# ND1 3-phase power quality analyser

ADEL INSTRUMENTATION

**FEATURES:**

EN 50160 | www ftp | THD | Har 51 | IP65 | CF 4GB | RTC | Password protection

**INPUTS:**

AC | RS 485 | MOD BUS

**OUTPUTS:**

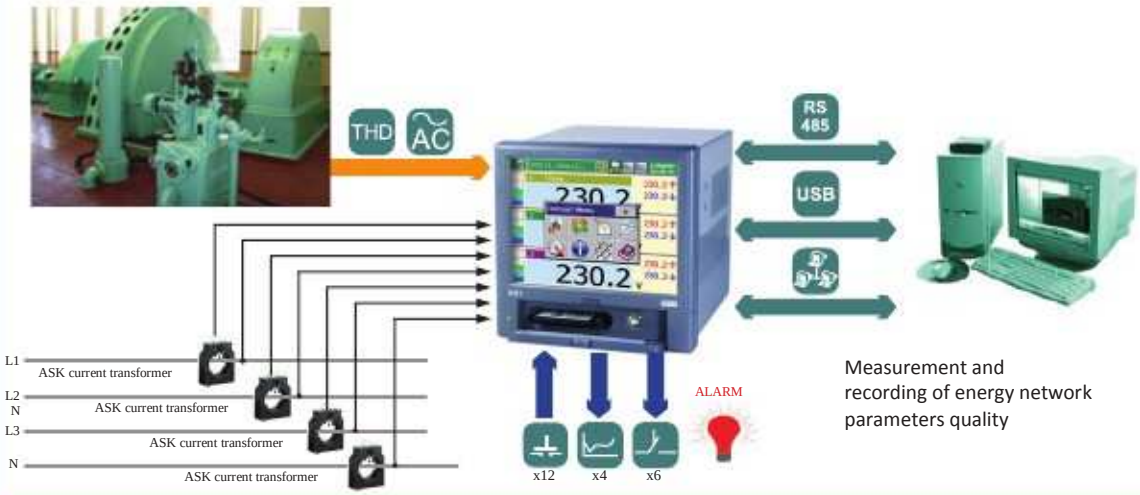
0/4...20 mA | RS 485 | MOD BUS | USB

**GALVANIC ISOLATION:**

Supply | RS 485

- 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 and recording of energy network parameters quality

## Measurement, visualiSation 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: $tgj_1$, $tgj_2$, $tgj_3$
- mean phase-to-phase voltage: $U_S$ $U_{mf}$
- current in neutral wire and mean 3-phase current: $I_O$, $I_S$
- active, reactive and apparent 3-phase power: P, Q, S
- mean 3-phase power factors: PF, tgj
- 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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# ND1 3-phase power quality analyser

## 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, USBB-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 | 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<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 j | -10.00...0...10.00 | ±1% | Ratio of active power to reactive |
| j 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:

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

**See ool :T alSo 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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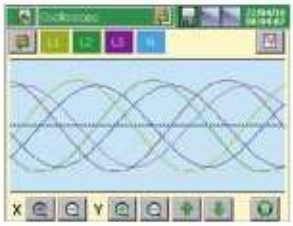
## Examples of measuring data presentation

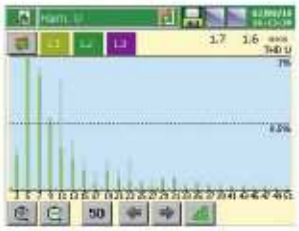
Various forms of data display:

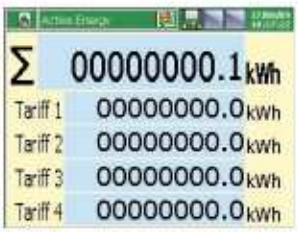
- digital display,
- analog view,
- harmonic analysis,
- bargraphs,
- vector diagram of currents and voltages,
- shape of current and voltage run (oscillo-scope),
- watt-hour meter,
- monitoring of binary states,
- tables and others.

