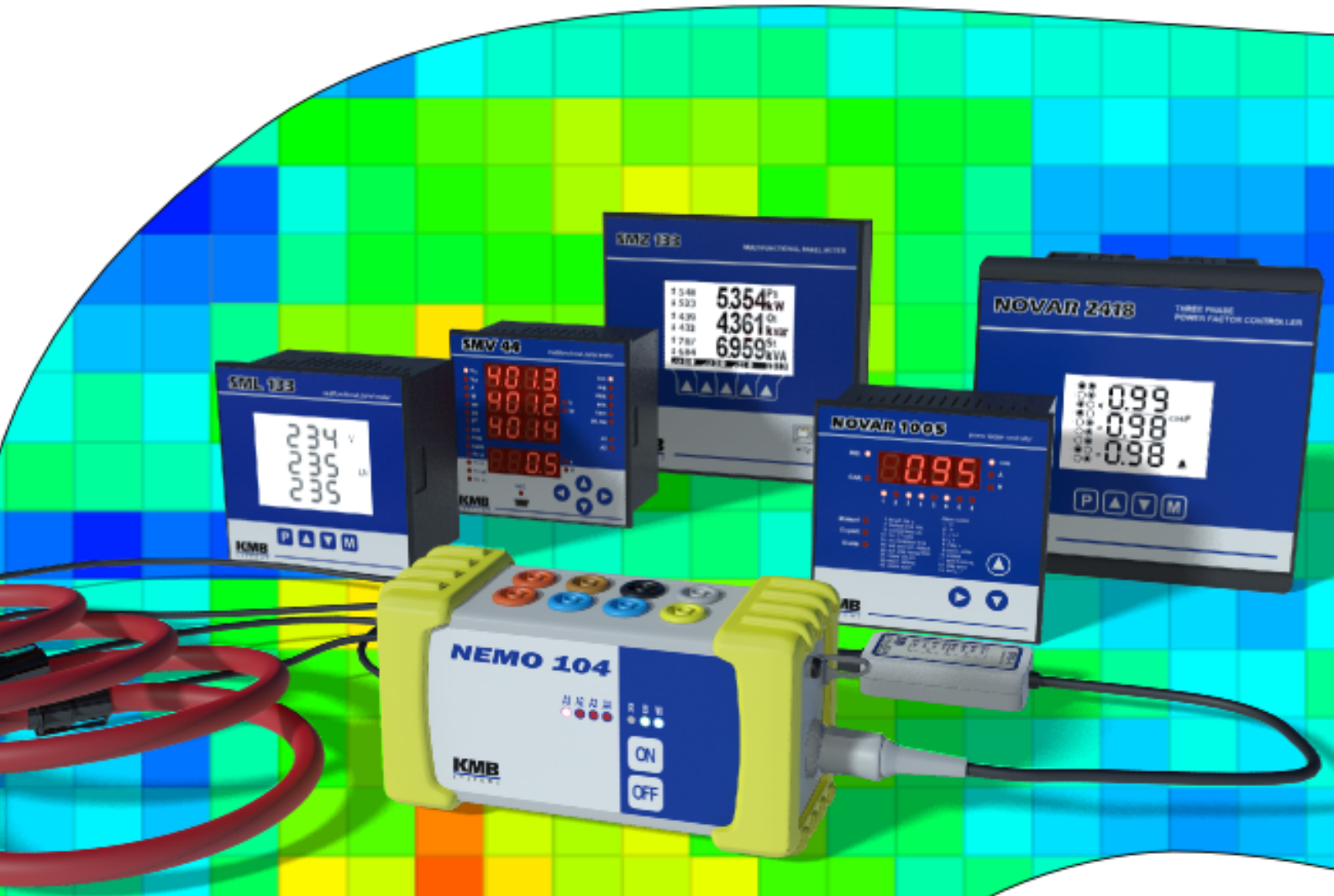
PRODUCT CATALOGUE

ENERGY MANAGEMENT SYSTEM
POWER FACTOR CORRECTION
POWER QUALITY ANALYSERS



KMB SYSTEMS

Contents

Introduction

Power quality analysers and energy efficiency monitors

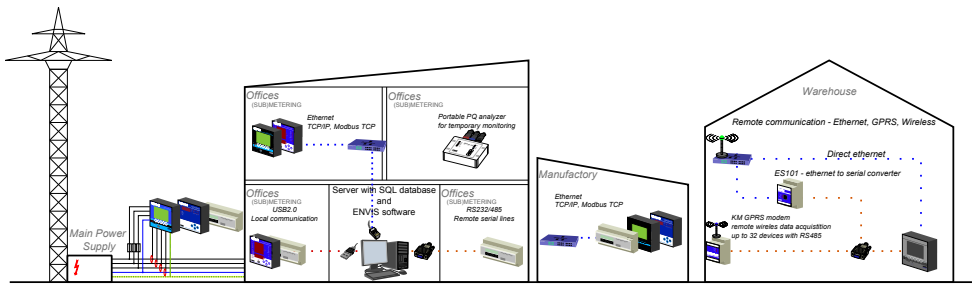
Our line of power analysers covers all the typical needs for energy management systems from bottom to top. We provide a broad range of meters from simple meters without memory and automation to fully equipped analysers for continuous power quality evaluation. Our meters optionally provide capabilities for remote data acquisition and evaluation in ENVIS application. Their input-output capabilities allow them to perform several automated control functions such as simple load management etc. The NEMO product line complements the offering with a range of portable analysers for temporary measurements anywhere in the grid.

NOVAR: Power Factor Correction

NOVAR represents a family of power factor controllers and its accessories. It is designed to be reliable, precise and easy to operate in all possible power factor control situations. For classical PFC applications the NOVAR 11xx/12xx lines for regular response times can be chosen. The NOVAR 1312 with fast control response times supports thyristor switched capacitors for fast operation. We have also developed fast thyristor switches (SSR) KATKA. We also deliver regular contactors, compensation capacitors, chokes and other switchgear equipment. With remote communication option (RS485, Ethernet) the NOVAR PFC supports data collection and processing with the ENVIS software.

ENVIS: Software for Recording and Analysis of Measurement Archives

ENVIS application represents a solution for a flexible and transparent energy management system. It can also evaluate collected data in respect to power quality compliance. It supports data collection from our instruments (SM, SIMON, NOVAR) as well as some third-party energy meters with ModBus or M-Bus interfaces. Data acquisition can be performed over various communication interfaces such as USB, RS232, RS485, Ethernet, GPRS or WiFi. For data storage the SQL Server databases can be used and mined later for post-event analysis. System can also automatically detect non-compliant situations and distribute alarms to the responsible stakeholder in form of email, SMS or over SNMP protocol. Standard version of ENVIS is provided free of charge with all our supported instruments and allows the configuration, manual data acquisition and basic data processing. Data from ENVIS can be exported to various files such as CEA, PQDIF, XLS, CSV or PDF.



About KMB systems

Our main goal is to be successful in development and in manufacturing of electronic devices for control and measuring applications in energetics and components for power factor correction. History of the company began in 1991 when the association of founders with experience in industrial automatization and electronics was founded. The first project for SCE Decin led our interests towards long-distance monitoring of energy consumption. In 1992 we transformed into a small business (ltd.).

Portable measuring instrument Simon for low-, high- and very-high voltage distribution networks is firstly introduced. We already used the SMD technology in this product already. Assortment list extended gradually with multi-functional panel meters, HDO monitoring instruments and many other universal devices. In 1999 company developed and presented new award winning and innovative instrument - NOVAR power factor controller.


ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Czech

CERTIFICATE

The Certification Body for the Quality Management System No. 3053
TÜV SÜD Czech s.r.o.

certifies that

KMB SYSTEMS

K M B systems, s.r.o.
Tř. Dr. M. Horákové 559
CZ – 460 06 Liberec 7
Ident. No.: 47781904

has established and applies
a Quality Management System for

development, manufacturing and supply of power factor controllers, components for compensation of power factor, measuring instruments and equipment, complete supply of systems for measuring in power industry

An audit was performed, Report No. 0083/20/10/QM/AZ/C
Proof has been furnished that the requirements according to

ČSN EN ISO 9001:2009

are fulfilled. The certificate is valid until 11.03.2013
Certificate Registration No. 01.426.088

Prague, 11.03.2010

IAF S 3053

TÜV SÜD Czech s.r.o. ● Novodvorská 994 ● 142 21 Prague 4 ● Czech Republic

TÜV®

Since 2002 company has progressively expanded to foreign markets in Europe, Asia and Middle East. Head count and production capacities has grown. Nowadays we focus on R&D in emerging technologies for measuring and controlling of the quality of electrical energy. Recently we have innovated and complemented the PFC product lines to follow requirements of different markets and added new electronic equipment for transformers.

In cooperation with Technical University in Liberec we also assure research capabilities and innovative approach to our customers. The TS (TrafoSTART) is an example product of this cooperation - an electronic relay for soft switching single-phase transformers. This transformer starting method totally eliminates inrush current with minimal start up time and it was patented under patent number CZ 296466.

In 2009 we have introduced a new line of power quality analyzers for three phase voltage networks which we actively focus on. The latest addition to this family is SMC 144 and NEMO instrument. For the year 2013 we prepared advanced power factor controller innovation - the NOVAR 26xx and 25xx three phase power factor controller. it build on our previous PFC experience and adds a powerful computing core which allowed more advanced functions to be embed. Yes the installation stays consistently simple - just wire it, let it auto-detect the connection, commission it and use it.

The company is certificated by the quality assurance system according to the EN ISO 9001:2009 standard.

Built-In Meters and Analysers

Comparison table of built-in instruments											
	Memory [MB]	Display	Meter	Communication					IEC 61000-4-30	EN 50160	Installation
SML	–	LED	–	RS232	RS485	Ethernet	USB	Wi-Fi	–	–	91x91
SMM	–	LED	–	✓	✓	–	–	–	–	–	DIN-35
SMN	–	LED	–	✓	✓	–	–	–	–	–	DIN-35
SMD	–	–	–	✓	✓	–	–	–	–	–	DIN-35
PA33	–	–	–	✓	✓	–	–	–	–	–	DIN-35
SMY	1	graphical LCD	–	✓	✓	–	–	–	–	–	91x91
SMZ	1	LED	✓[a]	✓	✓	–	–	–	–	–	138x138
SMC 11/33	0.5	–	✓	✓	✓	–	–	✓	–	–	DIN-35
PA 144	–	–	✓	–	✓	✓	✓	✓	–	–	DIN-35
SMC 144	512	–	✓	–	✓	✓	✓	✓	–	–	DIN-35
SMD 118	512	–	✓	–	✓	✓	✓	✓	–	–	DIN-35
SML 133	–	segment LCD	✓	–	✓	✓	–	–	–	–	91x91
SMY 133	512	color LCD	✓	–	✓	✓	✓	–	–	–	91x91
SMV	512	LED	✓	✓	✓	✓	✓	–	S	✓[b]	91x91
SMVQ	512	LED	✓	✓	✓	✓	✓	–	S	✓	91x91
SMP	512	graphical LCD	✓	✓	✓	✓	✓	–	S	✓[b]	91x91
SMPQ	512	graphical LCD	✓	✓	✓	✓	✓	–	S	✓	91x91
ARTIQ 144	512	–	✓	–	✓	✓	✓	✓	A	✓	DIN-35

[a] Option E
[b] With VE modul

Panel meters, multifunction power meters and power quality analyzers and recorders (instruments with internal memory) represent one significant line of our products. These are typically used for measurements in low and high voltage distribution networks in industrial and large residential houses, offices or even to monitor individual appliances. Installed instruments are typically constructed in two different designs. Instruments mounted into panel and instruments for DIN-35 rail mounting.

All built-in KMB systems instruments can be optionally equipped with various communication interfaces. From standard RS-232 up to Wi-Fi is available. Basic instruments can be equipped with serial communication interface RS-232 or RS-485, advanced instruments features also Ethernet, USB or Wi-Fi. All instruments may be extended to Ethernet or GPRS via external communication converter like ES 101 serial-Ethernet converter or KM GPRS 101 modem.

Instrument configuration, data acquisition and data warehousing is supported within our ENVIS application. Most of its features are provided free of charge and the actual stable version can be downloaded without even registering to the website. Our instruments also support ModBus protocols (RTU, TCP) to simplify integration into other systems at the customer side.

Overview of measuring instruments

	SML			SMM	SMN	SMY	
			NEW				NEW
	SML 33 U 230 X/5A 2	SML 33 U 230 X/5A E	SML 133 U 400 X/5A RI E	SMN 33 48 100 X/1A E	SMN 33 24 230 S600 2	SMY 33+ R/485	SMY 133 U 400 X/5A RI E
Nominal Voltage L-N, AC	230 V_{AC}		230 V_{AC}	57,7 V_{AC}	230 V_{AC}	230 V_{AC}	230 V_{AC}
Nominal Voltage L-L, AC	400 V_{AC}		400 V_{AC}	100 V_{AC}	400 V_{AC}	400 V_{AC}	400 V_{AC}
Measurement category And pollution degree	CAT III/2 [1]		CAT III/2 [1]		CAT III/2 [1]	CAT III/2 [1]	CAT III/2 [1]
Operating voltage L-N	-		-	-	-	-	-
Auxiliary voltage	85 ÷ 275 V_{AC} 80 ÷ 350 V_{DC}		85 ÷ 275 V_{AC} 80 ÷ 350 V_{DC}	36 ÷ 72 V_{DC} 48 V_{AC}	18 ÷ 36 V_{DC} 24 V_{AC}	80 ÷ 260 V_{AC} 100 ÷ 350 V_{DC}	85 ÷ 275 V_{AC} 80 ÷ 350 V_{DC}
	45 ÷ 450 Hz		45 ÷ 450 Hz	45 ÷ 450 Hz	45 ÷ 450 Hz	42 ÷ 80 HZ	45 ÷ 450 Hz
Three phase/four phase	●/-		●/-	●/-	●/-	●/-	●/-
Quadrants	4		6	4	4	4	6
Scan frequency 50/60Hz	6.4kHz		6.4kHz	6.4kHz	6.4kHz	3.2kHz	6.4kHz
Measurement points per sec.	6400		6400	6400	6400	3200	6400
Continuous measurement	●		●	●	●	-	●
Measuerements per second	12.5/15		5	12.5/15	12.5/15	12.5 every 3 sec	5
Effective value from periods 50/60Hz	4		10/12	4	4	4	10/12
Harmonics V/A	1 – 25		1-50	1 – 25	1 – 25	1 – 25	1-50
Interharmonics	-		-	-	-	-	-
Disortion factor THD-U [%]	●		●	●	●	●	●
Disortion factor THD-I [%]	●		●	●	●	●	●
Unbalance	-		●	-	-	-	●
Short/long-term flicker	-		-	-	-	-	-
Transients	-		-	-	-	-	-
Short-term interruptions	-		-	-	-	-	-
Accuracy V/A	±0.5%		0.5	±0.5%	±0.5%	±0.5%	0.5
Active energy classification	-		0.5	-	-	±2%	0.5
Reactive energy classification	-		1	-	-	±2%	1
Digital inputs	-		1	-	1	-	1
Digital/pulse output	-		1	-	-	-	1
Relay outputs	-		1	-	-	2	1
Analogue inputs	-		-	-	-	-	-
Analogue outputs	-		-	-	-	-	-
Temperature input	1		-	1	1	1	-
Min/max value memory	-		●	-	-	●	●
Memory size	-		-	-	-	1MB	512MB
Clock	●		-	●	●	●	●
Software	ENVIS		ENVIS	ENVIS	ENVIS	ENVIS	ENVIS
EN 50160	-		-	-	-	-	-
IEC 61000-4-30	-		-	-	-	-	-
Interfaces							
RS 232	●	-	-	-	●	●	-
RS 485	-		-	-	-	●	-
Ethernet	-	●	●	●	-	-	●
USB	-		-	-	-	-	●
Web server	-		●	-	-	-	●
Wifi	-		-	-	-	-	-
Protocols							
Modbus RTU	●	-	-	-	●	●	-
KMB short	●		-	●	●	●	-
KMB long	-		●	-	-	-	●
ModBus TCP/IP	-	●	●	●	-	-	●

1. in compliance with IEC EN 61010-1
2. analog or temp input

SMZ		PA 144	SMC 144		SMD		
	NEW					NEW	
SMZ 33 E R T/RS-485	SMZ 133 U 400 X/5A R I A ET	PA 144 U S100 R B E	SMC 144 U S200 R B N	SMC 144 L P100 I D E	SMD 101 – 100/4	SMD 118 U D500 R D W	
230 V_{AC}	230 V_{AC}	230 V_{AC}	230 V_{AC}		-	230 V_{AC}	Nominal Voltage L-N, AC
400 V_{AC}	400 V_{AC}	400 V_{AC}	400 V_{AC}		-	400 V_{AC}	Nominal Voltage L-L, AC
CAT III/2 [1]	CAT III/2 [1]	CAT III/2 [1]	CAT III/2 [1]			CAT III/2 [1]	
115 V/230V 42 ÷ 80 HZ	-	-	-		-	-	Operating voltage L-N
-	75 ÷ 500 V_{AC} 90 ÷ 600 V_{DC}	75 ÷ 510 V_{AC} 80 ÷ 350 V_{DC}	75 ÷ 510 V_{AC} 80 ÷ 250 V_{DC}	20 ÷ 75 V_{DC} 24 ÷ 48 V_{AC}	18 ÷ 36 V_{DC}	75 ÷ 510 V_{AC} 80 ÷ 250 V_{DC}	Auxiliary voltage
400 V_{AC}	45 ÷ 450 Hz						
●/-	●/-	●/●	●/●		1×I	1×U, 8×I	Three phase/four phase
4	6	4	4		-	6	Quadrants
3.2kHz	6.4kHz	6.4kHz	6.4kHz		1.6kHz	6.4kHz	Scan frequency 50/60Hz
3200	6400	6400	6400		1600	6400	Measurement points per sec.
-	●	●	●		●	●	Continuous measurement
12.5 every 3 sec	5	5	5		2,5	5	Measuerements per second
4	10/12	10/12	10/12		20/24	10/12	Effective value from periods 50/60Hz
1 – 25	1-50	1 – 63	1 – 63		-	1-50	Harmonics V/A
-	-	-	-		-	-	Interharmonics
●	●	●	●		-	●	Disortion factor THD-U [%]
●	●	●	●		-	●	Disortion factor THD-I [%]
-	●	●	●		-	-	Unbalance
-	-	-	-		-	-	Short/long-term flicker
-	-	-	-		-	-	Transients
-	-	-	-		-	-	Short-term interruptions
±0.5%	0.5	±0.2%	±0.2%		-/±1%	0.5	Accuracy V/A
±2%	0.5	1	1		-	0.5	Active energy classification
±2%	1	2	2		-	1	Reactive energy classification
1	5	-	-	2	-	2	Digital inputs
-	4	-	-	1	2	-	Digital/pulse output
2	4	1	1	-	-	1	Relay outputs
-	2	-	-		-	-	Analogue inputs
-	2	-	-		-	-	Analogue outputs
1	1	-	-		-	-	Temperature input
●	●	-	●		-	●	Min/max value memory
1MB	512MB	-	512MB		-	512MB	Memory size
●	●	-	●		-	●	Clock
ENVIS	ENVIS	ENVIS	ENVIS		ENVIS	ENVIS	Software
-	-	-	●		-	-	EN 50160
-	-		S		-	-	IEC 61000-4-30
							Interfaces
●	-	-	-		-	-	RS 232
●	-	●	2	1	●	●	RS 485
-	●	●	-	●	-	-	Ethernet
-	●	-	-		-	-	USB
-	●	-	●	●	-	-	Web server
-	-	-	●	-		●	Wifi
							Protocols
●	-	●	●		●	-	Modbus RTU
●	-	-	-		-	-	KMB short
-	●	●	●		●	●	KMB long
-	●	●	●	-	-	●	ModBus TCP/IP

	SMV		SMP			SMPQ		ARTIQ
								NEW
	SMV 44 U 400 X/5A RI A E	SMV 33 L 400 X/5A RR T	SMP 44 U 400 X/5A RI T 4	SMP 44 U 400 X/5A RR A E VE	SMP 44 L 400 X/5A II T 2	SMPQ 44 U 400 X/5A RR A E	SMPQ 33 L 400 X/5A RI T 2	ARTIQ 144 U P005 I D E
Nominal Voltage L-N, AC	230 V_{AC}		230 V_{AC}			230 V_{AC}		230 V_{AC}
Nominal Voltage L-L, AC	400 V_{AC}		400 V_{AC}			400 V_{AC}		400 V_{AC}
	CAT III/2 [1]		CAT III/2 [1]			CAT III/2 [1]		CAT III/2 [1]
Operating voltage L-N	-		-			-		-
Auxiliary voltage	85 ÷ 275 V_{AC} 80 ÷ 350 V_{DC}	20 ÷ 50 V_{AC} 20 ÷ 75 V_{DC}	85 ÷ 275 V_{AC} 80 ÷ 350 V_{DC}		20 ÷ 50 V_{AC} 20 ÷ 75 V_{DC}	85 ÷ 275 V_{AC} 80 ÷ 350 V_{DC}	20 ÷ 50 V_{AC} 20 ÷ 75 V_{DC}	85 ÷ 275 V_{AC} 80 ÷ 350 V_{DC}
	45 ÷ 450 Hz		45 ÷ 450 Hz			45 ÷ 450 Hz		
Three phase/four phase	●/●	●/-	●/●			●/●	●/-	●/●
Quadrants	4		4			4		6
Scan frequency 50/60Hz	6.4kHz		6.4kHz			6.4kHz		12,8kHz
Measurement points per sec.	6400		6400			6400		12800
Continuous measurement	●		●			●		●
Measuerements per second	5		5			5		5
Effective value from periods 50/60Hz	10/12		10/12			10/12		10/12
Harmonics V/A	1 – 63		1 – 63			1 – 63		1-127
Interharmonics	●		●			●		●
Disortion factor THD-U [%]	●		●			●		●
Disortion factor THD-I [%]	●		●			●		●
Unbalance	●		●			●		●
Short/long-term flicker	-		-	-	-	●		●
Transients	-		-	-	-	●		●
Short-term interruptions	-		-	●	-	●		●
Accuracy V/A	±0.1%/±0.3%		±0.1%/±0.3%			±0.1%		0,05/0,05
Active energy classification	0.5S		0.5S			0.5S		0,2
Reactive energy classification	2		2			2		1
Digital inputs	1		1			1	1	2
Digital/pulse output	1	-	1	-	2	-	1	2
Relay outputs	1	2	1	2	-	2	1	-
Analogue inputs	1	-	-	1	-	1	-	-
Analogue outputs	-		-	-	-	-		-
Temperature input	-	1	1	-	1	-		-
Min/max value memory	●		●			●		●
Memory size	512MB		512MB			512MB		512MB
Clock	●		●			●		●
Software	ENVIS		ENVIS			ENVIS		ENVIS
EN 50160	-		-	●	-	●		●
IEC 61000-4-30	S		S			S		A
Interfaces								
RS 232	-		-	-	●	-	●	-
RS 485	-		●	-	-	-	-	●
Ethernet	●	-	-	●	-	●	-	●
USB	●		●			●		●
Web server	●		-	●	-	●	-	●
Wifi	-		-			-		●
Protocols								
Modbus RTU	●		●			-	●	●
KMB short	-		-			-		-
KMB long	●		●			●		●
ModBus TCP/IP	●	-	-	●	-	●	-	●

ARTIQ 144

precise, compact, dinrail mountable EN 50160 class A analyzer

ARTIQ 144 is a compact advanced power quality monitor for industry, smart buildings, smart grids and for continuous remote distribution network monitoring. It is also a precise power analyzer with data logger and it has embedded energy meter. ARTIQ measures unbalance, frequency, total harmonic distortion and up to 128 individual RMS values and phase angles of harmonics and interharmonics etc. It also records Plt and Pst flicker severity indices, voltage events, transients, detailed precise load profiles etc. Multiple options are provided to keep the internal time precisely synchronized.

Always included is one RS-485 serial communication line. Each instrument can be equipped with a wide range of optional interfaces including Ethernet and wireless ports or additional inputs & outputs. ENVIS application provides configuation and data management from a remote PC. In combination with ENVIS.Online service its actual values can be periodically archived to the SQL database for further processing and data analysis.

Standards: Class A EN 61000-4-30 ed. 3 and reports EN 50160 ed3, class 1 EN 61000-4-7 ed. 2, class 1 EN 61000-4-15, IEC EN 61557-12 voltage 0.05 and active energy 0.2,

Typical applications: measurement of power quality and energy consumption at critical infrastructure points, advanced energy management systems, monitoring of distribution networks, precise industrial automation & energy management

Key features:

- four independent voltage and current inputs (4x1p, 3p-wye, 3p-delta)
- direct and indirect voltage measurement
- includes through-hole (up to 300A) or split-core/clamp-on (up to 600A) current transformers
- electricity meter supports 3 tariffs, single- and three-phase measurement in four or six quadrants
- basic measurement interval 10/12 periods, 256 samples/period
- standard embedded RS-485 interface, optionally Ethernet, WiFi, USB or ZigBee
- Supported Firmware Modules: ModBus Master, General Oscillograms, Ripple Control Signals

Technical specification

Metering	Phase Voltage (ULN)	U1, U2, U3, UN
	Line Voltage (ULL)	U12, U23, U31
	Current (I)	IL1, IL2, IL3, ILN
	Power (P)	P1, P2, P3, PN, 3P (import, export, total, 1st harmonic)
	Reactive Power (Q)	Q1, Q2, Q3, QN*, 3Q (import, export, total, 1st harmonic)
	Aparent Power (S)	S1, S2, S3, SN, 3S
	Distortion Power (D)	D1, D2, D3, DN
	Power Factor (PF)	PF1, PF2, PF3, PFN, 3PF
	cosj	cosj1, cosj2, cosj3, cosjN, 3cosj,
	Symetrical Components	zero, negative and positive sequence components of voltage and current
	Unbalance Factor	unbI, unbU, jnsI
	Voltage THD (THDU)	THDU1, THDU2, THDU3, THDUN
	Current THD (THDI)	THDI1, THDI2, THDI3, THDIN
	Individual Harmonics	Harmonics 1st to 127th of Voltage and Current and their angles
	Inter-Harmonics	Inter-Harmonics 1st to 127th of Voltage and Current
	Fundamental Harmonic (Ufh, Ifh)	U1fh, U2fh, U3fh, Unfh, I1fh, I2fh, I3fh, INfh
	Frequency (f)	f
	Active Energy	Import (E1, E2, E3, SE), Export (E1, E2, E3, SE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy	Inductive (E1, E2, E3, SE), Capacitive (E1, E2, E3, SE), Total Inductive (Tariff1, Tariff2, Tariff3), Total Capacitive (Tariff1, Tariff2, Tariff3)
Datalogging	Main archive	min., max., avg. values of ULN, ULL, I, P, Q, S, D, THDU, THDI, f up to 128 individual harmonics/inter-harmonics, RMS value and phase angles for U and I, Ufh, Ifh, Symetrical components, Unbalance factors, Flicker, state of I/Os
	Electricity Meter Readings	Active and reactive imp. and exp. energy per phase (L1, L2, L3) and per tariff (T1, T2, T3)
	Voltage Event logging	Saq, Swell, Dip
	PQ Event trends recording	Yes
	Waveforms recording	Yes
Others	Alarms	Logical functions, under/over limit of V, I, P, Q, S, unbl, THD, cos, f
	Inputs/Outputs	Optionally: 1 digital input, 2 relay or 2 digital output, Analog input or input for thermometer
	Memory Size	512MB
	RTC	seconds, minutes, hours, days, months, years
	Communication	RS485, Ethernet, M-bus, USB, Wifi, Zigbee

POWER	aux. voltage	Option U: 75 ÷ 275 V_{AC} / 80 ÷ 350 V_{DC}
		Option L: 24 ÷ 48 V_{AC} / 20 ÷ 75 V_{DC}
	power	10 VA / 5 W
	overvoltage category	CAT III / 300 V
INPUT	VOLTAGE measuring range	0 ÷ 1125 V_{AC} / 0 ÷ 850 V_{AC} (line/phase)
	VOLTAGE input impedance	2,4 MΩ (L_i ↔N)
	VOLTAGE connection	wye, delta
	VOLTAGE permanent overload	1300 V_{RMS}
	VOLTAGE surge overload	1950 V_{RMS} for 1s
	CURRENT measuring range	0,02 ÷ 1,2 × I_{NOM}
	CURRENT permanent overload	2 × I_{NOM}
	CURRENT surge overload	10 × I_{NOM} for 1s
	TEMP measuring range	-25°C ÷ 65°C

INPUTS/OUTPUTS	D	Voltage levels	U_L < 3 V, U_H > 10 V
	D	Max. Input voltage	U_M = 30 V
	D	Input current	3 mA/12 V, 8 mA/24 V
	I	Semiconductor ratings	100 V_{DC} / 300 mA
OTHER	TEMP	Operating	-25 ÷ 60°C, <95% non-condens. environ.
	TEMP	Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Emmision	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 6, EN 61000 – 4 – 11
	EMC	Immunity	EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 20
		Dimmensions	105W×90H×58D mm / 0,19 kg

COMMUNICATION	Primary RS-485 (stand.)	2.4 ÷ 921kbd, 2-wire, isolated
	Ethernet 10Base-T (opt. E)	10 Mbit, UTP RJ-45
	USB (opt. U)	Mini-B connector
	WiFi (opt. W)	IEEE 802.11 b, g
	ZigBee (opt. Z)	9.6 ÷ 115.2 kbd

ACCURACY	Voltage	0.05
	Current	0.05
	Active Power	0.2
	Reactive Power	1
	Apparent Power	0.1
	PF, cosφ	0.5
	Frequency	0.02
	Active Energy	0.2
	Reactive Energy	1
	Harmonics, THD of U, I	1
	Unbalance	0.2
	Flicker	2

Ordering options

ARTIQ 144 U P100 I D E

Instrument model
ARTIQ = Class A insrtrument series

Measuring inputs
144 = 4 voltage + 4 current inputs

Auxiliary power supply
U = 75 V ÷ 275 VAC, 80 V ÷ 350 VDC
L = 20 V ÷ 75 VDC, 24 V ÷ 48 VAC

Current inputs
Snnn = with low current output CTs, split-core
Pnnn = with low current output CTs, through-hole
NOCT = without current inputs

Split-core options		**Through-hole options**	
S005 = 5 A	S150 = 150 A	P005 = 5 A	P150 = 150 A
S015 = 15 A	S200 = 200 A	P015 = 15 A	P200 = 200 A
S025 = 25 A	S250 = 250 A	P025 = 25 A	P250 = 250 A
S035 = 35 A	S300 = 300 A	P035 = 35 A	P300 = 300 A
S050 = 50 A	S400 = 400 A	P050 = 50 A	
S075 = 75 A	S500 = 500 A	P075 = 75 A	
S100 = 100 A	S600 = 600 A	P100 = 100 A	

Optional digital output
N = without output
I = 2× pulse output

Optional peripheral
N = without optional peripheral
D = two digital inputs
M = M-Bus interface (not combinable with option E)

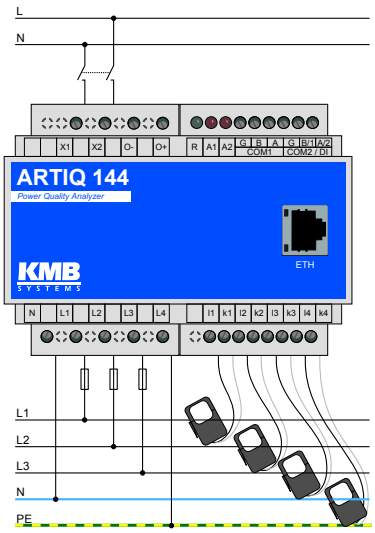
Optional expanding module
N = without expanding module
U = USB
E = Ethernet interface (not combinable with option M)
W = Wi-Fi wireless communication + USB
Z = ZigBee wireless communication + USB
F = MicroSD slot + USB

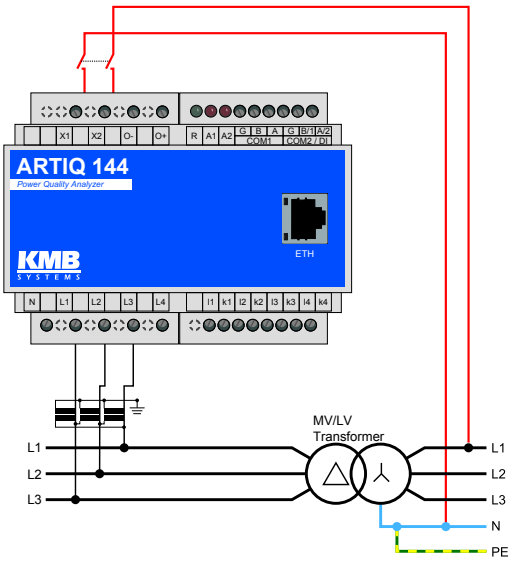
Current ranges and respective CTs

Option Pxxx						Range	Option Sxxx					
Type	d	x	y	z	m		Type	d	x	y	z	m
	[mm]				[g]	[A]		[mm]				[g]
JP3W	7	24	27	11	11	**005**	JC10F	10	23	50	26	45
						015						
JP5W	13	37	41	14	37	**025**						
						035						
						050						
						075	JC16F	16	30	55	31	75
						100						
						150	JC24F	24	45	75	34	150
JP6W	19	49	51	20	70	**200**						
						250						
						300	JC36S-3	36	57	91	41	280
						400						
						500						
						600						

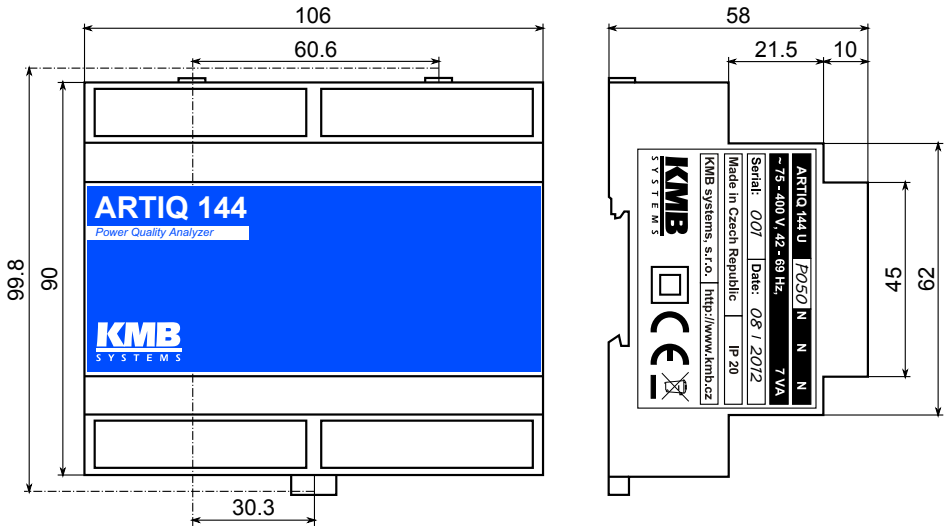
Variant **NOCT** has not current sensors nor current inputs.

