



ND40

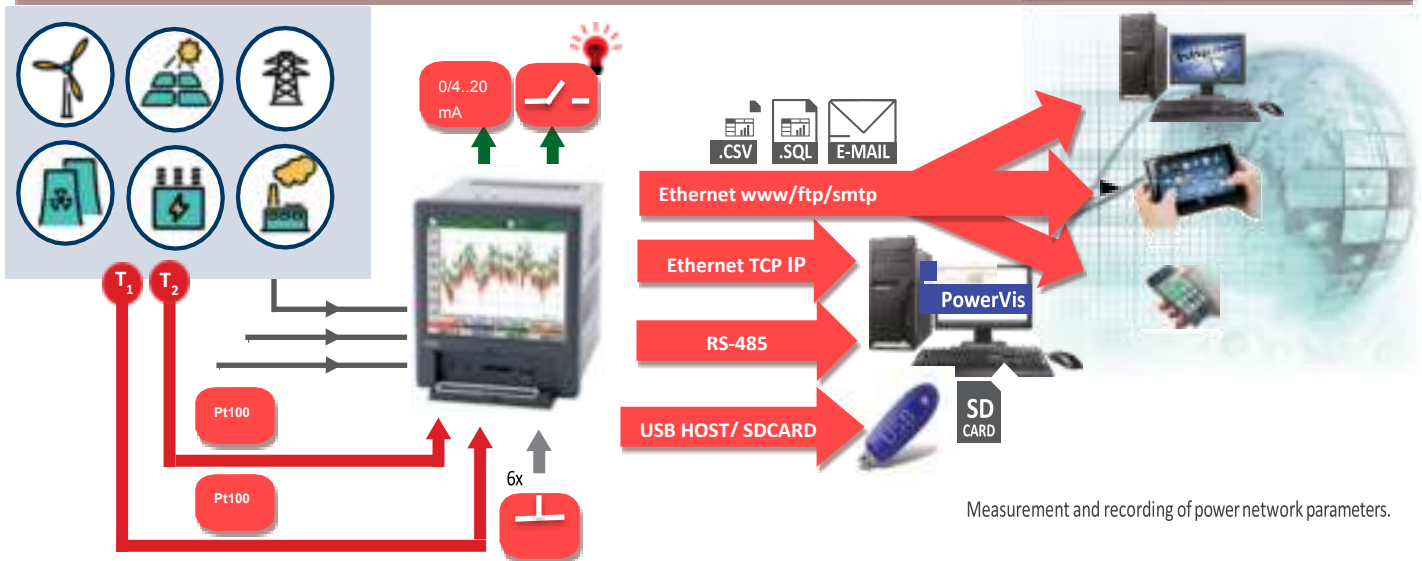
- POWER NETWORK ANALYZER /RECORDER

- Measurement and recording of over 500 electric energy quality parameters acc. to en 50160, en 61000-4-30, en 61000-4-7 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.
- color 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.



* for selected parameters - details in the technical data

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:

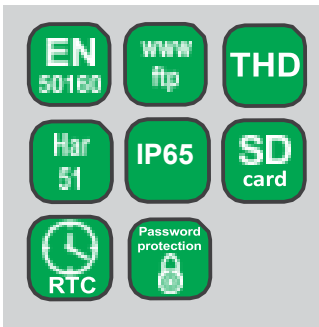
- phase voltages $u_1, u_2, u_3, u_{123} \text{ avg}$
- phase current $i_1, i_2, i_3, i_{123} \text{ avg}$
- active phase powers $p_1, p_2, p_3, \Sigma p_{123}, p_{123} \text{ avg}$
- reactive phase powers $Q_1, Q_2, Q_3, \Sigma Q_{123}, Q_{123} \text{ avg}$
- apparent phase powers $s_1, s_2, s_3, \Sigma s_{123}, s_{123} \text{ avg}$
- active power factors $pF_1, pF_2, pF_3, pF_{123} \text{ avg}$
- power factor distortion $dpF_1, dpF_2, dpF_3, dpF_{123} \text{ avg}$
- reactive/active power factors $tg_1, tg_2, tg_3, tg_{123} \text{ avg}$
- phase-to-phase voltages $u_{12}, u_{23}, u_{31}, u_{123} \text{ avg}$
- current in neutral wire i_n
- the angle between the voltage and current $\varphi_1, \varphi_2, \varphi_3, \varphi_{123} \text{ avg}$ (degrees and radians)
- voltage phase-to-phase angle $\sphericalangle u_{12}, \sphericalangle u_{31}, \sphericalangle u_{23}, \sphericalangle u_{123} \text{ avg}$

