

MULTIFUNCTION METER ND40 www.sifamtinsley.co.uk



# DATASHEET

Issue 1.0



# Multitunction Meters

**Fransducers & Isolators** 

**Temperature Controllers** 

**Converters & Recorders** 

**Digital Panel Meters** 

**Current Transformers** 

**Analogue Panel Meters** 

Shunts

**Digital Multimeters** 

**Clamp Meters** 

**Insulation Testers** 

# **ND40**

Urms L1, Urms L2, Urms L3

L2

Uavg

**ND40** 

# POWER NETWORK ANALYZER / RECORDER

229.12↑ 227.18↓

229.371 227.411

229.981 228.031

229.491

227.541

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# Features

- Measurement and recording of over 500 electric energy quality parameters acc. to EN 50160, EN 61000-4-30, EN 6100-4-7 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
- → Web Server, FTP Server
- → Interfaces: RS-485 Modbus Slave, Ethernet 100 Base-T (Modbus TCP Server), USB Device & Host
- → Colour 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.



## **Example of Application**



# Measurement and Visualization of Power Network Parameters

#### Aggregated values for 3 seconds, 10 minutes and two hours:

- Phase voltages U<sub>1</sub>, U<sub>2</sub>, U<sub>3</sub>, U<sub>123</sub>avg
- Phase current I<sub>1</sub>, I<sub>2</sub>, I<sub>3</sub>, I<sub>123</sub>avg
- Active phase powers  $\mathsf{P}_1, \mathsf{P}_2, \mathsf{P}_3, \pmb{\Sigma}\mathsf{P}_{123}, \mathsf{P}_{123}\mathsf{avg}$
- Reactive phase powers  $\mathsf{Q}_1,\mathsf{Q}_2,\mathsf{Q}_3,\pmb{\Sigma}\mathsf{Q}_{123},\mathsf{Q}_{123}\mathsf{avg}$
- Apparent phase powers  $S_1$ ,  $S_2$ ,  $S_3$ ,  $\Sigma S_{123}$ ,  $S_{123}$  avg
- Active power factors PF<sub>1</sub>, PF<sub>2</sub>, PF<sub>3</sub>, PF<sub>123</sub>avg
- Power factor distortion  $dPF_1$ ,  $dPF_2$ ,  $dPF_3$ ,  $dPF_{123}avg$
- Reactive/active power factors tg  $\phi_{\text{1}}$ , tg  $\phi_{\text{2}}$ , tg  $\phi_{\text{3}}$ , tg  $\phi_{\text{123}}$  avg
- Phase-to-phase voltages U<sub>12</sub>, U<sub>31</sub>, U<sub>23</sub>, U<sub>123</sub>avg
- Current in neutral wire In
- The angle between the voltage and current φ<sub>1</sub>, φ<sub>2</sub>, φ<sub>3</sub>, φ<sub>1</sub>, φ<sub>123</sub>avg (degrees and radians)
- Voltage phase-to-phase angle  $\triangleleft U_{12}, \triangleleft U_{31}, \triangleleft U_{23}, \triangleleft U_{123} avg$

#### 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 parametres • Factors: THD, THDS, THDG, PWHD. Calculated for currents and

- voltages of each phase and 3-phase parametersHarmonics 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 minimun and maximum of measured values.

#### Features







Outputs



#### **Galvanic Isolation**





# **Technical Data**

# Inputs

Input type	Measuring range	Parameters	Basic error
Voltage input	230/400 V	0.051.2 Un	± 0.1%
Current input	1A or 5A	0.0051.2 In	± 0.1%
Logic input	6 logic inputs: 0/524 V d.c.	switching frequency up to 50 Hz	

#### Outputs

Output type	Properties
Analog output	3 programmable current outputs 0/420 mA, load resistance < 500 $\Omega$
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 300115200 bit/s, transmission mode ASCII/RTU
USB	2 interfaces: Device & Host, USB v.2.0
Ethernet	10 Base-T, RJ45 socket, Modbus TCP Server

#### **Rated Operating Conditions**

Supply voltage	85 V240 V a.c., 40400Hz	90 V320 V d.c.	power consumption: 15 VA , 35 VA (when loading)
Ambient temperature	work: 0 up to 50°C		storage: - 2050°C
Relative humidity	< 75%		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	IP 65		
Safety requirements	Installation category III Pollution grade 2		EN 61010-1
Maximum phase-to-earth operating voltage	RS485, temperature/resistar measuring circuit, relays, sup	nce input, USB: 50V ply: 300 V	EN 61010-1 Measuring ranges