Typical connection schema

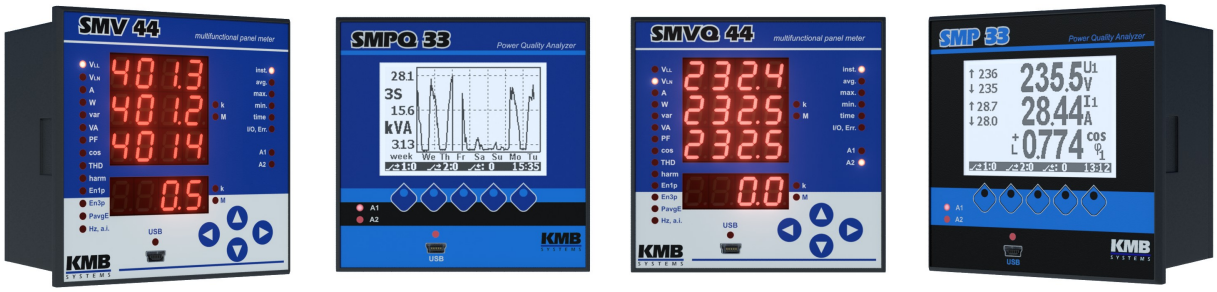




Mechanical dimensions



SMV, SMP and SMVQ, SMPQ
Class S power quality analysers

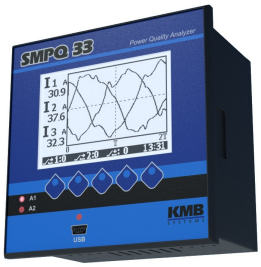


These advanced panel meters are designed to monitor the quality of electric energy in a three- to five-wire electrical networks. They are characterized by continuous measurement of up to four voltages and currents. The instrument is also capable to evaluate other variables such as active, reactive, apparent and distortion power, energy consumption (kWh/kvarh, three tariffs, four quadrants), power factor, harmonic distortion etc. All three variants share the core features and functions and its other characteristics vary with advanced optional services and display features. SMPQ offers increased accuracy and precision of energy measurement. It also extends the list of measured variables such as flicker (Pst, Plt), inter-harmonic subgroups etc. It also allows assessment of power quality indices according to the EN 50160.

Key features:

- advanced panel meters to monitor quality of electric energy in a three- to five- wire electrical networks.
- continuous measurement of up to four voltages and currents
- class S power monitoring according to the international standard IEC 61000-4-30, ed. 2.
- embedded four quadrant three phase three tariff electricity meter
- continuous power quality evaluation according EN 50160 (SMPQ)
- built-in USB 2.0 communication port with optional remote interface like RS 232, RS 485 or Ethernet
- standard MODBUS protocol support for SCADA systems

SMVQ and SMPQ 33 & 44 - The Advanced Power Quality Analyzer



SMPQ and SMVQ is the advanced instrument in this category. It continuously evaluates power quality according to DIN EN 50160. Additionally included are short and long-term flicker severity indexes according to IEC 61000-4-15 and harmonic emissions measured up to 50th harmonic and inter-harmonic subgroups as defined in IEC 61000-4-7. The device has improved precision of power and energy evaluation and by default it is equipped with an evaluation of voltage events like dips and swells. Active and reactive energy meter complies to the EN 62053-21 0.5s class resp. EN 62053-23 class 2. The instrument is fitted for even the most demanding applications.

SMV and SMP 33 & 44 - The universal power quality analyzer

SMP and SMV devices are all-purpose compact panel meters with uncompromisable list of measured quantities. Both instruments differs mainly in display. SMV features LED display, whose contrast and mechanical robustness is an advantage in certain application. SMP device has back-lit high resolution LCD graphic display to immediately check all actual and average values, week and day trends (graphs), phasors, harmonic and inter-harmonic diagrams, actual wave-shapes, actual, last month and total electricity meter readings, archive statuses and many other relevant information. The device provides menu for a user-friendly navigation with easy access to most of the configuration options and parameters. To protect data and infrastructure against unauthorized manipulation a two-level administrator lock mechanism is also implemented. Optionally the SMV and SMP devices can be equipped with module to record voltage events (dips, swells) as defined in DIN EN 50160.

Options X/5A and X/1A are for standard CTs with nominal output of 5A or 1A. You don't have to specify current range as CTs are not part of the delivery in case of this option. But it's possible to order them separately. This is usually most common option for SMP and SMPQ instruments.

Split-core (Clamp On) JC-series current transformers used for S-option of SMP and SMPQ. The JC series of current transformer is simple to use, compact split-core design which is easily installed for metering applications. This is ideal for distributed measurement systems and can be retro-fitted into existing installations and non-interruptible equipment as there is no requirement for disconnection of wiring.

Flexible Rogowski-coil sensor for F- option of SMP and SMPQ. This flexible and lightweight sensors are equipped with signal amplifiers and a four-position range switch built into the sensor cable. This kind of sensors provides easy & quick installation in uninterruptible power line.

Technical specification

Metering	Phase Voltage (ULN)	U1, U2, U3, UN
	Line Voltage (ULL)	U12, U23, U31
	Current (I)	IL1, IL2, IL3, ILN*
	Power (P)	P1, P2, P3, PN*, 3P (import, export, total, 1st harmonic)
	Reactive Power (Q)	Q1, Q2, Q3, QN*, 3Q (import, export, total, 1st harmonic)
	Aparent Power (S)	S1, S2, S3, SN*, 3S
	Distortion Power (D)	D1, D2, D3, DN*
	Power Factor (PF)	PF1, PF2, PF3, PFN*, 3PF
	cosφ	cosφ1, cosφ2, cosφ3, cosφN*, 3cosφ,
	Symetrical Components	zero, negative and positive sequence components of voltage and current
	Unbalance Factor	unbI, unbU, φnsI
	Voltage THD (THDU)	THDU1, THDU2, THDU3, THDUN*
	Current THD (THDI)	THDI1, THDI2, THDI3, THDIN*
	Individual Harmonics	Harmonics 1st to 63rd of Voltage and Current and their angles
	Inter-Harmonics	Inter-Harmonics 1st to 63rd of Voltage and Current**
	Fundamental Harmonic (Ufh, Ifh)	U1fh, U2fh, U3fh, Unfh, I1fh, I2fh, I3fh, INfh
	Frequency (f)	f
	Active Energy	Import (E1, E2, E3, SE), Export (E1, E2, E3, SE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy	Inductive (E1, E2, E3, SE), Capacitive (E1, E2, E3, SE), Total Inductive (Tariff1, Tariff2, Tariff3), Total Capacitive (Tariff1, Tariff2, Tariff3)
Datalogging	Main archive	min., max., avg. values of ULN, ULL, I, P, Q, S, D, THDU, THDI, f Avg. values of individual harmonics and their angles, Ufh, Ifh, Symetrical components, Unbalance factors, state of I/Os
	Electricity Meter Readings	Active and reactive imp. and exp. energy per phase (L1, L2, L3) and per tariff (T1, T2, T3)
	Voltage Event logging	Saq, Swell, Dip**
	PQ Event trends recording	Yes**
	Waveforms recording	Yes**, optional firmware module General Oscilogram
Others	Alarms	Logical functions, under/over limit of V, I, P, Q, S, unbI, THD, cos, f
	Inputs/Outputs	Optionally: 1 digital input, 2 relay or 2 digital output, Analog input or input for thermometer
	Memory Size	512MB
	RTC	seconds, minutes, hours, days, years
	Communication	USB, RS232, RS485, Ethernet

* SMV, SMP 44 and SMVQ, SMPQ 44 only

** SMVQ, SMPQ only

POWER		aux. voltage	Option U: 85 ÷ 275 VAC / 80 ÷ 350 VDC Option L: 24 ÷ 48 VAC / 20 ÷ 75 VDC
		power	7 VA / 3 W
		overvoltage category	CAT III / 300 V
INPUT	VOLTAGE	measuring range	3 ÷ 800 V_{AC} /5 ÷ 1380 V_{AC} (phase/line)
		input impedance	2,7 MW ($L_i \leftrightarrow N$)
		connection	wye, delta
		permanent overload	800 V_{RMS}
		surge overload	1200 V_{RMS} for 1min
	CURRENT	measuring range	1 ÷ 7 A
		permanent overload	7 A
		surge overload	70 A
	TEMP	measuring range	depending on temperature sensor range

INPUTS/OUTPUTS	D	Digital Input ratings	5 V_{DC}/1 mA, min 100 ms
	A	Analog input ratings	2 ÷ 22 mA, impedance 75Ω
	T	Pt 100 input ratings	Range -50 ÷ 150°C
	I	Semiconductor ratings	100 V_{DC} / 300 mA
	R	Relay switch ratings	230 V_{AC} or 30 V_{DC} / 3 A
OTHER	TEMP	Operating	-25 ÷ 60°C, <95% non-condens. environ.
		Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Emmision	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 6, EN 61000 – 4 – 11
		Immunity	EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 40 (optional IP 54) front panel
		Dimmensions	96W×96H×58D mm / 0,3 kg

COMMUNICATION	Local USB 2.0 (standard) Connector Mini-B
	Remote RS-232 (opt. 2) galvanically isolated 3-wire connection 2400 ÷ 230400 baud
	Remote RS-485 (opt. 4) galvanically isolated 2-wire connection 2400 ÷ 230400 baud
	Remote Ethernet 10Base-T (opt. E) 4-wires (2 twisted pairs) 10 Mbit/s

		SMV, SMP	SMVQ, SMPQ
ACCURACY	Voltage	0,10%	0,10%
	Current	0,30%	0,10%
	Power	1,00%	0,50%
	Reactive Power	1,00%	0,50%
	PF, cosφ	0,01	0,005
	Frequency	0,20%	0,20%
	Active Energy	2,00%	Class 0,5S
	Reactive Energy	2,00%	Class 2
	Harmonics of U, I	Class 3	
	THD of Voltage	0,30%	
	Flicker	-	5,00%

Ordering options

SMPQ 33 U 400 X/5A N N N

Instrument model
- SMV = LED numeric display
- SMP = LCD graphic display
- SMVQ = LED display, power quality evaluation
- SMPQ = LCD graphic display, power quality evaluation

Measuring inputs
- 33 = 4 voltage + 3 current inputs
- 44 = 4 voltage + 4 current inputs

Auxiliary voltage range
- U = 85 ÷ 275 V AC, 80 ÷ 350 V DC (standard)
- L = 20 ÷ 75 V DC, 24 V ÷ 48 V AC

Nominal measuring voltage
- 400 = 230V/400V ÷ 400V/690V
- 100 = 57.7V/130V

Measuring current input type
- X/5A = 5A AC (standard indirect measurement)
- F = Rogowski-type sensor current input
- Snnn = with low current output CTs, split-core
- Pnnn = with low current output CTs, through-hole

Split-core options			Through-hole options	
S005 = 5 A	S150 = 150 A		P005 = 5 A	P150 = 150 A
S015 = 15 A	S200 = 200 A		P015 = 15 A	P200 = 200 A
S025 = 25 A	S250 = 250 A		P025 = 25 A	P250 = 250 A
S035 = 35 A	S300 = 300 A		P035 = 35 A	P300 = 300 A
S050 = 50 A	S400 = 400 A		P050 = 50 A	
S075 = 75 A	S500 = 500 A		P075 = 75 A	
S100 = 100 A	S600 = 600 A		P100 = 100 A	

Digital I/O
- N = without I/O
- RR = 2 relay outputs + 1 logic input
- RI = 1 relay output + 1 pulse output + 1 logic input
- II = 2 pulse output + 1 logic input

Analog I/O
- N = without I/O
- A = 4 ÷ 20 mA current loop input
- T = Pt100 temperature sensor input

Remote comm. link interface
- N = no remote comm. link
- 2 = RS-232
- 4 = RS-485
- E = Ethernet 10BaseT

Current ranges and respective CTs

Option Pxxx						Range	Option Sxxx					
Type	d	x	y	z	m		Type	d	x	y	z	m
	[mm]				[g]	[A]		[mm]				[g]
JP3W	7	24	27	11	11	**005**	JC10F	10	23	50	26	45
						015						
JP5W	13	37	41	14	37	**025**						
						035						
						050						
						075	JC16F	16	30	55	31	75
						100						
						150	JC24F	24	45	75	34	150
JP6W	19	49	51	20	70	**200**						
						250						
						300	JC36S-3	36	57	91	41	280
						400						
						500						
						600						

Variant **NOCT** has not current sensors nor current inputs.

Examples of connection

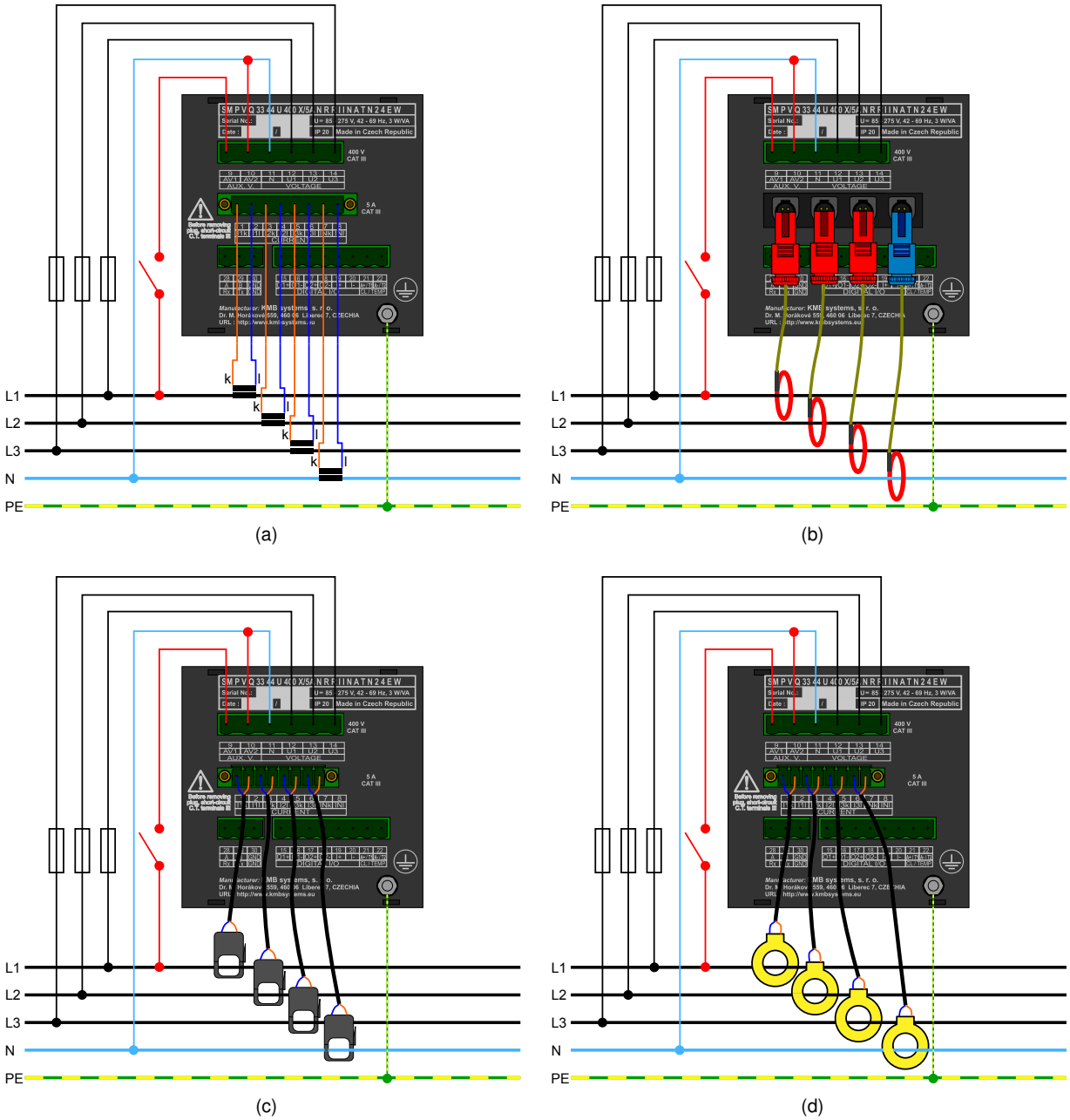
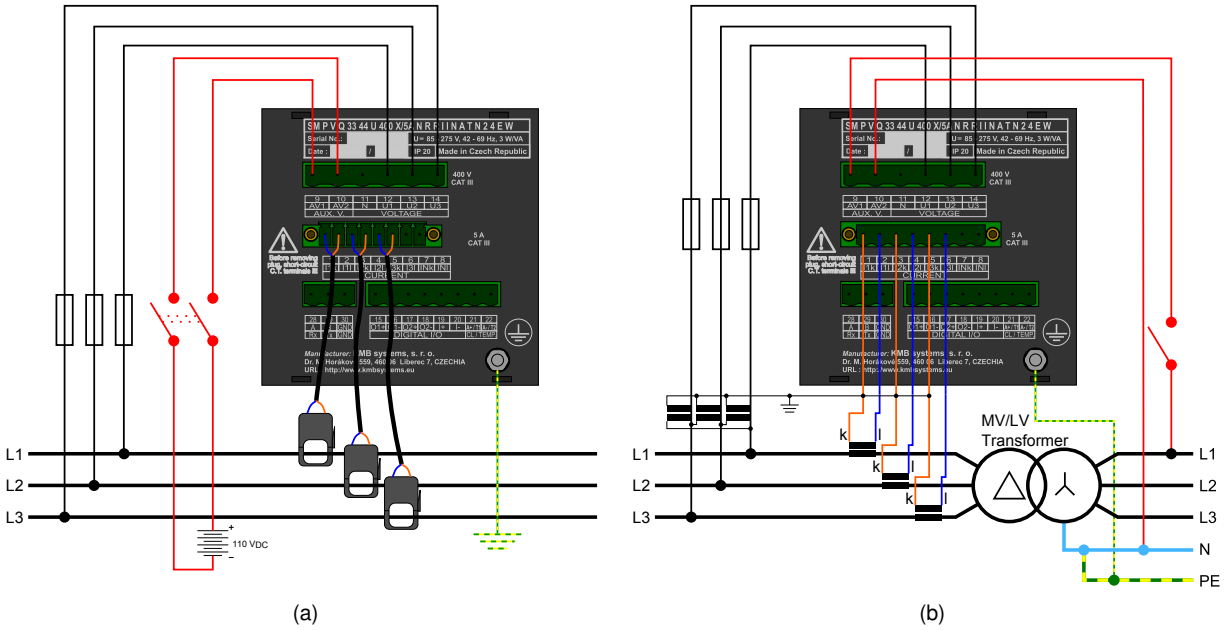


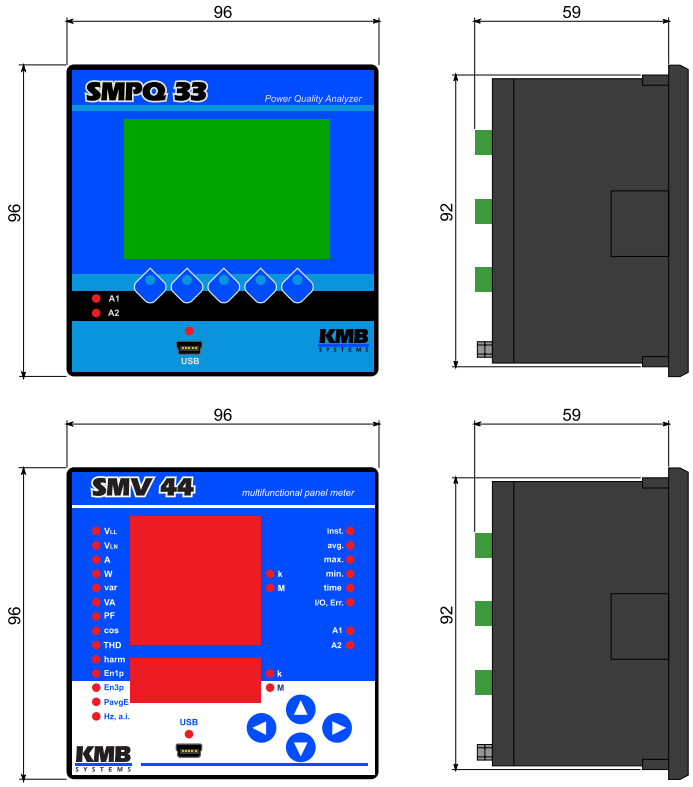
Figure 1: X/5A-Option, Star connection (4Y), direct voltage connection,mains 3x 230/400 V (a)
F-Option, Star connection (4Y), B3000/1000 current sensors (b)
S-Option, Star connection (4Y), JC-line split core current transformers (c)
P-Option, Star connection (4Y), JP-line split core current transformers (d)



(a) (b)

Figure 2: S-Option, Delta connection (3D), direct voltage connection, aux. DC power supply (a)
X/5A-Option, Delta connection (3D), voltage and current connection on MV side (b)

Mechanical dimensions



SML 133
Multifunctional panel meter

SML 133 is a basic 3-phase multimeter with large bright segment LCD display. Instrument is designed for load or generation monitoring in single-phase and three-phase low, medium and high voltage networks. It monitors actual value of frequency, line and phase voltages, currents, unbalances, active and reactive powers, power factors and up to 50 voltage and current harmonics as well as the total harmonic distortions. Measurement of actual temperature within a control panel is also supported with an in-built temperature sensor.
Optional relay or impulse outputs can be programmed to control other equipment based on measured values (fan control, overvoltage/overcurrent etc). Impulse outputs can also work as an S0 pulse output for the embedded electricity meter. Optional communication interface allows it to be simply configured and managed via ENVIS application from a remote PC. In combination with ENVIS.Online service its actual values can be also periodically downloaded and stored to the SQL database for further processing.

Typical applications: replacement of analog instrument, energy management, sub-metering, remote online energy and power monitoring, industrial automation.

Key features:

- measuring multimeter of actual network data
- three-phase energy meter (kWh, kVARh, +,-) measures in 4 or 6 quadrants
- alternatively registers apparent energy also in kVAh (bivector electricity meter function)
- pulse outputs and programmable alarm relays (option RR, RI, II)
- single-phase, three-phase or Aron connection, direct & indirect measuremnt (with VT and CT)
- precise continuous measurement, 128 samples/period, independent 6.4 kHz sampling
- voltage and current: class 0.5 / 0.5 according to 61557-12
- energy: active 0.5, reactive class 1 according to 61557-12, 62053-22 resp. -23
- built-in PT100 temperature sensor, binary input
- optional remote RS 485 or 10/100Mbit Ethernet communication

Technical specification

Metering	Phase Voltage (ULN)	U1, U2, U3 [act, avg, avg_{max}, avg_{min}]
	Line Voltage (ULL)	U12, U23, U31 [act, avg, avg_{max}, avg_{min}]
	Current (I)	IL1, IL2, IL3 [act, avg, avg_{max}, avg_{min}]
	Power (P)	P1, P2, P3, 3P [act, avg, avg_{max}, avg_{min}]
	Reactive Power (Q)	Q1, Q2, Q3, 3Q [act, avg, avg_{max}, avg_{min}]
	Aparent Power (S)	S1, S2, S3, 3S [act, avg, avg_{max}, avg_{min}]
	Power Factor (PF)	PF1, PF2, PF3, 3PF [act, avg, avg_{max}, avg_{min}]
	cosφ	cosφ1, cosφ2, cosφ3 [act, avg, avg_{max}, avg_{min}]
	Unbalance Factor	unbI, unbU, φnsI [act]
	Voltage THD (THDU)	THDU1, THDU2, THDU3, THDU12, THDU23, THDU31 [act]
	Current THD (THDI)	THDI1, THDI2, THDI3 [act]
	Individual Harmonics	Harmonics 1st to 50th of Voltage and Current
	Frequency (f)	f [act, avg, avg_{max}, avg_{min}]
	Active Energy	Import (E1, E2, E3, SE), Export (E1, E2, E3, SE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy	Inductive Export (E1, E2, E3, SE), Capacitive Export (E1, E2, E3, SE), Inductive Import (E1, E2, E3, SE), Capacitive Import (E1, E2, E3, SE), Total Inductive Exp. (Tariff1, Tariff2, Tariff3), Total Capacitive Exp. (Tariff1, Tariff2, Tariff3) Total Inductive Imp. (Tariff1, Tariff2, Tariff3), Total Capacitive Imp. (Tariff1, Tariff2, Tariff3)
Datalogging	Main archive	NO
	Electricity Meter Readings	NO
	Voltage Event logging	NO
	PQ Event trends recording	NO
	Waveforms recording	NO
Others	Alarms	Logical functions, under/over limit of U, I, P, Q, S, THD, cosj, f
	Inputs/Outputs	Optionally: 1 digital input, 2 relay or 2 digital output,
	Memory	NO
	RTC	NO
	Communication	RS485, Ethernet

POWER		Aux. voltage	Option U: 85 ÷ 275 V_{AC} / 80 ÷ 350 V_{DC} Option L: 24 ÷ 48 V_{AC} / 20 ÷ 75 V_{DC}
		Power	3 VA / 3 W
		Overvoltage cathegory	III / polution degree 2
INPUT	VOLTAGE	Measuring range	Option 400: 8 ÷ 830 V_{AC} / 6 ÷ 480 V_{AC}, 300 V CAT III Option 100: 4 ÷ 210 V_{AC} / 2 ÷ 120 V_{AC}, 150 V CAT III
		Input impedance	Option 400: 6 MΩ (Li ↔N) Option 100: 1,5 MΩ (Li ↔N)
		Connection	wye
		Permanent overload	Option 400: 600 V_{RMS} Option 100: 150 V_{RMS}
		Surge overload	Option 400: 1500 V_{RMS} po 1s Option 100: 400 V_{RMS} po 1s
	CURRENT	Measuring range	Option X/5A: 0,005 ÷ 6 A, 150V CAT III Option S, P: 0,02 ÷ 1,2 × I_{NOM}, 600V CAT III
		Permanent overload	Option X/5A: 7,5A Option S, P: 2 × I_{NOM}
		Surge overload	Option X/5A: 70 A Option S, P: 10 × I_{NOM} for 1s
	TEMP	Measuring range	-40°C ÷ 80°C

INPUTS/OUTPUTS	D	Voltage levels	U_L < 3 V, U_H > 10 V
		Max. Input voltage	U_M = 60 V_{AC} / 100 V_{DC}
		Input power	< 0,4VA (Ri = 200 kW)
	I	Semiconductor ratings	60 V_{AC} / 100 V_{DC}, 100 mA
	R	Relay switch ratings	250 V_{AC} / 30 V_{DC}, 5 A
OTHER	TEMP	Operating	-25 ÷ 60°C, <95% non-condens. environ.
		Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Emmision	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 6, EN 61000 – 4 – 11
		Immunity	EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 40 (optional IP 54) front panel
		Dimmensions	96W×96H×58D mm / 0,3 kg

COMMUNICATION	RS-485 (opt. 4) galvanically isolated KMBlong, MODBUS RTU protocols 2-wire connection 2400 ÷ 921600 baud
	Ethernet 10Base-T (opt. E) KMBlong, MODBUS TCP protocols 4-wires (2 twisted pairs) 10 Mbit/s

ACCURACY	Voltage	0,5
	Current	0,5
	Active Power	0,5
	Reactive Power	1
	Apparent Power	0,5
	PF, cosφ	0,5
	Frequency	0,05
	Active Energy	0,5
	Reactive Energy	1
	Harmonics and THD of U, I	2
	Unbalance	1

Ordering options

SML 133 U 400 X/5A RR E

Instrument Model
SML 133 = Three-phase multimeter

Auxiliary Power Supply
U = 75 V ÷ 275 VAC, 75 V ÷ 350 VDC
L = 20 V ÷ 75 VDC, 24 V ÷ 48 VAC

Nominal Measuring Voltage
400 = 230V/400V ÷ 400V/690V
100 = 57,7V/100V

Current Inputs
X/5A = 5A AC (standard indirect measurement)
Snnn = with low current output CTs, split-core
Pnnn = with low current output CTs, through-hole

Split-core options		**Through-hole options**	
S005 = 5 A	S150 = 150 A	P005 = 5 A	P150 = 150 A
S015 = 15 A	S200 = 200 A	P015 = 15 A	P200 = 200 A
S025 = 25 A	S250 = 250 A	P025 = 25 A	P250 = 250 A
S035 = 35 A	S300 = 300 A	P035 = 35 A	P300 = 300 A
S050 = 50 A	S400 = 400 A	P050 = 50 A	
S075 = 75 A	S500 = 500 A	P075 = 75 A	
S100 = 100 A	S600 = 600 A	P100 = 100 A	

Digital I/O
N = without I/O
RR = 2× relay output + 1× logical input 24V
RI = 1× relay output + 1× pulse output + 1× logical input 24V
II = 2× pulse output + 1× logical input 24V

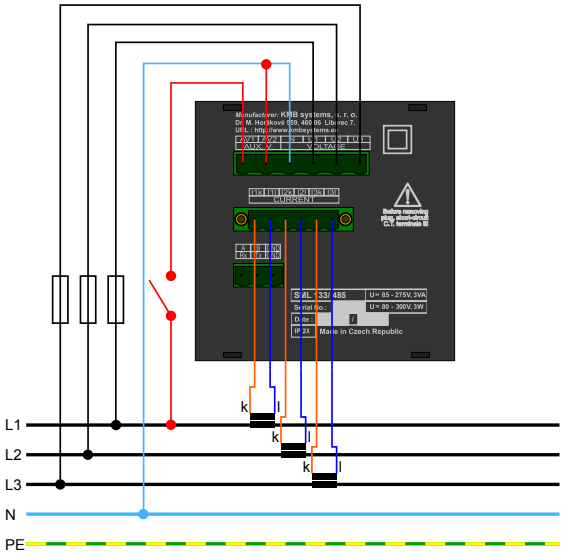
Remote Communication Interface
N = no remote comm. link
4 = RS-485
E = Ethernet 10BaseT

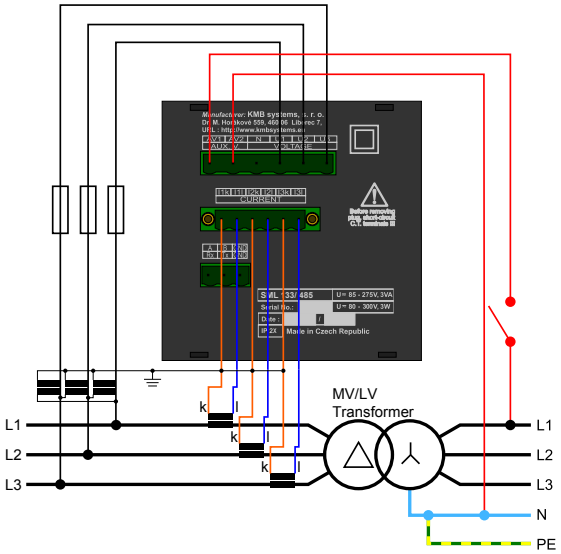
Current ranges and respective CTs

Option Pxxx						Range	Option Sxxx					
Type	d	x	y	z	m		Type	d	x	y	z	m
	[mm]				[g]	[A]		[mm]				[g]
JP3W	7	24	27	11	11	**005**	JC10F	10	23	50	26	45
						015						
JP5W	13	37	41	14	37	**025**						
						035						
						050						
						075	JC16F	16	30	55	31	75
						100						
						150	JC24F	24	45	75	34	150
JP6W	19	49	51	20	70	**200**						
						250						
						300	JC36S-3	36	57	91	41	280
						400						
						500						
						600						

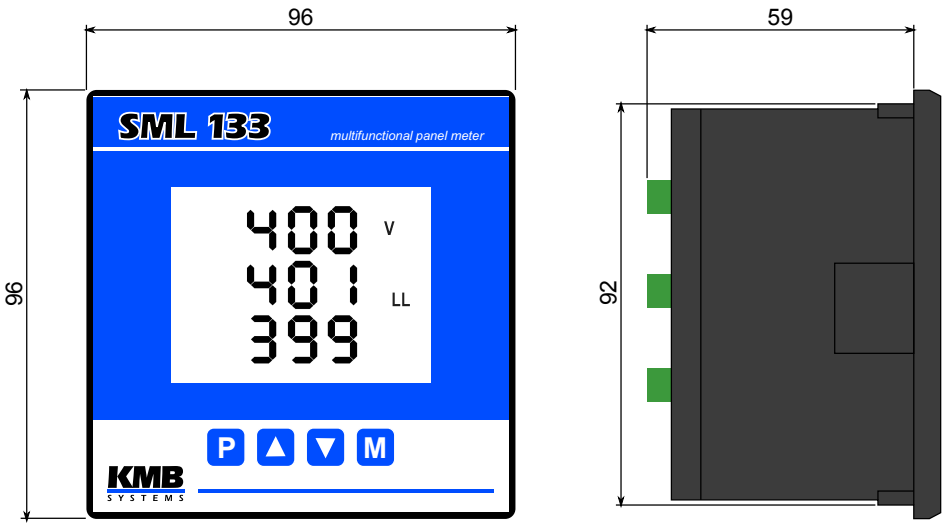
Variant **NOCT** has not current sensors nor current inputs.

