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SML33 / SMM33 / SMN3

Multifunctional Meters

Operating Manual

Firmware 3.0 / 2013

The instruments are designed to measure and monitor line and phase voltages, currents, active and reactive power, power factors, THD as well as frequency in single-phase and three-phase low voltage, high voltage, and very high voltage power systems. They further allow informative measurement of temperatures within a switchboard cabinet using an inbuilt temperature sensor.

Instruments of the SML 33 and SMM 33 line are identical from the wiring and operation's points of view, they only differ in physical design : the SML 33 instruments are designed for panel-mounted installation (96 x 96 mm) while the SMM 33 instruments are designed for installation on a DIN EN 50022 rail (rail 35 mm, Modulbox width 5M – 89 mm).

The SMN33 instruments are nearly identical to the SMM33 instruments but, furthermore, they offer rendition and display of current through the PEN wire and evaluation of maximum average three-phase active power (quarter-hour P_{MAX}, for example). For time stamping, they are equipped with real time clock circuit backed up with an inbuilt accumulator and with a synchronization input.

The instruments feature three voltage and three fully isolated current measuring inputs. Nominal range of the voltage inputs can be 57.7/100, 230/400 or 400/690 V_{AC}.

The current inputs can be either the „X/5A“ or „X/1A“, i.e. with 5 A_{AC} or 1 A_{AC} nominal range (for standard Cts),or they can adopted to connect to special miniature through-hole („Pxxx“-type) or split core („Sxxx“-type)) current transformers. These transformers are part of instrument shipment and they can be simply installed on measured cables. Therefore, they are convenient in applications where use of standard xxx/5 A CTs is impossible or not

optimal. As assortment of the shipped CTs starts at 5A nominal current model, they can be installed at secondary circuit of standard xxx/5 A CTs.
The instruments power supply voltage depending of the model can be either 24 V, or 48 V (AC or DC) or universal range 85 ÷ 275 V_{AC} or 80 ÷ 350 V_{DC}.

All types of instruments can be equipped with an RS 485 or RS 232 or Ethernet communication interface. Then the ENVIS or RETIS software allows viewing and archiving the data measured in a graphic format and it has a number of other features. For custom design systems, the Modbus communication protocol can be used too.

1. Instrument Connection

1.1 Physical

The SML33 instrument is built in a plastic box to be installed in a distribution board panel. The instrument's position must be fixed with locks.

The SMM33, SMN33 instruments are designed for mounting on a DIN-35 bar.

Natural air circulation should be provided inside the distribution board cabinet, and in the instrument's neighbourhood, especially underneath the instrument, no other instrumentation that is source of heat should be installed or the temperature value measured may be false.

1.2 Power Supply

The supply voltage (in range according technical specifications) connects to terminals AV1 and AV2 3 (*N*) via a disconnecting device (switch – see wiring diagram). It must be located at the instrument's proximity and easily accessible by the operator. The disconnecting device must be marked as such. A circuit breaker for nominal current of 1 amp makes a suitable disconnecting device, its function and working positions, however, must be clearly marked.

1.3 Measured Voltages

The phase voltages measured are connected to terminals L1, L2, L3 the common terminal to connect the neutral wire is identified as N (it stays free at delta- (3-D) and Aron- (A) connections). It is suitable to protect the voltage lines measured for example with 1A fuse links. Measurement voltages can also be connected via instrument voltage transformers.

SML33 U 230 X/5A Instrument Rear Panel

1.4 Measured Currents

The instruments are designed for indirect current measurement via external CTs only. Proper current signal polarity (k, l terminals) must be observed. You can check the polarity by the sign of phase active powers on the instrument display (in case of energy transfer direction is known, off course).

The I2k, I2l terminals stay free in case of the Aron (A) connection.

1.4.1 „X/5A“- , „X/1A“-Type Instruments

The current signals from 5A or 1A instrument current transformers must be connected to the terminal pairs I1k, I1l, I2k, I2l, I3k, I3l. In the P.01 parameter (see below), set the CT-ratio.

1.4.2 „Pxxx“-, „Sxxx“-Type Instruments

The supplied current transformers (which are standard accessory) must be clamped on measured wires and interconnected with corresponding terminal pairs I1k, I1l, I2k, I2l, I3k, I3l using a twisted-pair cable of maximum length of 3 m.

The secondary winding of the through-hole (JP-type) transformers for the „Pxxx“-type instruments is led by pair of fixed cables of length about 10 cm and requires a wiring block for interconnection to the instrument terminals. It is recommended to orient the dark side of the transformer housing to the source ("K"), the light side ("L") to the load – then, the light output cable is "k" and the dark cable is "l".

The secondary winding of the split-core (JC-type) transformers for the „Sxxx“-type instruments is led to the screw terminals. The „K“/„L“ and „k“/„l“ orientation is marked. A connection cable maximum cross section area is 1.5 mm^2.

> **WARNING** : Connection of standard CTs with 5A or 1A nominal output current is **forbidden** !!! Otherwise the instrument can be badly damaged !!!