# Measuring Ranges and Admissible Basic Conversion Errors

Measuring quantity	Measurement method	Range	Basic error
Voltage U RMS	U RMS	U RMS L-N (150% Un)	class A acc. to EN 61000-4-30:2008
	averaged values:	Un = 230 V - 23.046345.0 V (Ku=1)	U RMS L-N
	1 s class: B	480.0 kV (Ku≠1)	(10% Udin - 150% Udin): ±0.1% Udin.
	3 s class: A	U RMS L-L (150% Un):	
	10 min class: S	Un = 400 V - 40.080 600.0 V (Ku=1)	
	2 hrs class: S	1020.0 kV (Ku≠1)	
Current I RMS	I RMS:	I RMS (150% In):	IRMS
	averaged values:	In = 1 A - 0.0100.11.5 A (Ki=1)	(10% In - 150% In): ±0.1% of measurement
	1 s class: B	In = 5 A - 0.0500.57.5 A (Ki=1)	
	3 s class: A	480.0 kA (Ki≠1)	
	10 min class: S		
	2 hrs class: S		
Frequency	Class S	42.5 up to 57.5 Hz for 50 Hz	a.c. of supply Class S acc.
	appointed from 10 or 12 cycles		to EN 61000-4-30:2008
	in 200 ms.	51.0 up to 69.0 Hz for 60 Hz	a.c. of supply ±0.050 Hz
	Class A		Class A acc. to EN 61000-4-30:2008
	appointed from 100 or 120 cycles in 10 s.	±0.010 Hz	
Active, reactive	Active power:	Depends on voltage and	acc. to EN 61557-12:
and apparent power	Measured every 10 cycles (50 Hz)	actual ratio value.	
	or 12 cycles (60 Hz)		Active power: ± 0.5% Pn
	Reactive power:		Reactive power: ± 1% Qn
	appointed from apparent and active power.	Apparent power: ± 0.5% Sn	
	Apparent power:		
	appointed from value U RMS and I RMS.		



#### Measuring Ranges and Admissible Basic Conversion Errors - Continued

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 exporten, imported active and reactive energy.	Depends on voltage and actual ratio value.	acc. to EN 61557-12: Active power: ± 0,5% Reactive power: ± 1% Apparent power: ± 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 ± 0.01% Power distortion factor PFdist ± 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 ± 5% Urdg if Urdg > 1% ± 0.05% Un if Urdg < 1% Current harmonics – class II ± 5% Urdg if Urdg > 3% ± 0.5% Un if Urdg < 3%
THD U, THD I, THDG U, THDG I, THDS U, THDS I, PWHD U, PWHD I	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 %	THD U: ±5% (50/60Hz) THD I: ±5% (50/60Hz) THDG U: ±5% (50/60Hz) THDG I: ±5% (50/60Hz) THDS U: ±5% (50/60Hz) THDS I: ±5% (50/60Hz) PWHD U: ±5% (50/60Hz) PWHD I: ±5% (50/60Hz)

where:

Ku - voltage transformer ratio Ki - current transformer ratio Udin - declared input voltage Urdg, Irdg - measurement values Un, In, Pn, Qn - nominal values

# **Examples of Measuring Data Presentation**

Various forms of data display:	Control Panel			P	Urms L1, Ur	ms L2, Urms L3,		41 5-07
<ul> <li>digital display</li> <li>analog view,</li> <li>bargraphs,</li> <li>vector diagrams</li> <li>trends</li> <li>energy meter</li> <li>harmonics analysis</li> <li>energy meter.</li> </ul>	General settings Ethernet	Measuring input Modbus Modbus Outputs	Alarms Alarms Archive Office System information	Visualization Security	L1 25 Urms Urms L2 1s Urms Urms - 1s Uavg	225 225 225 225	225.01 V 226.81 225.15 V 227.51 225.86 V 227.51 225.86 V 227.51 225.86 V 227.51 225.34 V	
Screen system log files.	Urms L1, U	rms L2, Urms L	3, 🔳 🔳	11:00:19 2015-04-13	Urms L1, Ur	ms L2, Urms L3,	😑 📄 11:00: 2015-04	31 4-13
Screens log alarms.	69 138 0	207	69 11 0	276	227.5	m Jun	we what it	
Control panel.	225.46	229.09 t 223.62 J	225.69	229.33 t 223.85 t	226			-
	69 138 0 V 226.31	207 276 229.96 † 224.47 1	69 1: 0 225.82	229.46 t 223.98 t	225.5 225 224.5 224.5 224.5 10:52:0	4 10:53:44 10:55:2	5 min. / 2s 4 10:57:04 10:58:44 11:00	0:24
	L3 Urms	15	- Uavg	15	225.71 V	225.94 V	226.56 V 226.07	v



