

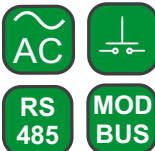
ND1 3-PHASE POWER QUALITY ANALYSER



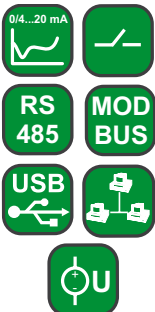
FEATURES:



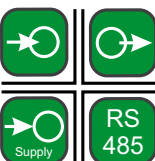
INPUTS:



OUTPUTS:

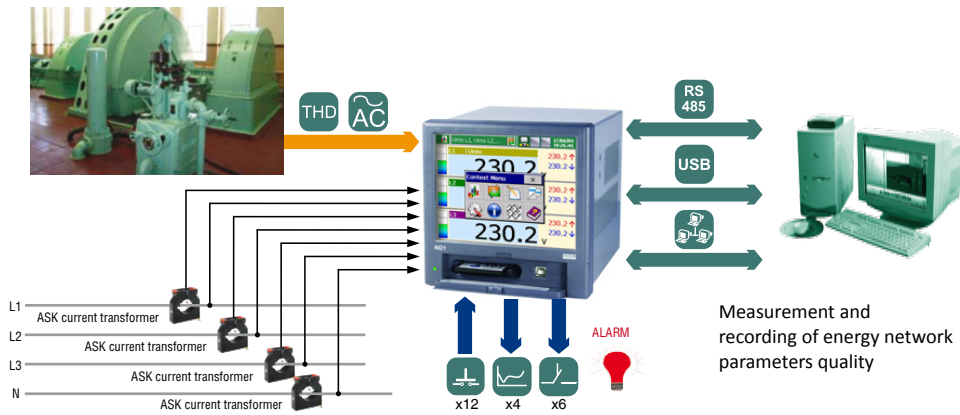


GALVANIC ISOLATION:



- 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 asymetry
- 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-G socket |
| Ethernet | 10 Base-T, RJ45 socket, Modbus Slave TCP/IP |

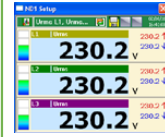
| RATED OPERATING CONDITIONS | | |
|--|--|---|
| Supply voltage | 85...230...253 V a.c./d.c., 40...400 Hz a.c. | Power consumption ≤ 30 VA |
| Ambient temperature | Work: 0...23...50°C | Storage: - 20...60°C |
| Relative humidity | < 70% | Condensation inadmissible |
| Reaction against | supply decays supply recovery | Data and device state preservation 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 Pollution grade: 2 | EN 61010-1 |
| 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 % | |

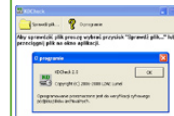
where:

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

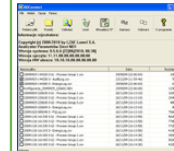
TOOL SOFTWARE:



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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ND1 3-PHASE POWER QUALITY ANALYSER



EXAMPLES OF MEASURING DATA PRESENTATION

SEE ALSO:



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.

The collage includes the following screenshots:

- Urms L1, Urms...**: Digital display of phase voltages (L1, L2, L3) at 230.2 V.
- Statistics U**: Table of voltage statistics (Val, Max, Min, Peak+).
- Urms L1, Urms L2...**: Analog bargraphs for phase voltages.
- Phasor U**: Vector diagram showing phase relationships between U1, U2, and U3.
- Oscilloscope**: Waveform display for three phases (L1, L2, L3).
- Harm. U**: Harmonic analysis graph showing THD U at 1.7%.
- Active Energy**: kWh meter showing 00000000.1 kWh and tariff data.
- Binary inputs**: Grid of 12 binary input indicators (BI1-BI12).
- ND1 Control Panel**: Main navigation menu with icons for settings, inputs, alarms, outputs, power quality, visualization, archiving, ethernet, Modbus, file browser, security, and system information.
- Select one option:** Configuration menu for parameters like Voltage, Current, Power, Frequency, and Harmonics.
- Editing group: 1 (Process Group 1)**: Settings for process group, including name, parameters, and archive period.

SOFTWARE ND ARCHIVING

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



P43 - 3-phase transducers of power network parameters.

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

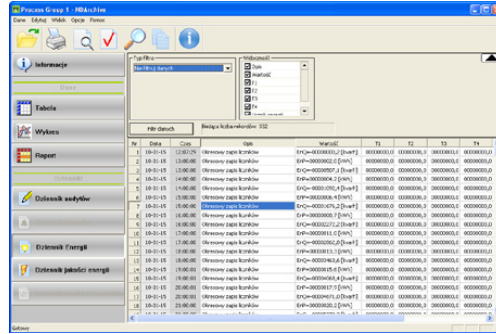
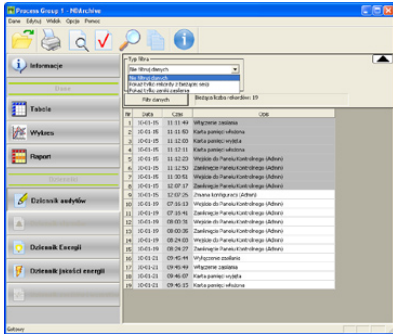
The screenshots show:

- Table view**: A data table with columns for time, phase, and various parameters.
- Graph view**: A multi-line graph titled 'Process Group 1' showing trends for parameters like THD U, Urms L1, Urms L2, Urms L3, I, and P over a time period from 10:00 to 12:00.

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ND SOFTWARE ARCHIVING

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

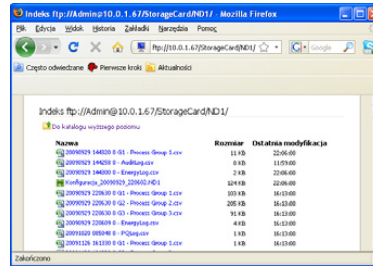
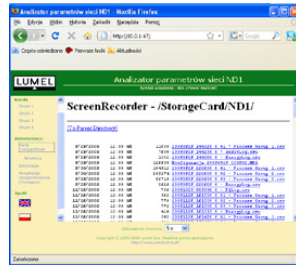


SEE ALSO:



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

Contact Details:

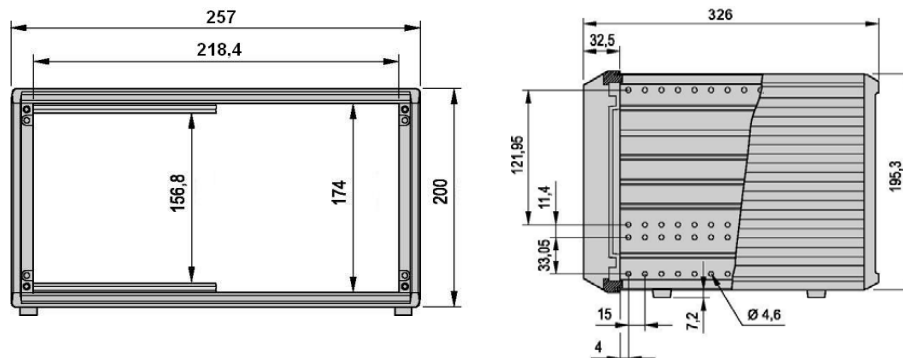
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HOUSING DIMENSIONS



Rishabh-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 |
|--|---|---|----|----|---|
| 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 an extra quality inspection certificate | | | | | 1 |
| acc. to customer's request* | | | | | X |

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.

* after agreeing with the manufacturer

NOTE:

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

our offer



www.rishabh.co.in

For more information about Rishabh's products please visit our website: www.rishabh.co.in

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