In the P.01 parameter, set the CT-ratio primary current to the „xxx“ according the instrument/transformer type and the secondary current to 5 A.

1.5 Digital Input

The SMN33 instruments have time synchronisation input at terminals „D-“ and „D+“. A potential-free contact only can be connected / see technical specifications further below.

Attention ! The „D-“ signal and the „GND“ signal of communication interface are interconnected !

1.6 Communication Interface

1.6.1 RS 485, RS 232 Interfaces

For the RS 485, use terminals “A”, “B” and “GND”. Connect the cable shield with the Protective Earth wire in a single point. On the final points of the link it is recommended to instal terminating resistors (330 Ohm, typically).

For the RS 232, use terminals “RxD”, “TxD” and “GND”. Connect the cable shield with the Protective Earth wire in a single point.

A communication cable maximum cross section area is 2.5 mm^2.

1.6.2 Ethernet (IEEE802.3) Interface

Using this interface the instruments can be connected directly to the local computer network (LAN). Instruments with this interface are equipped with a corresponding connector RJ- 45 with eight signals (in accordance with ISO 8877), a physical layer corresponds to 10/100 BASE- T.

Type and maximum length of the required cable must respond to IEEE 802.3. Each instrument must have a different IP- address, preset during the installation.

Physically, the interface is created with embedded Ethernet-to-serial converter ES01. Setup of the module can be found in application handbook *ES01 Embedded Ethernet to Serial Link Converter* that is available on www.kmbsystems.eu .

2. Operation

On connecting power supply the display shows gradually the instrument type and then message 'ini', test of internal circuitry is carried out and the display's bottom line shows the software version. Then the instrument starts showing the measured values.
If the instrument has a communication line, it can be set and its measured values read via the communication link using a PC.

Measured Quantities

q.No.	q. mark	quantity	q.No.	q. mark	quantity
1	U_{L-L}	line voltage	9	3-PF	3-phase power factor
2	U_{L-N}	phase voltage	10	cos φ	phase power factors of 1st harmonic component
3	I	phase current	11	$THDU_{L-L}$	total harmonic distortion of line voltages
3'	I_{PEN}*	neutral current	12	$THDU_{L-N}$	total harmonic distortion of phase voltages
4	P	phase active powers	13	THDI	total harmonic distortion of phase currents
5	3-P	3-phase active power	14	f	frequency
6	Q	phase reactive powers	15	T	temperature (instrument ambient)
7	3-Q	3-phase reactive power	16	$3\text{-}P_{MAX}$*	maximum of average 3-phase active power
8	PF	phase power factors			

*) … SMN 33 instruments only

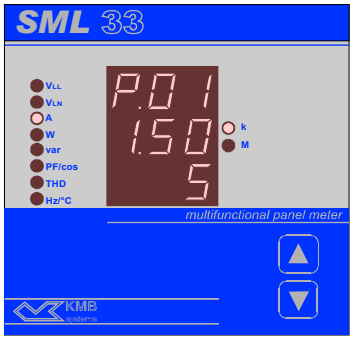
2.1 Setup

For proper operation, the instrument must be set. The instrument setup is determined using parameters, for example the current transformer [CT] conversion, type of measured voltage connection (direct connection or via a voltage transformer [VT] and its ratio), and connection configuration (single-phase, two-phase, wye, delta, Aron).

By pressing the '▼ ' button for an extended time (about 6 seconds) you start the parameter edit mode. The display shows 'P.xx' / 'yyy' / 'zzz' where P.xx is the parameter being edited (display's upper line), yyy = value 1 (display's middle line), zzz = value 2 (display's lower line). A flashing value can be edited using the '▲ ' button, then you confirm it and proceed to another value using the '▼ ' button. The setting process is terminated by pressing the '▼ ' for an extended time again.

