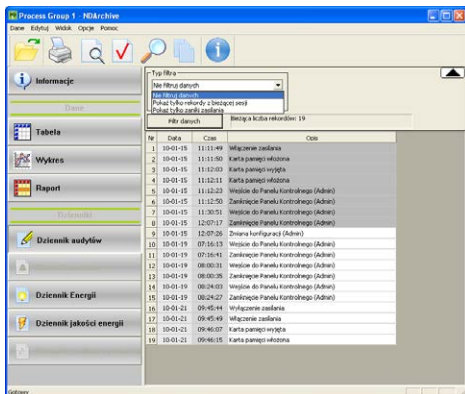
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## ND SOFTWARE ARCHIVING

- Audit log, report of energy quality, report of electric energy consumption

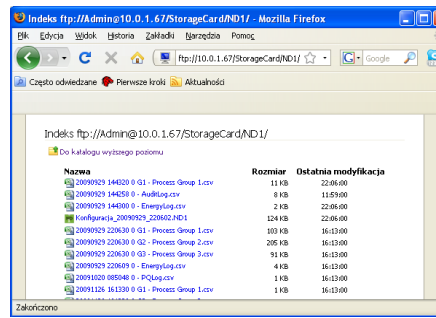
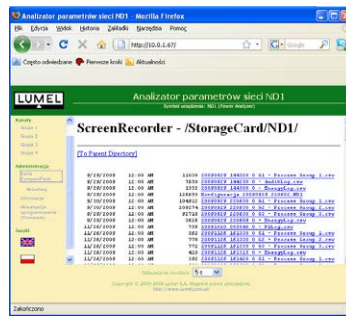


**SEE ALSO:**



Meter of 3-phase network parameters - N14.

## ETHERNET: WWW, FTP SERVER



Meter of network parameters - ND20.

## PORTABLE HOUSING



Housing view from frontal side



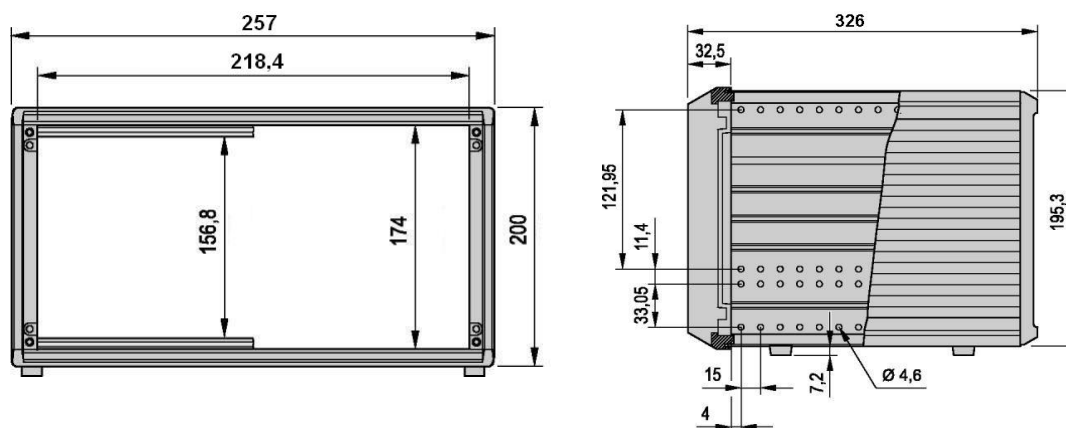
Housing view from rear view

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**HOUSING DIMENSIONS**



LUMEL-PROCES software.

**ACCESSORIES**

1301-130-903 – wire MLS R, 2m, black

1301-130-902 – crocodile terminal AK-2B 2540, black

**ORDERING CODES**

|   |   |   |    |   |   |
|---|---|---|----|---|---|
| ANALYSER OF NETWORK PARAMETERS ND1-         | X | X | XX | X | X |
| <b>Current input:</b>                       |   |   |    |   |   |
| 1 A   | 1 |   |    |   |   |
| 5 A   | 2 |   |    |   |   |
| <b>Voltage input:</b>                       |   |   |    |   |   |
| 57.7/100 V                                  |   | 1 |    |   |   |
| 230/400 V                                   |   | 2 |    |   |   |
| 400/690 V                                   |   | 3 |    |   |   |
| <b>Version:</b>                             |   |   |    |   |   |
| standard                                    |   |   | 00 |   |   |
| custom-made (supply: 18...30 v d.c.)        |   |   | 01 |   |   |
| in a portable case, without RJ45 socket     |   |   | PO |   |   |
| in a portable case, with Rj45 socket        |   |   | PE |   |   |
| <b>Language:</b>                            |   |   |    |   |   |
| Polish                                      |   |   |    | P |   |
| English                                     |   |   |    | E |   |
| other*                                      |   |   |    | X |   |
| <b>Acceptance tests:</b>                    |   |   |    |   |   |
| without extra quality requirements          |   |   |    |   | 0 |
| with a extra quality inspection certificate |   |   |    |   | 1 |
| acc. to customer's request*                 |   |   |    |   | X |

\* after agreeing with the manufacturer

**NOTE:**

Each ND1 analyser is equipped with 6 alarms (electromecanic relays), 4 analog outputs, 12 logic inputs and Ethernet interface.

**EXAMPLE OF ORDER:**

The code **ND1 - 2 1 00 E 0** means:

- ND1** - analyser of 3-phase power network parameters of ND1 type
- 2** - current input: 5 A
- 1** - voltage input: 57.7/100 V
- 00** - standard version
- E** - English language
- 0** - without extra quality requirements.

For more information about LUMEL's products please visit our website:  
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65-022 Zielona Góra  
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