Manual and automatic switching between screens.












See also:

LPConfig

Free delivered LPConfig program for programming

Current transformers from 5 A do 6 kA.

P43 - 3-phase transducers of power network parameters.

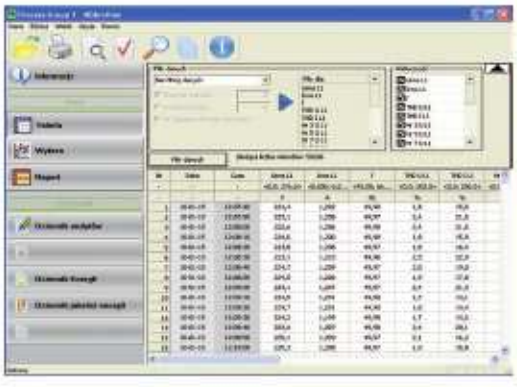
## Software ND archiving

- 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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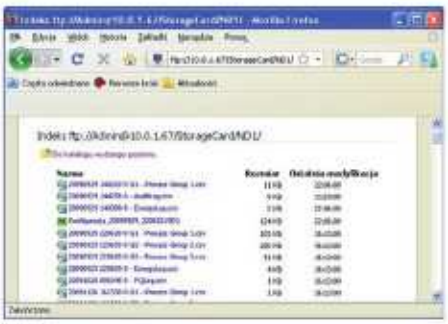
## ND software archiving

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

## Ethernet: www, ftp server

## portable housing

Housing view from frontal side

Housing view from rear view

See also:

Meter of 3-phase network parameters - N14.

Meter of network parameters - ND20.

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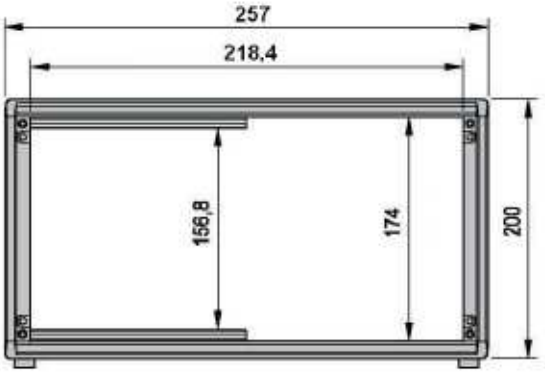
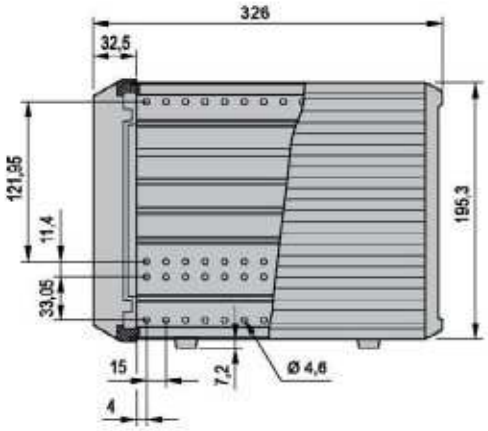
software.

## 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:** | | | | | |
| 1A | 1 | | | | |
| 5A | 2 | | | | |
| **Voltage input:** | | | | | |
| 57.7/100 V | | | | | |
| 230/400 V | | 1 | | | |
| 400/690 V | | 2 | | | |
| **Version:** | | 3 | | | |
| standard | | | | | |
| in a portable case, without RJ45 socket | | | 00 | | |
| in a portable case, with Rj45 socket | | | PO | | |
| **Language:** | | | PE | | |
| Polish | | | | | |
| English | | | | | |
| other* | | | | | |
| **Acceptance tests:** | | | | P | |
| without extra quality requirements | | | | E | |
| with a extra quality inspection certificate | | | | X | |
| acc. to customer's request* | | | | | |
| | | | | | 0 |
| | | | | | 1 |
| | | | | | X |

* after agreeing with the manufacturer

**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.

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

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