other parameters:

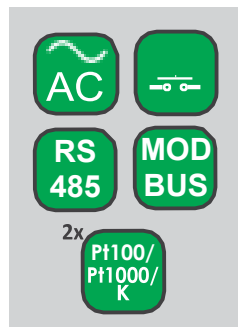
- frequency (aggregation for 1 and 10 seconds)
- temperature/ resistance values (two channels)
- demand values: p, Q, S, U, i (15-minute, 30-minute or 1 hour).
- energy: active imported/exported, reactive imported/exported and apparent. all energies are calculated for each phase and 3-phase parameters.
- 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 minimum and maximum of measured values.

ND40 - POWER NETWORK ANALYZER / RECORDER

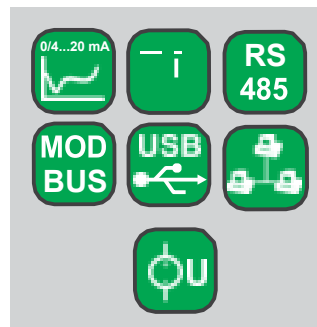
FEATURES



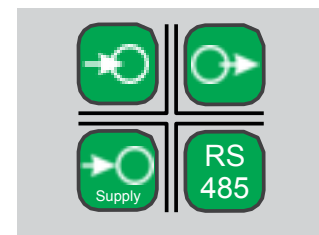
INPUTS



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	
input for temperature measurement	pt100: -200...850°C, pt1000: -200...850°C, resistance: 0...5000 Ω		± 0.2%

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	100 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 averaged values: 1 s class: B 3 s class: a 10 min class: S 2 hrs class: S	U rMS I-n (150% Un) Un = 230 V - 23.0..46..345.0 V (ku=1) ..480.0 kV (ku≠1) U rMS I-I (150% Un): Un = 400 V - 40.0..80.. 600.0 V (ku=1) ..1020.0 kV (ku≠1)	class a acc. to en 61000-4-30:2008 u rMs I-n (10% U _{din} - 150% U _{din}): ±0.1% U _{din} .
current i rMS	i rMs : averaged values: 1 s class: B 3 s class: a 10 min class: S 2 hrs class: S	i rMs (150% in) : in = 1 a - 0.010..0.1..1.5 a (ki=1) in = 5 a - 0.050..0.5..7.5 a (ki=1) ..480.0 ka (ki≠1)	i rMs (10% in - 150% in): ±0.1% of measurement
Frequency	class S appointed from 10 or 12 cycles in 200 ms. class a appointed from 100 or 120 cycles in 10 s.	42.5 up to 57.5 hz for 50 hz a.c. of supply 51.0 up to 69.0 hz for 60 hz a.c. of supply	class S acc. to en 61000-4-30:2008 ±0.050 hz class a acc. to en 61000-4-30:2008 ±0.010 hz
active, reactive and apparent power	active power : Measured every 10 cycles (50 hz) or 12 cycles (60 hz) reactive power : appointed from apparent and active power. apparent power : appointed from value U rMS and i rMS.	depends on voltage and actual ratio value.	acc. to en 61557-12: active power: ± 0.5% p _n reactive power: ± 1% Q _n apparent power: ± 0.5% S _n