Typical connection schema





Mechanical dimensions



SMY 133

Power monitor and data logger

SMY 133 advanced 3-phase multimeter with large color LCD display. Instrument is designed for load or generation monitoring in single-phase and three-phase low, medium and high voltage networks. It monitors actual value of frequency, line and phase voltages, currents, unbalances, active and reactive powers, power factors and up to 50 voltage and current harmonics as well as the total harmonic distortions. Measurement of actual temperature within a control panel is also supported with an in-built temperature sensor.
Optional relay or impulse outputs can be programmed to control other equipment based on measured values (fan control, overvoltage/overcurrent etc). Impulse outputs can also work as an S0 pulse output for the embedded electricity meter. Optional communication interface allows it to be simply configured and managed via ENVIS application from a remote PC. In combination with ENVIS.Online service its actual values can be also periodically downloaded and stored to the SQL database for further processing.

Typical applications: analog instrument replacement, remote online monitoring, industrial automation, energy management, sub-metering

Key features:

- three-phase energy meter (kWh, kVARh, +,-) measures in 4 or 6 quadrants
- alternatively registers apparent energy also in kVAh (bivector electricity meter function)
- pulse outputs and programmable alarm relays (option RR, RI, II)
- 512 MB of internal memory for datalogging and energy recording
- single-phase, three-phase or Aron connection, direct & indirect measuremnt (with VT and CT)
- precise continuous measurement, 128 samples/period, independent 6.4 kHz sampling
- voltage and current: class 0.5 / 0.2 according to 61557-12
- energy: active 0.5, reactive class 1 according to 61557-12, 62053-22 resp. -23
- built-in PT100 temperature sensor, binary input (state or pulse)
- optional remote RS 485 or 10/100Mbit Ethernet communication

Technical specification

Metering	Phase Voltage (ULN)	U1, U2, U3 [act, avg, avg_{max}, avg_{min}]
	Line Voltage (ULL)	U12, U23, U31 [act, avg, avg_{max}, avg_{min}]
	Current (I)	IL1, IL2, IL3 [act, avg, avg_{max}, avg_{min}]
	Power (P)	P1, P2, P3, 3P (import, export, total, 1st harmonic) [act, avg, avg_{max}, avg_{min}]
	Reactive Power (Q)	Q1, Q2, Q3, 3Q (import, export, total, 1st harmonic) [act, avg, avg_{max}, avg_{min}]
	Aparent Power (S)	S1, S2, S3, 3S [act, avg, avg_{max}, avg_{min}]
	Deformed Power (D)	D1, D2, D3 [act, avg, avg_{max}, avg_{min}]
	Power Factor (PF)	PF1, PF2, PF3, 3PF [act, avg, avg_{max}, avg_{min}]
	cosφ	cosφ1, cosφ2, cosφ3, 3cosφ [act, avg, avg_{max}, avg_{min}]
	Symetrical Components	zero, negative and positive sequence components of voltage and current
	Unbalance Factor	unbI, unbU, φnsI
	Voltage THD (THDU)	THDU1, THDU2, THDU3
	Current THD (THDI)	THDI1, THDI2, THDI3
	Individual Harmonics	Harmonics 1st to 63rd of Voltage and Current and their angles
	Fundamental Harmonic (Ufh, Ifh)	U1fh, U2fh, U3fh, I1fh, I2fh, I3fh
	Frequency (f)	f
	Active Energy	Import (E1, E2, E3, SE), Export (E1, E2, E3, SE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy	Inductive (E1, E2, E3, SE), Capacitive (E1, E2, E3, SE), Total Inductive (Tariff1, Tariff2, Tariff3), Total Capacitive (Tariff1, Tariff2, Tariff3)
Datalogging	Main archive	min., max., avg. values of ULN, ULL, I, P, Q, S, D, THDU, THDI, f Avg. values of individual harmonics and their angles, Ufh, Ifh, Symetrical components, Unbalance factors, state of I/Os
	Electricity Meter Readings	Active and reactive imp. and exp. energy per phase (L1, L2, L3) and per tariff (T1, T2, T3)
	Voltage Event logging	NO
	PQ Event trends recording	NO
	Waveforms recording	optional firmware module General Oscilogram
Others	Alarms	Logical functions, under/over limit of V, I, P, Q, S, unbI, THD, cos, f
	Inputs/Outputs	Optionaly: 1 digital input, 2 relay or 2 digital output
	Memory Size	512Mb
	RTC	seconds, minutes, hours, days, months, years
	Communication	USB, RS485, Ethernet

POWER		Aux. voltage	Option U: 85 ÷ 275 V_{AC} / 80 ÷ 350 V_{DC} Option L: 24 ÷ 48 V_{AC} / 20 ÷ 75 V_{DC}
		Power	3 VA / 3 W
		Overvoltage cathegory	III / polution degree 2
INPUT	VOLTAGE	Measuring range	Option 400: 8 ÷ 830 V_{AC} / 6 ÷ 480 V_{AC}, 300 V CAT III Option 100: 4 ÷ 210 V_{AC} / 2 ÷ 120 V_{AC}, 150 V CAT III
		Input impedance	Option 400: 6 MΩ (Li ↔N) Option 100: 1,5 MΩ (Li ↔N)
		Connection	wye
		Permanent overload	Option 400: 600 V_{RMS} Option 100: 150 V_{RMS}
		Surge overload	Option 400: 1500 V_{RMS} po 1s Option 100: 400 V_{RMS} po 1s
	CURRENT	Measuring range	Option X/5A: 0,005 ÷ 6 A, 150V CAT III Option S, P: 0,02 ÷ 1,2 × I_{NOM}, 600V CAT III
		Permanent overload	Option X/5A: 7,5A Option S, P: 2 × I_{NOM}
		Surge overload	Option X/5A: 70 A Option S, P: 10 × I_{NOM} for 1s
	TEMP	Measuring range	-40°C ÷ 80°C

INPUTS/OUTPUTS	D	Voltage levels	U_L < 3 V, U_H > 10 V
		Max. Input voltage	U_M = 60 V_{AC} / 100 V_{DC}
		Input power	< 0,4VA (Ri = 200 kW)
	I	Semiconductor ratings	60 V_{AC} / 100 V_{DC}, 100 mA
	R	Relay switch ratings	250 V_{AC} / 30 V_{DC}, 5 A
OTHER	TEMP	Operating	-25 ÷ 60°C, <95% non-condens. environ.
		Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Emmision	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 6, EN 61000 – 4 – 11
		Immunity	EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 40 (optional IP 54) front panel
		Dimmensions	96W×96H×58D mm / 0,3 kg

COMMUNICATION	Local USB 2.0 (standard) KMBlong, MODBUS RTU protocols Connector type Mini-B
	RS-485 (opt. 4) galvanically isolated KMBlong, MODBUS RTU protocols 2-wire connection 2400 ÷ 921600 baud
	Ethernet 10Base-T (opt. E) KMBlong, MODBUS TCP protocols 4-wires (2 twisted pairs) 10 Mbit/s

ACCURACY	Voltage	0,5
	Current	0,5
	Active Power	0,5
	Reactive Power	1
	Apparent Power	0,5
	PF, cosφ	0,5
	Frequency	0,05
	Active Energy	0,5
	Reactive Energy	1
	Harmonics and THD of U, I	2
	Unbalance	1

Ordering options

SMY 133 U 400 X/5A RR E

Instrument Model
SMY 133 = Power analyser and datalogger

Auxiliary Power Supply
U = 75 V ÷ 275 VAC, 75 V ÷ 350 VDC
L = 20 V ÷ 75 VDC, 24 V ÷ 48 VAC

Nominal Measuring Voltage
400 = 230V/400V ÷ 400V/690V
100 = 57.7V/100V

Current Inputs
X/5A = 5A AC (standard indirect measurement)
Snnn = with low current output CTs, split-core
Pnnn = with low current output CTs, through-hole

Split-core options		**Through-hole options**	
S005 = 5 A	S150 = 150 A	P005 = 5 A	P150 = 150 A
S015 = 15 A	S200 = 200 A	P015 = 15 A	P200 = 200 A
S025 = 25 A	S250 = 250 A	P025 = 25 A	P250 = 250 A
S035 = 35 A	S300 = 300 A	P035 = 35 A	P300 = 300 A
S050 = 50 A	S400 = 400 A	P050 = 50 A	
S075 = 75 A	S500 = 500 A	P075 = 75 A	
S100 = 100 A	S600 = 600 A	P100 = 100 A	

Digital I/O
N = without I/O
RR = 2× relay output + 1× logical input 24V
RI = 1× relay output + 1× pulse output + 1× logical input 24V
II = 2× pulse output + 1× logical input 24V

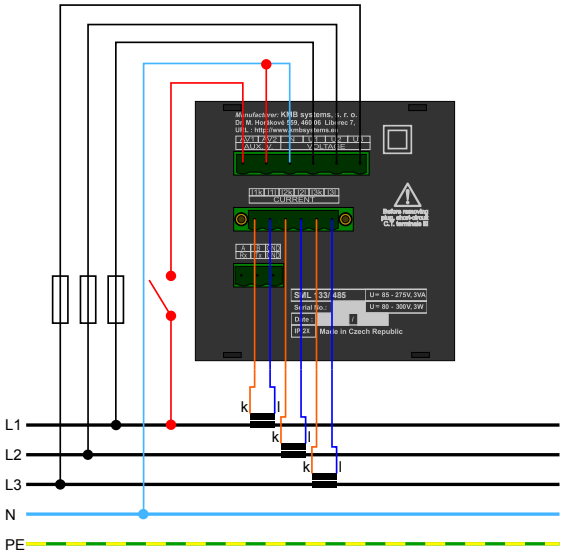
Remote Communication Interface
N = no remote comm. link
4 = RS-485
E = Ethernet 10BaseT

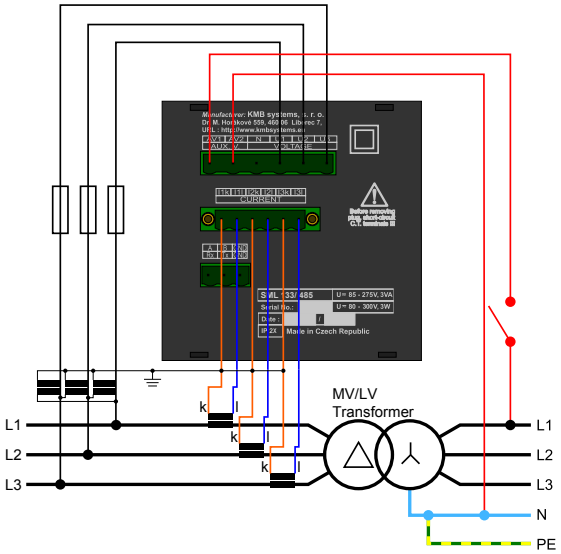
Current ranges and respective CTs

Option Pxxx						Range	Option Sxxx					
Type	d	x	y	z	m		Type	d	x	y	z	m
	[mm]				[g]	[A]		[mm]				[g]
JP3W	7	24	27	11	11	**005**	JC10F	10	23	50	26	45
						015						
JP5W	13	37	41	14	37	**025**						
						035						
						050						
						075	JC16F	16	30	55	31	75
						100						
						150	JC24F	24	45	75	34	150
JP6W	19	49	51	20	70	**200**						
						250						
						300	JC36S-3	36	57	91	41	280
						400						
						500						
						600						

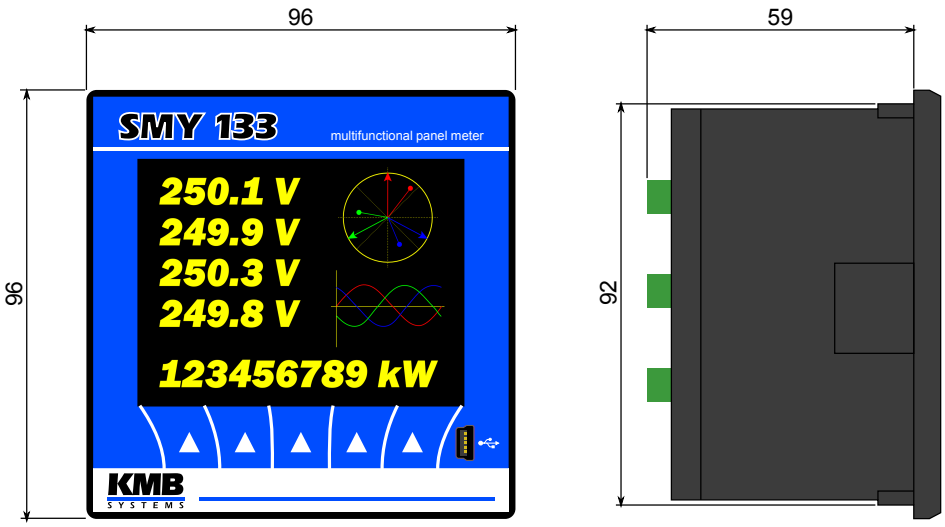
Variant **NOCT** has not current sensors nor current inputs.

Typical connection schema





Mechanical dimensions



SMZ 133

Power monitor and data logger

SMZ 133 advanced 3-phase multimeter with large LCD display. Instrument is designed for load or generation monitoring in single-phase and three-phase LV, MV, HV networks. It monitors actual value of frequency, line and phase voltages, currents, unbalances, active and reactive powers, power factors and up to 50 voltage and current harmonics as well as the total harmonic distortions. Measurement of actual temperature within a control panel is also supported with an in-built temperature sensor.

Optional relay or impulse outputs can be programmed to control other equipment based on measured values (fan control, overvoltage/overcurrent etc). Impulse outputs can also work as an S0 pulse output for the embedded electricity meter. Optional communication interface allows it to be simply configured and managed via ENVIS application from a remote PC. In combination with ENVIS.Online service its actual values can be also periodically downloaded and stored to the SQL database for further processing.

Typical applications: analog instrument replacement, remote online monitoring, industrial automation, energy management, sub-metering, programmable logic, pulse counters, load management

Key features:

- advanced three phase digital power meter, energy meter, data logger and controller
- high contrast bright wide LCD display with simple navigation menu, actual values, charts, ...
- precise evaluation of 3 voltage and current inputs, 128 s./period, continuous ~6.4kHz sampling
- 4 or 6 quadrant, three-phase energy meter (kWh, kvarh), supports tarrifs and TOU (time of use meter)
- alternatively registers apparent energy (kVAh, bivector/trivector electricity meter function)
- local USB, remote 1-2x RS-485 or Ethernet
- provides ModBus communication protocol for both master and slave
- programmable IO: 4 relays, 4 digital/pulse outputs, 5 digital inputs and PT100 thermometer

Technical specification

Metering	Phase Voltage (ULN)	U1, U2, U3 [act, avg, avg_{max}, avg_{min}]
	Line Voltage (ULL)	U12, U23, U31 [act, avg, avg_{max}, avg_{min}]
	Current (I)	IL1, IL2, IL3 [act, avg, avg_{max}, avg_{min}]
	Power (P)	P1, P2, P3, 3P (import, export, total, 1st harmonic) [act, avg, avg_{max}, avg_{min}]
	Reactive Power (Q)	Q1, Q2, Q3, 3Q (import, export, total, 1st harmonic) [act, avg, avg_{max}, avg_{min}]
	Aparent Power (S)	S1, S2, S3, 3S [act, avg, avg_{max}, avg_{min}]
	Deformed Power (D)	D1, D2, D3 [act, avg, avg_{max}, avg_{min}]
	Power Factor (PF)	PF1, PF2, PF3, 3PF [act, avg, avg_{max}, avg_{min}]
	cosφ	cosφ1, cosφ2, cosφ3, 3cosφ [act, avg, avg_{max}, avg_{min}]
	Symetrical Components	zero, negative and positive sequence components of voltage and current
	Unbalance Factor	unbI, unbU, φnsI
	Voltage THD (THDU)	THDU1, THDU2, THDU3
	Current THD (THDI)	THDI1, THDI2, THDI3
	Individual Harmonics	Harmonics 1st to 63rd of Voltage and Current and their angles
	Fundamental Harmonic (Ufh, Ifh)	U1fh, U2fh, U3fh, I1fh, I2fh, I3fh
	Frequency (f)	f
	Active Energy	Import (E1, E2, E3, SE), Export (E1, E2, E3, SE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy	Inductive (E1, E2, E3, SE), Capacitive (E1, E2, E3, SE), Total Inductive (Tariff1, Tariff2, Tariff3), Total Capacitive (Tariff1, Tariff2, Tariff3)
Datalogging	Main archive	min., max., avg. values of ULN, ULL, I, P, Q, S, D, THDU, THDI, f Avg. values of individual harmonics and their angles, Ufh, Ifh, Symetrical components, Unbalance factors, state of I/Os
	Electricity Meter Readings	Active and reactive imp. and exp. energy per phase (L1, L2, L3) and per tariff (T1, T2, T3)
	Voltage Event logging	-
	PQ Event trends recording	-
	Waveforms recording	optional firmware module General Oscilogram
Others	Alarms	Logical functions, under/over limit of V, I, P, Q, S, unbI, THD, cos, f
	Inputs/Outputs	Optionaly: 4 relay outputs, 4 digital inputs, 2 analog outputs (4÷20mA) 2 analog inputs, 1 input for Pt100, bus for external modules
	Memory Size	512MB
	RTC	seconds, minutes, hours, days, months, years
	Communication	USB, RS485, Ethernet

POWER		Aux. Voltage	Option U: 70 ÷ 500 V_{AC} / 90 ÷ 600 V_{DC} Option L: 24 ÷ 48 V_{AC} / 20 ÷ 75 V_{DC}
		Power	3 VA / 3 W
		Overvoltage cathegory	III / polution degree 2
INPUT	VOLTAGE	Measuring range	Option 400: 8 ÷ 830 V_{AC} / 6 ÷ 480 V_{AC}, 300 V CAT III Option 100: 4 ÷ 210 V_{AC} / 2 ÷ 120 V_{AC}, 150 V CAT III
		Input impedance	Option 400: 6 MΩ (Li ↔N) Option 100: 1,5 MΩ (Li ↔N)
		Connection	wye
		Permanent overload	Option 400: 600 V_{RMS} Option 100: 150 V_{RMS}
		Surge overload	Option 400: 1500 V_{RMS} po 1s Option 100: 400 V_{RMS} po 1s
	CURRENT	Measuring range	Option X/5A: 0,005 ÷ 6 A, 150V CAT III Option S, P: 0,02 ÷ 1,2 × I_{NOM}, 600V CAT III
		Permanent overload	Option X/5A: 7,5A Option S, P: 2 × I_{NOM}
		Surge overload	Option X/5A: 70 A Option S, P: 10 × I_{NOM} for 1s
	TEMP	Measuring range	depending on range of temp. transudcer

INPUTS/OUTPUTS	D	24V input	U_L < 3 V, U_H > 10 V, < 0,4VA (Ri = 1,5 kΩ)
		230V input	U_L < 30 V, U_H > 90 V, < 0,4VA (Ri = 200 kΩ)
	A	Analog input	2 ÷ 22 mA, impedance 120 Ω
		Analog output	0 ÷ 20 mA, max. 500 Ω
	T	Pt100 input	range -50 ÷ 150°C
	I	Semiconductor ratings	60 V_{AC} / 100 V_{DC}, 100 mA
	R	Relay switch ratings	250 V_{AC} / 30 V_{DC}, 5 A
OTHER	TEMP	Operating	-25 ÷ 60°C, <95% non-condens. environ.
		Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Emmision	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 6, EN 61000 – 4 – 11
		Immunity	EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 40 (optional IP 54) front panel
		Dimmensions	96W×96H×58D mm / 0,3 kg

COMMUNICATION	Local USB 2.0 (standard) KMBlong, MODBUS RTU protocols Connector type B
	RS-485 (opt. 4) galvanically isolated KMBlong, MODBUS RTU protocols 2-wire connection 2400 ÷ 921600 baud
	Ethernet 10Base-T (opt. E) KMBlong, MODBUS TCP protocols 4-wires (2 twisted pairs) 10 Mbit/s

ACCURACY	Voltage	0,5
	Current	0,5
	Active Power	0,5
	Reactive Power	1
	Apparent Power	0,5
	PF, cosφ	0,5
	Frequency	0,05
	Active Energy	0,5
	Reactive Energy	1
	Harmonics and THD of U, I	2
	Unbalance	1

Ordering options

SMZ 133 U 400 X/5A R I A ET

Instrument Model
SMZ 133 = Power analyser with internal memory

Auxiliary Power Supply
U = 75 V ÷ 500 VAC, 90 V ÷ 600 VDC
L = 20 V ÷ 75 VDC, 24 V ÷ 48 VAC

Nominal Measuring Voltage
400 = 230V/400V ÷ 400V/690V
100 = 57,7V/100V

Current Inputs
X/5A = 5A AC (standard indirect measurement)
Snnn = with low current output CTs, split-core
Pnnn = with low current output CTs, through-hole

Split-core options		**Through-hole options**	
S005 = 5 A	S150 = 150 A	P005 = 5 A	P150 = 150 A
S015 = 15 A	S200 = 200 A	P015 = 15 A	P200 = 200 A
S025 = 25 A	S250 = 250 A	P025 = 25 A	P250 = 250 A
S035 = 35 A	S300 = 300 A	P035 = 35 A	P300 = 300 A
S050 = 50 A	S400 = 400 A	P050 = 50 A	
S075 = 75 A	S500 = 500 A	P075 = 75 A	
S100 = 100 A	S600 = 600 A	P100 = 100 A	

Digital I/O 1
N = No digital I/O
R = 4× relay output + 1× logical input 100 ÷ 230VAC

Digital I/O 2
N = No digital I/O
I = 4× pulse output + 4× logical input 24V

Analog I/O
N = No analog I/O
A = 2× analog output 0/4÷20mA + 2× analog input 0/4÷20mA

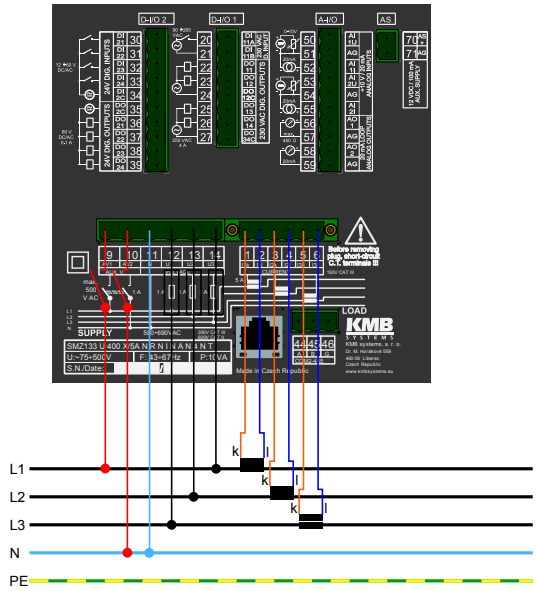
Remote Communication Interface and External Thermometer Input
NN = without remote communication and thermometer input
4N = RS-485
44 = RS-485 + RS-485
4T = RS-485 + input for Pt100 thermometer
EN = Ethernet 10BaseT
E4 = Ethernet 10BaseT + RS-485
ET = Ethernet 10BaseT + input for Pt100 thermometer

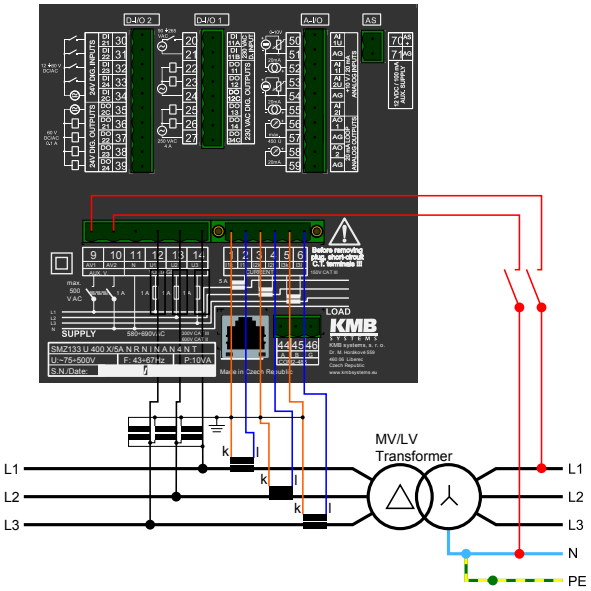
Current ranges and respective CTs

Option Pxxx						Range	Option Sxxx					
Type	d	x	y	z	m		Type	d	x	y	z	m
	[mm]				[g]	[A]		[mm]				[g]
JP3W	7	24	27	11	11	**005**	JC10F	10	23	50	26	45
						015						
JP5W	13	37	41	14	37	**025**						
						035						
						050						
						075	JC16F	16	30	55	31	75
						100						
						150	JC24F	24	45	75	34	150
JP6W	19	49	51	20	70	**200**						
						250						
						300	JC36S-3	36	57	91	41	280
						400						
						500						
						600						

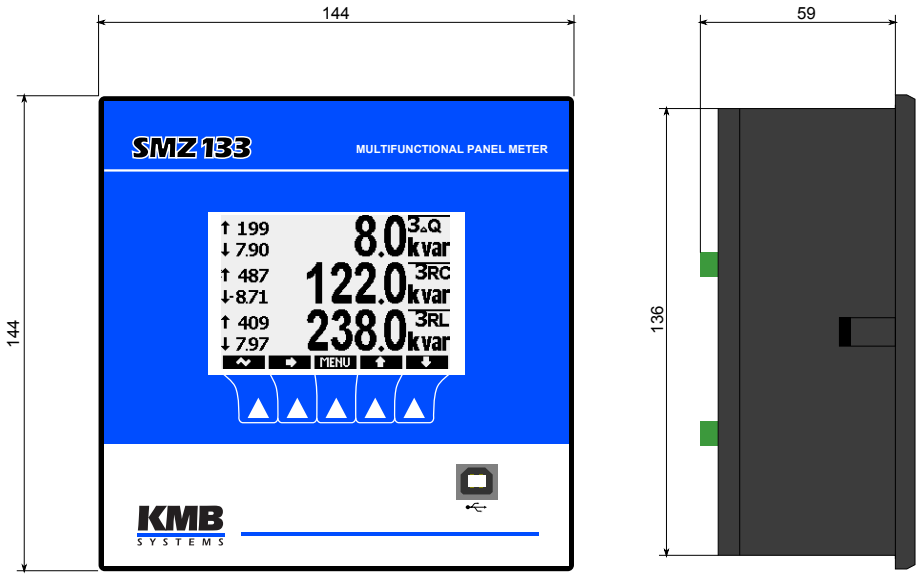
Variant **NOCT** has not current sensors nor current inputs.

Typical connection schema





Mechanical dimensions



PA 144, SMC 144
meters, analysers and data loggers for energy management systems

PA 144 and SMC 144 is specially designed for remote monitoring of energy consumption and its quality. The DIN rail displayless design with multiple communication options is suitable for a wide spectrum of automation tasks in modern buildings, remote supervision of the infrastructure and also remote load management. Absence of local panel controls (display and keyboard) limits possibilities for hostile user interaction.

This instruments are an ideal and cost-optimized source of data for any modern SCADA system with embedded support for ModBus protocol and it is also supported by our free ENVIS application. Its input and output set can be extended with additional IO modules for advanced control functionality.

PA 144 is sensor for measuring of actual values, SMC 144 furthermore features large internal memory for datalogging of measured values. Quantities includes a multitude of additional functions such as the storage of minimum, average and maximum values, energy consumption, logs of state changes and many other. All this information is available for later download by the supervising software.

Key features:

- four independent voltage and current inputs (4x1p, 3p-wye, 3p-delta)
- direct and indirect voltage measurement
- includes through-hole (up to 300A) or split-core/clamp-on (up to 600A) current transformers
- electricity meter supports 3 tariffs, single- and three-phase measurement in four quadrants
- basic measurement interval 10/12 periods, 128 samples/period
- standard embedded RS-485 interface, optionally Ethernet, WiFi, USB or ZigBee
- optional bus for external modules or 2 digital inputs
- features can be upgraded via external I/O modules (with ModBus Master fw. module)
- Supported Firmware Modules: ModBus Master, General Oscillograms, Ripple Control Signals

Technical specification

Metering	Phase Voltage (ULN)		U1, U2, U3, UN [act, avg, avg_{max}, avg_{min}]
	Line Voltage (ULL)		U12, U23, U31 [act, avg, avg_{max}, avg_{min}]
	Current (I)		IL1, IL2, IL3, ILN [act, avg, avg_{max}, avg_{min}]
	Power (P)		P1, P2, P3, PN, 3P (import, export, total, 1st harmonic) [act, avg, avg_{max}, avg_{min}]
	Reactive Power (Q)		Q1, Q2, Q3, QN, 3Q (import, export, total, 1st harmonic) [act, avg, avg_{max}, avg_{min}]
	Aparent Power (S)		S1, S2, S3, SN, 3S [act, avg, avg_{max}, avg_{min}]
	Deformed Power (D)		D1, D2, D3, DN [act, avg, avg_{max}, avg_{min}]
	Power Factor (PF)		PF1, PF2, PF3, PFN, 3PF [act, avg, avg_{max}, avg_{min}]
	cosφ		cosφ1, cosφ2, cosφ3, cosφN, 3cosφ
	Symetrical Components		zero, negative and positive sequence components of voltage and current
	Unbalance Factor		unbI, unbU, φnsI
	Voltage THD (THDU)		THDU1, THDU2, THDU3, THDUN
	Current THD (THDI)		THDI1, THDI2, THDI3, THDIN
	Individual Harmonics		Harmonics 1st to 63rd of Voltage and Current and their angles
	Fundamental Harmonic (Ufh, Ifh)		U1fh, U2fh, U3fh, Unfh, I1fh, I2fh, I3fh, INfh
	Frequency (f)		f
	Active Energy		Import (E1, E2, E3, SE), Export (E1, E2, E3, SE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy		Inductive (E1, E2, E3, SE), Capacitive (E1, E2, E3, SE), Total Inductive (Tariff1, Tariff2, Tariff3), Total Capacitive (Tariff1, Tariff2, Tariff3)
Datalogging	SMC 144	Main archive	min., max., avg. values of ULN, ULL, I, P, Q, S, D, THDU, THDI, f Avg. values of individual harmonics and their angles, Ufh, Ifh, Symetrical components, Unbalance factors, state of I/Os
		Electricity Meter Readings	Active and reactive imp. and exp. energy per phase (L1, L2, L3) and per tariff (T1, T2, T3)
		Voltage Event logging	NO
		PQ Event trends recording	NO
		Waveforms recording	optional firmware module General Oscilogram
Others	Alarms		Logical functions, under/over limit of V, I, P, Q, S, unbl, THD, cos, f
	Inputs/Outputs		Optionaly: 2 digital inputs, 1 relay or digital output, bus for external modules
	Memory Size		512MB (SMC 144)
	RTC		seconds, minutes, hours, days, years
	Communication		RS485, Ethernet, WiFi, ZigBee, USB, M-bus

POWER	aux. voltage		Option U: 75 ÷ 510 V_{AC} / 80 ÷ 350 V_{DC}
			Option L: 24 ÷ 48 V_{AC} / 20 ÷ 75 V_{DC}
	power		7 VA / 3 W
	overvoltage category		CAT III / 300 V
INPUT	VOLTAGE	measuring range	4 ÷ 500 V_{AC} /2,3 ÷ 285 V_{AC} (line/phase)
		input impedance	2,7 MW (L_i ↔N)
		connection	wye, delta
		permanent overload	1300 V_{RMS}
		surge overload	1950 V_{RMS} for 1s
	CURRENT	measuring range	0,02 ÷ 1,2 × I_{NOM}
		permanent overload	2 × I_{NOM}
		surge overload	10 × I_{NOM} for 1s
	TEMP	measuring range	-25°C ÷ 65°C

INPUTS/OUTPUTS	D	Voltage levels	U_L < 3 V, U_H > 10 V
		Max. Input voltage	U_M = 30 V
		Input current	3 mA/12 V, 8 mA/24 V
	I	Semiconductor ratings	100 V_{DC} / 300 mA
	R	Relay switch ratings	230 V_{AC} or 30 V_{DC} / 3 A
OTHER	TEMP	Operating	-25 ÷ 60°C, <95% non-condens. environ.
		Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Emmision	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 6, EN 61000 – 4 – 11
		Immunity	EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 20
		Dimmensions	105W×90H×58D mm / 0,19 kg

COMMUNICATION	Primary RS-485 (stand.)	2.4 ÷ 921 kbd, 2-wire, isolated
	Secondary RS-485 (opt. B)	2.4 ÷ 921 kbd, 2-wire, isolated
	Ethernet 10Base-T (opt. E)	10 Mbit, UTP RJ-45
	USB (opt. U)	Mini-B connector
	WiFi (opt. W)	IEEE 802.11 b, g
	ZigBee (opt. Z)	9.6 ÷ 115.2 kbd

ACCURACY	Voltage	0,10%
	Current	0,10%
	Power	0,10%
	Reactive Power	0,10%
	PF, cosφ	0.5
	Frequency	0.05
	Active Energy	1
	Reactive Energy	1
	Harmonics, THD of U, I	2
	Unbalance	1

Ordering options

SMC	144	U	P100	R	B	E

Instrument model
PA = power sensor & network monitor
SMC = network analyser & datalogger

Measuring inputs
144 = 4 voltage + 4 current inputs
118 = 1 voltage + 8 current inputs

Auxiliary power supply
U = 75 V ÷ 510 VAC, 80 V ÷ 350 VDC
L = 20 V ÷ 75 VDC, 24 V ÷ 48 VAC

Current inputs
Snnn = with low current output CTs, split-core
Pnnn = with low current output CTs, through-hole
NOCT = without current inputs

Split-core options		**Through-hole options**	
S005 = 5 A	S150 = 150 A	P005 = 5 A	P150 = 150 A
S015 = 15 A	S200 = 200 A	P015 = 15 A	P200 = 200 A
S025 = 25 A	S250 = 250 A	P025 = 25 A	P250 = 250 A
S035 = 35 A	S300 = 300 A	P035 = 35 A	P300 = 300 A
S050 = 50 A	S400 = 400 A	P050 = 50 A	
S075 = 75 A	S500 = 500 A	P075 = 75 A	
S100 = 100 A	S600 = 600 A	P100 = 100 A	

Optional digital output
N = without output
R = relay output
I = pulse output

Optional peripheral
N = without optional peripheral
B = bus for connection of external modules
D = two digital inputs
M = M-Bus interface (not combinable with option E)

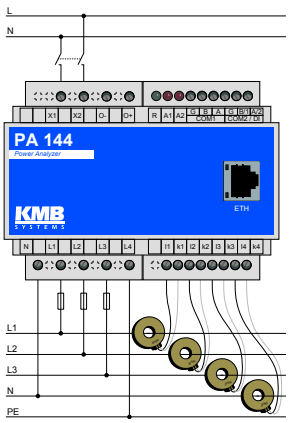
Optional expanding module
N = without expanding module
U = USB
E = Ethernet interface (not combinable with option M)
W = Wi-Fi wireless communication + USB
Z = ZigBee wireless communication + USB
F = MicroSD slot + USB

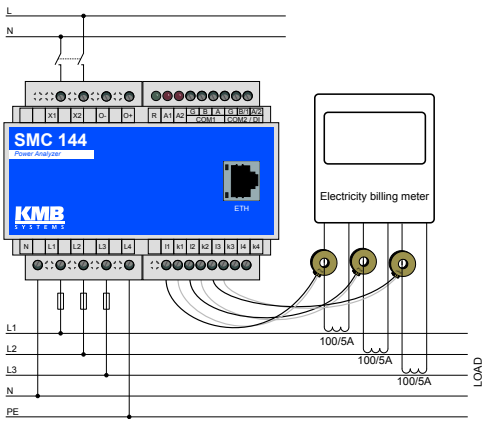
Current ranges and respective CTs

Option Pxxx						Range	Option Sxxx					
Type	d	x	y	z	m		Type	d	x	y	z	m
	[mm]				[g]	[A]		[mm]				[g]
JP3W	7	24	27	11	11	**005**	JC10F	10	23	50	26	45
						015						
JP5W	13	37	41	14	37	**025**						
						035						
						050						
						075	JC16F	16	30	55	31	75
						100						
						150	JC24F	24	45	75	34	150
JP6W	19	49	51	20	70	**200**						
						250						
						300	JC36S-3	36	57	91	41	280
						400						
						500						
						600						

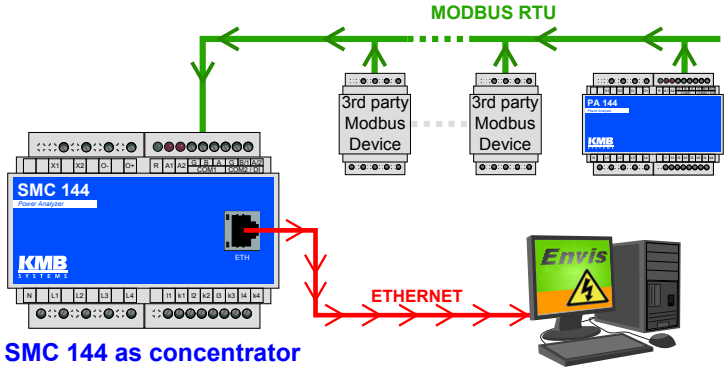
Variant **NOCT** has not current sensors nor current inputs.