2.2 Description of Parameters

- P.00 = edit lock; yyy = '0' – edit unlocked, yyy = '1' – edit locked. If the edit mode is locked, you can only view parameters and scroll through them using the '▼ ' button. To unlock the edit mode again, you need to enter the passcode.
  Edit unlocking method: on simultaneous pressing of '▲ ' and '▼ ' the zzz section starts showing random generated numbers; if the number is odd, press '▲ ', if it is even, press '▼ '.
- P.01 = metering current transformer (CT) ratio; yyy = primary current in A / kA, zzz = --- / 1 / 5 A. Ratio undefined: yyy = zzz = ---. For the „Pxxx"- a „Sxxx"-type instruments, the yyy must be set according to the instrument type (and shipped CT range) to the "xxx" and the zzz must be set to 5 A.
- P.02 = metering voltage transformer (VT) ratio; yyy = primary voltage in V / kV, zzz = --- / 100 V. Direct connection (no VT): yyy = zzz = --- (= default setting).
- P.03 = connection configuration; yyy = 1 – single-phase, yyy = 2 – two-phase, yyy = 3-Y – three-phase with neutral wire (wye), yyy = 3-D – three-phase without neutral wire (delta), yyy = A – three-phase Aron connection.
- P.04 = display mode; yyy = 0 – quantities shown are switched every 3 seconds, yyy = 1 – quantity last selected is shown, yyy = 2 – default quantity selected in zzz is shown after 10 seconds of no button operation (see table below, appropriate LED is on too).
- P.05 = displayed quantities; yyy = order of value (see table above, appropriate LED is on too), zzz = 0 / 1 – value Not Shown / Shown, respectively. Default setting: all quantities shown.
- P.06 = mains nominal frequency; Sampling of measured quantities is controlled by L1 voltage automatically if in range according tech. specifications. If out the range (not connected, for example), the sampling corresponds to preset value yyy = A50 / A60 Hz.
- P.07 = communication protocol; yyy = 0 –KMB protocol, y = '1--' / '1-E' / '1-O' – Modbus protocol, no parity / even parity / odd parity. Must be set for Ethernet interface too according the *ES01 Embedded Ethernet to Serial Link Converter* handbook that is available on www.kmbsystems.eu .
- P.08 = communication; yyy = Baud rate in kBaud, zzz = instrument address. Default setting: rate 9.6 kBd, address 1.Must be set for Ethernet interface too : the Baud rate in compliance with the ES01 embedded converter setup (usually 9.6 kBd, see application handbook noted above) and the address zzz setup to 1 is recommended.
- P.09 = P_{MAX} processing time window; yyy = period of time window in minutes (SMN33 only). Default setting: 15 min.



Example

The current measured is connected via a metering CT with ratio 1,500 A / 5 A. You start the parameter edit mode by pressing the '▼ ' button for an extended time *(You may have to unlock the edit mode first).* By pressing '▼ ' you select parameter 01, by pressing '▲ ' you select the secondary current value and confirm by pressing '▼ '; by pressing '▲ ' select the primary current value (LEDs indicating order of magnitude and unit of measure, respectively) and complete by pressing '▼ ' for an extended time. *(Then you may want to relock the edit mode.)*

2.3 List of Parameters

#	field	description	setting range	def. setting	comment
P.00	yyy	lock	0 / 1	0	as described above
P.01	yyy	CT ratio – primary current	1A ÷ 10kA	---	for „Pxxx“- and „Sxxx“-type instruments see descr. above
	zzz	CT ratio – secondary current	--- / 1A / 5A	---	--- = undefined, corresponds to ratio of 1
P.02	yyy	VT ratio – primary voltage	0.1kV ÷ 400kV	---	--- = direct connection
	zzz	VT ratio – secondary voltage	--- / 100 V	---	--- = direct connection
P.03	yyy	connection configuration	1 / 2 / 3-Y / 3-D / A	3-Y	as described above
P.04	yyy	display mode	0 / 1 / 2	1	as described above
	zzz	default quantity number according the *Measured Quantities* table above	1 ÷ 15 or 16	2	[1] if 3 selected, SMN33 displays I_{PEN} current in the next step and upper display line shows -4- [2] if 5, 7 or 9 selected, upper display line shows -3- (-2- with two-phase connection) and data are shown in middle display line [3] if 10 or 15 selected, relevant LED flashes [4] if 11 through 13 selected, THD LED as well as relevant quantity LED are on [5] 16 valid for SMN33 only
P.05	yyy	order of quantity	1 ÷ 15 or 16	all enabled	
	zzz	quantity selected display enabled	0 / 1		
P.06	yyy	mains frequency	A50 / A60	A50	appropriate scanning applied if L1 voltage is out of range only
P.07	yyy	communication protocol	0 / 1-- / 1-O / 1-E	0	as described above
P.08	yyy	comm. baudrate in kBd	2.4 ÷ 38.4	9.6	
	zzz	communication address	1 ÷ 255	1	
P.09	yyy	P_{MAX} evaluation time window length	15 / 30 / 60	15	valid for SMN33 only

2.4 Display Brightness Setup

If you press ‘▲ ’ while ‘ini’ is displayed and release the button on software version display, all display segments will be lit and you can set their brightness by repeated pressing of ‘▲ ’. Pressing ‘▼ ’ for an extended time completes the setting.

2.5 Processing and Display of Measured Quantities

A LED in the column on the front panel's left indicates a quantity (unit) measured, the currently measured values in each phase, with some quantities also three-phase values — can be viewed in three three-digit display lines (the upper line shows '-3-' for three-phase values or '-A-' when Aron connection). The LEDs on the right indicate the order of magnitude (shared by all three values). You can switch between the values measured using the ▲ and ▼ buttons.

The instrument measures True Root Mean Square values (TRMS) of voltages and currents.

$U_{L\text{-}L}$ is shown in the order of $U_{L1\text{-}L2}$, $U_{L2\text{-}L3}$, $U_{L3\text{-}L1}$.

SMN33 instruments can additionally calculate current value I_{PEN} as summ of instantaneous I_{L1},I_{L2} & I_{L3} current phasors.

If single-phase connection is set, only single-phase values are shown.

If two-phase connection is set, two values are shown and only two-phase values of active and reactive power and power factor (there is shown "-2-" on the upper display).