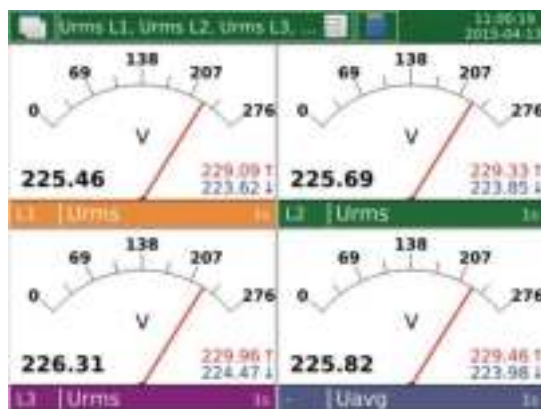
ND40 - POWER NETWORK ANALYZER / RECORDER

Measuring quantity	Measurement method	range	Basic error
active imported/exported energy, reactive imported/exported energy, apparent energy	Measured every 10 cycles (50 Hz) or 12 cycles (60 Hz). Separate measurement for exported, imported active and reactive energy .	depends on voltage and actual ratio value.	acc. to en 61557-12: active power: $\pm 0.5\%$ reactive power: $\pm 1\%$ apparent power: $\pm 2\%$
active power factor, power distortion factor	active power factor : depends on U rMS, i rMS and active power. power distortion factor depends on thd i.	-1,000 .. 0 .. 1,000	power factor pF $\pm 0.01\%$ power distortion factor pFdist $\pm 0.05\%$
harmonics of voltages and current	acc. to en 61000-4-7:2007, up to 51st harmonic window: 10 cycles (for 50 Hz), 12 cycles (for 60 Hz). FFT: 4096 points	Voltage harmonics: 0.00 .. 100.00 % current harmonics: 0.00 .. 100.00 %	Voltage harmonics – class ii $\pm 5\%$ Urdg if Urdg > 1% $\pm 0.05\%$ Un if Urdg < 1% current harmonics – class ii $\pm 5\%$ Urdg if Urdg > 3% $\pm 0.5\%$ Un if Urdg < 3%
thdU, thdi, thdGU, thdGi, thdSU, thdSi, pwhdU, pwhdi	acc. to en 61000-4-7:2007, up to 51st harmonic window: 10 cycles (for 50 Hz), 12 cycles (for 60 Hz). FFT: 4096 points	thd U: 0.00 .. 100.00 % thd i: 0.00 .. 100.00 % thdG U: 0.00 .. 100.00 % thdG i: 0.00 .. 100.00 % thdS U: 0.00 .. 100.00 % thdS i: 0.00 .. 100.00 % pwhd U: 0.00 .. 100.00 % pwhd i: 0.00 .. 100.00 %	thd U: $\pm 5\%$ (50/60Hz) thd i: $\pm 5\%$ (50/60Hz) thdG U: $\pm 5\%$ (50/60Hz) thdG i: $\pm 5\%$ (50/60Hz) thdS U: $\pm 5\%$ (50/60Hz) thdS i: $\pm 5\%$ (50/60Hz) pwhd U: $\pm 5\%$ (50/60Hz) pwhd i: $\pm 5\%$ (50/60Hz)

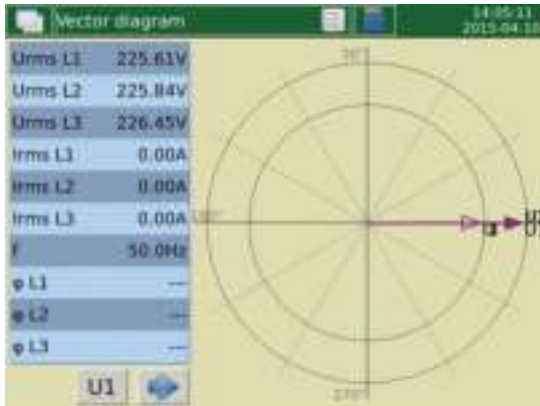
where:
 ku - voltage transformer ratio
 ki - current transformer ratio
 U_{in} - declared input voltage
 U_{rdg}, i_{rdg} - measurement values
 U_n, i_n, p_n, Q_n - nominal values

EXAMPLES OF MEASURING DATA PRESENTATION

- various forms of data display:
- digital display
 - analog view,
 - bargraphs,
 - vector diagrams
 - trends
 - energy meter
 - harmonics analysis
 - energymeter.
- Screen system log files.
- Screens log alarms.
- control panel.



