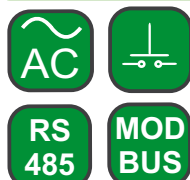


ND1 3-PHASE POWER QUALITY ANALYSER

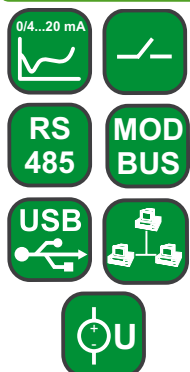
FEATURES:



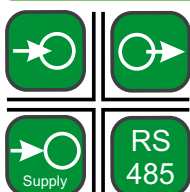
INPUTS:



OUTPUTS:

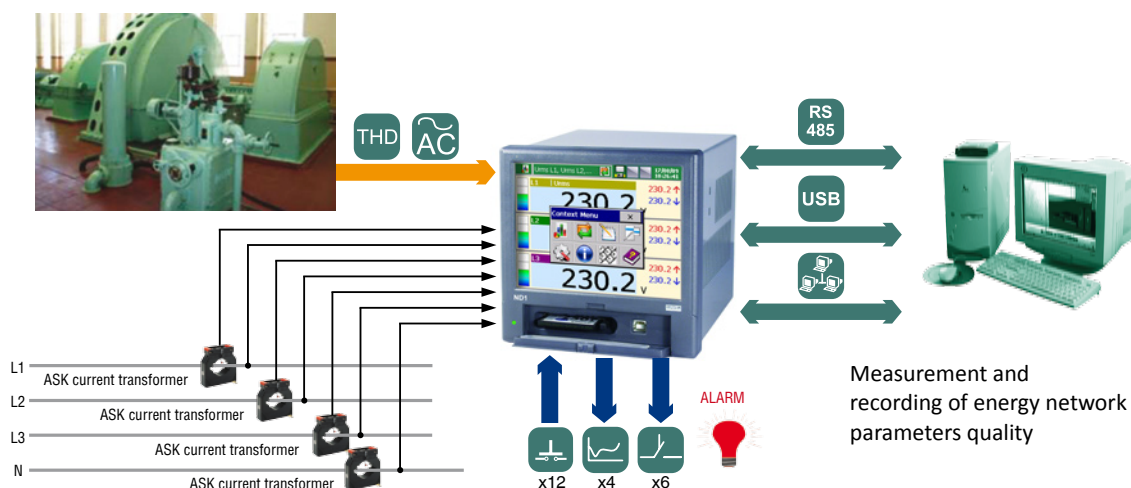


GALVANIC ISOLATION:



- 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.

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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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...230...253 V a.c./d.c., 40...400 Hz a.c.	Power consumption ≤ 30 VA
Ambient temperature	Work: 0...23...50°C	Storage: - 20...60°C
Relative humidity	< 70%	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	From frontal side: IP 65	From terminal side: IP20
Safety requirements	Installation category: II	EN 61010-1
	Pollution grade: 2	
Maximum phase-to-earth operating voltage	From the measuring system, relays and supply: 500 V For RS-485 and USB interfaces: 50 V	

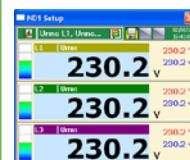
MEASURING RANGES AND ADMISSIBLE BASIC CONVERSION ERRORS

Measuring quantity	Range	Basic error	Remarks
Voltage U	57.73 / 100.0 V (Ku = 1) 230.0 / 400.0 V (Ku = 1) 400.0 / 690.0 V (Ku = 1) 400.0 kV (Ku ≠ 1)	± 0.2 %	Ku = 1...4000
Current I	1.000 A (Ki = 1) 5.000 A (Ki = 1) 100.0 kA (Ki ≠ 1)	± 0.2 %	Ki = 1...20000
Active power P Mean active power Pav	0.0... (-) 6000.0 W 999.00 MW (Ku ≠ 1, Ki ≠ 1)	± 0.5 %	
Apparent power S	0.0...6000.0 VA 999.00 MVA (Ku ≠ 1, Ki ≠ 1)	± 0.5 %	
Reactive power Q	0.0...(-) 6000.0 var 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 Harmonics U, I (up to 51)	0...200.0 % 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 %	

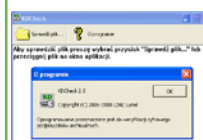
where:

Ku	voltage transformer ratio
Ki	current transformer ratio
THD U	total coefficient of voltage harmonic distortion
THD I	total coefficient of current harmonic distortion

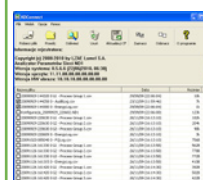
Tool SOFTWARE:



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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SEE ALSO:



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



Current transformers from 5 A to 6 kA.