If delta connection is set, the phase voltage is measured against an artificial neutral potential which is indicated by flashing decimal point in the $U_{L\text{-}N}$ values.

If "Aron" connection is set, only values I_{L1} and I_{L3} are shown in the currents and in the powers and power factors only three-phase values are shown (there is shown "-A-" on the upper display).

If power is drawn at a point of consumption, the decimal point flashes in active power values.

If the reactive power is of a capacitive characteristic rather than inductive, the decimal point flashes in reactive power values.

True power factor is shown (TPF or lambda).

Cos φ is shown in four quadrants and it is calculated from the angular shift between fundamental harmonic components of $U_{L\text{-}N}$ and I_L.. Reactive power's capacitive characteristic is indicated by letter 'c' before the decimal point in place of zero and active power back direction (= export) is indicated by flashing decimal point in cos φ values.

The total harmonic distortion (THD) level in voltages and currents is measured for up to the 25th harmonic.

Calculation of the maximum active power P_{MAX} is to be executed only three-phase in the 15, 30 or 60 minutes interval according to the setting of P.09 parameter. Register clearing of the maximum active power P_{MAX} is to be executed with extended time pressing '▲' and after the sign **"Clr P"** is on has to be confirmed by pressing '▼' . If the procedure is finished the sign **"Clr P don"** is on.

Real time can be set and red and time of maximum power P_{MAX} can be red via communication port only using ENVIS or RETIS program.

2.6 Elementary Formulas

The formulas apply to the default connection (wye configuration).
4 periods are measured at sampling rate 128 samples per period (n = 512).

phase voltage: $U_1 = \sqrt{\frac{1}{n}\sum_{i=1}^{n} U_{1i}^2}$ line voltage: $U_{12} = \sqrt{\frac{1}{n}\sum_{i=1}^{n} (U_{1i} - U_{2i})^2}$

current: $I_1 = \sqrt{\frac{1}{n}\sum_{i=1}^{n} I_{1i}^2}$ active power: $P_1 = \frac{1}{n}\sum_{i=1}^{n} U_{1i} \times I_{1i}$

reactive power: $Q_1 = \frac{1}{n}\sum_{i=1}^{n} U_{1(i-\pi/2)} \times I_{1i}$ power factor: $PF_1 = |P_1| / (U_1 \times I_1)$

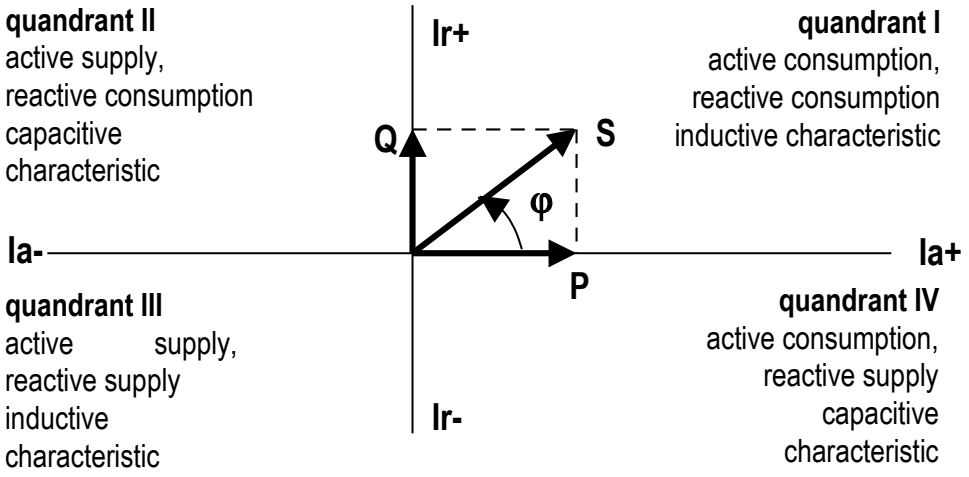
3-phase active power: $P = P_1 + P_2 + P_3$

3-phase reactive power: $Q = Q_1 + Q_2 + Q_3$

3-phase power factor: $PF = |P| / (U_{1} \times I_{1} + U_{2} \times I_{2} + U_{3} \times I_{3})$

total harmonic distortion: $THD_{U1} = \sqrt{\sum_{i=2}^{25} h_{U1i}^{2}} \times 100\%$ *(similar for U_{L-L} and I_L)*

Identification of consumption or supply and reactive power characteristic by phase shift (in accordance with IEC 375)