EXAMPLES OF MEASURING DATA PRESENTATION



Harmonics U - table
 14:00:48 2015-04-18

	L1 [%]	L2 [%]	L3 [%]
THD	2.34	2.35	2.34
THDG	2.34	2.35	2.34
THDS	0.00	0.00	0.00
FWHD	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	0.04	0.04	0.04

Energy
 13:08:41 2015-04-18

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

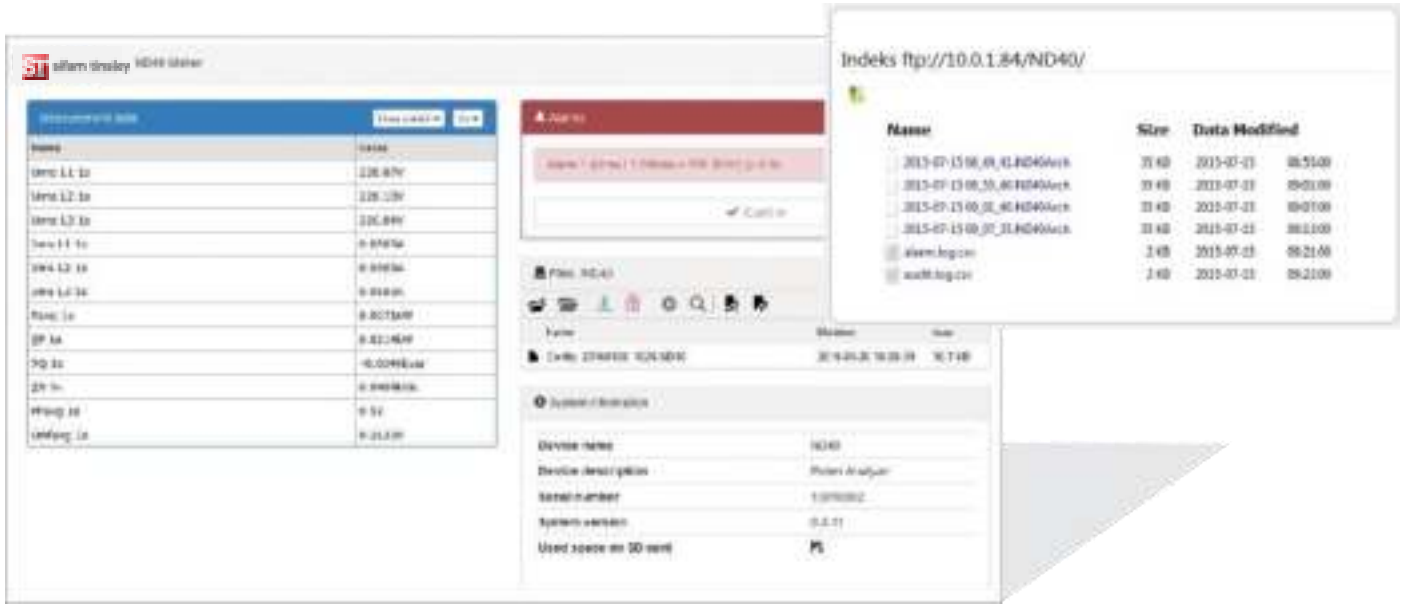


Alarm logs
 14:08:29 2016-01-20

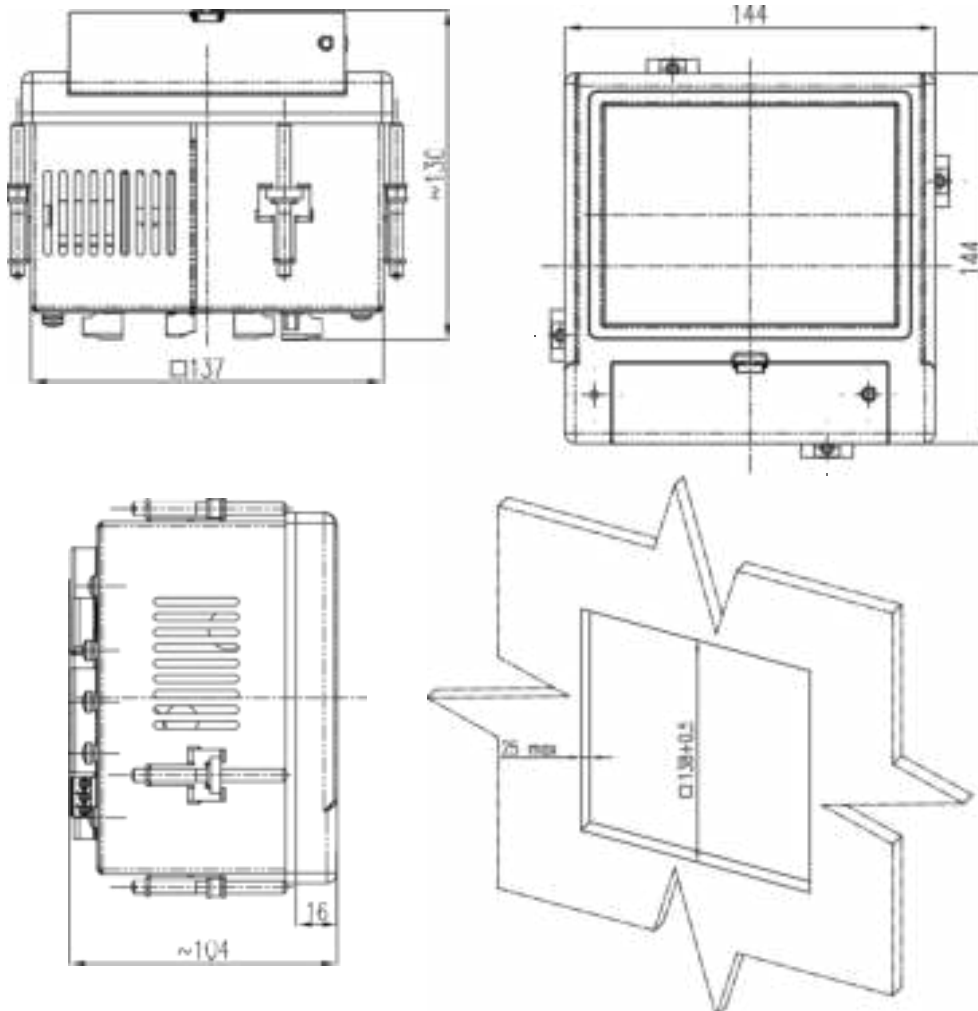
No	Date	Time	Description
43	2016-01-20	13:49:54	Alarm 2 - Wt. (Urms L2 200ms 224.811V) (> 210)
42	2016-01-20	13:49:54	Alarm 1 - Wt. (Urms L1 200ms 224.823V) (> 200)
41	2016-01-20	08:53:15	Alarm 1 - Wt. (Urms L1 200ms 240.477V) (> 200)
40	2016-01-19	16:00:19	Alarm 2 - Wt. (Urms L2 200ms 229.91V) (> 210)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

ND40 - POWER NETWORK ANALYZER / RECORDER

ETHERNET: WWW SERVER, FTP



DIMENSIONS AND ASSEMBLY



ND40 - POWER NETWORK ANALYZER / RECORDER

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

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.

* only after agreeing with the manufacturer

SEE ALSO:



ND30 - power network meter with ethernet and recording



RE92 - dual loop



P30U - universal transducer of temperature and standard signals



ND20 - power network



N43 - rail mounted 3-phase power network



P43 - 3-phase transducer of power network parameters



current transformers from 5a up to 6ka



PowerVis - process visualization software



Free **eCon** software

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