# **Examples of Measuring Data Presentation**





Energy			13:08:41 2015-04-15
	value	unit	
ΣEnP+	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	
ΣEnQ+	00000000.0	kVARh	
L1	00000000.0	kVARh	-



📑 Har	monics U - table		201	4:00:48 15-04-10
1	L1 [%]	L2 [%]	L3 [%]	
THD	2.34	2.35	2.34	
THDG	2.34	2.35	2.34	
THDS	0.00	0.00	0.00	
PWHD	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	0.02	0.02	0.03	

Binary in	nputs	E 8	14:07:45 2015-10-20
0	BI1		BI2
W	1	ŵ	0
	BI3		BI4
Ŭ	0	Ŭ	0
	BI5		BI6
U	0	Ŵ	0

No	Date	Time	Description	
43	2016-01-20	13:49:54	Alarm 2 - Wł. (Urms L2 200ms 224.811V) (> 210)	-
42	2016-01-20	13:49:54	Alarm 1 - Wł. (Urms L1 200ms - 224.823V) (> 200)	
41	2016-01-20	08:53:15	Alarm 1 - Wł. (Urms L1 200ms 240.477V) (> 200)	
40	2016-01-19	16:00:19	Alarm 2 - Wł. (Urms L2 200ms 229.91V) (> 210)	
39	2016-01-19	16:00:19	Alarm 1 - Wł. (Urms L1 200ms 229.898V) (> 200)	
38	2016-01-19	15:36:32	Alarm 2 - Wł. (Urms L2 200ms 228.824V) (> 210)	
37	2016-01-19	15:36:31	Alarm 1 - Wł. (Urms L1 200ms 228.798V) (> 200)	•
			Alarm 7 - 144 /11rms 1 2 200ms	



# Ethernet:WWW, SERVER, FTP

ND40 Meter			Indeks ftp	0://10.0.1	.84/ND40/			
Measurement data	Userset#1+ ts+	Atams	Nam	e		Size	Data Modi	fied
Norme Urms L1 1s Urms L2 1s Urms L3 1s	Value 226.07V 226.18V 226.04V	Alarm 1 (Urms L1 200ms = 226 301V) (> 0	0) 201 201 finn 201 201 201	15-07-15 08_48 13-07-15 08_55 15-07-15 09_01 15-07-15 09_07	41.ND40Arch 40.ND40Arch 40.ND40Arch 35.ND40Arch	35 KB 35 KB 35 KB 35 KB	2015-07-15 2015-07-15 2015-07-15 2015-07-15	08:55:00 09:01:00 09:07:00 09:13:00
lims L1 15 lims L2 1s	0.0503A 0.0503A	Files: /ND40	ම් sia ම හා	rm.log.csv dit.log.csv		2 KB 2 KB	2015-07-15 2015-07-15	09:21:00 09:22:00
Ims L3 Is Pavg Is	0.0003A 0.0071KW	🛫 🚈 🛓 📋 🌣 Q. 📑	Matter	Size	1			
2P 1s 2Q 1s	0.9214kw -0.0349kvar	Confg_20160420_1026.ND40	2016-04-20 10:26:39	10.7 KB				
25 1s PFavg 1s	0.0409kVA 0.52	O System information						
Umfavg 1s	0.2533V	Device name	ND40					
		Device description Serial number	Power Analyzer 16010002					
		System version	0.2.11					
		Used space on SD card	P2					

# **Dimensions and Assembly**





Analyzer/recorder ND40 -	Х	Х	XX	Х	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			EXAMPLE OF ORDER:
Language:				-		The code: <b>ND40 - 0 1 00 E 0</b> means:
English				U		ND40 - analyzer/recorder ND40
German				D		<b>0 -</b> class S
Russian				R		<b>1</b> - 8 relay outputs
other*				Х		<b>00 -</b> standard version
Acceptance tests:					-	<b>U -</b> user's manual in English
without additional quality requirements					0	0 - without additional quality requirements.
with an extra quality inspection certificate					1	
acc.to customer's request*					X	

\* - after agreeing with the manufacturer

#### See Also



ND40 - power network analyzer/ recorder



RE92 - dual loop controller



P30U- universal transducer of temperature and standard signals



KS31 - Digital synchronizing unit



N43 - rail mounted 3-phase power network meter



P43 - 3-phase transducer of power network parameters



ND1 - analyser of network parameters



Current transformers from 5 A up to 6 kA



Free **eCON** software

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