Typical connection schema

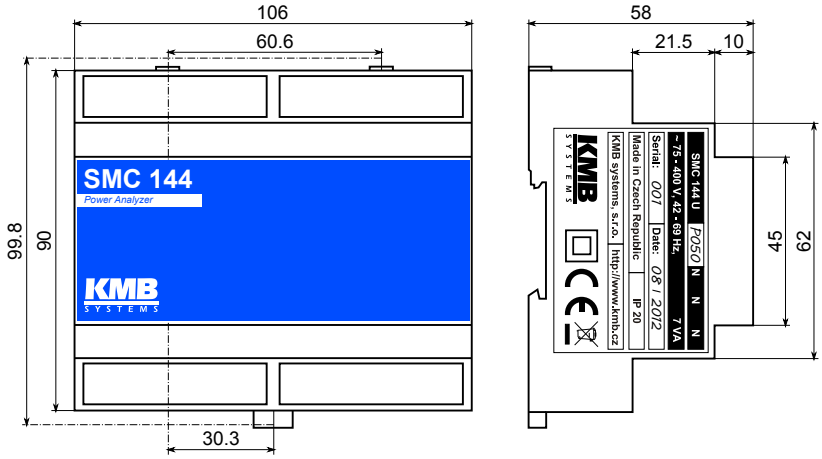




ModBus Master firmware option



Mechanical dimensions



SMD 118
DC analyser and data logger for energy management systems

SMD 118 is designed for remote or standalone supervision of loads and sources such as DC motors, convertors and chargers, photovoltaic systems etc. It supports measurement of 1 voltage and up to 8 AC or DC currents/powers. It is developed with fast and simple installation on din rail in mind. With split core CT Hall sensors the installation can be performed without necessary system decommissioning. Broad range of communication interfaces and protocols allows simple integration into the supervisor systems. Displayless design minimizes the attention in places with general public access.

Inputs, outputs and communication interfaces can be extended by optional expansion modules. SMD analyser supportd M-Bus and Modbus protocols, Ethernet, WiFi, ZigBee, USB and the traditional RS 485 interface. SMD is a great component for any modern SCADA system. ENVIS v1.2+ supports configuration, data acquisition, archival and reporting of all the measurements collected with SMD 11x.

In complex energy management and automation systems the instrument can be well accompanied by other components like SMC 144 and PA 144.

Key features:

- 1 voltage and up to 8 current inputs (8×1 line)
- AC and DC measurement of current and voltage
- fully programmable digital output (relay or impulse)
- standard embedded RS-485 interface, optionally Ethernet, WiFi, USB, ZigBee
- optional second BUS for external modules or 2 additional digital inputs
- features can be upgraded via external I/O modules (with ModBus Master fw. module)

Technical specification

Metering	Phase Voltage (ULN)	U [act, avg, avg_{max}, avg_{min}]
	Line Voltage (ULL)	-
	Current (I)	I1, I2, I3, I4, I5, I6, I7, I8 [act, avg, avg_{max}, avg_{min}]
	Power (P)	P1, P2, P3, P4, P5, P6, P7, P8 (import, export, total, 1st harmonic) [act, avg, avg_{max}, avg_{min}]
	Reactive Power (Q)	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8 (import, export, total, 1st harmonic) [act, avg, avg_{max}, avg_{min}]
	Aparent Power (S)	S1, S2, S3, S4, S5, S6, S7, S8
	Deformed Power (D)	D1, D2, D3, D4, D5, D6, D7, D8
	Power Factor (PF)	PF1, PF2, PF3, PF4, PF5, PF6, PF7, PF8
	cosφ	cosφ1, cosφ2, cosφ3, cosφ4, cosφ5, cosφ6, cosφ7, cosφ8,
	Symetrical Components	-
	Unbalance Factor	-
	Voltage THD (THDU)	THDU
	Current THD (THDI)	THDI1, THDI2, THDI3, THDI4, THDI5, THDI6, THDI7, THDI8
	Individual Harmonics	Harmonics 1st to 63rd of Voltage and Current and their angles
	Fundamental Harmonic (Ufh, Ifh)	Ufh, I1fh, I2fh, I3fh, I4fh, I5fh, I6fh, I7fh, I8fh
	Frequency (f)	f
	Active Energy	Import (E1, E2, E3, E4, E5, E6, E7, E8, ΣE), Export (E1, E2, E3, E4, E5, E6, E7, E8, ΣE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy	Inductive (E1, E2, E3, E4, E5, E6, E7, E8, ΣE), Capacitive (E1, E2, E3, E4, E5, E6, E7, E8, ΣE) Total inductive (Tariff1, Tariff2, Tariff3), Total capacitive (Tariff1, Tariff2, Tariff3)
Datalogging	Main archive	min., max., avg. values of ULN, I, P, Q, S, D, THDU, THDI, f Avg. values of individual harmonics and their angles, Ufh, Ifh, Symetrical components, Unbalance factors, state of I/Os
	Electricity Meter Readings	Active and reactive energy (imp/exp)
	Voltage Event logging	-
	PQ Event trends recording	-
	Waveforms recording	optional firmware module General Oscilogram
Others	Alarms	Logical functions, under/over limit of V, I, P, Q, S, unbl, THD, cos, f
	Inputs/Outputs	Optionaly: 2 digital inputs, 1 relay or digital output, bus for external modules
	Memory Size	512MB
	RTC	seconds, minutes, hours, days, months, years
	Communication	RS485, Ethernet, WiFi, ZigBee, USB, M-bus

POWER		aux. voltage	Option U: 75 ÷ 510 V_{AC} / 80 ÷ 350 V_{DC}
			Option L: 24 ÷ 48 V_{AC} / 20 ÷ 75 V_{DC}
		power	7 VA / 3 W
		overvoltage category	CAT III / 300 V
INPUT	VOLTAGE	measuring range	4 ÷ 890 $V_{AC/DC}$
		input impedance	2,7 MΩ (L_i ↔N)
		connection	wye, delta
		permanent overload	1300 V_{RMS}
		surge overload	1950 V_{RMS} for 1s
	CURRENT	measuring range	0,02 ÷ 1,2 × I_{NOM}
		permanent overload	2 × I_{NOM}
		surge overload	10 × I_{NOM} for 1s
	TEMP	measuring range	-25°C ÷ 65°C

INPUTS/OUTPUTS	D	Voltage levels	U_L < 3 V, U_H > 10 V
		Max. Input voltage	U_M = 30 V
		Input current	3 mA/12 V, 8 mA/24 V
	I	Semiconductor ratings	100 V_{DC} / 300 mA
	R	Relay switch ratings	230 V_{AC} or 30 V_{DC} / 3 A
OTHER	TEMP	Operating	-25 ÷ 60°C, <95% non-condens. environ.
		Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Emmision	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 6, EN 61000 – 4 – 11
		Immunity	EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 20
		Dimmensions	105W×90H×58D mm / 0,19 kg

COMMUNICATION	Primary RS-485 (stand.)	2.4 ÷ 921 kbd, 2-wire, isolated
	Secondary RS-485 (opt. B)	2.4 ÷ 921 kbd, 2-wire, isolated
	Ethernet 10Base-T (opt. E)	10 Mbit, UTP RJ-45
	USB (opt. U)	Mini-B connector
	WiFi (opt. W)	IEEE 802.11 b, g
	ZigBee (opt. Z)	9.6 ÷ 115.2 kbd

ACCURACY	Voltage	0,10%
	Current	0,10%
	Power	0,10%
	Reactive Power	0,10%
	PF, cosφ	0.5
	Frequency	0.05
	Active Energy	1
	Reactive Energy	1
	Harmonics, THD of U, I	2
	Unbalance	1

Ordering options

SMD	118	U	D100	R	B	E

Instrument model
SMD = AC/DC power analyser

Measuring inputs
112 = 1 voltage + 2 current inputs
114 = 1 voltage + 4 current inputs
118 = 1 voltage + 8 current inputs

Auxiliary power supply
U = 75 V ÷ 510 VAC, 80 V ÷ 350 VDC
L = 20 V ÷ 75 VDC, 24 V ÷ 48 VAC

Current inputs
Dnnn = hall sensor, split-core

Split-core options

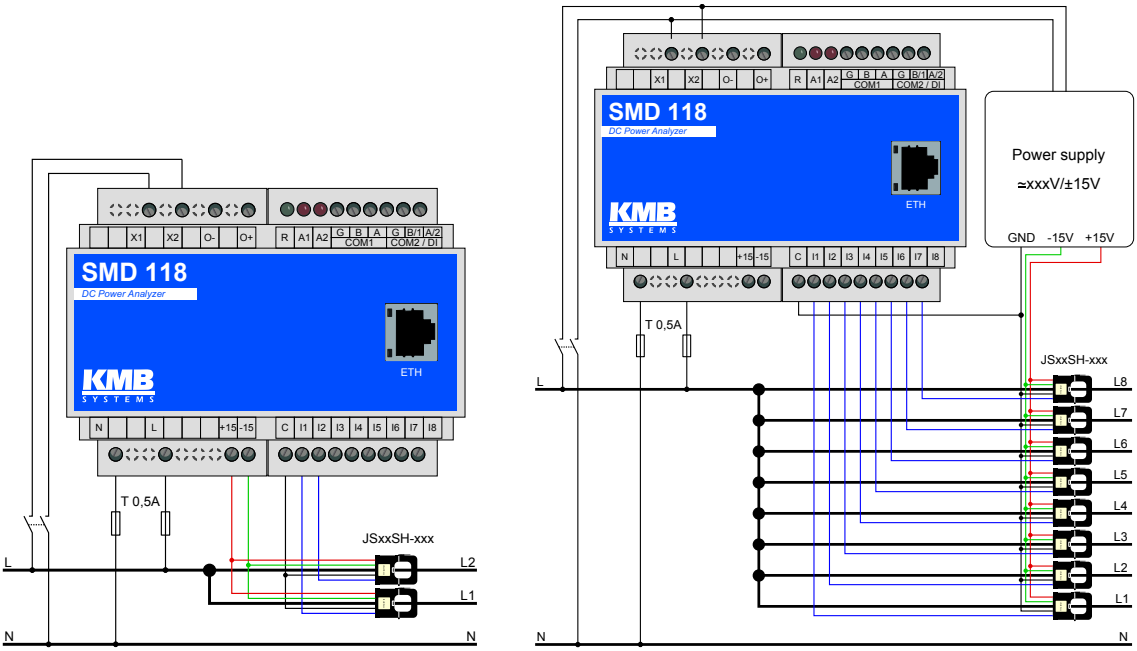
D005 = 5 A	D025 = 25 A	D200 = 200 A
D010 = 10 A	D050 = 50 A	D250 = 250 A
D020 = 20 A	D100 = 100 A	D500 = 500 A

Optional digital output
N = without output
R = relay output
I = pulse output

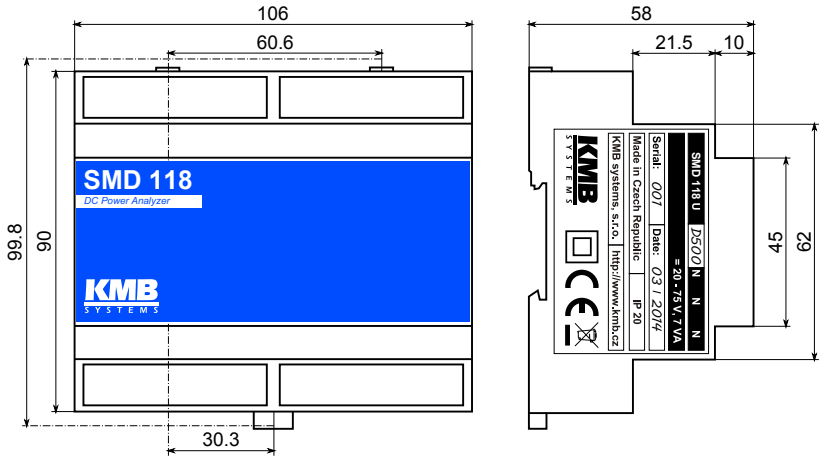
Optional peripheral
N = without optional peripheral
B = bus for connection of external modules
D = two digital inputs
M = M-Bus interface (not combinable with option E)

Optional expanding module
N = without expanding module
U = USB
E = Ethernet interface (not combinable with option M)
W = Wi-Fi wireless communication + USB
Z = ZigBee wireless communication + USB
F = MicroSD slot + USB

Typical connection schema



Mechanical dimensions



SML, SMM and SMN multifunctional panel meters

These instruments are simple 3-phase multimeters without built in memory which are designed to measure and monitor line/phase voltages, currents, active and reactive power, power factors, total harmonic distortion and frequency in single-phase and three-phase low voltage, high voltage and extra high voltage power systems. Measurement of temperatures within a control panel is also supported with an in-built temperature sensor. Optional communication interface allows it to be simply configured and managed via ENVIS from a remote PC. In combination with ENVIS.Online service its actual values can be periodically downloaded and stored to the SQL database for further processing.

Typical applications: analog instrument replacement, remote online monitoring, industrial automation

Key features:

- basic measuring instruments for actual data
- panel mounted SML 33
- DIN-bar mounted SMM 33 and SMN 33
- 1-, 2-, 3-phase or Aron connection
- supports direct & indirect voltage connection
- has built-in temperature sensor
- optional RS 232, RS 485 or Ethernet communication
- inputs for special split core CTs
- visualization software ENVIS, ENVIS.Daq and ENVIS.Online for remote data acquisition

Technical specification

Metering	Phase Voltage (ULN)	U1, U2, U3
	Line Voltage (ULL)	U12, U23, U31
	Current (I)	IL1, IL2, IL3, IN (calculated SMN)
	Power (P)	P1, P2, P3, 3P
	Reactive Power (Q)	Q1, Q2, Q3, 3Q
	Aparent Power (S)	S1, S2, S3, 3S
	Power Factor (PF)	PF1, PF2, PF3, 3PF
	cosφ	cosφ1, cosφ2, cosφ3
	Voltage THD (THDU)	THDU1, THDU2, THDU3, THDU12, THDU23, THDU31
	Current THD (THDI)	THDI1, THDI2, THDI3
	Individual Harmonics	NO
	Frequency (f)	f
	Active Energy	NO
	Reactive Energy	NO
Datalogging	Main archive	NO
	Electricity Meter Readings	NO
	Voltage Event logging	NO
	PQ Event trends recording	NO
	Waveforms recording	NO
Others	Alarms	NO
	Inputs/Outputs	1 digital input (SMN), thermometer input
	Memory Size	NO
	RTC	YES*
	Communication	RS232, RS485, Ethernet

POWER		aux. voltage	85 ÷ 275 V_{AC} / 80 ÷ 350 V_{DC}
		power	3 VA / 3 W
		overvoltage category	CAT III / 300 V
INPUT	VOLTAGE	measuring range	4 ÷ 500 V_{AC} /2,3 ÷ 285 V_{AC} (line/phase)
		input impedance	660 kW (L_1 ↔N)
		connection	wye
		permanent overload	1000 V_{RMS}
		surge overload	2000 V_{RMS} for 1s
	CURRENT	measuring range	Option X/5A: 0,02 ÷ 7A Option X/1A: 0,02 ÷ 1,2A Option S, P: 0,02 ÷ 1,2 × I_{NOM}
		permanent overload	2 × I_{NOM}
		surge overload	10 × I_{NOM} for 1s
	TEMP	measuring range	-25°C ÷ 60°C

INPUTS/OUTPUTS	Digital Input	Voltage levels	U_L < 3 V, U_H > 10 V
		Max. Input voltage	U_M = 30 V
		Input current	3 mA/12 V, 8 mA/24 V
OTHER	TEMP	Operating	-25 ÷ 60°C, <95% non-condens. environ.
		Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Emmision	EN 61000-6-2
		Immunity	EN 50081-2, EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 20
		Dimmensions	SML: 96W×96H×51D mm / 0,3 kg SMM, SMN: 89W×90H×58D mm / 0,3 kg

COMMUNICATION	RS-232 (opt. 2) galvanically isolated KMBlong, MODBUS RTU protocols 2-wire connection 2400 ÷ 38400 baud
	RS-485 (opt. 4) galvanically isolated KMBlong, MODBUS RTU protocols 2-wire connection 2400 ÷ 38400 baud
	Ethernet 10Base-T (opt. E) KMBlong, MODBUS TCP protocols 4-wires (2 twisted pairs) 10 Mbit/s

ACCURACY	Voltage	0,50%
	Current	0,50%
	Power	2,00%
	Reactive Power	2,00%
	Power Factor	2,00%
	cosφ	2,00%
	Frequency	0,02%
	THD of Voltage	2,00%
	THD of Current	2,00%

Ordering options

SML 33 U 230 X/5A 4

Instrument model
- SML 33 = 3×V + 3×I, panel
- SMM 33 = 3×V + 3×I, DIN 35
- SMN 33 = 3×V + 3×I, DIN 35, ¼ Pmax, RTC, log. input, calculated In

Auxiliary voltage range
- U = 75 ÷ 275 V_{AC}, 75 ÷ 350 V_{DC}
- 24 = 18 ÷ 36 V_{DC}, 24 V_{AC}
- 48 = 36 ÷ 72 V_{DC}, 48 V_{AC}

Nominal measuring voltage
- 230 = 230/400V
- 400 = 400/690V
- 100 = 57,7/100V

Measuring current input type
- X/5A = 5A AC (standard indirect measurement)
- X/1A = 1A AC (standard indirect measurement)
- Snnn = with low current output CTs, split-core
- Pnnn = with low current output CTs, through-hole

Split-core options				Through-hole options			
S005 = 5 A	S150 = 150 A			P005 = 5 A	P150 = 150 A		
S015 = 15 A	S200 = 200 A			P015 = 15 A	P200 = 200 A		
S025 = 25 A	S250 = 250 A			P025 = 25 A	P250 = 250 A		
S035 = 35 A	S300 = 300 A			P035 = 35 A	P300 = 300 A		
S050 = 50 A	S400 = 400 A			P050 = 50 A			
S075 = 75 A	S500 = 500 A			P075 = 75 A			
S100 = 100 A	S600 = 600 A			P100 = 100 A			

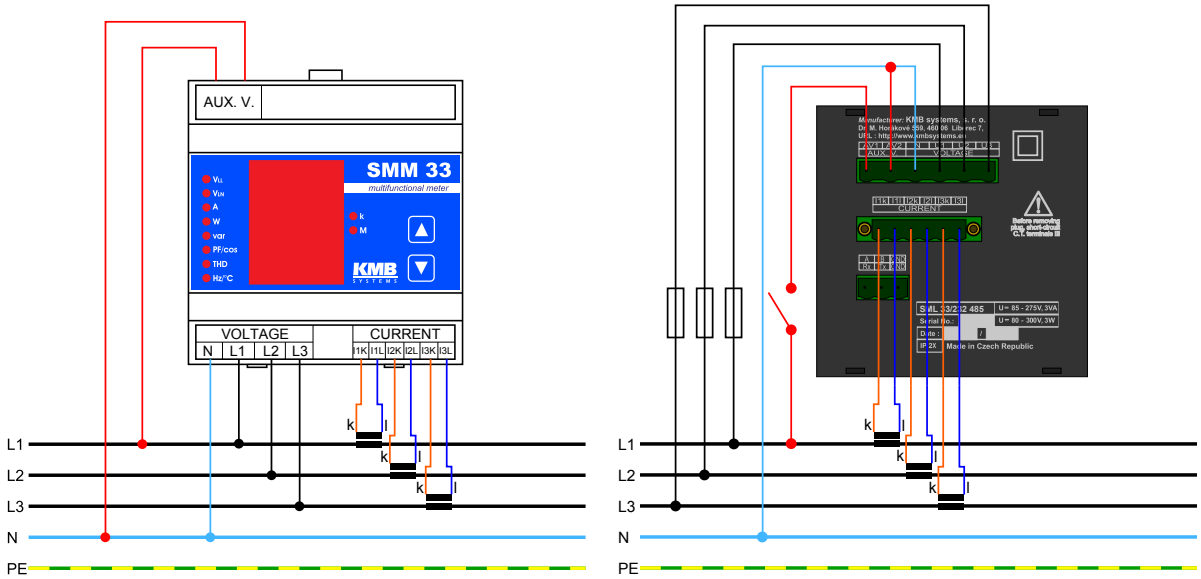
Remote comm. link interface
- N = no remote comm. link
- 2 = RS-232
- 4 = RS-485
- E = Ethernet

Current ranges and respective CTs

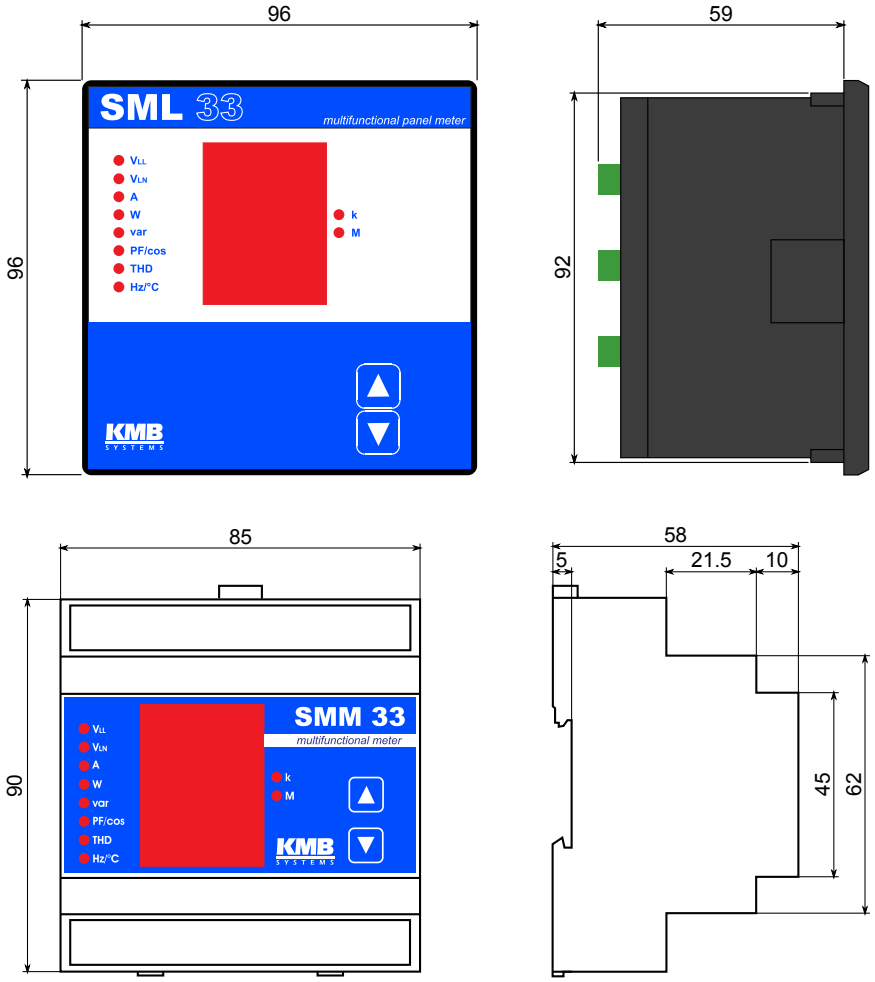
Option Pxxx						Range	Option Sxxx					
Type	d	x	y	z	m		Type	d	x	y	z	m
	[mm]				[g]	[A]		[mm]				[g]
JP3W	7	24	27	11	11	**005**	JC10F	10	23	50	26	45
						015						
JP5W	13	37	41	14	37	**025**						
						035						
						050						
						075	JC16F	16	30	55	31	75
						100						
						150	JC24F	24	45	75	34	150
JP6W	19	49	51	20	70	**200**						
						250						
						300	JC36S-3	36	57	91	41	280
						400						
						500						
						600						

Variant **NOCT** has not current sensors nor current inputs.

Typical connection schema



Mechanical dimensions



SMY 33 and SMZ 33 multifunctional meters with data logger

SMY and SMZ devices are ideal for application where monitoring and recording of electric quantities in three-phase LV, HV or VHV grids are required. Measured values are stored in the instruments internal memory and can be later downloaded for processing using a built-in (RS-232) or remote (RS-232 or RS-485) communication line. Basic parameters and measured quantities of SMY and SMZ instruments are similar. Both instrument lines are for panel mounting with dimensions of 96×96mm for SMY and 144x144mm for SMZ. Option R of instruments includes two relay outputs with programmable function. SMY device is equipped with bright LCD display which features many user-friendly views on the measured data. Thanks to high resolution of display it not only shows actual values in numeric form but also graphs. Next to this it also shows actual waves of voltage and current. SMZ unit has a high-contrast LED display for rough environments which provides better readability.

Both instruments measure and record voltages, currents, power factors, frequency, powers, THD and harmonics up to 25th order, active and reactive energy etc. It can also measure and record temperature with its internal sensor or with optional external PT 100 thermometer (option T in SMZ). Built-in real time clock can be synchronized through appropriate synchronization input or from PC via comm. interface. Both instruments are fully supported in ENVIS software suite, where all acquired data can be managed and analysed.

SMZ in option E also features embedded three-phase, three-tariff four-quadrant electronic electricity meter for more precise energy monitoring. Furthermore SMZ can be optionally equipped with analog outputs.

Key features:

- basic registering instruments
- actual values visible on the display
- high contrast LED display with large digits (SMZ)
- range of input and output options with programmable functions and automated status recording
- built-in RS 232 communication interface in front panel
- optional RS 232/RS 485 remote communication interface

Technical specification

Metering	Phase Voltage (ULN)	U1, U2, U3
	Line Voltage (ULL)	U12, U23, U31
	Current (I)	IL1, IL2, IL3
	Power (P)	P1, P2, P3, 3P (import, export, total)
	Reactive Power (Q)	Q1, Q2, Q3, 3Q (import, export, total)
	Aparent Power (S)	S1, S2, S3, 3S
	Power Factor (PF)	PF1, PF2, PF3, 3PF
	cosφ	cosφ1, cosφ2, cosφ3
	Voltage THD (THDU)	THDU1, THDU2, THDU3
	Current THD (THDI)	THDI1, THDI2, THDI3
	Individual Harmonics	Harmonics 2nd to 25th of Voltage and Current
	Frequency (f)	f
	Active Energy	Import (ΣE), Export (ΣE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy	Inductive (ΣE), Capacitive (ΣE), Total Inductive (Tariff1, Tariff2, Tariff3), Total Capacitive (Tariff1, Tariff2, Tariff3)
Datalogging	Main archive	avg. values of ULN, ULL, I, P, Q, S, D, THDU, THDI, f Avg. values of individual harmonics, state of I/Os
	Electricity Meter Readings	NO
	Voltage Event logging	NO
	PQ Event trends recording	NO
	Waveforms recording	NO
Others	Alarms	Logical functions, under/over limit of V, I, P, Q, S, unbl, THD, cos, f
	Inputs/Outputs	Optionaly: 1 digital input, 2 relay or digital outputs, 2 analog outputs (SMZ), input for Pt100 (SMZ
	Memory Size	1Mb
	RTC	seconds, minutes, hours, days, months, years
	Communication	RS232, RS485

			SMY	SMZ
POWER		aux. voltage	80 ÷ 260 V_{AC} 100 ÷ 350 V_{DC}	230 V or 115 V
		power	5 VA	10 VA
		overvoltage category	CAT III / 400 V	
INPUT	VOLTAGE	measuring range	20 ÷ 500 V_{AC}	
		input impedance	1 MW (Li ↔N)	
		connection	wye, delta	
		permanent overload	800 V_{RMS}	
		surge overload	1200 V_{RMS} for 1s	
	CURRENT	measuring range	0,01 ÷ 6,00 A	
		permanent overload	10 A	
		surge overload	100 A for 1s	
	TEMP	measuring range	depending on temperature sensor range	

			SMY	SMZ
I/O	A	Analog input ratings	-	0-20 mA, max. 500 W
	D	Digital Input	-	12 V_{DC}/20mA, Min 100 ms
	I	Semiconductor ratings	-	Max 30V DC/ 50mA
	R	Relay switch ratings	230 V_{AC} / 4 A	
OTHER	TEMP	Operating	-15 ÷ 50°C, <95% Non-condens.	-25 ÷ 50°C, <95% Non-condens.
		Storage	-40 ÷ 70°C, <95% Non-condens. environ.	
	EMC	Emmision	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 11	
		Immunity	EN 55011 - class A, EN 55022 - class A	
		Protection rating	IP 4x / IP 2x back panel	
		Dimmensions	96W×96H×58D mm 0,5 kg	144W×144H×80D mm 1,5kg

COMMUNICATION	Local RS-232 (standard) galvanically isolated KMBlong, MODBUS RTU protocols 3-wire connection 9600 baud
	Remote RS-232 (opt. 2) galvanically isolated KMBlong, MODBUS RTU protocols 3-wire connection 2400 ÷ 38400 baud
	Remote RS-485 (opt. 4) galvanically isolated KMBlong, MODBUS RTU protocols 2-wire connection 2400 ÷ 38400 baud

		SMY	SMZ
ACCURACY	Voltage	0,50%	1,00%
	Current	0,50%	1,00%
	Power	2,00%	2,00%
	Reactive Power	2,00%	2,00%
	Power Factor	2,00%	2,00%
	cosφ	2,00%	2,00%
	Frequency	0,20%	0,20%
	Active Energy	2,00%	2,00%
	Reactive Energy	2,00%	2,00%
	Harmonics, THD of U, I	10,00%	10,00%

Ordering options

SMY 33+ R / 485

Instrument Model
SMY 33+ = 3 voltage + 3 current inputs

Digital Outputs
_ = Without ouptuts
R = 2 relay outputs

Remote Communication Interface
_ = Without remote communication interface
232 = RS-232
485 = RS-485

SMZ 33 E R T / 485

Instrument Model
SMZ33 = 3 voltage + 3 current inputs

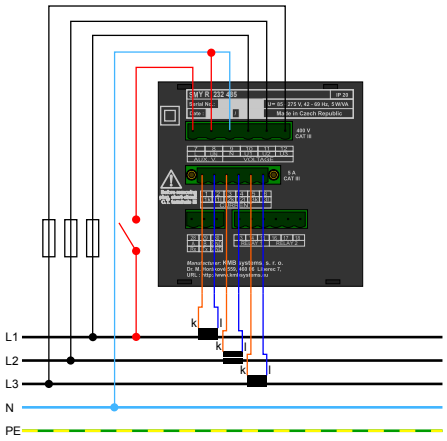
Options
_ = Without optional features
E = Built-in electricity meter + 2 pulse out.