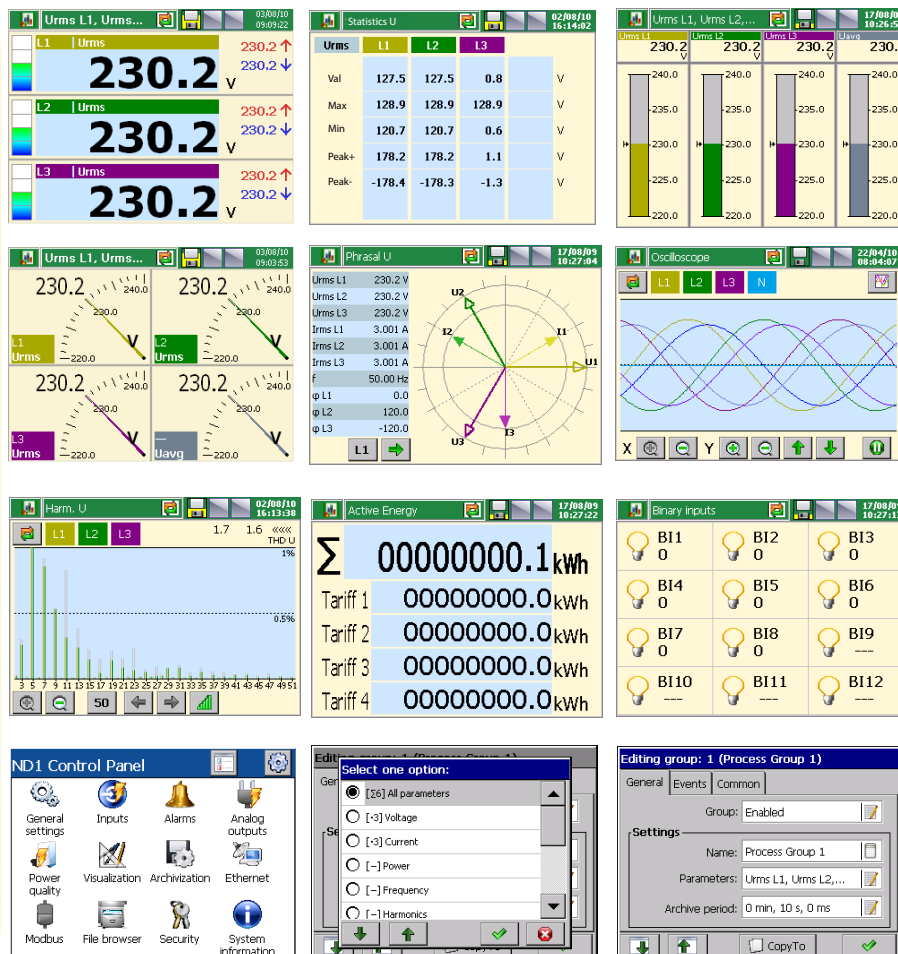
P43 - 3-phase transducers of power network parameters.

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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

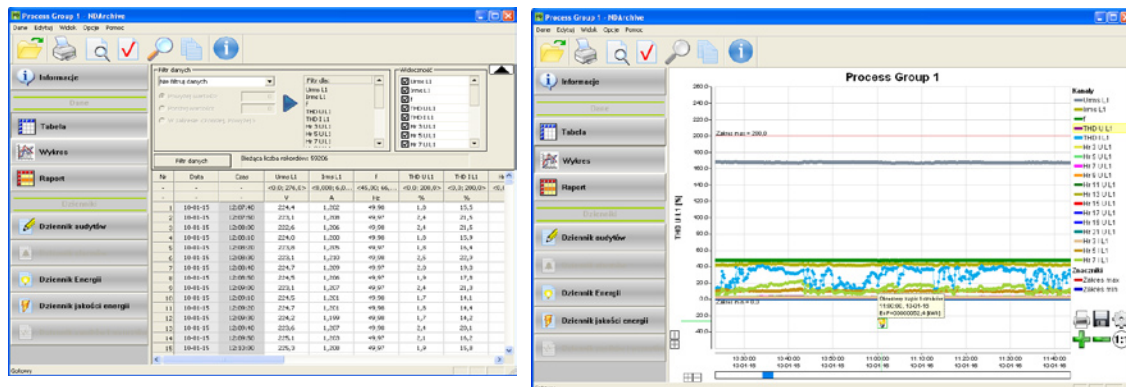
- Tools to analyse collected data
- Checking of data authenticity - verification of digital signature