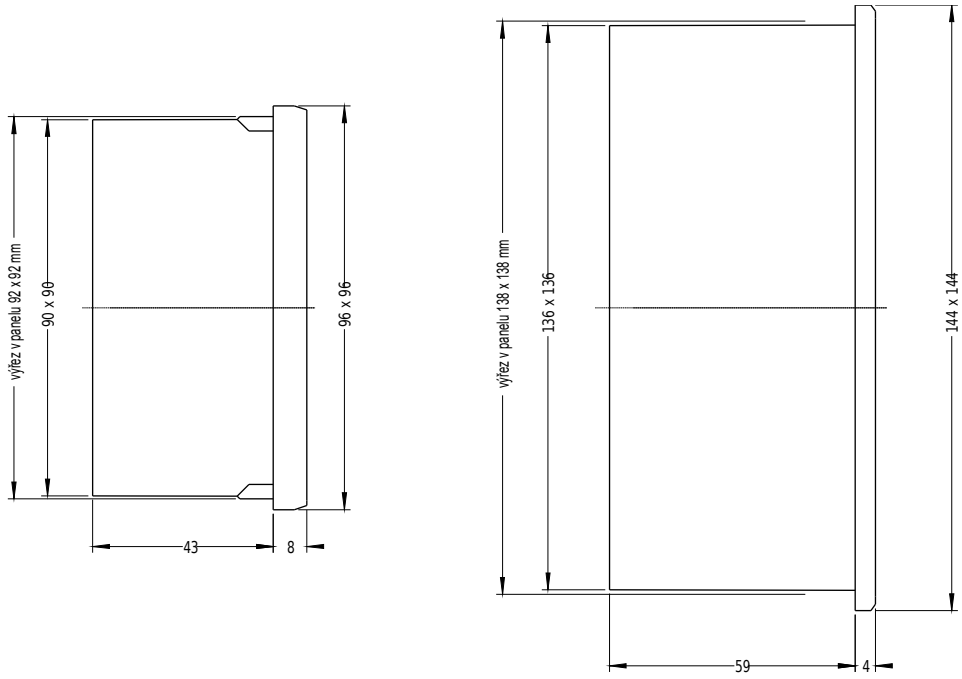


3. Technical Specifications

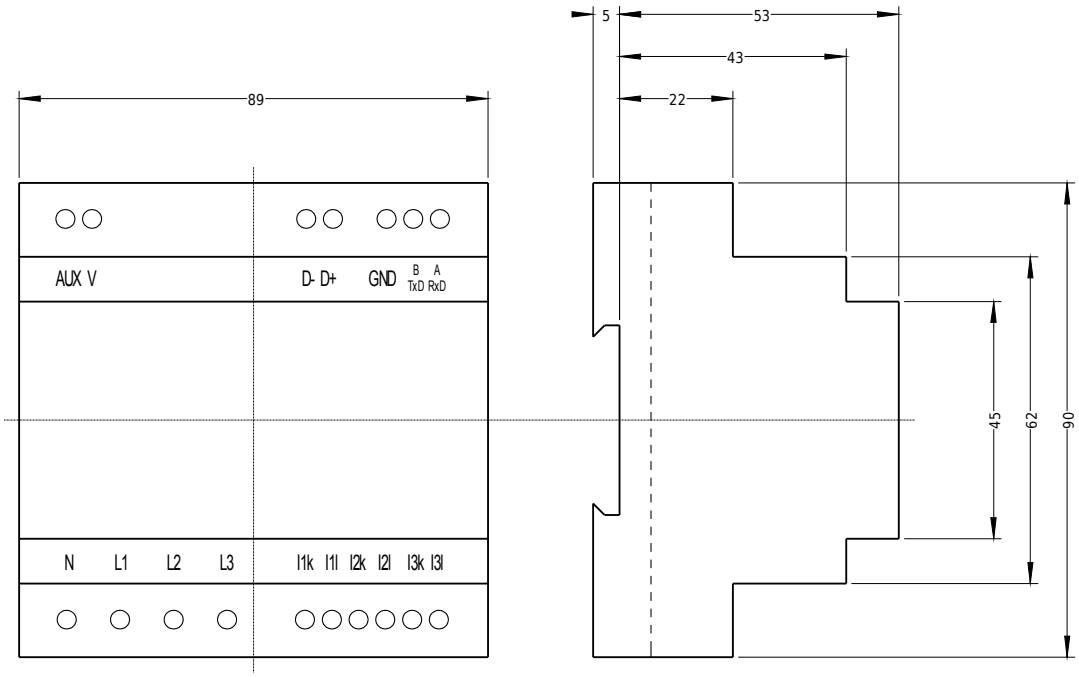
auxiliary supply voltage range, overvoltage cathegory – „U“ - type – „24“ - type – „48“ - type	 85÷275 V_{AC} / 45÷450 Hz, 80 ÷ 350 V_{DC}, 300V/CATIII 16 ÷ 30 V_{AC} / 45 ÷ 450 Hz, 18 ÷ 36 V_{DC}, 150V/CATIII 32 ÷ 54 V_{AC} / 45 ÷ 450 Hz, 36 ÷ 72 V_{DC}, 150V/CATIII
power	3 VA / 3 W
pollution degree	2
connection	galvanically isolated, polarity free
meas. voltage(phase/line) range, measurement cathegory type : - „230“, (U_{NOM} = 230/400 V_{AC}) - „400“, (U_{NOM} = 400/690 V_{AC}) - „100“, (U_{NOM} = 57.7/100 V_{AC})	 2.3 ÷ 285 / 4 ÷ 500 V_{AC}, 300V/CATIII 4 ÷ 505 / 7 ÷ 880 V_{AC}, 600V/CATII 1 ÷ 115 / 2 ÷ 200 V_{AC}, 150V/CATIII
voltage measurement accuracy	± 0.5 % of rdg ± 0.5 % of rng
input impedance type „100“ / „230“ / „400“	 356 / 880 / 1560 kΩ (U_i – N)
connection	single phase / two phases / wye / delta / Aron
permanent overload (IEC 258)	2 x
surge overload	4 x for one second
frequency	45 ÷ 65 Hz
frequency measurement accuracy	± 0.02 %
measured current range - „X/5A“-type, (I_{NOM} = 5 A_{AC}) - „X/1A“-type, (I_{NOM} = 1 A_{AC}) - „Pxxx“, „Sxxx“-t. (I_{NOM}=xxx A_{AC})	 0.02 ÷ 7 A_{AC} 0.01 ÷ 1.4 A_{AC} 0.005 ÷ 1.2 x I_{NOM}
current measurement accuracy - „X/5A“-, „X/1A“-, „Pxxx“-types - „Sxxx“-type	 ± 0.5 % of rdg ± 0.5 % of rng ± 1 % of rdg ± 1 % of rng
„X/5A“-, „X/1A“-type current input design	
burden power	< 0.25 VA (R_i < 10 mΩ)
connection	galvanically isolated from other circuits
permanent overload	14 A_{AC}
surge overload	70 A_{AC} for 1 second
„Pxxx“-, „Sxxx“- type instruments current transformers	
design, maximum measured wire diameter - „Pxxx“-type („JP“-type CT) - „Sxxx“-type („JC“-type CT)	 through-hole, 7 ÷ 19 mm split-core, 10 ÷ 36 mm
max. output cable length	3 m