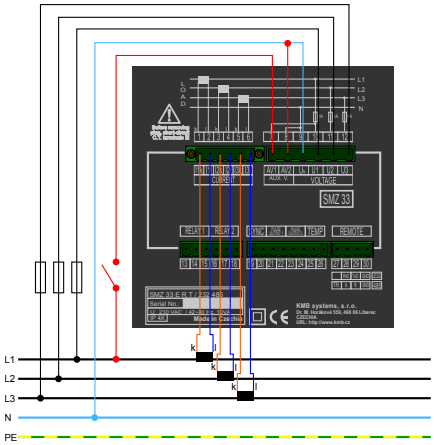
Digital I/Os
_ = Without I/Os
R = 2 relay outputs + 1 dig. input

Analog I/Os
_ = Without I/Os
T = 1 input for thermometer
A = 2 analog outputs 0/4-20mA

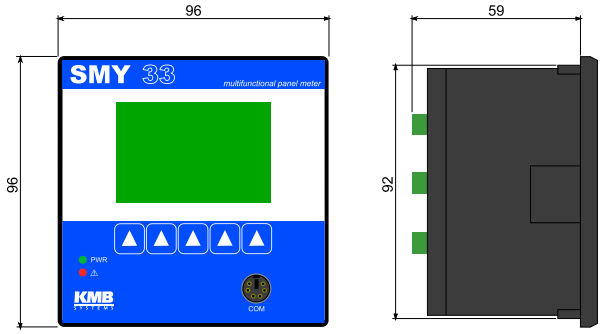
Remote Communication Interface
_ = Without remote communication interface
232 = RS-232
485 = RS-485

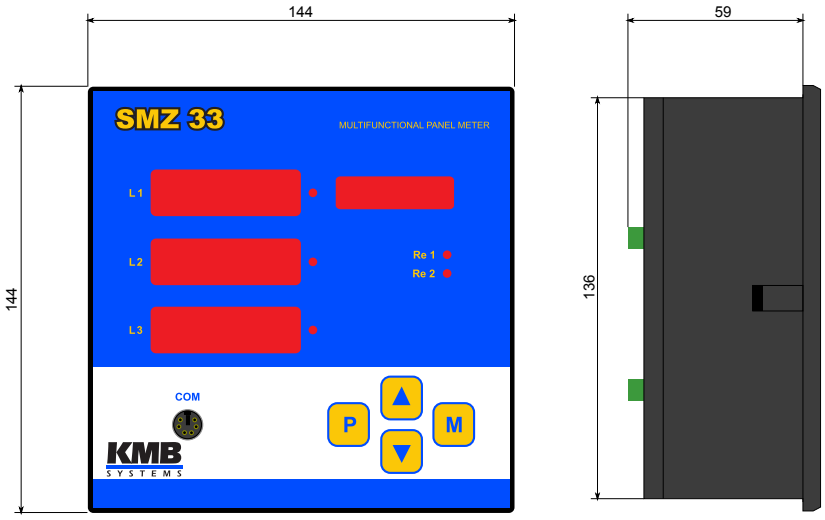
Typical connection schema





Mechanical dimensions



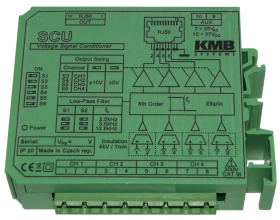


Distributed measurement and remote data collection

PA 33 Power Measuring Transducer

PA33 converter measures electrical quantities (such as voltages, currents, active, reactive or apparent power, frequency, unbalance/symmetrical components etc.) in three LV, MV, HV networks and converts the measured value to its configurable outputs. The convertor is equipped with 3 terminals for voltage (nominal voltage 3 x 230Vrms) and 3 terminals for currents.
Converters are assembled with one or two current outputs by default. Another option is one or two galvanically isolated digital outputs for "Alarm" function (SSR pulse contactors or relay contacts) or for pulse outputs (electricity meter). The device can be also optionally equipped with RS232 or RS485.

SCU Voltage Signal Conditioner

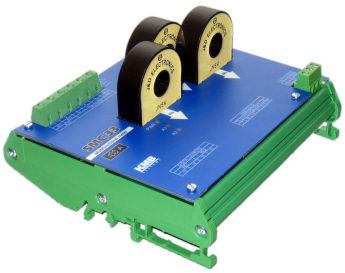


SCU is four channel voltage to voltage converter. It has 4 independent galvanically isolated differential voltage input channels with insulation voltage of over $4\,kV$ from other channels and from the rest of the instrument. Output voltage swing of each channel can be switched between $\pm 5\,V$ or $\pm 10\,V$ corresponding to linear input range $\pm 675\,V$ with DIP-switches. It may include integrated switched-capacitor elliptic anti-aliasing filter of 8^{th} order. Cut-off frequency can be chosen also with DIP-switches as $2.5\,kHz$, $3.6\,kHz$ or $12.8\,kHz$. Power supply input can be connected to $7 \div 26\,V_{AC}$ or $10 \div 37\,V_{DC}$.

SMD DC ammeter

SMD 101 is a simple single purpose DC ammeter with serial communication interface for automated remote monitoring of lines in DC networks. Currents are measured with a hall sensor, which is built in the instrument.
The instrument is equipped with electrically isolated communication line RS-485 or RS-232. In connection with the remote computer, the measured current can be monitored with standard ENVIS.Online program or a third-party monitoring system using the Modbus protocol. Logic output with programmable function can be used as an alarm to indicate limit states in the infrastructure or to manage load under certain supply conditions.

SMC 11 and SMC 33 multimeter and recorder



SMC 33 is multifunctional programmable and registration device (with internal memory for readings) for measuring of electrical quantities in single- and three-phase networks. A separate archive holds periodic record of the internal three phase, four quadrant electricity meter readings. The instrument is designed for DIN rail mounting and the through-hole type current inputs for direct measuring up to 150A nominal current are part of the instrument. This feature reduces the total costs of installation. SMC analyser is a good choice for last mile - monitoring and control of energy consumption in modern buildings, large machines and anywhere else.
SMC uses serial communication line for configuration and remote supervision. Optional peripherals such as digital and analog inputs and outputs or Pt100 thermometer input can be ordered. SMC does not contain any display or local control options and is thus ideal for energy management systems with remote control and supervision or for autonomous load balancing applications.

ES 101 Ethernet-Serial Converter

ES 101 is a general purpose Ethernet-to-Serial converter. It allows different instrument(s) with a serial line to be connected directly and transparently to the Ethernet. It can by configured and parametrized over the network with the ENVIS.Daq software. In the case of data acquisition from KMB instruments, the ENVIS software supports ES 101 converters directly within. Module accepts serial line speeds from 300 Bd up to 115 kBd for RS-232 or RS-485. It's possible to connect up to 32 instruments with RS-485 to one ES 101 converter.

KM GPRS 101 modem

The KM GPRS 101 modem is communication device for point-to-point interconnection, especially for remote management and monitoring of instruments and controllers of the KMB systems company. It provides either a GSM-connection (standard modem) or a GPRS-connection with both TCP and UDP protocols, using either fixed or dynamic IP-addressing. The modem is equipped with RS-485 or RS-232 serial line interface. For the RS-485 models, up to 32 instruments with appropriate interface can be connected to. Modem accepts serial line speeds from 1200 Bd to 38400 Bd for RS-232 or RS-485. Various GSM antennas with SMA-M connector is supported. This is especially important in places with low signal strength.

AFR 111 Smart Load
for reduction of ferroresonance

AFR 1xx smart load is an instrument designed to monitor and protect measuring voltage transformers (VT) against the potentially harmful effects of ferroresonance in a high voltage distribution network. Ferroresonance occurs between the inductance of the transformer and the capacitance of the MV lines or switching equipments. Ferroresonance can be initialized by switching, disconnection, ground connections or by other transient events.
During the ferroresonance a significant overvoltage and concurrent current peaks can occur due to the saturation of the magnetic circuit of the VT. This often leads to a fatal destruction of the VT. AFR 1xx acts as a protection of the VT against the unwanted effects of such events.
In comparison with other protection methods AFR 1xx is only selectively activated during the occurrence of ferroresonance and stays inactive during the normal operation. AFR 11x is intended for alone operated VTs, i.e. for single phase measuring, V connection measuring or for one pole power feeders. Whereas, the variant AFR 13x is intended for connection into open delta of auxiliary secondary windings of three VTs.

Key features:

- protects instrument transformers against effects of ferroresonance
- optional memory for events recording
- optional auxiliary power supply
- applicable for 1 pole VTs and for 3 phase open-delta conected VTs
- optional RS-485 communication interface with MODBUS support

Ordering options

AFR 110 N 100/V3

Instrument Class
AFR 1 = Smart load to reduce ferroresonance

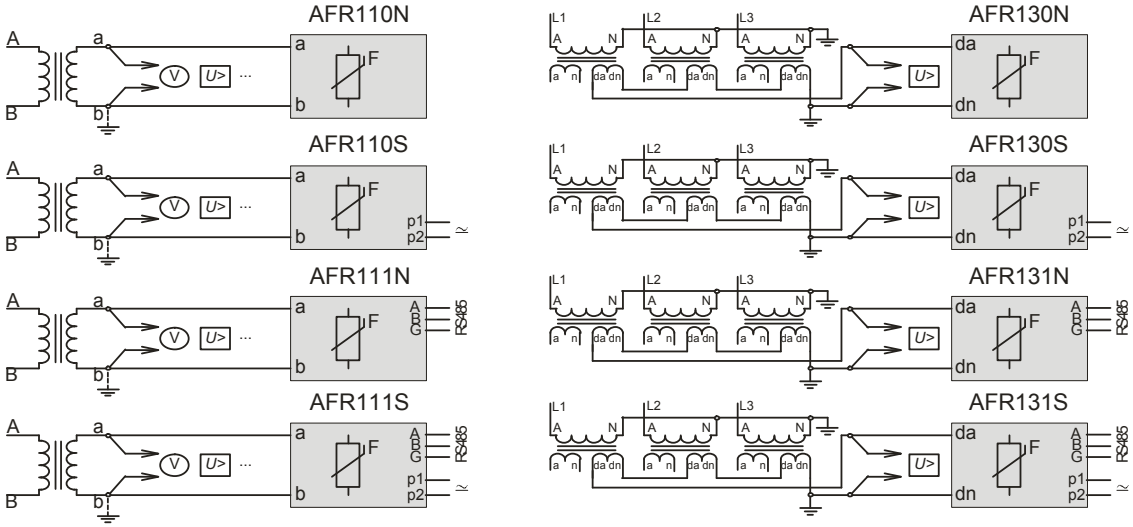
Connection of protected VT
1 = 1 pole VT, V connection (2 AFRs)
3 = 3 phase measuring with open delta secondary

Accessories
0 = no extension
1 = memory for events, RS-485 communication interface

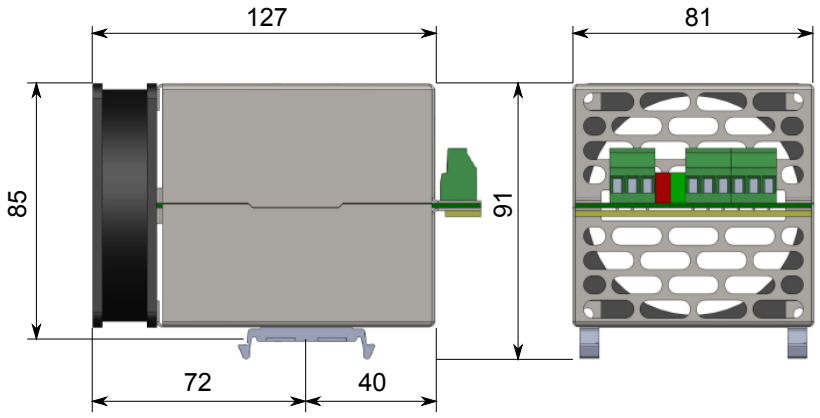
Auxiliary supply
0 = supply from protected VT
S = indirect from auxiliary power supply

Nominal voltage
100 = Nominal secondary voltage of VT Un = 100 VAC
110 = Nominal secondary voltage of VT Un = 110 VAC
100/V3 = Nominal secondary voltage of VT Un = 100/√3 VAC
110/V3 = Nominal secondary voltage of VT Un = 110/√3 VAC
120/V3 = Nominal secondary voltage of VT Un = 120/√3 VAC

Typical connection schema



Mechanical dimensions



Portable Analysers

Comparison table of portable instruments							
	Memory [Mb]	Meter	Communication	IEC 61000-4-30	EN 50160	Mesurement	Dimensions
NEMO 332	512	✓	USB, WiFi, GPRS, HSDPA	S	✓	4×U, 32×I	250 x 210 x 70 mm
NEMO 104	512	✓	USB, WiFi	S	✓	4×U, 4×I (24×I[a])	138 x 53 x 78 mm
NEMO 101	512	✓	USB, WiFi	S	✓	2×U, 2×I	138 x 53 x 78 mm
SMP-BX	512	✓	USB	S	✓	4×U, 4×I	210 x 125 x 65 mm
SMP-CA	512	✓	USB, RS-485, Ethernet	S	✓	4×U, 4×I	371 x 258 x 152 mm
NEMO 304	512	✓	USB, WiFi, GPRS, HSDPA	S	✓	4×U, 4×I	250 x 210 x 70 mm

[a]with SPQ-IMPX6 multiplexer.

NEMO products represent main line of portable power quality analyzers and network monitors for unattended measuring and recording campaigns of energy consumption. Voltage, current, power factor, frequency, flicker, harmonics and interharmonics and other parameters of the distribution network or local installation are recorded and analysed. SMP-BX, CA and NEMO instruments can also record disturbances, spot and record voltage events and analyze the overall power quality in the point of measurement. Large internal memory and flexible record option configuration allows users to perform long measurements in field.

	SMP/SMPQ				NEMO			
	SMP-BX 300	SMPQ-BX 360	SMP – CA	SMP – CA	NEMO 101	NEMO 104	NEMO 304	NEMO 332
Nominal Voltage L-N, AC	230 V_{AC}	230 V_{AC}	230 V_{AC}	230 V_{AC}	230 V_{AC}	230 V_{AC}	230 V_{AC}	230 V_{AC}
Nominal Voltage L-L, AC	400 V_{AC}	400 V_{AC}	400 V_{AC}	400 V_{AC}	400 V_{AC}	400 V_{AC}	400 V_{AC}	400 V_{AC}
Measurement category And pollution degree	CAT III/2 [1]	CAT III/2 [1]	CAT III/2 [1]	CAT III/2 [1]	CAT III/2 [1]	CAT III/2 [1]	CAT III/2 [1]	CAT III/2 [1]
Operating voltage L-N	-	-	-	-	-	-	-	-
Auxiliary voltage	85 ÷ 275 V_{AC} 80 ÷ 350 V_{DC}	85 ÷ 275 V_{AC} 80 ÷ 350 V_{DC}	85 ÷ 275 V_{AC} 80 ÷ 350 V_{DC}	85 ÷ 275 V_{AC} 80 ÷ 350 V_{DC}	85 ÷ 480 V_{AC} 80 ÷ 680 V_{DC}	85 ÷ 480 V_{AC} 80 ÷ 680 V_{DC}	85 ÷ 480 V_{AC} 80 ÷ 680 V_{DC}	85 ÷ 480 V_{AC} 80 ÷ 680 V_{DC}
	45 ÷ 70 Hz	45 ÷ 70 Hz	45 ÷ 70 Hz	45 ÷ 70 Hz	42 ÷ 70 Hz	42 ÷ 70 Hz	42 ÷ 70 Hz	42 ÷ 70 Hz
Three phase/four phase	●/●	●/●	●/●	●/●	-/-	●/●	●/●	●/●
Quadrants	-	4	4	4	4	4	4	4
Scan frequency 50/60Hz	6.4kHz	6.4kHz	6.4kHz	6.4kHz	6.4kHz	6.4kHz	6.4kHz	6.4kHz
Measurement points per sec.	6400	6400	6400	6400	6400	6400	6400	6400
Continuous measurement	●	●	●	●	●	●	●	●
Measuerements per second	5	5	5	5	5	5	5	5
Effective value from periods 50/60Hz	10/12	10/12	10/12	10/12	10/12	10/12	10/12	10/12
Harmonics V/A	1 – 63	1 – 63	1 – 63	1 – 63	1 – 63	1 – 63	1 – 63	1 – 63
Interharmonics	●	●	●	●	-	-	-	-
Disortion factor THD-U [%]	●	●	●	●	●	●	●	●
DIsortion factor THD-I [%]	-	●	●	●	●	●	●	●
Unbalance	●	●	●	●	●	●	●	●
Short/long-term flicker	-	●	●	●	●	●	●	●
Transients	-	●	●	●	●	●	●	●
Short-term interruptions	-	●	●	●	●	●	●	●
Accuracy V/A	±0.1%/-	±0.1%	±0.1%	±0.1%	±0.1%/±0.5%	±0.1%/±0.5%	±0.1%/±0.5%	±0.1%/±0.5%
Active energy classification	-	0.5S	0.5S	0.5S	0.5S	0.5S	0.5S	0.5S
Reactive energy classification	-	2	2	2	2	2	2	2
Auxiliary input	-	-	-	-	-	-	-	-
Digital inputs	-	-	1	1	-	-	-	-
Digital/pulse output	-	-	-	-	-	-	-	-
Relay outputs	-	-	-	-	-	-	-	-
Analogue inputs	-	-	-	-	-	-	1	1
Analogue outputs	-	-	-	-	-	-	-	-
Temperature input	-	-	1	1	-	-	1	1
Min/max value memory	●	●	●	●	●	●	●	●
Memory size	512MB	512MB	512MB	512MB	512MB	512MB	512MB	512MB
Clock	●	●	●	●	●	●	●	●
Software	ENVIS	ENVIS	ENVIS	ENVIS	ENVIS	ENVIS	ENVIS	ENVIS
EN 50160	●	●	●	●	●	●	●	●
IEC 61000-4-30	S	S	S	S	S	S	S	S
Portable	●	●	●	●	●	●	●	●
Interfaces								
RS 232	-	-	-	-	-	-	-	-
RS 485	-	-	●	-	-	-	-	-
Ethernet	-	-	-	●	-	-	-	-
USB	●	●	●	●	●	●	●	●
Web server	-	-	-	●	-	-	-	-
Wifi	-	-	-	-	●	●	●	●
GPRS	-	-	-	-	-	-	●	●
HSDP/UMTS. GPS	-	-	-	-	-	-	●	●
Protocols								
Modbus RTU	-	-	-	-	-	-	-	-
KMB short	-	-	-	-	-	-	-	-
KMB long	●	●	●	●	●	●	●	●

1. in compliance with IEC EN 61010-1

NEMO 332
Multi-channel power quality analyser

NEMO 332 is a portable multifunctional power meter and power analyser with data logger functions. It is suitable for measurement in all types of power distribution networks (LV, HV measured via voltage transformer). Its large internal memory can store months of measured power parameters. Disturbance data such as transients, voltage events, ripple control signals and other variations, system log, electricity meter reading + load profiles and other interesting information is also recorded.
It can measure up to 8 different feeders (32 currents and powers, 4 common voltages) and thus it is suitable for monitoring campaigns where several separated loads should be measured concurrently. Flexible current probes are available at different types, lengths and nominal values. ENVIS application is used for analysis and report generation of the recorded data.
Typical use: power quality troubleshooting, load monitoring, substation data logger, energy efficiency, portable analyzer.

Key features:

- 4 voltage inputs
- up to 8×4 current inputs to connect SPQ-I current probe (32 currents)
- class S power monitoring according to the international standard IEC 61000-4-30, ed. 2.
- power quality evaluation according to EN 50160
- power supply - external voltage 100 ÷ 400V_{AC}, through USB interface
- built-in lithium accumulator to cover power outages
- internal memory for archives with capacity of 512 MB
- USB interface and optional WiFi interface, GPRS, HSDPA module for remote communication

Technical specification

Metering	Phase Voltage (ULN)	U1, U2, U3, UN
	Line Voltage (ULL)	U12, U23, U31
	Current (I)	IL1, IL2, IL3, ILN
	Power (P)	P1, P2, P3, PN, 3P (import, export, total, 1st harmonic)
	Reactive Power (Q)	Q1, Q2, Q3, QN, 3Q (import, export, total, 1st harmonic)
	Aparent Power (S)	S1, S2, S3, SN, 3S
	Distortion Power (D)	D1, D2, D3, DN
	Power Factor (PF)	PF1, PF2, PF3, PFN, 3PF
	cosφ	cosφ1, cosφ2, cosφ3, cosφN, 3cosφ
	Symetrical Components	zero, negative and positive sequence components of voltage and current
	Unbalance Factor	unbI, unbU, φnsI
	Voltage THD (THDU)	THDU1, THDU2, THDU3, THDUN
	Current THD (THDI)	THDI1, THDI2, THDI3, THDIN
	Individual Harmonics	Harmonics 1st to 63rd of Voltage and Current and their angles
	Inter-Harmonics	-
	Fundamental Harmonic (Ufh, Ifh)	U1fh, U2fh, U3fh, Unfh, I1fh, I2fh, I3fh, INfh
	Frequency (f)	f
	Active Energy	Import (E1, E2, E3, SE), Export (E1, E2, E3, SE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy	Inductive (E1, E2, E3, SE), Capacitive (E1, E2, E3, SE), Total Inductive (Tariff1, Tariff2, Tariff3), Total Capacitive (Tariff1, Tariff2, Tariff3)
Datalogging	Main archive	min., max., avg. values of ULN, ULL, I, P, Q, S, D, THDU, THDI, f Avg. values of individual harmonics and their angles, Ufh, Ifh, Symetrical components, Unbalance factors, state of I/Os
	Electricity Meter Readings	Active and reactive imp. and exp. energy per phase (L1, L2, L3) and per tariff (T1, T2, T3)
	Voltage Event logging	Saq, Swell, Dip
	PQ Event trends recording	Yes
	Waveforms recording	Yes
Others	Alarms	Logical functions, under/over limit of V, I, P, Q, S, unbl, THD, cos, f
	Inputs/Outputs	Optionally: input for thermometer or analog input
	Memory Size	512MB
	RTC	seconds, minutes, hours, days, months, years
	Communication	USB, optionally: WiFi, GPRS, HSDPA/UMTS

POWER		aux. voltage	85 ÷ 480 V_{AC} / 80 ÷ 680 V_{DC}
		power	8 VA / 8W
		overvoltage category	CAT III / 300 V
INPUT	VOLTAGE	measuring range	3 ÷ 800 V_{AC} /5 ÷ 1380 V_{AC} (phase/line)
		input impedance	15 MΩ (L_i ↔N)
		connection	wye, delta
		permanent overload	800 V_{RMS}
		surge overload	1200 V_{RMS} for 1min
	CURRENT	measuring range	up to 3150 A, depends on selected range and type of current probe
		permanent overload	-
		surge overload	-
	TEMP	measuring range	-50 ÷ 150 °C

I/O	A	Analog input ratings	2 ÷ 22 mA, impedance 75 W
	T	Pt100 input ratings	Range -50 ÷ 150°C
		Digital input	
OTHER	TEMP	Operating	-25 ÷ 60°C, <95% non-condens. environ.
		Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Immunity	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 6, EN 61000 – 4 – 11
		Emission	EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 40
		Dimensions	250 x 210 x 65 mm, 1 kg

COMMUNICATION	Local USB 2.0 (standard) KMB long protocol Connector Mini-B
	WiFi (options W, X) IEEE 802.11 b, g KMB long protocol
	GPRS (option G) KMB long protocol
	HSDPA/UMTS + GPS (option H) KMB long protocol

Accuracy	Voltage	0,10%
	Current	0,50%
	Active Power	1,00%
	Reactive Power	2,00%
	Power Factor	0,02
	cosφ	0,02
	Frequency	0,20%
	Active Energy	1,00%
	Reactive Energy	2,00%
	Harmonics of Voltage	0,50%
	Harmonics of Current	1,00%
	THD of Voltage	0,30%
	THD of Current	0,30%
	Flicker	5,00%

Ordering options

NEMO 332 - 1 A W G

Instrument Type
NEMO 332 = Portable Network Monitor

Current Inputs
1 = 1 input for SPQ-I current probe (up to 4 currents)
2 = 2 inputs for SPQ-I current probes (up to 8 currents)
4 = 4 inputs for SPQ-I current probes (up to 1 currents)
8 = 8 inputs for SPQ-I current probes (up to 32 currents)

Analog Inputs
N = Without inputs
A = 0(4) - 20 mA current loop input, 2 logical inputs
T = Input for temperature sensor, 2 logical inputs

Wireless Communication Interface 1
N = Without communication interface
W = Wi-Fi with integrated antenna
X = Wi-Fi, SMA-M connector for external antenna

Wireless Communication Interface 2
N = Without communication interface
G = GPRS modem, SMA-M connector for external antenna
H = HSDPA/UMTS modem, GPS, SMA-M connectors for external antennas

Current sensor options

SPQ - I3000 - 4 JRF1

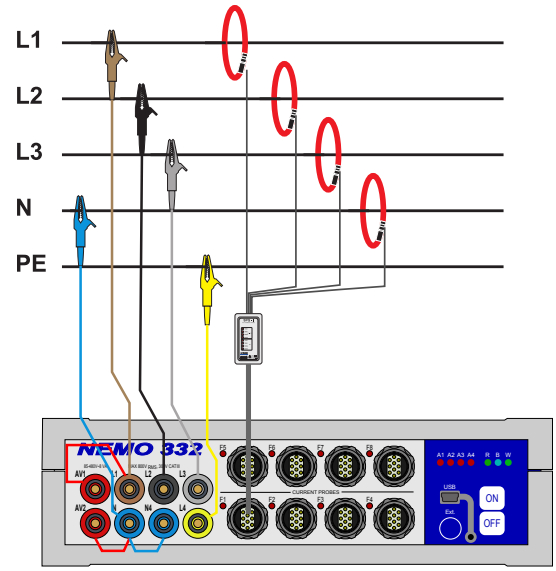
Current Probe Type
SPQ - Probe for NEMO class instruments

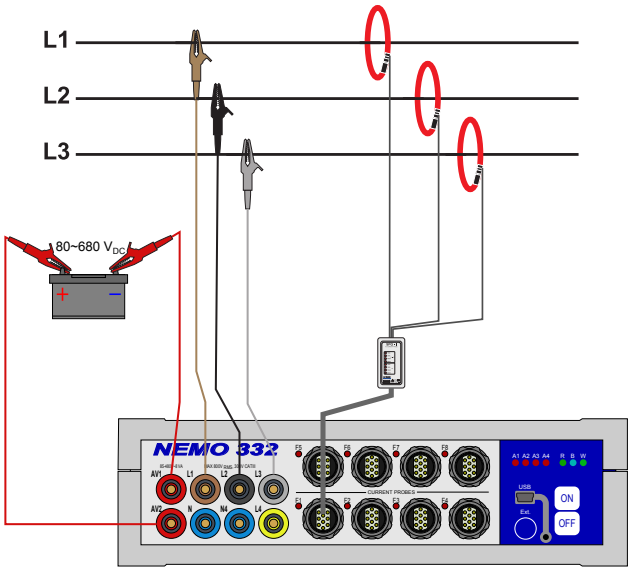
Current Ranges
I10000 = Inom 10000A/3000A/1000A/300A
I3000 = Inom 3000A/1000A/300A/100A
I1000 = Inom 1000A/300A/100A/30A
I300 = Inom 300A/100A/30A/10A
I250 = Inom 250A/50A/10A/2A (JCLA only)

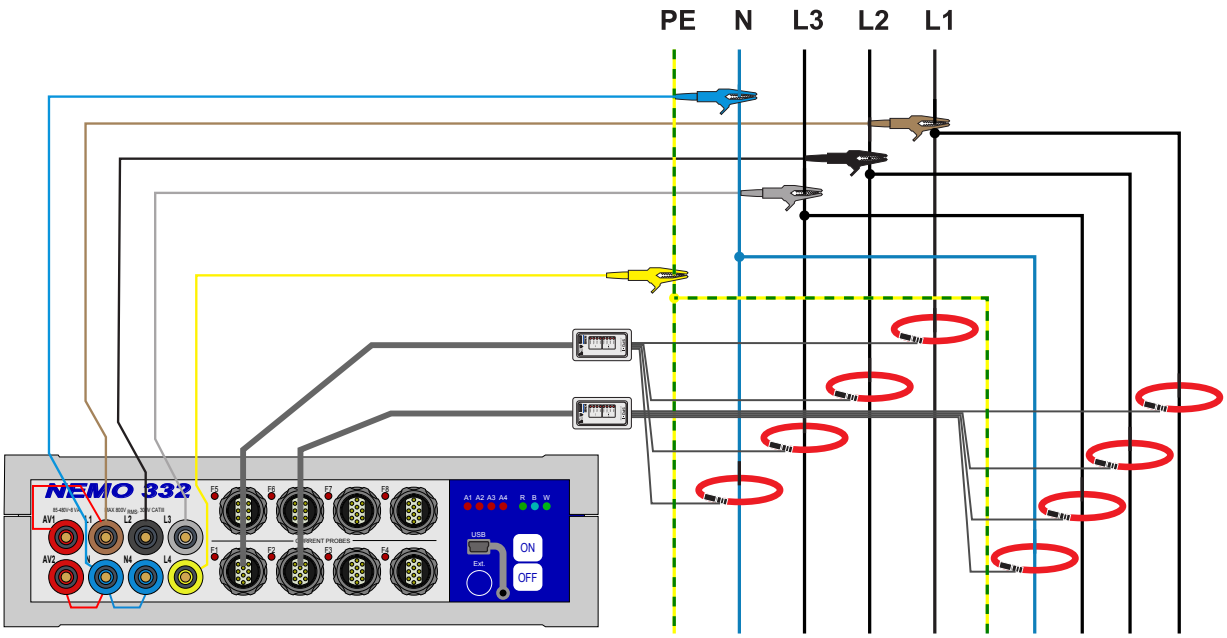
Number of Current Sensors
3 = Three sensors
4 = Four sensors

Current Sensor Type
JRF1 = Rogowski coil (Ø12mm), latch lock, length 40cm (Ø12,7cm)
JRF2 = Rogowski coil (Ø12mm), latch lock, length 60cm (Ø19,1cm)
JRF3 = Rogowski coil (Ø12mm), latch lock, length 100cm (Ø32,0cm)
MFC0 = Rogowski coil (Ø8,3mm), bayonet lock, length 25cm (Ø8,0cm)
MFC1 = Rogowski coil (Ø8,3mm), bayonet lock, length 40cm (Ø12,7cm)
MFC2 = Rogowski coil (Ø8,3mm), bayonet lock, length 60cm (Ø19,1cm)
MFC3 = Rogowski coil (Ø8,3mm), bayonet lock, length 100cm (Ø32,0cm)
JCLA = Clamp-on CT, max. conductor Ø13mm, (only I250)

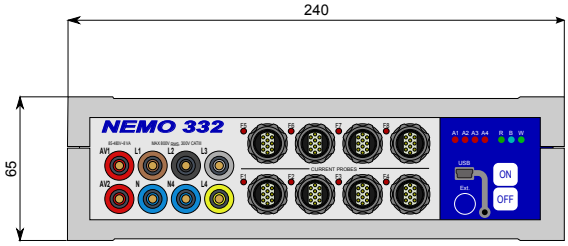
Typical connection schema

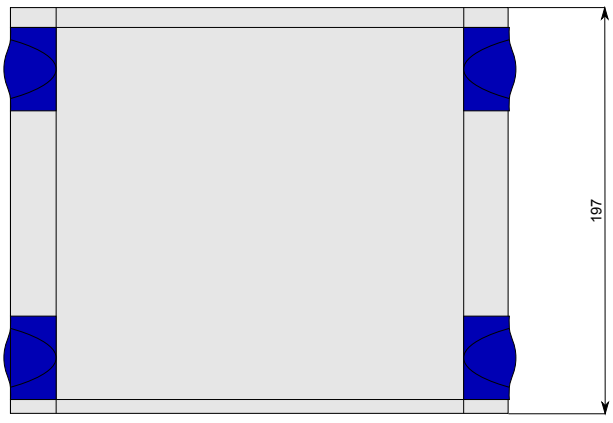






Mechanical dimensions





NEMO 104

Compact power quality analyser

NEMO 104 is a modular analyzer of power quality. In the basic package it is intended for continuous monitoring of four voltages and currents (in three phase AC networks). The device shares many features and parameters with its built-in predecessor SMPQ.
Compared to the basic SIMON 341 line of analysers it can additionally evaluate flicker severity indexes, inter-harmonics and handles voltage measurement fully according to IEC EN 61000-4-30 ed. 2. The power quality in NEMO 104 is evaluated according to EN 50160. It also records voltage events and other pre-defined phenomena. Its ultra compact case and IP50 case is making this monitor an ideal choice for measurements in rough space limited environments.