Results of file signature verification



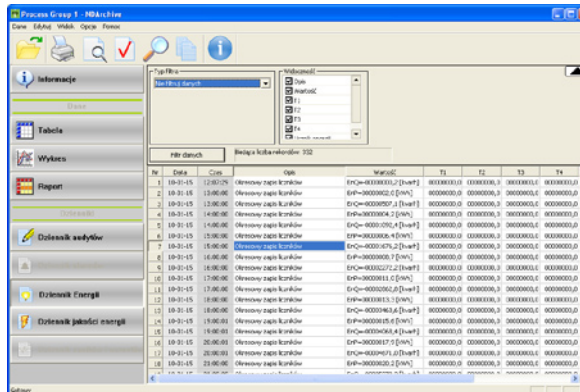
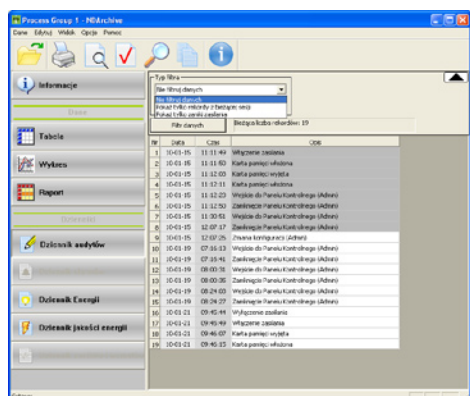
File verification: CORRECT!
Data were not be modified.
• Measuring data: CORRECT
• Audit log: CORRECT
• Alarm log: lack of data
• Energy log: CORRECT
• Log of energy quality: CORRECT
• Log of dips and growths: lack of data

- Data presentation in tables and diagrams



ND SOFTWARE ARCHIVING

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

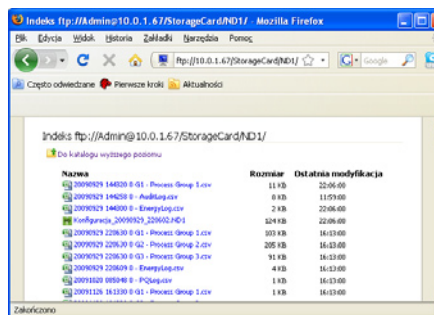
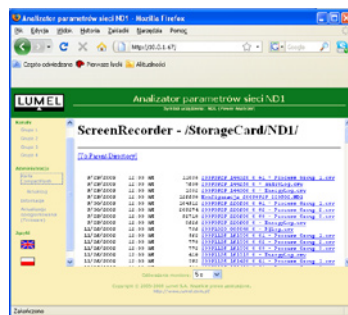


SEE ALSO:



Meter of 3-phase network parameters - N14.

ETHERNET: WWW, FTP SERVER



Meter of network parameters - ND20.

PORTABLE HOUSING



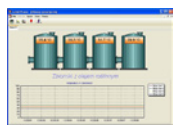
Housing view from frontal side



Housing view from rear view

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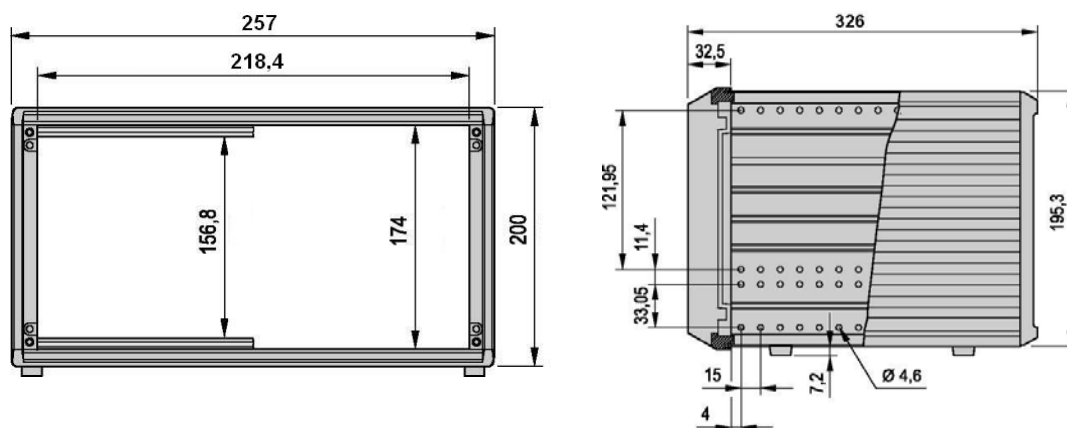
LUMEL-PROCES
software.



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HOUSING DIMENSIONS



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
Current input:					
1 A		1			
5 A		2			
Voltage input:					
57.7/100 V			1		
230/400 V			2		
400/690 V			3		
Version:					
standard				00	
in a portable case, without RJ45 socket				PO	
in a portable case, with RJ45 socket				PE	
Language:					
Polish				P	
English				E	
other*				X	
Acceptance tests:					
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.