measured powers active – range	 limited by measurement voltage and current ranges
active power meas. accuracy - „X/5A“-, „X/1A“-, „Pxxx“- types - „Sxxx“ - type	 ± 0.5 % of rdg ± 0.5 % of rng ± 1 % of rdg ± 1 % of rng
reactive - range	limited by measurement voltage and current ranges
reactive power meas. accuracy - „X/5A“-, „X/1A“-, „Pxxx“- types - „Sxxx“ - type	 ± 1 % of rdg ± 1 % of rng ± 2 % of rdg ± 2 % of rng
measured P.F., cos φ accuracy in range 0,50 ÷1,00, I > 5% I_{NOM} - „X/5A“-, „X/1A“-, „Pxxx“- types - „Sxxx“ - type	 ± 1 % of rng ± 2 % of rng
accuracy, full range - „X/5A“-, „X/1A“-, „Pxxx“- types - „Sxxx“ - type	 ± 2 % of rng ± 5 % of rng
THD meas. : range, accuracy U, I > 10 % U_{NOM} ,I_{NOM}	up to 25th harmonic, 0÷200%, ±2 % of rdg ±0.5%
meas. temperature – range, acc.	-25°C ÷ +60°C, ±3°C
communication port	RS485 or RS232 (2.4 ÷38.4 kBd) or Ethernet 10/100 BASE-T, galvanically isolated, Modbus and KMB protocol support
synchronization input (SMN33 only)	for potential-free contact only I_{MIN} = 10 mA, U_{MIN} = 10 V, R_{MAX} = 40 Ω galvanically connected with communication port
operating environment	class C1 in compliance with IEC 654-1
operating temperature	-25°C ÷ 60°C
storage temperature	-40°C ÷ 85°C
operating and storage humidity	< 95 % - noncondensation conditions
EMC – emission	EN 50081-2; EN 55011 , class A ; EN 55022 , class A
EMC – resistance	EN 61000-6-2
protection rating SML33 SMM33 / SMN33	 IP41 (IP54 with cover film), rear panel IP20 IP20
dimensions SML33 SMM33 / SMN33	 96x96 mm, built-in depth 80 mm, installation cutout 92^{+1} x 92^{+1} mm 89 x 90 mm (5 modules), height 53 mm
mass	0.3 kg

SML33



SMM33 / SMN33



Split Core Low Output Current CTs for „Sxxx“ option instruments

instrument model	CT type	CT inside diameter	dimensions [mm] / mass
S005 ÷ S050	JC10F	10 mm	23 x 26 x 50 / 45 g
S075 ÷ S100	JC16F	16 mm	30 x 31 x 55 / 75 g
S150 ÷ S250	JC24F	24 mm	45 x 34 x 75 / 150 g
S300 ÷ S600	JC36S-3	36 mm	57 x 41 x 91 / 280 g

Through-Hole Low Output Current CTs for „Pxxx“ option instruments

instrument model	CT type	CT inside diameter	dimensions [mm] / mass
P005 ÷ P015	JP3W	7 mm	24 x 27 x 11 / 11 g
P025 ÷ P150	JP5W	13 mm	37 x 41 x 14 / 37 g
P200 ÷ P300	JP6W	19 mm	49 x 51 x 20 / 70 g