Key features:

- 4 voltage inputs, 4 current inputs
- ultra compact housing with silicone protectors
- class S power monitoring according to the international standard IEC 61000-4-30, ed. 2.
- power quality evaluation according to EN 50160
- supply voltage separated from measured
- built-in lithium accumulator to cover power outages
- internal memory for archives with capacity of 512 MB
- USB communication interface and optional WiFi interface

Technical specification

Metering	Phase Voltage (ULN)	U1, U2, U3, UN
	Line Voltage (ULL)	U12, U23, U31
	Current (I)	IL1, IL2, IL3, ILN
	Power (P)	P1, P2, P3, PN, 3P (import, export, total, 1st harmonic)
	Reactive Power (Q)	Q1, Q2, Q3, QN, 3Q (import, export, total, 1st harmonic)
	Aparent Power (S)	S1, S2, S3, SN, 3S
	Distortion Power (D)	D1, D2, D3, DN
	Power Factor (PF)	PF1, PF2, PF3, PFN, 3PF
	cosφ	cosφ1, cosφ2, cosφ3, cosφN, 3cosφ,
	Symetrical Components	zero, negative and positive sequence components of voltage and current
	Unbalance Factor	unbI, unbU, φnsI
	Voltage THD (THDU)	THDU1, THDU2, THDU3, THDUN
	Current THD (THDI)	THDI1, THDI2, THDI3, THDIN
	Individual Harmonics	Harmonics 1st to 63rd of Voltage and Current and their angles
	Inter-Harmonics	-
	Fundamental Harmonic (Ufh, Ifh)	U1fh, U2fh, U3fh, Unfh, I1fh, I2fh, I3fh, INfh
	Frequency (f)	f
	Active Energy	Import (E1, E2, E3, ΣE), Export (E1, E2, E3, ΣE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy	Inductive (E1, E2, E3, ΣE), Capacitive (E1, E2, E3, ΣE), Total Inductive (Tariff1, Tariff2, Tariff3), Total Capacitive (Tariff1, Tariff2, Tariff3)
Datalogging	Main archive	min., max., avg. values of ULN, ULL, I, P, Q, S, D, THDU, THDI, f Avg. values of individual harmonics and their angles, Ufh, Ifh, Symetrical components, Unbalance factors, state of I/Os
	Electricity Meter Readings	Active and reactive imp. and exp. energy per phase (L1, L2, L3) and per tariff (T1, T2, T3)
	Voltage Event logging	Saq, Swell, Dip
	PQ Event trends recording	Yes
	Waveforms recording	Yes
Others	Alarms	Logical functions, under/over limit of V, I, P, Q, S, unbl, THD, cos, f
	Inputs/Outputs	-
	Memory Size	512MB
	RTC	seconds, minutes, hours, days, months, years
	Communication	USB, optionally: WiFi

POWER		aux. voltage	85 ÷ 480 V_{AC} / 80 ÷ 680 V_{DC}
		power	8 VA / 8W
		overvoltage category	CAT III / 300 V
INPUT	VOLTAGE	measuring range	3 ÷ 800 V_{AC} /5 ÷ 1380 V_{AC} (phase/line)
		input impedance	15 MΩ (L_i ↔N)
		connection	wye, delta
		permanent overload	800 V_{RMS}
		surge overload	1200 V_{RMS} for 1min
	CURRENT	measuring range	up to 10500 A, depends on selected range and type of current probe
		permanent overload	-
		surge overload	-
	TEMP	measuring range	-

OTHER	TEMP	Operating	-25 ÷ 60°C, <95% non-condens. environ.
		Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Immunity	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 6, EN 61000 – 4 – 11
		Emission	EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 40
		Dimensions	138 x 73 x 58 mm, 0,25 kg

COMMUNICATION	Local USB 2.0 (standard) KMB long protocol Connector Mini-B
	WiFi (options W, X) IEEE 802.11 b, g KMB long protocol

Accuracy	Voltage	0,10%
	Current	0,50%
	Active Power	1,00%
	Reactive Power	2,00%
	Power Factor	0,02
	cosφ	0,02
	Frequency	0,20%
	Active Energy	1,00%
	Reactive Energy	2,00%
	Harmonics of Voltage	0,50%
	Harmonics of Current	1,00%
	THD of Voltage	0,30%
	THD of Current	0,30%
	Flicker	5,00%

Ordering options

NEMO 104 - 1 W

Instrument Type
NEMO 104 = Portable Network Monitor

Current Inputs
0 = Without input for current probe
1 = 1 input for SPQ-I current probe (up to 4 currents)

Wireless Communication Interface
N = Without communication interface
W = Wi-Fi with integrated antenna
X = Wi-Fi, SMA-M connector for external antenna

Current probe options

SPQ - I3000 - 4 JRF1

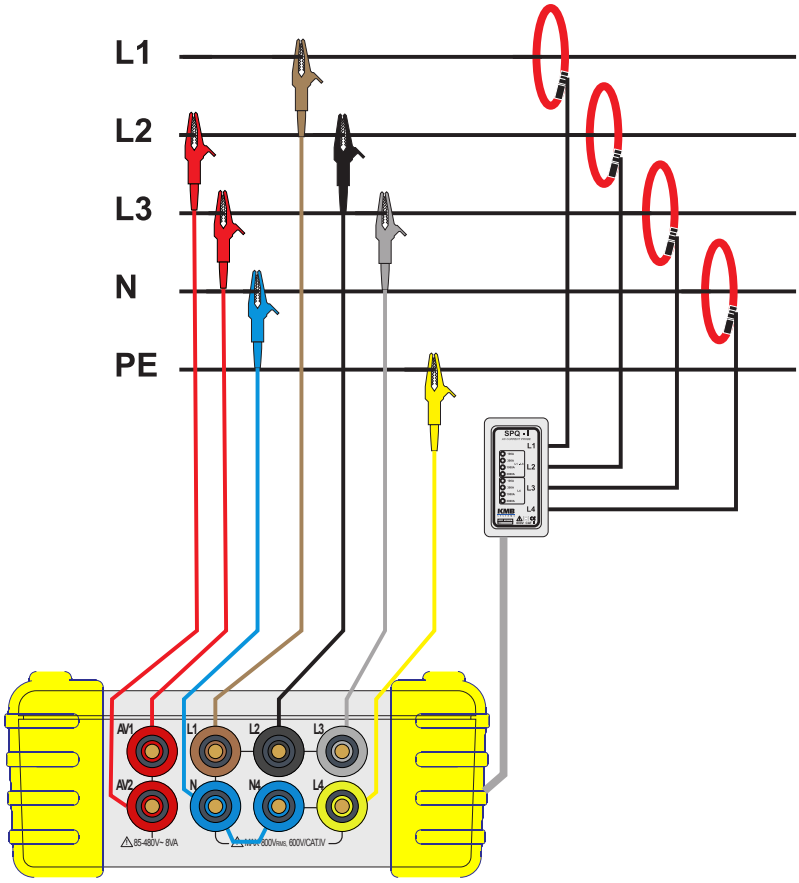
Current Probe Type
SPQ - Probe for NEMO class instruments

Current Ranges
I10000 = Inom 10000A/3000A/1000A/300A
I3000 = Inom 3000A/1000A/300A/100A
I1000 = Inom 1000A/300A/100A/30A
I300 = Inom 300A/100A/30A/10A
I250 = Inom 250A/50A/10A/2A (JCLA only)

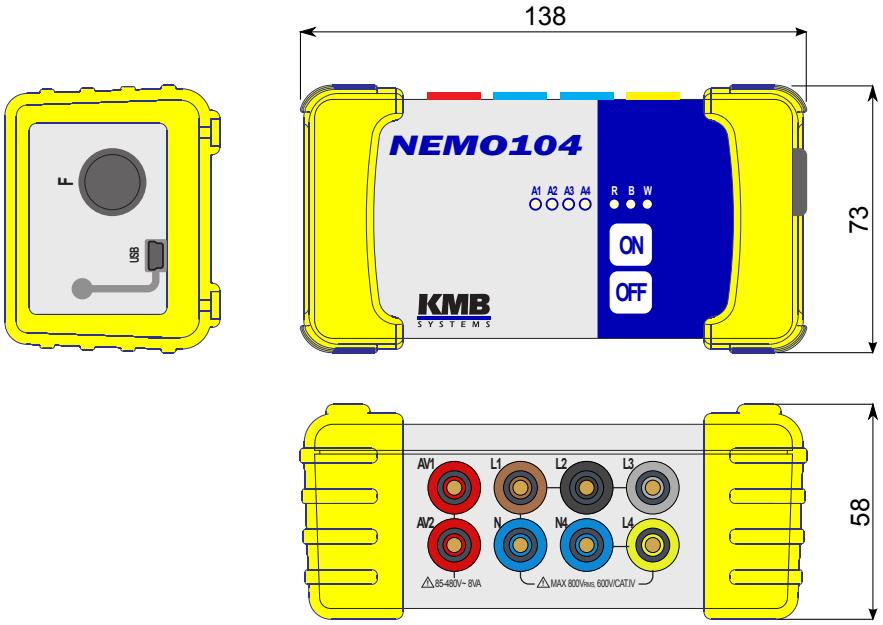
Number of Current Sensors
3 = Three sensors
4 = Four sensors

Current Sensor Type
JRF1 = Rogowski coil (Ø12mm), latch lock, length 40cm (Ø12,7cm)
JRF2 = Rogowski coil (Ø12mm), latch lock, length 60cm (Ø19,1cm)
JRF3 = Rogowski coil (Ø12mm), latch lock, length 100cm (Ø32,0cm)
MFC0 = Rogowski coil (Ø8,3mm), bayonet lock, length 25cm (Ø8,0cm)
MFC1 = Rogowski coil (Ø8,3mm), bayonet lock, length 40cm (Ø12,7cm)
MFC2 = Rogowski coil (Ø8,3mm), bayonet lock, length 60cm (Ø19,1cm)
MFC3 = Rogowski coil (Ø8,3mm), bayonet lock, length 100cm (Ø32,0cm)
JCLA = Clamp-on CT, max. conductor Ø13mm, (only I250)

Typical connection schema



Mechanical dimensions



SMP-BX
Embedded compact analyser

Analysers of electric network parameters SMP-BX 300, SMP-BX 340, SMPQ-BX 300 and SMPQ-BX 340 are a measuring and data logging instruments for single- and three phase low voltage (up to 230/400 VAC) distribution networks in substations, switchgear boxes, cubicles or directly at the consumers premises such as smart buildings, hospitals, industrial infrastructures etc.
Core of the instrument is a modified SMP or SMPQ analyser. Its features and functions closely corresponds to the -BX enclosure version. SMP-CA is another similar portable instrument with different enclosure.
SMPQ-BX instruments are a fully featured power quality analysers with support for interharmonics, flicker indices (Pst, Plt), record of voltage events and weekly power quality evaluations according to EN 50160.

Key features

- advanced portable power quality analyzer
- based on SMPQ option F. built-in robust plastic box
- continuous measurement of four voltages and currents
- flexible Rogowski coil current sensors (up to 3000 A)
- class S power monitoring according to the international standard IEC 61000-4-30, ed. 2.
- embedded four quadrant three phase three tariff electricity meter
- continuous power quality evaluation according EN 50160 (SMPQ-BX)
- built-in USB 2.0 communication port

Technical specification

Metering	Phase Voltage (ULN)	U1, U2, U3, UN
	Line Voltage (ULL)	U12, U23, U31
	Current (I)	IL1, IL2, IL3, ILN
	Power (P)	P1, P2, P3, PN, 3P (import, export, total, 1st harmonic)
	Reactive Power (Q)	Q1, Q2, Q3, QN, 3Q (import, export, total, 1st harmonic)
	Aparent Power (S)	S1, S2, S3, SN, 3S
	Distortion Power (D)	D1, D2, D3, DN
	Power Factor (PF)	PF1, PF2, PF3, PFN, 3PF
	cosj	cosj1, cosj2, cosj3, cosjN, 3cosj,
	Symetrical Components	zero, negative and positive sequence components of voltage and current
	Unbalance Factor	unbI, unbU, jnsI
	Voltage THD (THDU)	THDU1, THDU2, THDU3, THDUN
	Current THD (THDI)	THDI1, THDI2, THDI3, THDIN
	Individual Harmonics	Harmonics 1st to 63rd of Voltage and Current and their angles
	Inter-Harmonics	Inter-Harmonics 1st to 63rd of Voltage and Current
	Fundamental Harmonic (Ufh, Ifh)	U1fh, U2fh, U3fh, Unfh, I1fh, I2fh, I3fh, INfh
	Frequency (f)	f
	Active Energy	Import (E1, E2, E3, SE), Export (E1, E2, E3, SE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy	Inductive (E1, E2, E3, SE), Capacitive (E1, E2, E3, SE), Total Inductive (Tariff1, Tariff2, Tariff3), Total Capacitive (Tariff1, Tariff2, Tariff3)
Datalogging	Main archive	min., max., avg. values of ULN, ULL, I, P, Q, S, D, THDU, THDI, f Avg. values of individual harmonics and their angles, Ufh, Ifh, Symetrical components, Unbalance factors, state of I/Os
	Electricity Meter Readings	Active and reactive imp. and exp. energy per phase (L1, L2, L3) and per tariff (T1, T2, T3)
	Voltage Event logging	Saq, Swell, Dip
	PQ Event trends recording	Yes
	Waveforms recording	Yes
Others	Alarms	Logical functions, under/over limit of V, I, P, Q, S, unbl, THD, cos, f
	Inputs/Outputs	-
	Memory Size	512MB
	RTC	seconds, minutes, hours, days, months, years
	Communication	USB

POWER		aux. voltage	Option U: 85 ÷ 275 V_{AC} / 80 ÷ 350 V_{DC}
		power	7 VA / 3 W
		overvoltage category	CAT III / 300 V
INPUT	VOLTAGE	measuring range	3 ÷ 800 V_{AC} /5 ÷ 1380 V_{AC} (phase/line)
		input impedance	2,7 MΩ (L_i ↔N)
		connection	wye, delta
		permanent overload	800 V_{RMS}
		surge overload	1200 V_{RMS} for 1min
	CURRENT	measuring range	up to 3150 A, depends on selected range and type of current probe
		permanent overload	-
		surge overload	-
	TEMP	measuring range	-

I/O			-
OTHER	TEMP	Operating	-25 ÷ 50°C, <95% non-condens. environ.
		Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Emmision	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 6, EN 61000 – 4 – 11
		Immunity	EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 40
		Dimmensions	125 x 210 x 85 mm, 0,6 kg

COMMUNICATION	Local USB 2.0 (standard) KMBlong, MODBUS RTU protocols Connector Mini-B

		SMP-BX	SMPQ-BX
ACCURACY	Voltage	0,10%	0,10%
	Current	1,00%	1,00%
	Power	1,00%	1,00%
	Reactive Power	2,00%	2,00%
	Power Factor	0,02	0,02
	cosφ	0,02	0,02
	Frequency	0,20%	0,20%
	Active Energy	2,00%	2,00%
	Reactive Energy	2,00%	2,00%
	Harmonics of Voltage	Class 3	Class 3
	Harmonics of Current	1,00%	1,00%
	THD of Voltage	0,30%	0,30%
	THD of Current	2,00%	2,00%
	Flicker	-	5,00%

Ordering options

SMPQ-BX 340

Instrument model
- SMP-BX = Portable variant of SMP analyser
- SMPQ-BX = Portable variant of SMPQ analyser

Current measuring options
- 300 = Without current measuring
- 340 = 4 current inputs for Bxxx series flexible current sensors

Current sensor options

B3000 - JRF1

Current Ranges
- B10000 = Inom 10000A/3000A/1000A/300A
- B3000 = Inom 3000A/1000A/300A/100A
- B1000 = Inom 1000A/300A/100A/30A
- B300 = Inom 300A/100A/30A/10A
- B250 = Inom 250A/50A/10A/2A (JCLA only)

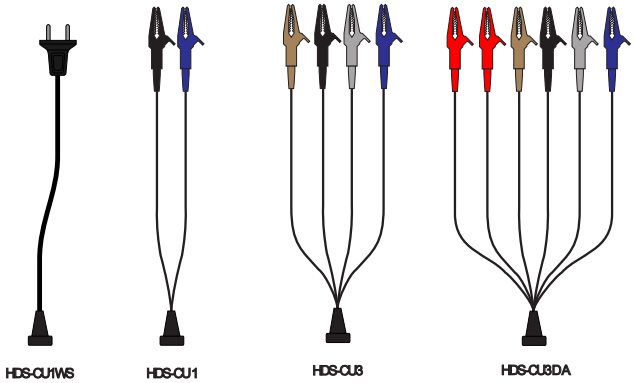
Current Sensor Type
- JRF1 = Rogowski coil (Ø12mm), latch lock, length 40cm (Ø12,7cm)
- JRF2 = Rogowski coil (Ø12mm), latch lock, length 60cm (Ø19,1cm)
- JRF3 = Rogowski coil (Ø12mm), latch lock, length 100cm (Ø32,0cm)
- MFC0 = Rogowski coil (Ø8,3mm), bayonet lock, length 25cm (Ø8,0cm)
- MFC1 = Rogowski coil (Ø8,3mm), bayonet lock, length 40cm (Ø12,7cm)
- MFC2 = Rogowski coil (Ø8,3mm), bayonet lock, length 60cm (Ø19,1cm)
- MFC3 = Rogowski coil (Ø8,3mm), bayonet lock, length 100cm (Ø32,0cm)
- JCLA = Clamp-on CT, max. conductor Ø13mm, (only B250)

Voltage cable options

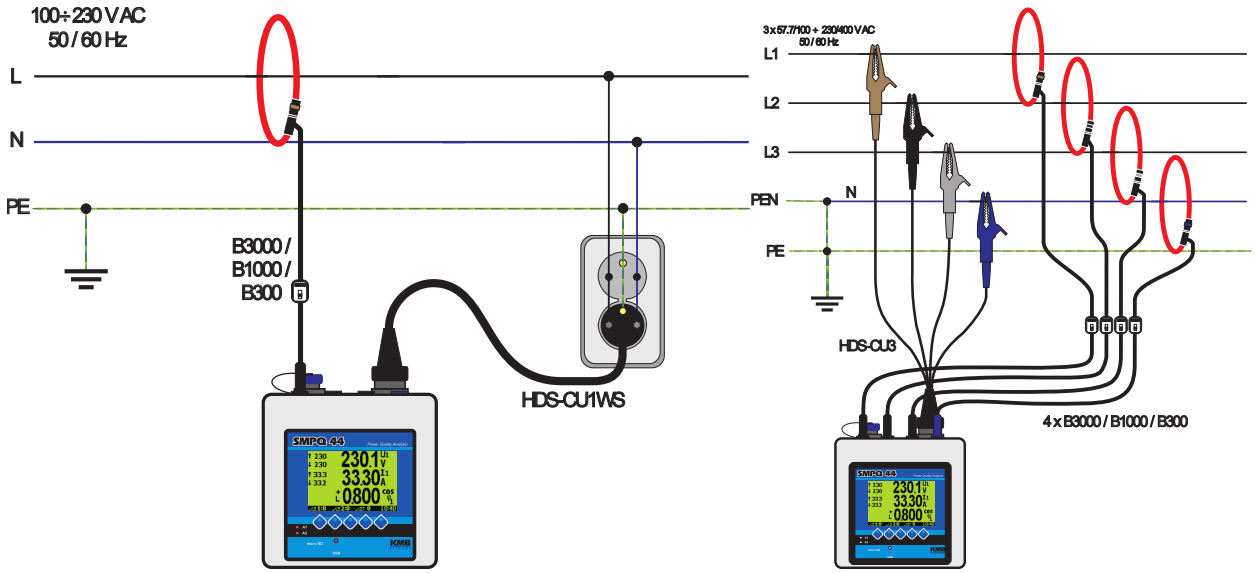
HDS - CU3

Model
- HDS = Voltage cable for SMP-BX and SMPQ-BX

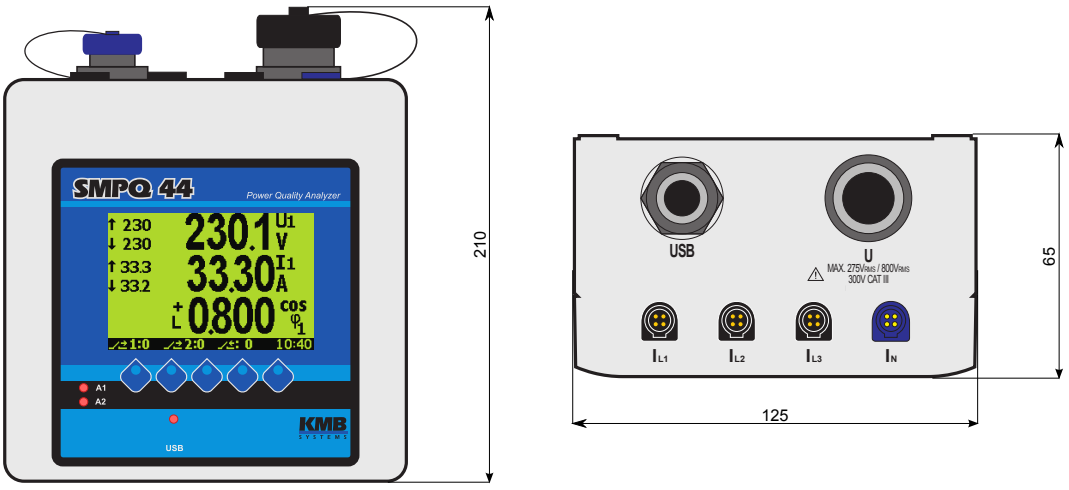
Voltage Cable Type
- CU1WS = single phase, with plug for measuring in wall socket
- CU1 = single phase cable, two wires with banana plugs
- CU3 = three phase cable, four wires with banana plugs
- CU3DA = three phase with separated supply voltage, six wires



Typical connection schema



Mechanical dimensions



SMP-CA
Portable analyser in case

SMP-CA power quality analyzer is a programmable measuring and data logging set for measurement in LV distribution grids. It can be used in transformer stations, low voltage switchgear boxes or directly at consumers. SMPQ44-FT/4 panel instrument built in a plastic case is heart of the set. The SMP-CA analyser uses SMP line as a core instrument base and shares most of its functionality.
Standard set contains voltage cables with croco-clips, power cord and USB communication cable. Optional accessories comprise current sensors, temperature sensor, connection adapters etc.

Key features

- advanced portable power quality analyzer
- based on SMPQ option F built-in robust plastic case
- continuous measurement of four voltages and currents
- flexible Rogowski coil current sensors (up to 3000 A)
- class S power monitoring according to the international standard IEC 61000-4-30, ed. 2.
- embedded four quadrant three phase three tariff electricity meter
- continuous power quality evaluation according EN 50160 (SMPQ)
- fully configurable inputs and outputs
- built-in USB 2.0 port with optional remote communication interface like RS 485 or Ethernet

Technical specification

Metering	Phase Voltage (ULN)	U1, U2, U3, UN
	Line Voltage (ULL)	U12, U23, U31
	Current (I)	IL1, IL2, IL3, ILN
	Power (P)	P1, P2, P3, PN, 3P (import, export, total, 1st harmonic)
	Reactive Power (Q)	Q1, Q2, Q3, QN, 3Q (import, export, total, 1st harmonic)
	Aparent Power (S)	S1, S2, S3, SN, 3S
	Distortion Power (D)	D1, D2, D3, DN
	Power Factor (PF)	PF1, PF2, PF3, PFN, 3PF
	cosφ	cosφ1, cosφ2, cosφ3, cosφN, 3cosφ,
	Symetrical Components	zero, negative and positive sequence components of voltage and current
	Unbalance Factor	unbI, unbU, φnsI
	Voltage THD (THDU)	THDU1, THDU2, THDU3, THDUN
	Current THD (THDI)	THDI1, THDI2, THDI3, THDIN
	Individual Harmonics	Harmonics 1st to 63rd of Voltage and Current and their angles
	Inter-Harmonics	Inter-Harmonics 1st to 63rd of Voltage and Current
	Fundamental Harmonic (Ufh, Ifh)	U1fh, U2fh, U3fh, Unfh, I1fh, I2fh, I3fh, INfh
	Frequency (f)	f
	Active Energy	Import (E1, E2, E3, ΣE), Export (E1, E2, E3, ΣE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy	Inductive (E1, E2, E3, ΣE), Capacitive (E1, E2, E3, ΣE), Total Inductive (Tariff1, Tariff2, Tariff3), Total Capacitive (Tariff1, Tariff2, Tariff3)
Datalogging	Main archive	min., max., avg. values of ULN, ULL, I, P, Q, S, D, THDU, THDI, f Avg. values of individual harmonics and their angles, Ufh, Ifh, Symetrical components, Unbalance factors, state of I/Os
	Electricity Meter Readings	Active and reactive imp. and exp. energy per phase (L1, L2, L3) and per tariff (T1, T2, T3)
	Voltage Event logging	Saq, Swell, Dip
	PQ Event trends recording	Yes
	Waveforms recording	Yes
Others	Alarms	Logical functions, under/over limit of V, I, P, Q, S, unbl, THD, cos, f
	Inputs/Outputs	Optionally: 1 digital input, input for thermometer
	Memory Size	512MB
	RTC	seconds, minutes, hours, days, years
	Communication	USB, RS485, Ethernet

POWER		aux. voltage	Option U: 85 ÷ 275 V_{AC} / 80 ÷ 350 V_{DC}
		power	7 VA / 3 W
		overvoltage category	CAT III / 300 V
INPUT	VOLTAGE	measuring range	3 ÷ 800 V_{AC} /5 ÷ 1380 V_{AC} (phase/line)
		input impedance	2,7 MΩ (L_i ↔N)
		connection	wye, delta
		permanent overload	800 V_{RMS}
		surge overload	1200 V_{RMS} for 1min
	CURRENT	measuring range	up to 3150 A, depends on selected range and type of current probe
		permanent overload	-
		surge overload	-
	TEMP	measuring range	depending on temperature transmitter range

I/O	D	Digital Input ratings	5 V_{DC}/1 mA, min 100 ms
	T	Pt 100 input ratings	Range -50 ÷ 150°C
OTHER	TEMP	Operating	-25 ÷ 60°C, <95% non-condens. environ.
		Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Emmision	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 6, EN 61000 – 4 – 11
		Immunity	EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 41
		Dimmensions	371 x 258 x 152 mm, 5 kg

COMMUNICATION	Local USB 2.0 (standard) KMBlong, MODBUS RTU protocols Connector Mini-B
	Remote RS-485 (opt. 4) galvanically isolated KMBlong, MODBUS RTU protocols 2-wire connection 2400 ÷ 230400 baud
	Remote Ethernet 10Base-T (opt. E) KMBlong, MODBUS TCP protocols 4-wires (2 twisted pairs) 10 Mbit/s

ACCURACY	Voltage	0,10%
	Current	1,00%
	Power	1,00%
	Reactive Power	2,00%
	Power Factor	0,02
	cosφ	0,02
	Frequency	0,20%
	Active Energy	2,00%
	Reactive Energy	2,00%
	Harmonics of Voltage	Class 3
	Harmonics of Current	1,00%
	THD of Voltage	0,30%
	THD of Current	2,00%
	Flicker	5,00%

Ordering options

SMP-CA 4

Instrument model
SMP-CA = SMPQ 44 analyser in robust case

Communication interface
4 = RS-485
E = Ethernet 10BaseT

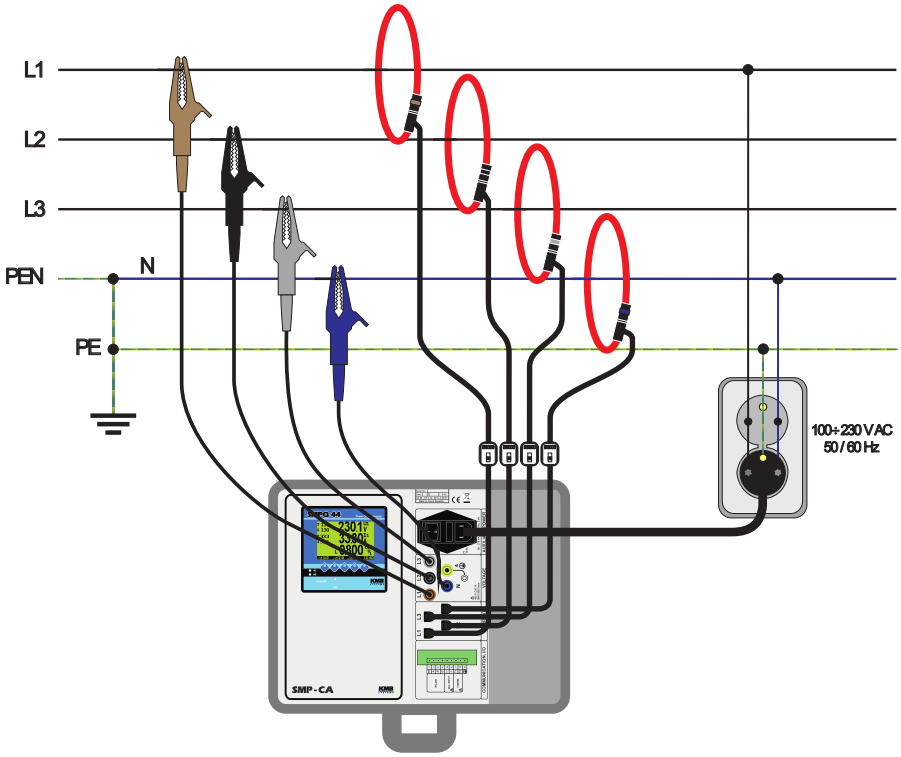
Current sensor options

B3000 - JRF1

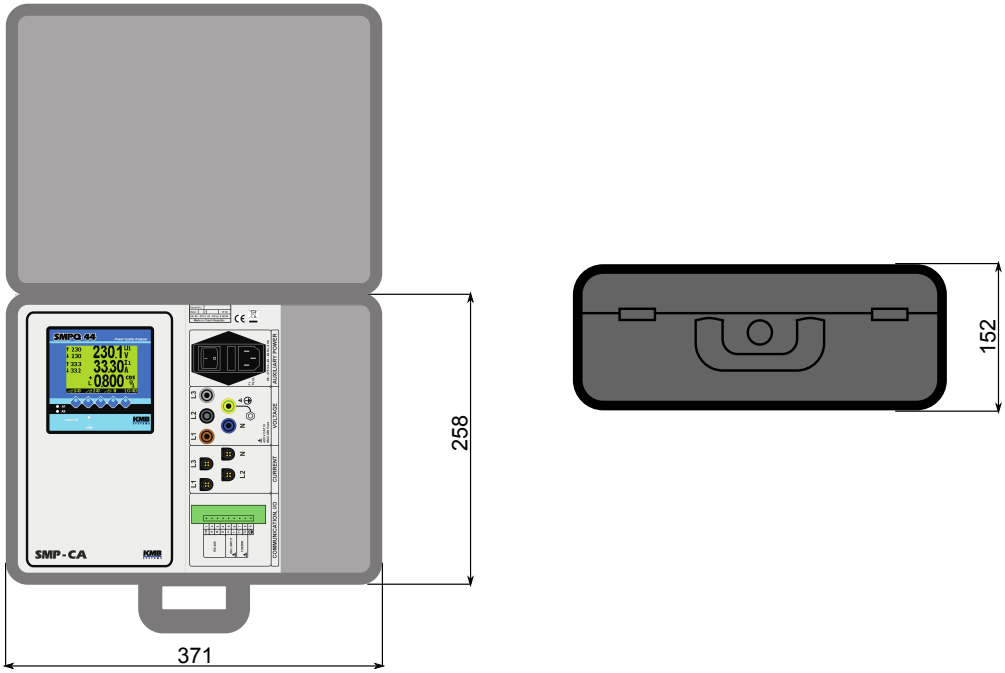
Current Ranges
B10000 = Inom 10000A/3000A/1000A/300A
B3000 = Inom 3000A/1000A/300A/100A
B1000 = Inom 1000A/300A/100A/30A
B300 = Inom 300A/100A/30A/10A
B250 = Inom 250A/50A/10A/2A (JCLA only)

Current Sensor Type
JRF1 = Rogowski coil (Ø12mm), latch lock, length 40cm (Ø12,7cm)
JRF2 = Rogowski coil (Ø12mm), latch lock, length 60cm (Ø19,1cm)
JRF3 = Rogowski coil (Ø12mm), latch lock, length 100cm (Ø32,0cm)
MFC0 = Rogowski coil (Ø8,3mm), bayonet lock, length 25cm (Ø8,0cm)
MFC1 = Rogowski coil (Ø8,3mm), bayonet lock, length 40cm (Ø12,7cm)
MFC2 = Rogowski coil (Ø8,3mm), bayonet lock, length 60cm (Ø19,1cm)
MFC3 = Rogowski coil (Ø8,3mm), bayonet lock, length 100cm (Ø32,0cm)
JCLA = Clamp-on CT, max. conductor Ø13mm, (only B250)

Typical connection schema



Mechanical dimensions



NEMO 101

Single phase power quality data logger

NEMO 101 is a modular analyzer of power quality. Its primary purpose is easy measuring, monitoring and datalogging of power quality directly in wall socket. The device shares many features and parameters with its built-in predecessor SMPQ.
Instrument may be connected directly between power supply and measured device, Compared to the basic SIMON 341 line of analysers it can additionally evaluate flicker severity indexes, inter-harmonics and handles voltage measurement fully according to IEC EN 61000-4-30 ed. 2. The power quality in NEMO 101 is evaluated according to EN 50160. It also records voltage events and other predefined phenomena.

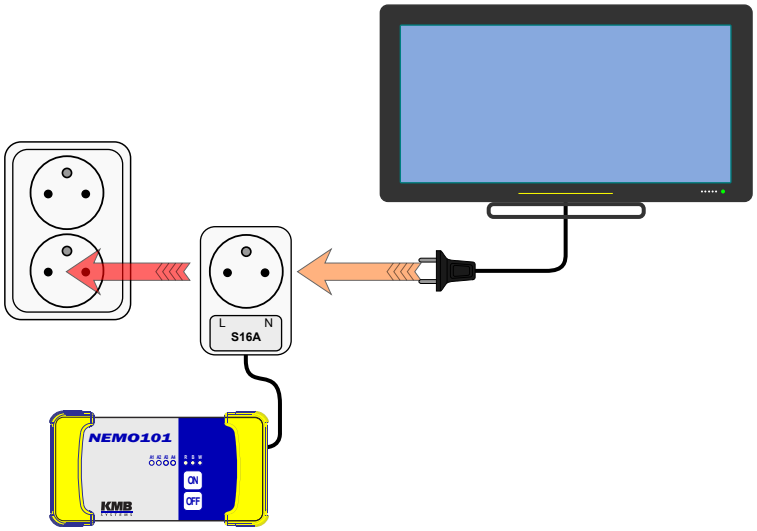
Key features:

- 1 voltage and 1 current input, measures accroding to EN 61000-4-30 ed.2
- ultra compact housing with silicone protectors
- power quality evaluation according to EN 50160
- supply voltage separated from measured
- built-in lithium accumulator to cover power outages
- internal memory for archives with capacity of 512 MB
- USB communication interface and optional WiFi interface

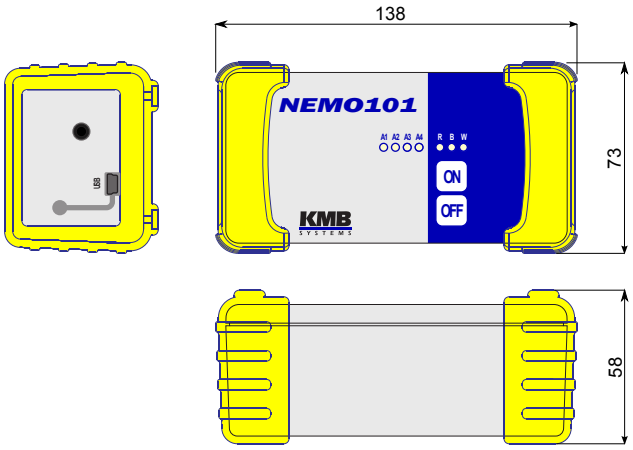
Ordering options

NEMO 101 - 1 W
Instrument Type NEMO 101 = Portable Network Monitor, 1-phase, wall socket
Current Inputs 0 = Without current measurement 1 = 2 currents In and I1 through wall socket adapter
Wireless Communication Interface N = Without communication interface W = Wi-Fi with integrated antenna X = Wi-Fi, SMA-M connector for external antenna

Typical connection schema



Mechanical dimensions



NEMO 304
Power Quality Analyser

NEMO 304 is a modular analyzer of power quality. In the basic package it is intended for continuous monitoring of four voltages and currents (in three phase AC networks). The number of monitored currents can be extended up to the maximum of 24 multiplexed inputs. The device shares many features and parameters with its built-in predecessor SMPQ.
Compared to the basic SIMON 341 line of analysers it can additionally evaluate flicker severity indexes, interharmonics and handles voltage measurement fully according to IEC EN 61000-4-30 ed. 2. The power quality in NEMO 104 is evaluated according to EN 50160. it also records voltage events and other predefined phenomena.

Key features:

- four voltage inputs for measurement, separated power supply
- four current inputs for Bxxxx current sensors
- one input for PT 100 temperature sensor or 0 - 20mA current loop input (optional)
- 128 samples per period, aggregation 200 ms or higher (user defined)
- voltage and currents are sampled continuously
- measures powers, PF, harmonics (63rd, including interharmonics and angles, THD), flicker...
- records power quality events (dips, sags, swells), detailed event trends and oscillograms
- power quality evaluation according to EN 50160
- internal memory capacity 512 MB
- USB for configuration and data acquisition, optionally WiFi, GPRS, HSDPA for remote communication
- internal battery backed real time clock, GPS time synchronization (optional)

Technical specification

Metering	Phase Voltage (ULN)	U1, U2, U3, UN
	Line Voltage (ULL)	U12, U23, U31
	Current (I)	IL1, IL2, IL3, ILN
	Power (P)	P1, P2, P3, PN, 3P (import, export, total, 1st harmonic)
	Reactive Power (Q)	Q1, Q2, Q3, QN, 3Q (import, export, total, 1st harmonic)
	Aparent Power (S)	S1, S2, S3, SN, 3S
	Distortion Power (D)	D1, D2, D3, DN
	Power Factor (PF)	PF1, PF2, PF3, PFN, 3PF
	cosφ	cosφ1, cosφ2, cosφ3, cosφN, 3cosφ
	Symetrical Components	zero, negative and positive sequence components of voltage and current
	Unbalance Factor	unbI, unbU, φnsI
	Voltage THD (THDU)	THDU1, THDU2, THDU3, THDUN
	Current THD (THDI)	THDI1, THDI2, THDI3, THDIN
	Individual Harmonics	Harmonics 1st to 63rd of Voltage and Current and their angles
	Inter-Harmonics	-
	Fundamental Harmonic (Ufh, Ifh)	U1fh, U2fh, U3fh, Unfh, I1fh, I2fh, I3fh, INfh
	Frequency (f)	f
	Active Energy	Import (E1, E2, E3, SE), Export (E1, E2, E3, SE), Total Import (Tariff 1, Tariff 2, Tariff 3), Total Export (Tariff 1, Tariff 2, Tariff 3)
	Reactive Energy	Inductive (E1, E2, E3, SE), Capacitive (E1, E2, E3, SE), Total Inductive (Tariff1, Tariff2, Tariff3), Total Capacitive (Tariff1, Tariff2, Tariff3)
Datalogging	Main archive	min., max., avg. values of ULN, ULL, I, P, Q, S, D, THDU, THDI, f Avg. values of individual harmonics and their angles, Ufh, Ifh, Symetrical components, Unbalance factors, state of I/Os
	Electricity Meter Readings	Active and reactive imp. and exp. energy per phase (L1, L2, L3) and per tariff (T1, T2, T3)
	Voltage Event logging	Saq, Swell, Dip
	PQ Event trends recording	Yes
	Waveforms recording	Yes
Others	Alarms	Logical functions, under/over limit of V, I, P, Q, S, unbl, THD, cos, f
	Inputs/Outputs	Optionally: input for thermometer or analog input
	Memory Size	512MB
	RTC	seconds, minutes, hours, days, months, years
	Communication	USB, optionally: WiFi, GPRS, HSDPA/UMTS

POWER		aux. voltage	85 ÷ 480 V_{AC} / 80 ÷ 680 V_{DC}
		power	8 VA / 8W
		overvoltage category	CAT III / 300 V
INPUT	VOLTAGE	measuring range	3 ÷ 800 V_{AC} /5 ÷ 1380 V_{AC} (phase/line)
		input impedance	15 MΩ (L_i ↔N)
		connection	wye, delta
		permanent overload	800 V_{RMS}
		surge overload	1200 V_{RMS} for 1min
	CURRENT	measuring range	up to 3150 A, depends on selected range and type of current probe
		permanent overload	-
		surge overload	-
	TEMP	measuring range	-50 ÷ 150 °C

I/O	A	Analog input ratings	2 ÷ 22 mA, impedance 75 W
	T	Pt100 input ratings	Range -50 ÷ 150°C
		Digital input	
OTHER	TEMP	Operating	-25 ÷ 60°C, <95% non-condens. environ.
		Storage	-40 ÷ 85°C, <95% non-condens. environ.
	EMC	Immunity	EN 61000 – 4 – 2, EN 61000 – 4 – 3, EN 61000 – 4 – 4, EN 61000 – 4 – 5, EN 61000 – 4 – 6, EN 61000 – 4 – 11
		Emission	EN 55011 - class A, EN 55022 - class A
		Protection rating	IP 40
		Dimensions	250 x 210 x 65 mm, 1 kg

COMMUNICATION	Local USB 2.0 (standard) KMB long protocol Connector Mini-B
	WiFi (options W, X) IEEE 802.11 b, g KMB long protocol
	GPRS (option G) KMB long protocol
	HSDPA/UMTS + GPS (option H) KMB long protocol

Accuracy	Voltage	0,10%
	Current	0,50%
	Active Power	1,00%
	Reactive Power	2,00%
	Power Factor	0,02
	cosφ	0,02
	Frequency	0,20%
	Active Energy	1,00%
	Reactive Energy	2,00%
	Harmonics of Voltage	0,50%
	Harmonics of Current	1,00%
	THD of Voltage	0,30%
	THD of Current	0,30%
	Flicker	5,00%

Ordering options

NEMO 304 - 1 A W G

Instrument Type
NEMO 304 = Portable Network Monitor

Current Inputs
1 = 4 inputs for Bxxxx series current sensors

Analog Inputs
N = Without inputs
A = 0(4) - 20 mA current loop input, 2 logical inputs
T = Input for temperature sensor, 2 logical inputs

Wireless Communication Interface 1
N = Without communication interface
W = Wi-Fi with integrated antenna
X = Wi-Fi, SMA-M connector for external antenna

Wireless Communication Interface 2
N = Without communication interface
G = GPRS modem, SMA-M connector for external antenna
H = HSDPA/UMTS modem, GPS, SMA-M connectors for external antennas

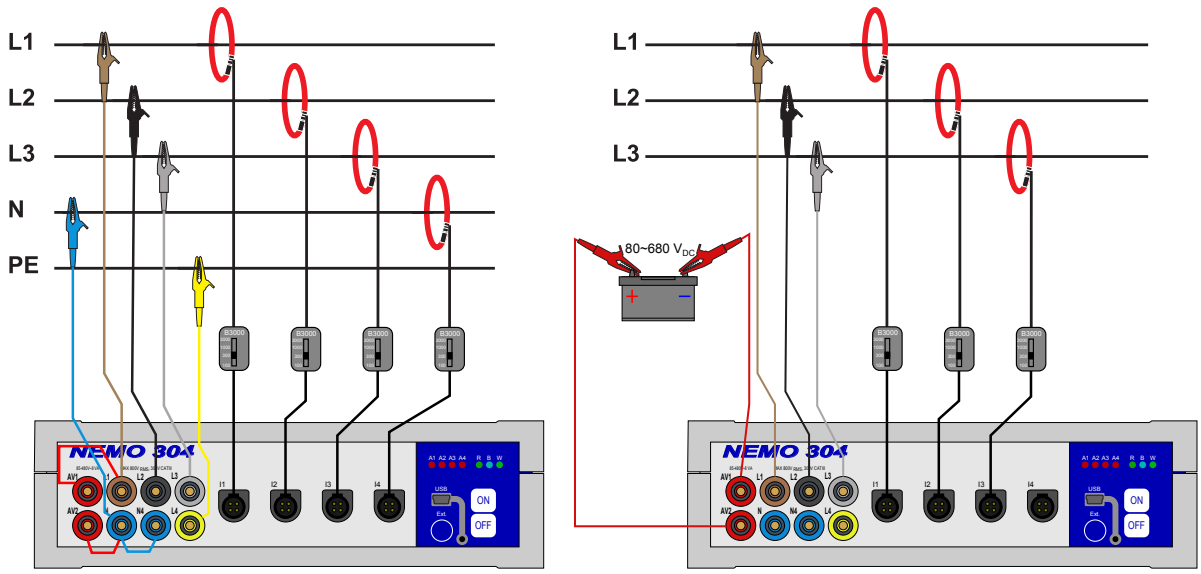
Current sensor options

B3000 - JRF1

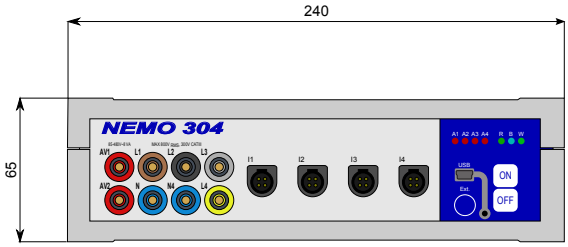
Current Ranges
B10000 = Inom 10000A/3000A/1000A/300A
B3000 = Inom 3000A/1000A/300A/100A
B1000 = Inom 1000A/300A/100A/30A
B300 = Inom 300A/100A/30A/10A
B250 = Inom 250A/50A/10A/2A (JCLA only)

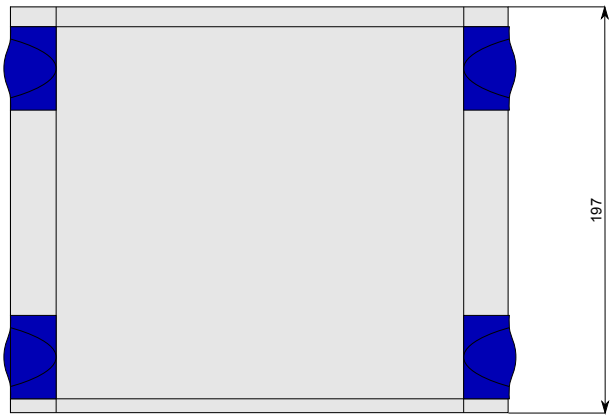
Current Sensor Type
JRF1 = Rogowski coil (Ø12mm), latch lock, length 40cm (Ø12,7cm)
JRF2 = Rogowski coil (Ø12mm), latch lock, length 60cm (Ø19,1cm)
JRF3 = Rogowski coil (Ø12mm), latch lock, length 100cm (Ø32,0cm)
MFC0 = Rogowski coil (Ø8,3mm), bayonet lock, length 25cm (Ø8,0cm)
MFC1 = Rogowski coil (Ø8,3mm), bayonet lock, length 40cm (Ø12,7cm)
MFC2 = Rogowski coil (Ø8,3mm), bayonet lock, length 60cm (Ø19,1cm)
MFC3 = Rogowski coil (Ø8,3mm), bayonet lock, length 100cm (Ø32,0cm)
JCLA = Clamp-on CT, max. conductor Ø13mm, (only B250)

Typical connection schema



Mechanical dimensions





Power Factor Controllers

Comparison table of power factor controllers												
NOVAR Model	Outputs R=relay T=transistor	Sensitivity [mA]	2nd tarif Input	Supply Volt. Up To 500V	Relay common pole Separated	Temp. Meas. & fan Control	Fast Compensation	Optional Remote Comm.	Panel 144×144	Panel 96×96	DIN-rail	3-phase Controller
1005	5+1 R	20	×	×	×	✓	×	×	×	✓	×	×
1007	7+1 R	20	×	×	×	✓	×	×	×	✓	×	×
1005D	5+1 R	20	×	×	×	✓	×	×	×	×	✓	×
1007D	7+1 R	20	×	×	×	✓	×	×	×	×	✓	×
1106	6 R	2	×	×	×	✓	×	✓	✓	×	×	×
1114	14 R	2	×	×	×	✓	×	✓	✓	×	×	×
1206	6 R	2	✓	×	×	✓	×	✓	✓	×	×	×
1214	14 R	2	✓	×	×	✓	×	✓	✓	×	×	×
1106/S400	6 R	2	×	✓	✓	✓	×	✓	✓	×	×	×
1114/S400	14 R	2	×	✓	✓	✓	×	✓	✓	×	×	×
1206/S400	6 R	2	✓	✓	✓	✓	×	✓	✓	×	×	×
1214/S400	14 R	2	✓	✓	✓	✓	×	✓	✓	×	×	×
1312	12 T+2 R	2	✓	×	×	✓	✓	✓	✓	×	×	×
1312-3	12 T+2 R	2	✓	×	×	✓	✓	✓	✓	×	×	✓
1414	14 R	2	✓	×	×	✓	×	✓	✓	×	×	✓
2418	18	5	✓	✓	✓	✓	×	✓	✓	×	×	✓
2618	18	5	✓	✓	✓	✓	×	✓	✓	×	×	✓

Development and production of NOVAR power factor controllers is one of company's most important activities. In the following overview the devices for fully automated and optimal compensation of reactive power are presented. Portfolio includes classic power factor controllers operation with electromechanical contactors as well as components for fast compensation systems - fast power factor controller and thyristor switching blocks.

PFC's are produced in three different housings. Typical enclosure type is panel mountable housing. It can be equipped with an optional communication line[1] and monitored in ENVIS application. For less demanding applications we designed compact line of PFC's (NOVAR 1006/1007/1006D/1007D) in 96x96 panel housing and for DIN35-rail.

NOVAR 11xx/12xx with "/S400" option can be used at isolated networks (without neutral wire)**.** It has increased maximum power supply voltage up to 500 V, both AC and DC and the common contacts of relays are isolated and connected to additional terminals.

[1] Please consider using this feature for all new designs where possible as the software alerts are much faster reaction to any problem with the compensation then the billing system of a customer. The communication and control feature leads to significant cost savings during operation of the cabinet.

Measurement Principles

- high current and power factor measurement accuracy are achieved by utilizing precise converter and digital signal processing using a microprocessor and FFT algorithm
- precise measurement and control functions even under conditions of voltage or current waveform distortion by higher harmonic components
- evaluation of total harmonic distortion (THD) level by up to the nineteenth harmonic component
- evaluation of current harmonic load of capacitors

Control Principles

- governor's speed of response independently programmable for conditions of under-compensation and overcompensation, respectively
- adjustable control range to reduce the number of control interventions in systems with a wide control range at high loads
- mains decompensation option
- two-rate operation controlled by energy flow direction
- any output can be set as fixed, heating, cooling or alarm can also be controlled via relays

Automatic Connection Detection

- any combination of measuring voltage and current
- automatic detection of connection and compensation systems, nominal voltage on governor setup

Automatic Control Section Recognition

- when switching it on, the governor automatically recognizes the sections power ratings
- it is possible to connect any combination of the control sections

Specifying Section Value, Disabling Faulty Sections

- continuous specification of section value recognized in the control process
- continuous checking of control sections in the control process and in case of repeated failure detection, temporary disablement of the faulty section and possibly concurrent alarm actuation
- periodic recheck of the temporarily disabled sections in five days and on positive test results (for example when replacing a section's burnt fuse link), enabling them again

Programmable Alarm

- independently settable alarm's warning and actuation functions

NOVAR 2618
Three phase PFC and data logger

The NOVAR 2618, 2616, 2609 and 2607 are the first models of the innovated new PFC line. These controllers are based on precise and powerful three-phase measurement and combine multifunctional panel meter and power quality analyzer with power factor control functionality in the same box. The built-in meter can be optionally equipped with memory for datalogging of measured quantities and various events in the network. The instrument can be used for long time network data recording. For on-line monitoring, the controllers can be provided with remote communication interface.
The two models differ from each other in display type. The NOVAR 2618 has comfortable 240x160 dots graphic LCD-display. Both of the models can be delivered with varying number of outputs & inputs, different optional datalogging capabilities and communication interfaces - RS485 and Ethernet.

Key features:

- NOVAR 2618 up to 18 output sections, relay or solid-state
  - optionally NOVAR 2609, NOVAR 2607 and NOVAR 2616 (last two with digital input)
- measures power factor and other quantities in each line separately
- automatic control of power factor independently in each phase
- supports both low and high voltage applications (direct or VT and CT connection)
- unlimited support for single-, two- and three-phase capacitors and chokes
- combined mains compensation & decompensation capability (supports booth capacitors and reactors)
- Fast USB, optional RS-485 and Ethernet communication options
- optional 512 MB of internal memory for data logging
- embedded four quadrant electricity meter with TOU, power meter (class 0.5) and data logger
- continuous measurement, 128 s./period, 10 periods (200 ms) sampling interval

Ordering Options

NOVAR 2618 - H L U / 4T

Instrument class
NOVAR = Automatic power factor controller

NOVAR model
26 = 3-phase, panel 144×144mm, LCD 240×160px

Outputs
07 = 7 relay outputs + 1 digital input
09 = 9 relay outputs
16 = 16 relay outputs + 1 digital input
18 = 18 relay outputs

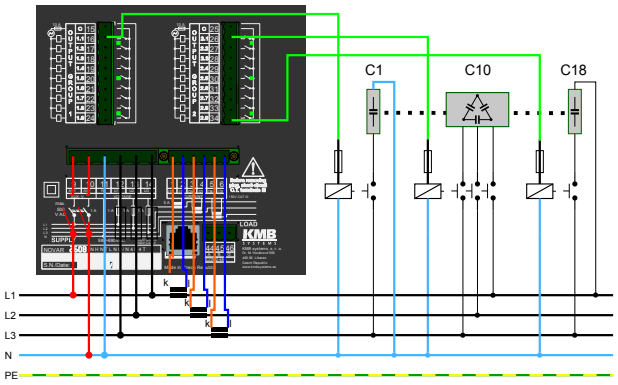
Relay Voltage Rating
N = max. 250 VAC
H = max. 400 VAC/ 220 VDC

Data logging
N = max. & min. values registering, electricity meter readout
T = weekly graphs of main quantities, max. & min.values with timestamp
current and last month electricity meter readouts
L = programable datalogging, 512MB of internal memory
includes all features of options N and T

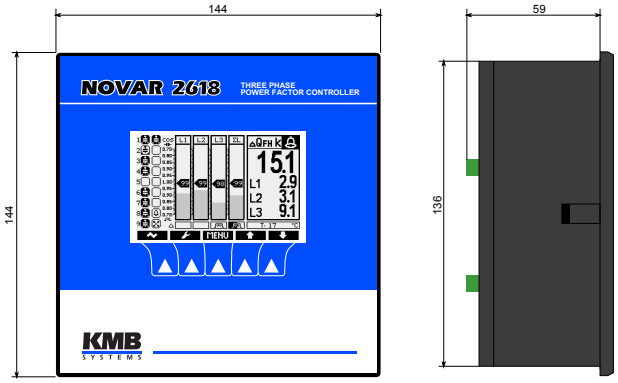
Local communication interface
N = without local communication
U = USB communication interface

Remote communication interface & ext. thermometer input
N = without remote comm. & external thermometer input
4 = RS-485
44 = RS-485 + RS-485
4T = RS-485 + Pt100 external thermometer input
E = Ethernet 10BaseT
E4 = Ethernet 10BaseT + RS-485
ET = Ethernet 10BaseT + Pt100 external thermometer input

Typical connection schema



Mechanical dimensions



NOVAR 2418
Three phase PFC and multimeter

NOVAR 2418 (and NOVAR 2407, 2409, 2416) represents basic type of a new product line of three phase APFCR with advanced functions and parameters. It has compact enclosure and **large segment LCD display**. All important control and compensation information is available in real time on its screen.

This controller builds on an innovated hardware and firmware platform with continual high accuracy measurement of all network parameters and energy. It also includes **complete digital power monitor** and precise **four-quadrant electricity meter**. It is fully automatic and it has a simple installation. Up to 18 relay outputs can control combinations of single-, two and three-phase compensation steps with booth compensation capacitors and de-compensation reactors.

Optional remote communication line offers **RS-485 or Ethernet**. These interfaces allows the controller to be fully supervised and managed from remote ENVIS application. It also supports **ModBus RTU** and **ModBus TCP** for simple integration with available SCADA systems.

Typical applications: power factor correction in three phase unbalanced networks, for systems with higher precision requirements, to compensate frequent load changes (18 steps) also in single phase applications

Key features:

- NOVAR 2418 up to 18 output sections, relay or solid-state
  - optionally NOVAR 2409, NOVAR 2407 and NOVAR 2416, last two with digital input
- measures power factor and other quantities in each line separately
- automatic control of power factor independently in each phase
- unlimited support for single-, two- and three-phase capacitors and reactors
- combined mains compensation & decompensation capability (supports booth capacitors and reactors)
- RS-485 and Ethernet communication options
- embedded four quadrant electricity meter with TOU and power meter (class 0.5)
- continuous measurement, 128 s./period, 10 periods (200 ms) sampling interval

Ordering Options

NOVAR 2418 E

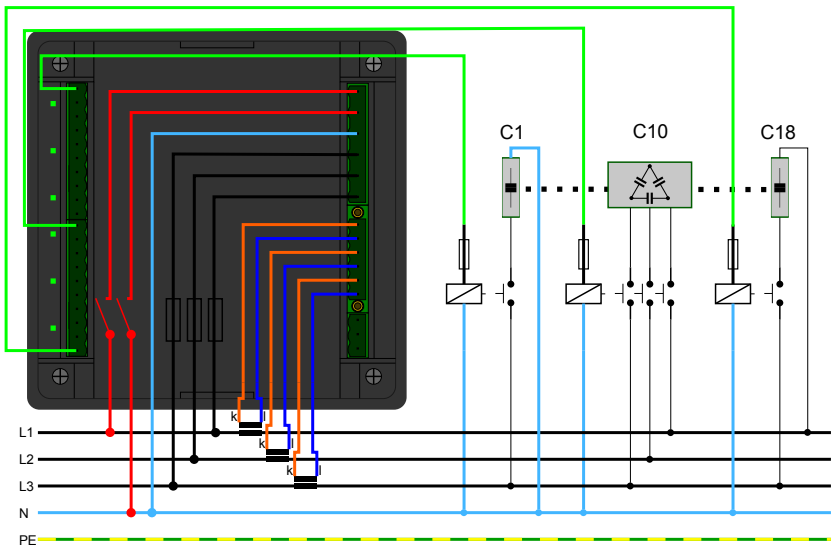
Instrument class
NOVAR = Automatic power factor controller

NOVAR model
24 = 3-phase, panel 144×144mm, segment LCD

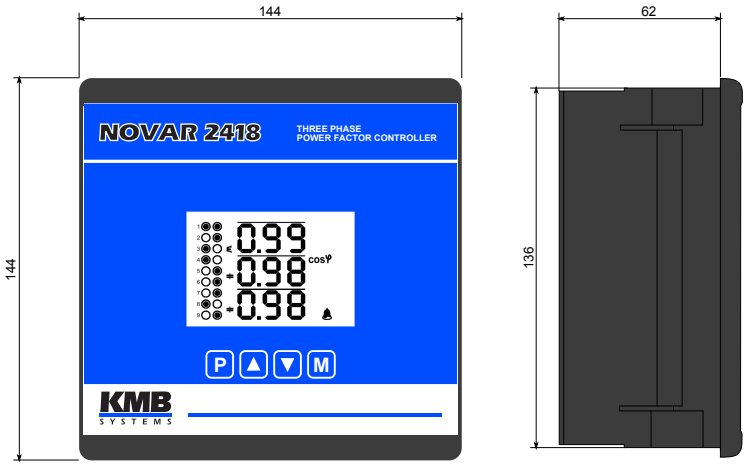
Outputs
07 = 7 relay outputs + 1 digital input
09 = 9 relay outputs
16 = 16 relay outputs + 1 digital input
18 = 18 relay outputs

Remote communication interface
N = without remote communication
4 = RS-485
E = Ethernet 10BaseT

Typical connection schema



Mechanical dimensions



NOVAR 1106/1114 &
NOVAR 1206/1214

NOVAR 1xxx reactive power controllers are fully automatic instruments that allow optimum control of reactive power compensation. They take their design concepts from the NOVAR 1xx/2xx line of instruments, bringing up a number of improvements and new features while keeping the way of operation.
The instruments features precise voltage and current measurement circuits, and the digital processing of values measured provides high evaluation accuracy of both true root–mean–square values of voltage, current and power factor values. The built-in temperature sensor measures the temperature inside the distribution board cabinet.
The instrument's installation is fully automatic. The controller automatically detects both the connection configuration and the value of each compensation section connected. Entering these parameters manually is also possible.

Key features:

- up to 14 outputs (1114/1214) and 1 alarm relay
- current measurement sensitivity 2 mA
- optional RS485 or Ethernet remote communication interface
- input for 2nd tariff (1206/1214)
- optional supply voltage up to 500 V (/S400 models)
- separated common pole of relays on additional terminals (/S400 models)

Ordering Options

NOVAR 1214 E

Instrument Class
NOVAR = Automatic power factor controller

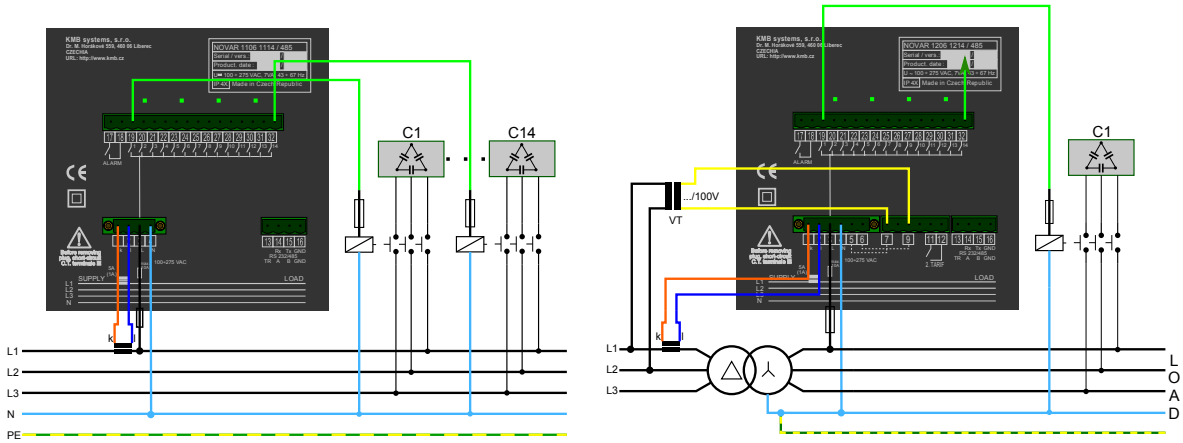
NOVAR model
11 = common terminal for meas. and supply voltage
12 = separated terminals for meas. and supply voltage

Outputs
06 = 6 relay outputs + 1 alarm relay
14 = 14 relay outputs + 1 alarm relay

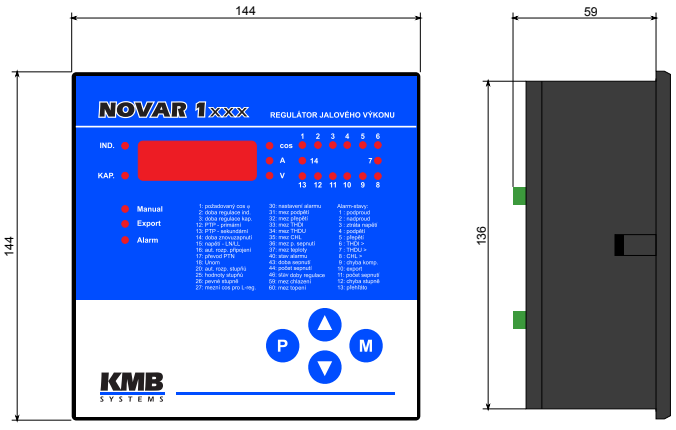
Supply voltage
_____ = Supply voltage up to 275V
/S400 = Supply voltage up to 500V, relays common pole separated

Remote Communication Interface
_ = Without remote communication interface
4 = RS-485
E = Ethernet

Typical connection schema



Mechanical dimensions



NOVAR 1005/1007 &
NOVAR 1005D/1007D

NOVAR 1005 and NOVAR 1007 power factor controllers are enhanced successors of very popular compact NOVAR 5 controller. These models are primarily intended for smaller and less demanding applications with budgetary constraints. The current sensitivity was increased in this innovated line. The NOVAR 1005 controller if fully backward compatible with the NOVAR 5 model (terminal, wiring). Furthermore, the NOVAR 1007 has 8 output relays.
Both models are produced in two different housings. Standard model is determined for panel mounting. Models marked with D, such as NOVAR 1005D or NOVAR 1007D features different housing which is determined for DIN-rail installation.

Key features:

- compact 96 x 96 mm panel footprint (NOVAR 1005/1007)
- DIN-rail mountable box (NOVAR 1005D/1007D)
- 6 (NOVAR 1005) or 8 (NOVAR 1007) control outputs
- current measurement sensitivity 0.02 A
- aimed for smaller less demanding applications
- features Automatic Control Section Recognition
- independent alarm warnings
- precise measurement and control even under conditions of voltage or current waveform distortion

Ordering options

NOVAR 1005D

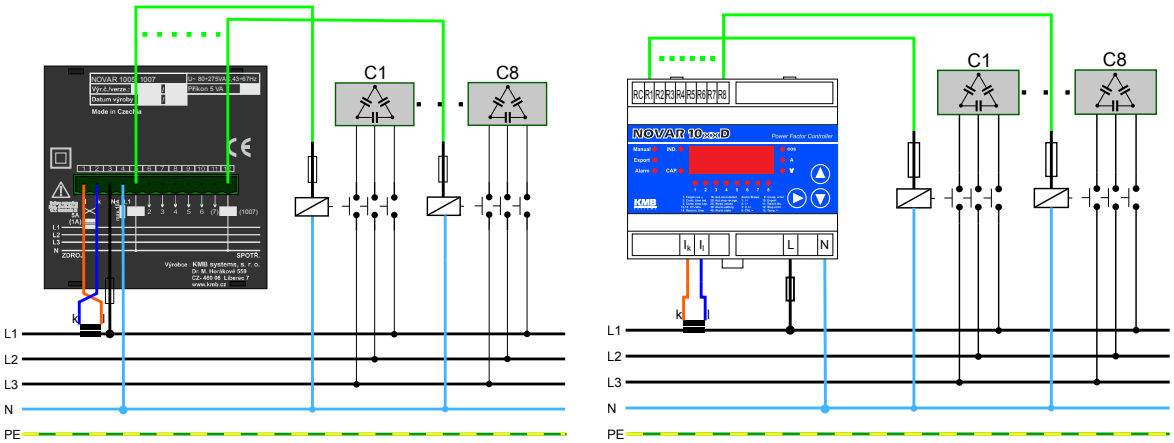
Instrument Class
NOVAR = Automatic power factor controller

NOVAR model
10 = compact, common terminal for meas. and supply voltage

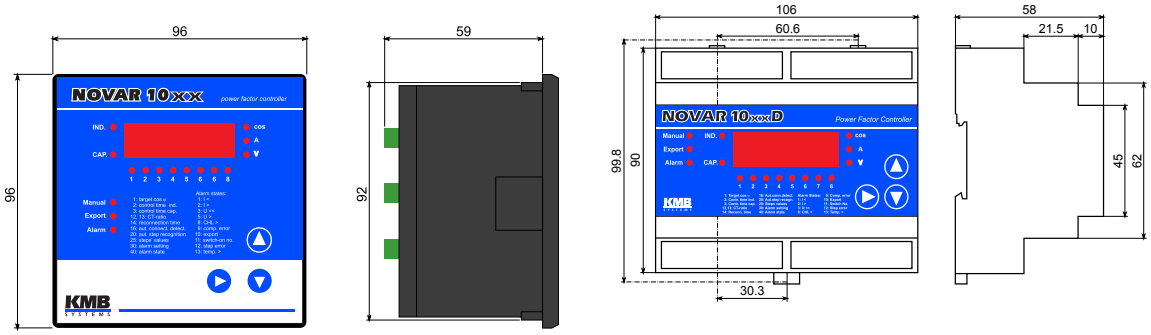
Outputs
05 = 6 relay outputs
07 = 8 relay outputs

Construction design
_ = panel mounted, 96×96mm
D = DIN-rail mounted, 6 modul width

Typical connection schema



Mechanical dimensions



NOVAR 1414
PFC with three phase measurement

NOVAR 1414 is based on NOVAR 1214 and shares most of it's features but despite of other models, this controller model has three current measurement inputs and one voltage measurement input. It is capable to measure load in each of three phases separately and then evaluates three-phase power factor from measured values from each phase for the control. Therefore, it is suitable especially for applications with great or variable load unbalance.

It features one voltage measurement input and expects that amplitude of other two is the same. It evaluates PF in each phase from measured currents and then three-phase PF which is used for operation. Threephase capactiors and reactors are used for power factor correction.

Key features:

- measures power factor in each line separately
- improves three phase PFC for unbalanced loads
- 14 independent compensation section + alarm relay
- fully automatic control section recognition
- embedded temperature sensor and relay for temperature control
- standard case for 144 x 144 mm cut-out
- 2 mA current sensitivity
- optional RS-485 or Ethernet communication interface

Ordering Options

NOVAR 1414 E

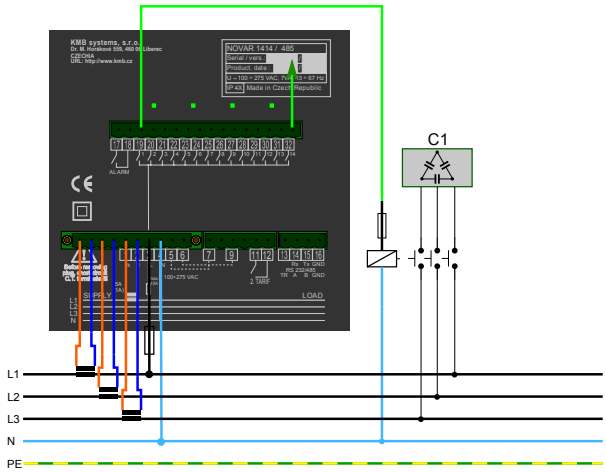
Instrument Class
NOVAR = Automatic power factor controller

NOVAR model
14 = 3-phase, panel 144×144mm

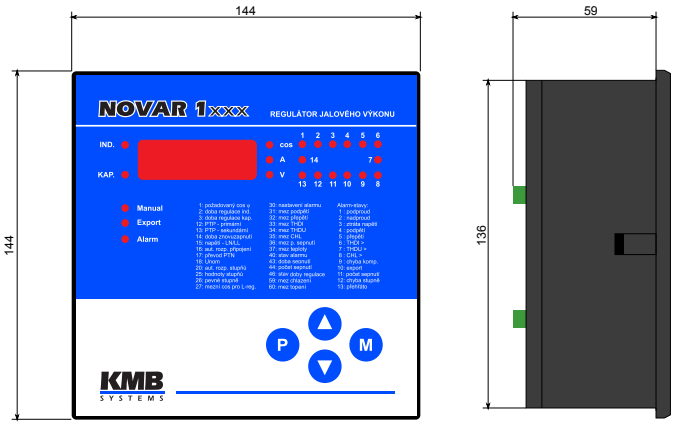
Outputs
14 = 14 relay outputs + 1 alarm relay

Remote Communication Interface
_ = Without remote communication interface
4 = RS-485
E = Ethernet

Typical connection schema



Mechanical dimensions



NOVAR 1312

Real-time power factor controller

NOVAR 1312 reactive power controllers are designed for dynamic compensation systems. These are typicaly systems with rapid and frequent changes in reactive power (elevators, welding machines etc.). Other typical application is a system with strict requirements on power quality and EMC. The controller has fast thyristor outputs to control dedicated switching modules. Its processor and algorithm allows up to 25 control interventions in one second. Together with KATKA thyristor switching modules it provides perfect control of fast reactive power compensation cabinet. The instrument features precise voltage and current measurement circuits and digital processing of measurement values achieves high accuracy of rendering voltage, current, and power factor values. FFT algorithm is used to render harmonic components. This provides precise measurement and control even in conditions of harmonic distortion. An in-built thermal sensor provides temperature measurement inside the cabinet.

The two highest outputs can be used to control cooling and heating of the cabinet. The controller also supports combined (mixed) compensation by combining both KATKA thyristor switching modules and classical electromechanical contactors. Optional galvanically isolated RS-232, RS-485 or Ethernet communication port. It is thus possible to monitor all measurement values and set instrument‘s parameters using a remote computer.

NOVAR 1312-3 is a special modification. It provides 3 independent current inputs and measures sum of all three phase current signals instead of 1. Therefore, it allows fast compensation according to a more precise three-phase power factor.

Typical applications: real time compensation, thyristor switched capacitors (TSC), combined compensation systems with fast thyristor modules and classic mechanical relays.

Key features:

- up to 25 control intervention per second
- 12 transistor switched outputs and 2 conventional relay outputs + alarm
- current measurement sensitivity 2 mA
- compatible with KATKA Thyristor Switching Modules
- allows combined compensation systems for both thyristor switching modules and contactors
- optional RS232, RS485 or Ethernet remote communication interface

Ordering Options

NOVAR 1312 E

Instrument Class
NOVAR = Automatic power factor controller

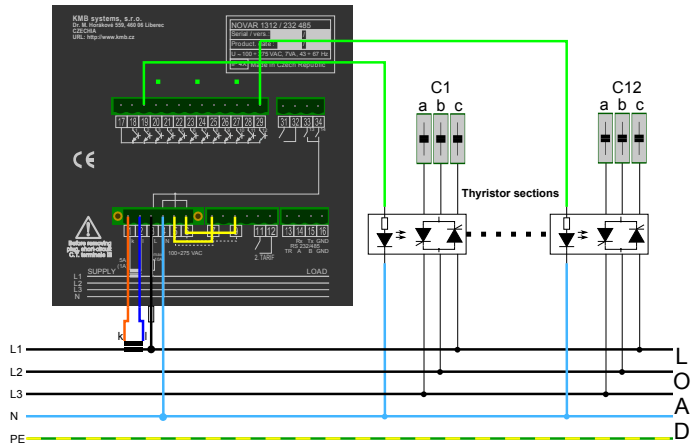
NOVAR model
13 = Real time (fast) power factor controller

Outputs
12 = 12 transistor outputs, 2 relay outputs + 1 alarm relay

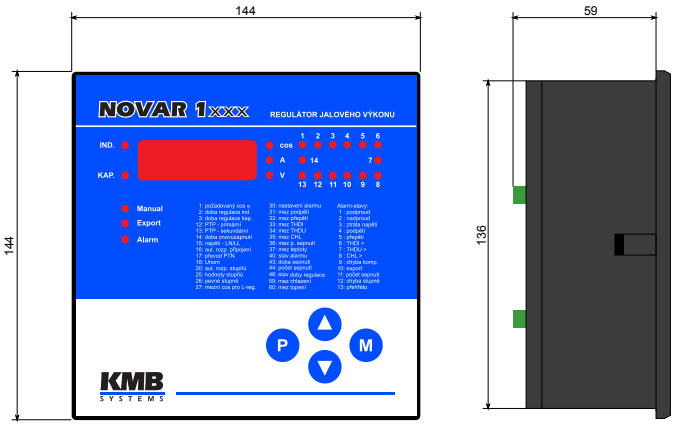
Current inputs
__ = 1 input for CT
-3 = 3 inputs for CT, three phase PFC

Remote Communication Interface
_ = Without remote communication interface
4 = RS-485 (KMB short communication protocol only)
E = Ethernet (KMB short communication protocol only)

Typical connection schema



Mechanical dimensions



KATKA
Thyristor switching modules

KATKA line of the thyristor switching (SSR) modules have been designed especially for switching power factor correction capacitors (TSC, thyristor switched capacitor) in real time reactive power compensation systems in cooperation with our fast power factor controller NOVAR 1312. KATKA is a solid state relay which can be also used in other applications for contact-less load switching with low EMC impact. In RT-APFC applications it handles up to 25 control interventions in one second.

Key features:

- for switching capactiors furing fast PFC
- with passive cooling KATKA 20T up to 26 kvar and KATKA 20D up to 20 kvar
- with active cooling KATKA 80T up to 80 kvar a KATKA 80D up to 60 kvar
- two-phase (D) or three-phase (T) options
- thermal protection (KATKA 80T and 80D)
- works with real-time PFC NOVAR 1312 a 1312-3

Technical specification

Technical Specifications – KATKA Thyristor Switching Modules					
Parameter	**Unit**	**Katka 20-D**	**Katka 20-T**	**Katka 80-D**	**Katka 80-T**
nominal operating voltage	V	400/230±10% 440/250±10%	400/230±10% 440/250±10%	400/230±10% 440/250±10%	400/230±10% 440/250±10%
maximum blocking voltage	V	1600	1600	1600	1600
maximum operating current	A	29	22	87	67
maximum rate of current rise dI/dt	A/us	50	50	50	50
conductor cross-section	mm^2	10	10	25	25
number of switches	-	2	3	2	3
load character	-	C/R/L	C/R/L	C/R/L	C/R/L
auxiliary voltage (for fan)	V	-	-	230±10%	230±10%
fan power (temperature controlled)	VA	-	-	32	32
auxiliary conductor cross-section	mm^2	-	-	2.5	2.5
fan threshold temperature	°C	-	-	60±5	60±5
control voltage / current - DC [1)]	V / mA	24 / 10	24 / 10	24 / 10	24 / 10
control conductor cross-section	mm^2	2.5	2.5	2.5	2.5
thermal protection (module switched off)	°C	—	—	100±5	100±5
overvoltage class / pollution degree	-	3 / II	3 / II	3 / II	3 / II
overvoltage protection	-	C	C	C	C
mechanical protection	IP	20	20	20	20
temperature - operating (maximum load)	°C	-20 ~ +45	-20 ~ +45	-20 ~ +45	-20 ~ +45
operating humidity – non condensing	%	5 ~ 95	5 ~ 95	5 ~ 95	5 ~ 95
dimensions WxHxD	mm	122×192×117	122×192×117	122×245×157	122×245×157
mass	kg	2.05	2.15	3.35	3.45

Ordering options

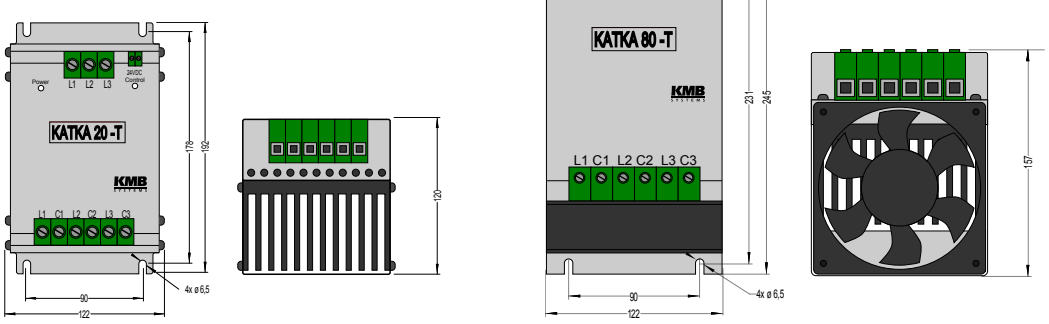
KATKA 80T

Instrument Class
KATKA = Thyristor switching module

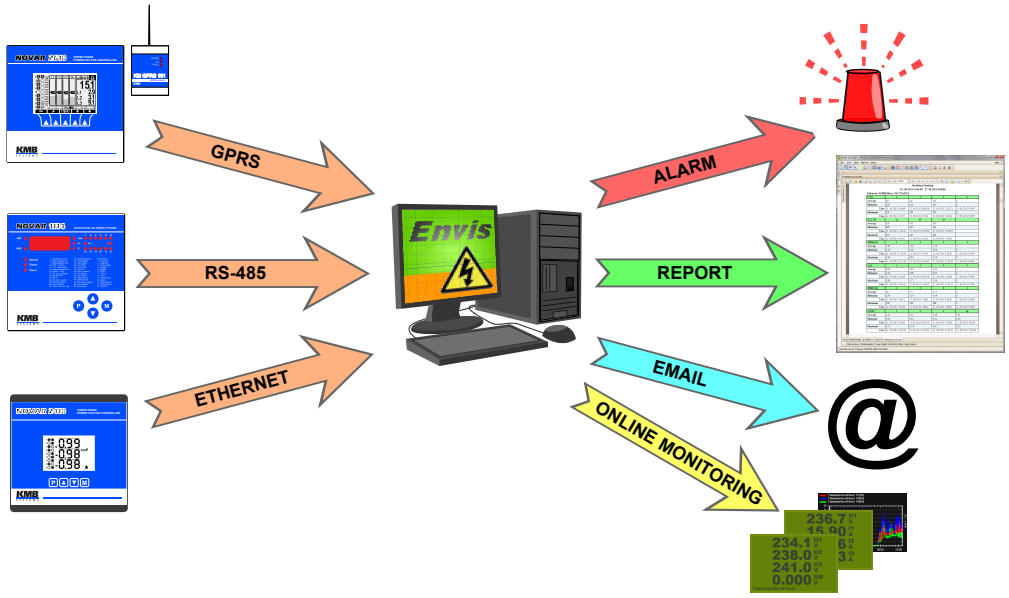
Construction and power
20 = passive cooling, up to 22A (T)/up to 29A(D)
80 = active cooling, up to 67A (T)/up to 87A(D)

Switching method
D = two-phase, two thyristors
T = three-phase, three thyristors

Mechanical dimensions



ENVIS application for NOVAR PFC



Key features:

- supported by any panel mounted 144×144 mm NOVAR PFC
- broad range of communication interfaces like USB, RS-485, Ethernet, GPRS with KM-GPRS 101
- online monitoring over power factor correction
- alarms and waring during abnormal behavior
- you will learn from display of your PC, on time, about issue with your PFC and not from invoice received from utility

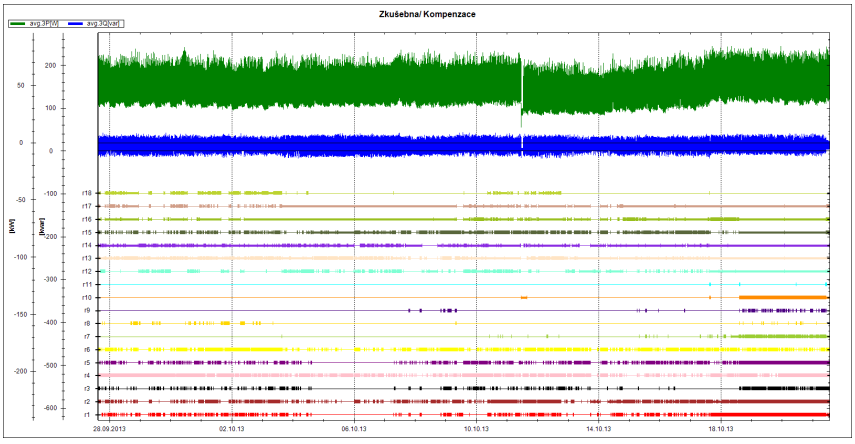


Figure 3: Record of power factor correction trend of NOVAR 2618 in ENVIS software

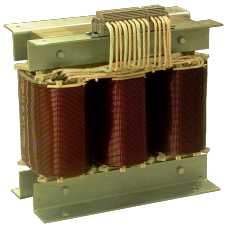
Distribution of Power Factor Correction components

We are not only developing and manufacturing measuring instruments and power factor controllers. We are supplementing mainly our line of PFC NOVAR for other components necessary for power factor correction. Our portfolio contains detuned filter reactors, isolation transformers, shunt reactors, PFC capacitors, PFC contactors etc.

ELEKTRA TRANSFORMERS REACTORS

Detuned Filter Reactors

- 2,5 to 100 kVAr
- detuning factor p = 5.6%, 7%, 14%
- voltage 400V, 440V, 480V, 525V



LV Isolation Transformers

- up to900 kVA
- also for medical applications, according to IEC 61558-2-15

Shunt Reactors

- all parameters of ELEKTRA products can be custom adjusted according to customer needs

PFC LV Capacitors

- MKP
- filled with ecological gel or gas
- voltage 130V to 1000V, 0,5-50 kVAr

ZEZ SILKO

BENEDICT

PFC Contactors

- power 12,5 kVAr to 100 kVAr
- switching voltage 400 V až 690 V
- control voltage 24V -400 V

Fuse switches

- vertical and horizontal design
- 160A to 1600A
- fuse check without switching off

EFEN

KMB SYSTEMS

Power factor controller NOVAR

- up to 18 outputs
- designed for panel or DIN-rail mounting
- fully automatic setup
- 1p and 3p measurement, relay and thyristor control

Thyristor switching modules KATKA

- up to 87 kVAr

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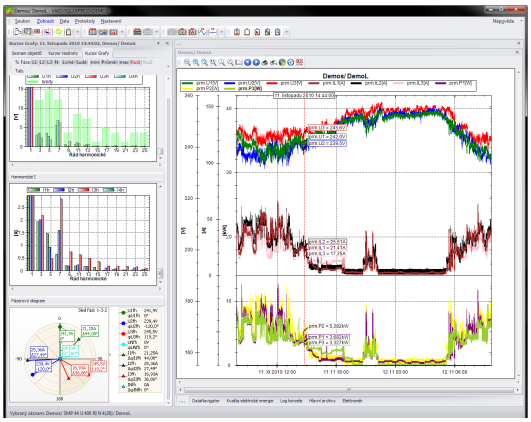
ENVIS Software Suite: Tools for energy management and power quality evaluation

ENVIS software is a framework for evaluation and supervision of power quality monitoring and energy efficiency data records. It retrieves, stores and serves the measured information from supported instruments and analyzers. ENVIS is a basic tool for configuration, management and data acquisition for our instruments. The software also provides on-line presentation of the actual device status and allows for simple and comfortable visualization and analysis of the archived historical data.

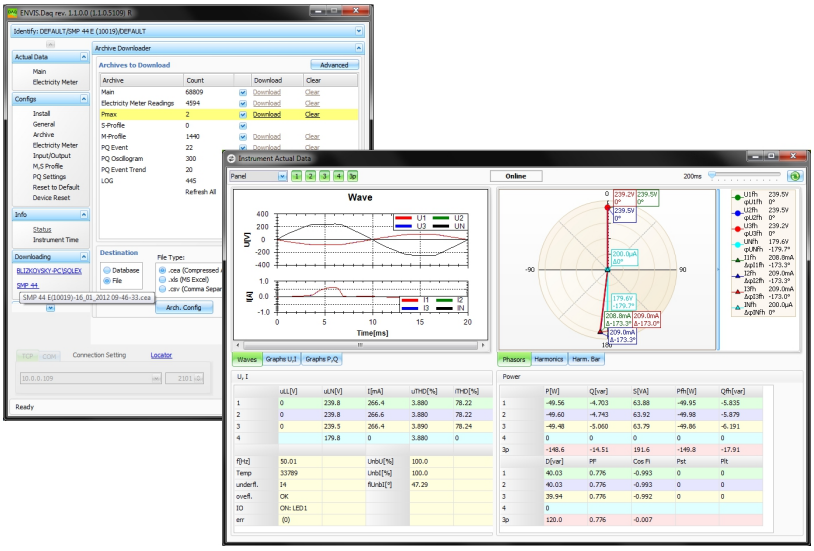


Key audience:

- energy billing and accounting personnel
- Smart building operators
- advanced facility management
- power quality technicians
- maintenance crew

Main Functions and Features:

- Data acquisition and storage in binary files or SQL server
- Online visualization of actual values, trends, input states, transients, energies....
- Analysis of records - charts, statistics, exports (PDF, XML, ...).
- Evaluation of power quality according to EN 50160.
- Analysis of energy consumption, energy profiles...
- Simple manual or automated reporting on recorded data.
- Support for many different measuring and control devices.



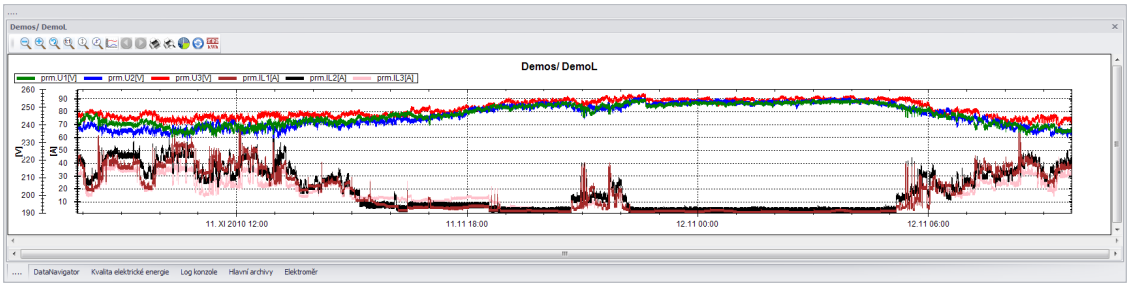
Content of ENVIS Application Suite

The installation package contains complete tool set for monitoring of energy efficiency, power quality and other related parameters. The tools for basic device management and data evaluation are available free of charge and can be downloaded from `http://www.kmb.cz/`.

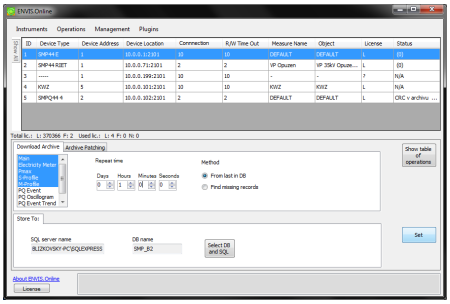
ENVIS application is the key SCADA and data analysis tool for administration and evaluation of the archived data – this program visualizes trends, exports/imports and archives data, generates custom reports etc. ENVIS version 1.1+ supports all our recent instruments with communication or memory options such as: power factor controllers NOVAR, built-in power meters and analysers - PA, SMM, SML, SMN, SMC, SMV, SMP, SMPQ, portable analysers SIMON and BRAVO and several 3-rd party instruments.

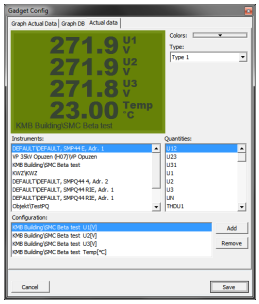
ENVIS.Daq (Data Acquisition) for instrument handling. Daq provides features for remote device configuration/programming, archive acquisition (download records) and saves it to various formats. This tool can be run as a standalone Windows application or initiated directly from ENVIS application. Analysers and meters can be managed over a broad range of modern communication lines such as RS485/RS232, USB, Ethernet, WiFi or GPRS.

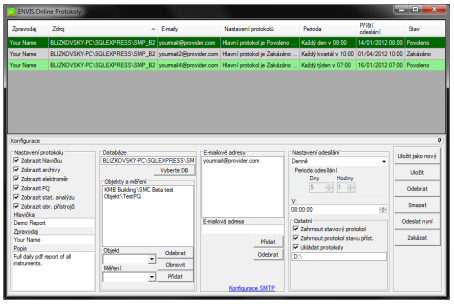
ENVIS.Online is a system service for standalone data retrieval. As such it needs no human interaction to perform preconfigured periodical tasks. It supports memory-less panel instruments as well as various 3-rd party electricity meters and smart meters, NOVAR power factor controllers and also the built-in analyzers. ENVIS.Online can download data periodically, check the status of instrument, generate reports automatically and distribute various preset alarms vie e-mail, SNMP, SMS or directly to desktop.

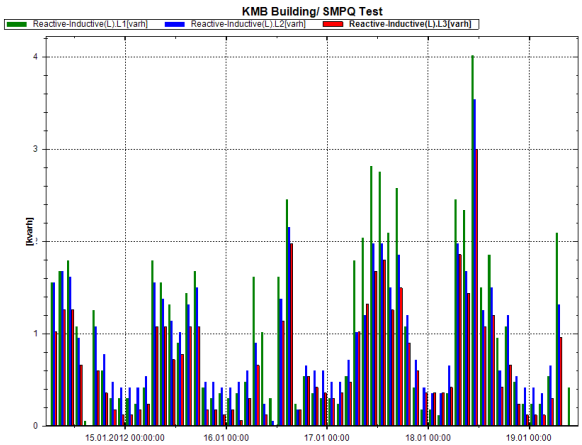


ENVIS application manages archive of energy consumption data and power quality data. Sources for this data warehouse are measuring instruments, power quality analysers, energy meters (also some 3rd party ModBus and M-Bus meters) and power factor controllers manufactured by KMB systems. A destination is typically SQL server database or binary file. ENVIS is also a data analysis tool - in the sample figure some of the features for analysis can be seen - namely the visualized consumption profile, trends for various quantities, a specific power quality report analysis and a detail of single recorded voltage event.

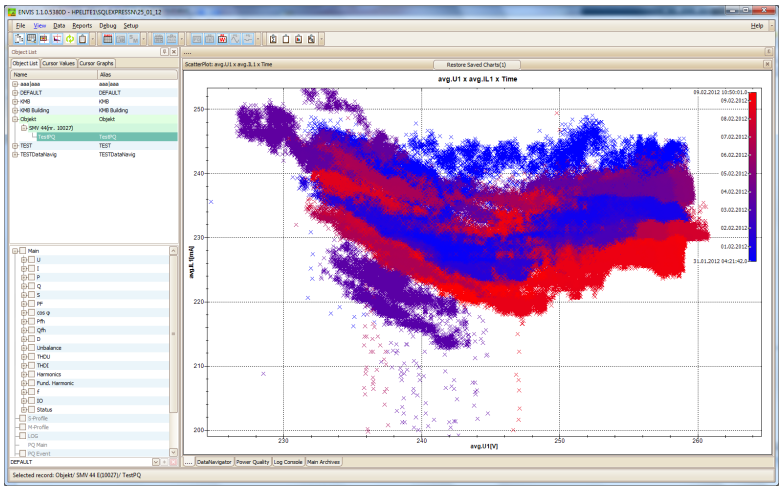




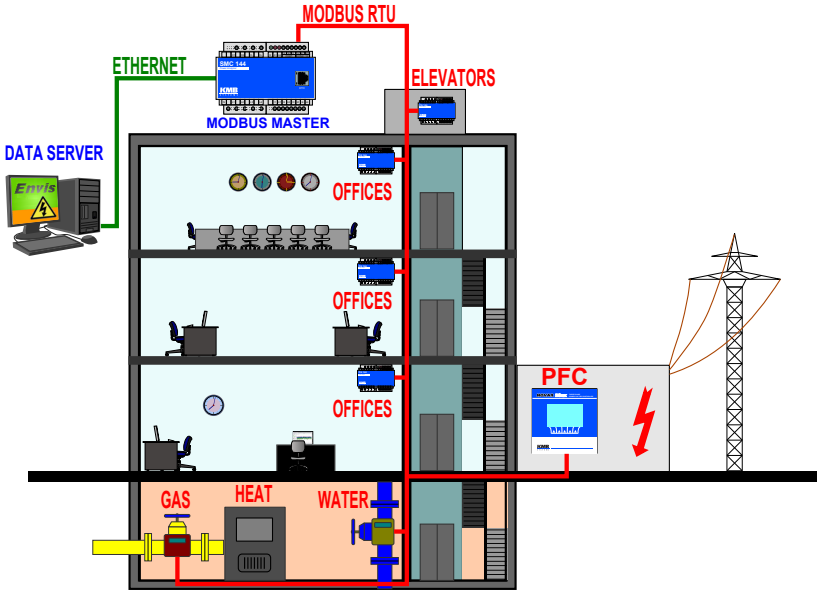




ENVIS is also a SCADA application for specific instruments - the **ENVIS.Online system service is a reliable and transparent tool to handle instruments** connected to your PC. It manages periodical downloads of the instrument. Also it monitors actual values of selected quantities or inputs and generate events/alarms based on the situation. Least but not last the service periodically generates and distributes reports, analysis or alerts to given e-mails. ENVIS.Online monitoring covers single instrument connected to the PC as well as multiple instruments geographically distributed over different communication networks such as Ethernet or GSM/GPRS.



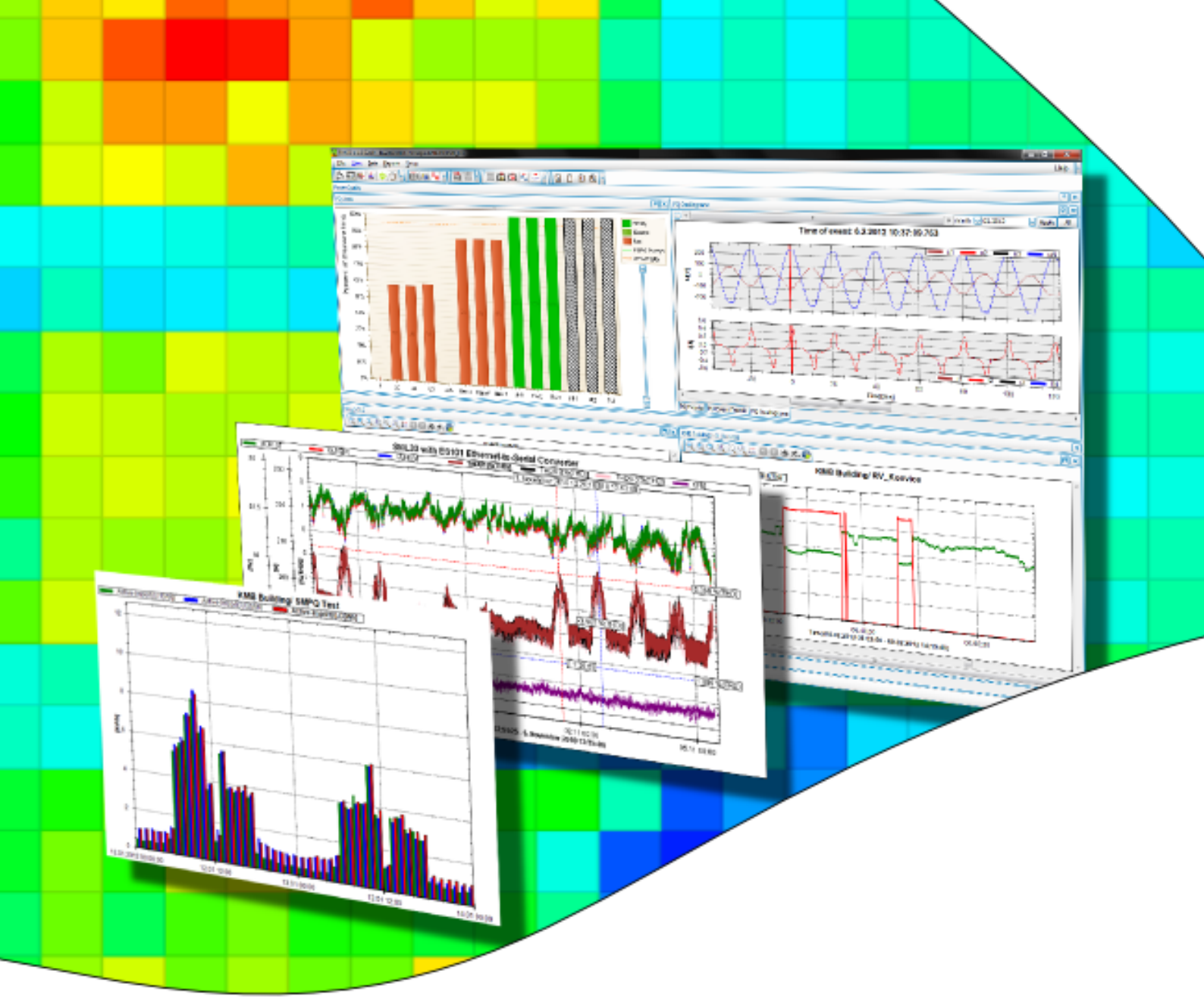
Flexible plug-in architecture of ENVIS provides foundation for extending of the functionality of the core application. We have already developed several custom plug-ins. The basic application can be extended with some features which are only selfdomly required. For specific projects we can also add special functions.
In the past we have helped the ENVIS users to **modify its visual appearance, modified reports, amended the actual content of the existing reports or added a completely new reports**. We have supported the only power quality IEEE file format (PQDIF) through plug-in as well. The provided sample figure (right) shows Graphical plug-in with advanced visual and statistical data analysis functions. This specific plug-in contains scatter plot features, histogram generation options and similar.



Modul Modbus Master is combination of plugins for ENVIS software and selected instruments. By using this module you can congure the instrument to read any Modbus registers from any instruments of any manufacturer connected to it's RS-485 line. Downloaded values are stored into it's memory including an actual timpestamp. Archived readings can be downloaded into a CEA file or to the SQL database with ENVIS.Daq or Online. All archived Modbus readings can be analysed and visualised in ENVIS - users can create graphs, tables, reports and other out of these archive readings. It's also possible to collect data from electric-, water- and gas-meters, power factor controlles (we used NOVAR for testing), HVAC, GPS, weather and any other device supporting Modbus.

Do you believe you need to handle obtained data in a special way or to get custom outputs?

Contact our R&D dept. and discus how the plug-in architecture can help you.



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