JC - line current transformers

JP - line current transformers

4. Manufactured Models and Marking

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 I_n

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
'nnn' specifies nominal meas. range in [A]

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

Remote comm. link interface

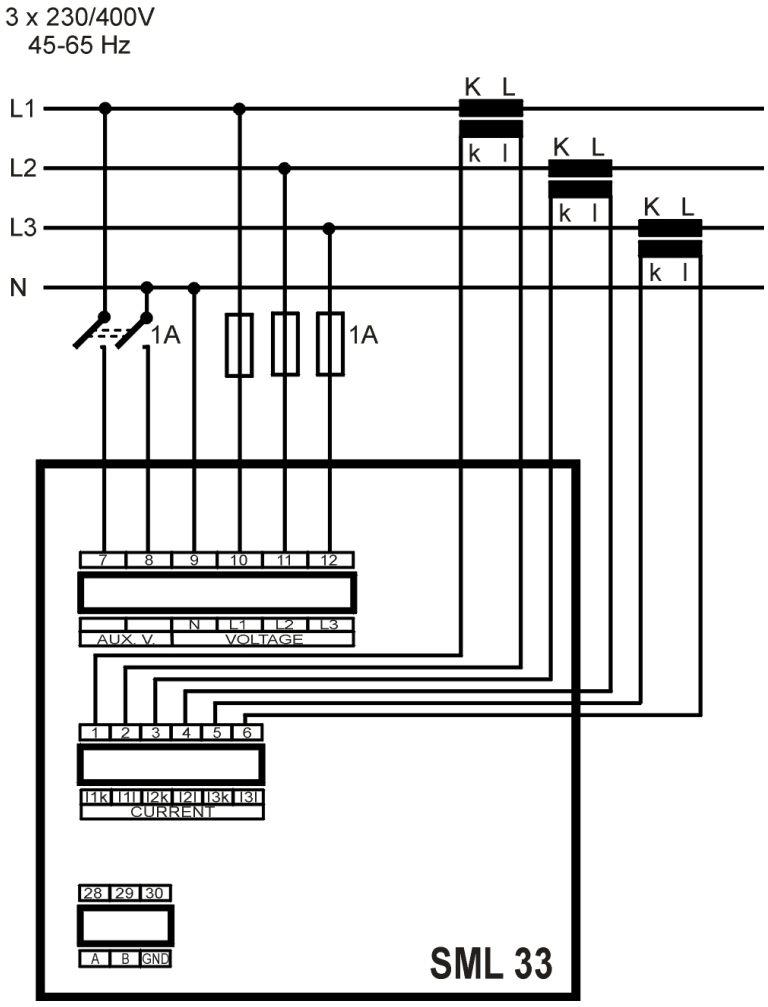
N = no remote comm. link
2 = RS-232
4 = RS-485

5. Examples of Connections

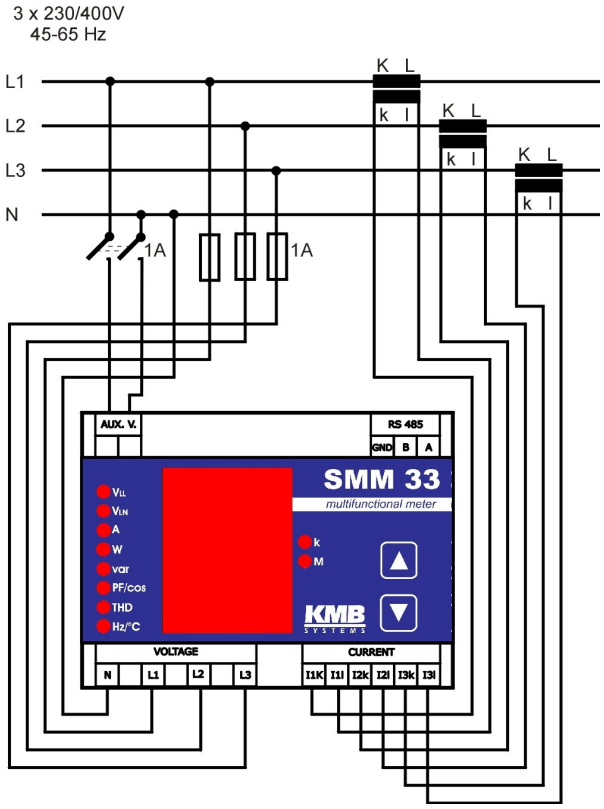
Numbering of Terminals

signal	terminal No.		signal	terminal No.	
	SML33	SMM33, SMN33		SML33	SMM33, SMN33
L1	12	3	AV1	9	16
L2	13	5	AV2	10	17
L3	14	7	A (RS485) RxD (RS232)	28	30
N	11	1			
I1k	1	10	B (RS485) TxD (RS232)	29	29
I1l	2	11			
I2k	3	12	G (RS485) G (RS232)	30	28
I2l	4	13			
I3k	5	14	D+	-	26
I3l	6	15	D-	-	25

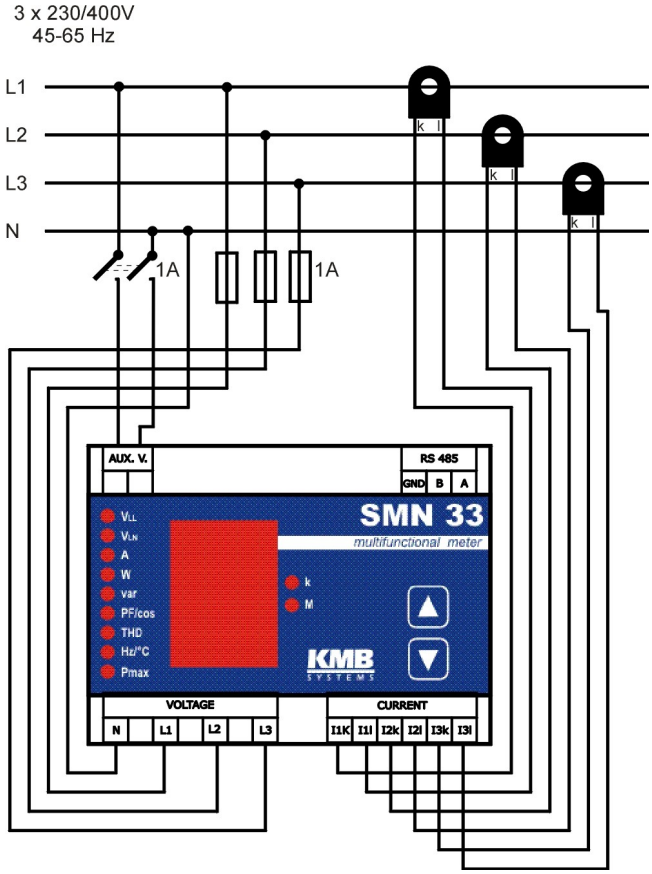
SML33 U 230 X/5A Wiring Diagram



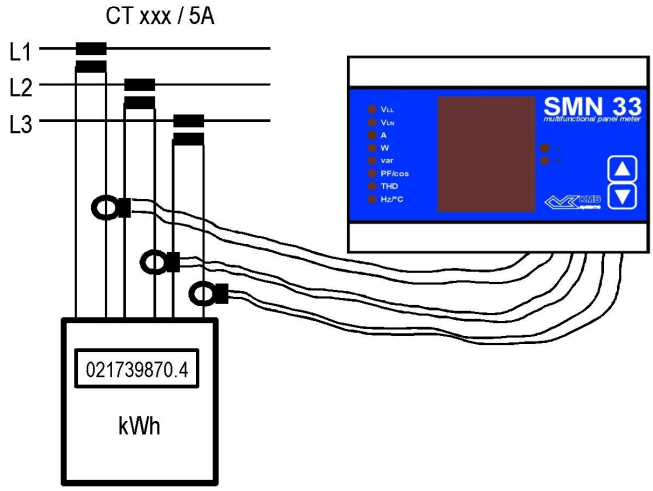
SMM33 U 230 X/5A Wiring Diagram



SMN33 U 230 Sxxx (or SMN33 U 230 Pxxx) Wiring Diagram



SMN33 U 230 S005 Alternative Wiring Diagram -
Connection to Standard „xxx/5A“-Type CT Secondary Winding



6. Maintenance, Service, Warranty Certificate

The SML33/SMM33/SMN33 instruments do not require any maintenance in their operation. For reliable operation it is only necessary to meet operating conditions specified and not expose the instrument to violent handling and activity of water or chemicals which could cause mechanical damage.
The instrument has mains fuse to disconnect it on incorrect power supply voltage connection or on a breakdown. The fuse is not accessible for a user, the instrument needs to be sent to the dealer that will arrange its replacement.
If the product has a breakdown, you need to complain to the supplier at their address:

Supplier:

Manufacturer : KMB systems, s.r.o.
Dr. M. Horákové 559
460 06 LIBEREC 7
Czech Republic
telephone: +420 485 130 314
fax: +420 482 736 896
e–mail : kmb@kmb.cz
website : www.kmbsystems.eu

The product must be in proper package to prevent damage in transit. Description of the problem or its symptoms must be delivered together with the product.
If a warranty repair is claimed, the warranty certificate must be sent in. In case of an out–of–warranty repair you must enclose an order for the repair.
Warranty period of 24 months from the date of purchase is provided for the instrument. Problems in the warranty period, provably because of faulty workmanship, design or inconvenient material, will be repaired free of charge by the manufacturer or an authorized servicing organization.
The warranty ceases even within the warranty period if the user makes unauthorized modifications or changes to the instrument, connects it to out-of-range quantities, if the instrument got damaged in out-of-specs falls or by improper handling or if it has been operated in contradiction with the technical specifications presented.

type of product: .....
serial number .....
final quality inspection: .....
date of dispatch: .....

manufacturer's seal:

date of purchase: .....

supplier's seal: