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User manual

Instrument for energy management

SMM 133

Document revision	Release date	Valid for versions			
		Hardware	Bootloader	Firmware	Software ENVIS
1.3	10.8.2020	2.0	4.1	3.6	1.9

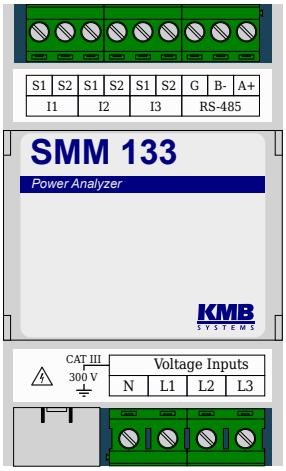


Figure 1: SMM 133 M 230 X/333mV N 4

You can find the current revision of this document on the manufacturer's website at http://www.kmb.cz/.

Contents

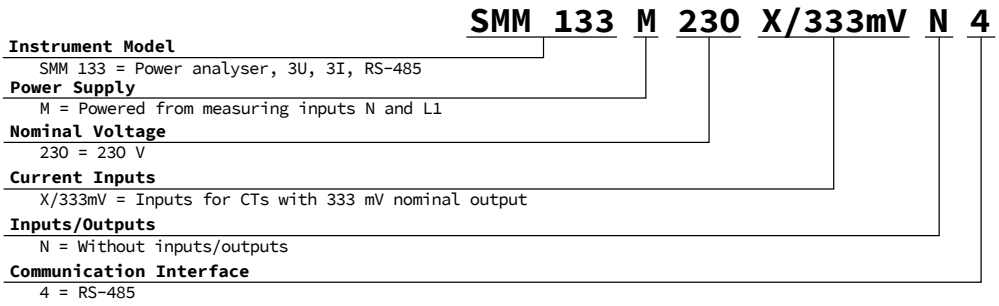


Figure 2: Ordering codes and schemas.

1 Basic description

The SMM 133 is designed for remote monitoring of energy consumption. It is designed for installation on a DIN rail or mounting panel and does not have a local display. This concept is suitable for a wide range of applications in power engineering and smart networks, in building automation and individual production processes, for remote infrastructure supervision and also for automatic load management. The device is not equipped with local controls and therefore cannot easily interfere with the functions it performs — in simple terms, it should not attract the special attention of lay people in easily accessible places. To protect settings and collected data, the device can be locked with a pin or password. It uses the RS-485 communication line for connection to a superior system. The instrument measures three voltages and three currents.

1.1 Types and options

The SMM 133 is available in various configurations according to the customer's specifications[1]. On figure 2 marking schema of all available options is drawn.

1.2 News in version 3.0

- four quadrant measurement of powers and energies, booth active and reactive
- extended, more accurate and continuous measurement of harmonic phasors (amplitudes and angles)
- possibility to synchronize device time from network frequency
- modular firmware - module for RCS/HDO
- locking the device: new features for user access management have been added (see AppNote 0004).

1.3 Measuring principles and signal processing

Connection and measurement

- AC power supplied from measured voltages 115 ÷ 280 V
- three voltage inputs (L_1, L_2, L_3) for direct or indirect measurement of star voltage, single-phase and Aron. Measurement category 300 V CAT III.
- 6.4 kHz sampling, continuous measurement
- calculate 50 components of harmonic voltages and currents
- evaluation of all commonly measured single- and three-phase quantities such as power (active, reactive, apparent, deformation and fundamental active and reactive power), power factors, voltage and current harmonics and THD, ...

Measured data recording

- built-in precise real time circuit with backup battery

[1] A complete and up-to-date list of optional accessories can be obtained from your dealer upon request.

Data transmission and evaluation

- ENVIS 1.9 or higher is available for free download
- system service ENVIS.Online for downloading and processing of archived measurement data
- tools for downloading, exporting and processing data using custom scripts or via command line
- data library for developing custom applications in C # /. NET or for Linux (C / C ++, .NET Core)
- for data transfer, instrument setting and firmware update, the RS-485 communication interface is used

Supported firmware modules

- Ripple Control Signals (RCS) — Allows you to record telegrams of remote remote control (RCS) and their voltage levels.

2 Operating the measuring instrument

2.1 Safety requirements for use of the SMM 133

When working with the device, all necessary precautions must be taken to protect persons and property against injury and electric shock.

- The device must be operated by a person with the required qualifications for such operation and this person must be familiar with the principles of working with the device described in this description!
- If the unit is connected to parts that are under dangerous voltage, all necessary precautions should be taken to protect users and equipment from electric shock.
- The operator performing installation or maintenance of the equipment must be equipped with personal protective equipment and other safety equipment at work.
- If the device is used in a manner not specified by the manufacturer, the protection provided by the analyzer may be reduced.
- If the device or its accessories appear to be damaged or not working properly, do not use it and send it for repair.

2.1.1 The meaning of the symbols used on the device

Table 1: Symbols

Symbol	Description
	Warning
	Warning, possibility of electric shock
	Alternating current
	Direct current
	CE mark declaring conformity with European regulations and regulations
	The device must not be disposed of with household waste
	Equipment with double or reinforced insulation

2.2 Installing the device in a switchboard

The SMM 133 is designed for mounting on a DIN rail. In the figure 3, the dimensions of the device are drawn. The hole positions for the wall mounting are dimensioned by a dashed line, which is screwed with two screws. The maximum cable cross-section for voltage and current inputs and RS-485 screw terminals is 2.5 mm^2.

Natural air circulation should be allowed inside the switchgear at the installation site and its immediate surroundings. Do not install other equipment that could be a significant source of heat near to the instrument.

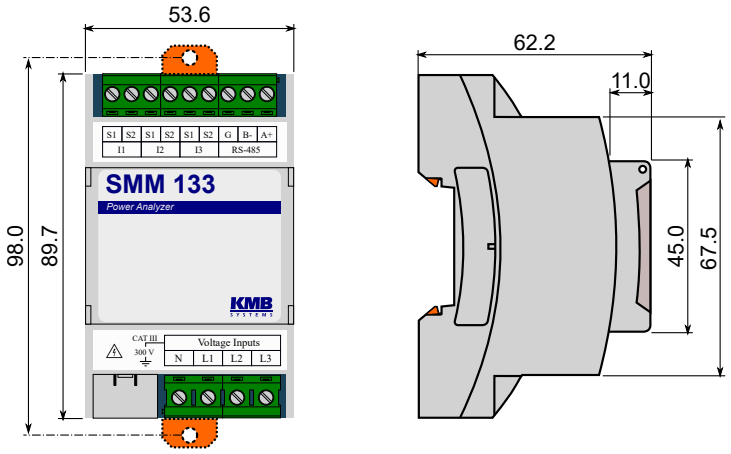


Figure 3: Dimensions of SMM 133.

2.2.1 Power supply and voltage inputs

The instrument supply voltage is internally connected to the terminals N and L1. These signals together with other voltage measurement inputs must be connected via suitable fuses with apropriate characteristics for the respective environment (see diagram in figure 4 for power off). The disconnector must be located on the left side of the device within reach of the operator. The circuit breaker must be marked as a disconnect switch. A 0.5 A circuit breaker is a suitable circuit breaker, but its location and function must be clearly identified (using the '0' and 'I' symbols according to EN 61010-1). The power supply galvanically separates the power terminals of the device from other internal circuits.

Overvoltage category signals 300 V/CAT III can be directly connected to the voltage measurement inputs.

The measured voltages are connected to terminals L1, L2 and L3. Since SMM 133 is supplied from the measured voltage at terminals N and L1, it is necessary that the terminal N is connected to the appropriate potential even in the case of delta or Aaron measurements. All voltage measuring inputs are connected to the internal circuits via high impedance.

Measured voltages should be protected, for example, by a 0.5A fuse with a suitable tripping characteristic.

Recommended type of conductor	H07V-U (CY)
Recommended minimum conductor cross-section:	0,5 mm^2
Maximum conductor cross section:	2,5 mm^2

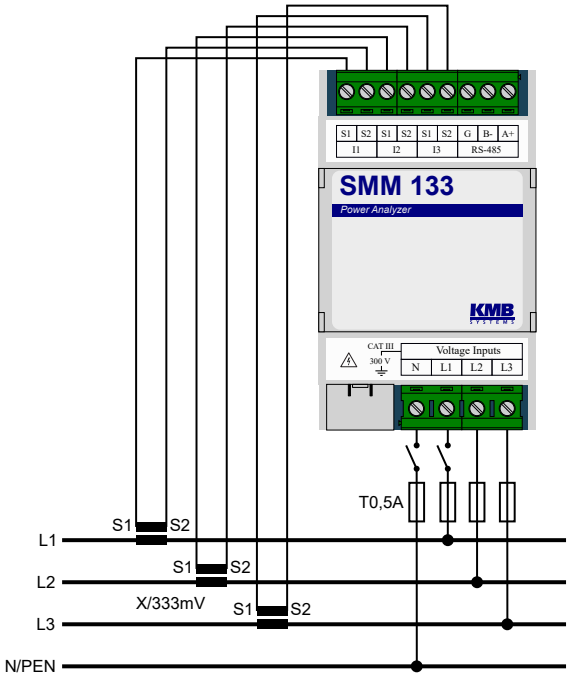


Figure 4: Usual connection of the device in 3p4w network.

2.2.2 Measured currents

Current inputs are galvanically isolated from the RS-485 for up to 1 kV_{DC}. Individual current inputs are not galvanically isolated from each other. It is necessary to use CT with the appropriate measurement category/insulation voltage or to install the CT on an insulated primary conductor with adequate insulation voltage.

All pins "S2" are galvanically connected to a common potential inside the instrument. Therefore, if the secondary side of the MTP is required to be grounded (usually in HV and VHV networks), the "S2" terminals must be grounded. If the "S1" terminals were connected during CT installation, all secondary circuits would be connected in parallel and all current inputs would measure the same current.

Option „X/333 mV" Advantages of X/333 mV sensors are the possibility of using wires with small cross-section and disconnection without the need to short circuit the CT's secondary.

The secondary CT winding of nominal 333 mV must be fed to the terminals S1 and S2 of the current inputs I1, I2 and I3. Figure 4 illustrates the correct connection with the CTs in the LV network. The direction of positive power flow from source to load is from left to right.

Recommended type of conductor	H07V-U (CY)
Recommended minimum conductor cross-section:	0,5 mm^2
Maximum conductor cross section:	2,5 mm^2

2.2.3 Connection of communication

RS-485 It is usually used as an interface for remote reading of current values, archive records, and instrument settings. The RS-485 serial line uses the A +, B-, and G-signal terminals on the terminals labeled RS-485 (fig. 5). The ends of the communication line must be terminated with the specified resistance.

For common use (cable length up to 100 m, communication speed up to 9600 Bd), the choice of cable type is not critical. It is possible to use virtually any shielded cable with two pairs of conductors and to connect the shield at one point to the PE conductor. If the cable length is over 100 m, or when the communication

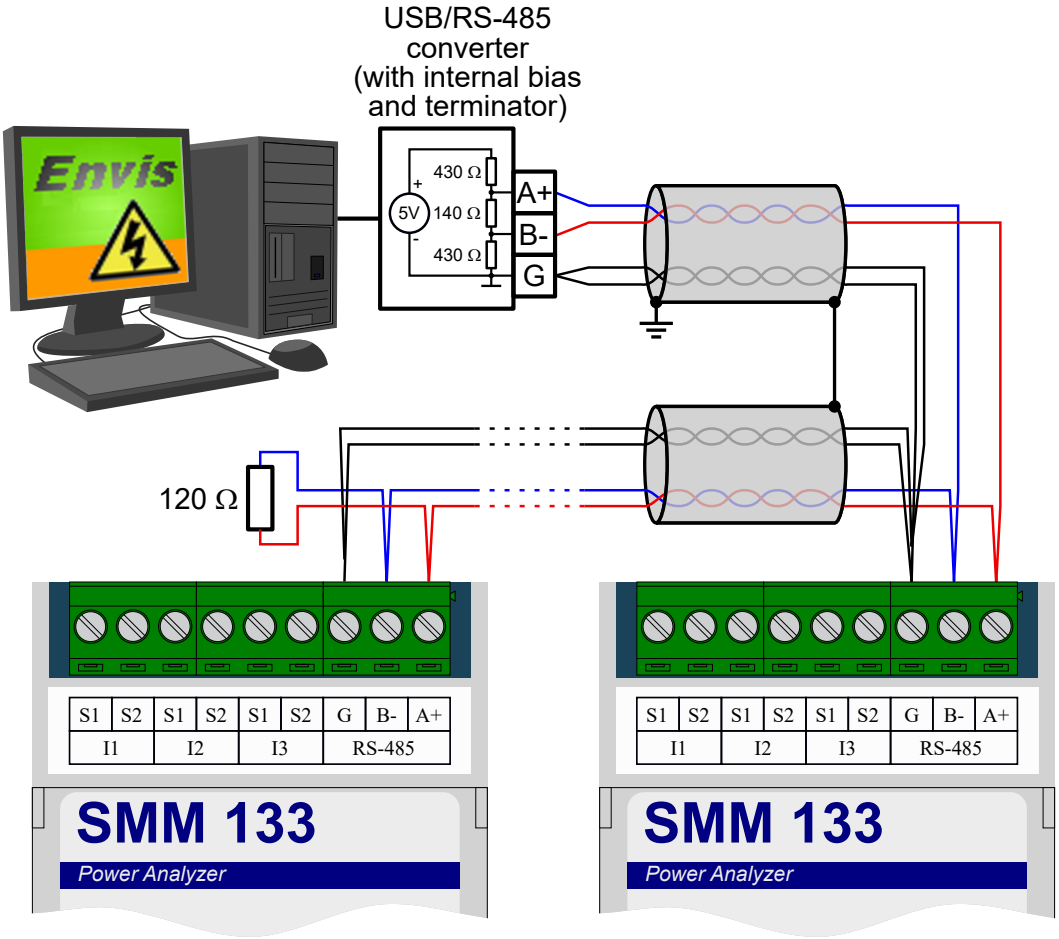


Figure 5: Connection of RS-485 communication lines to SMM 133 devices.

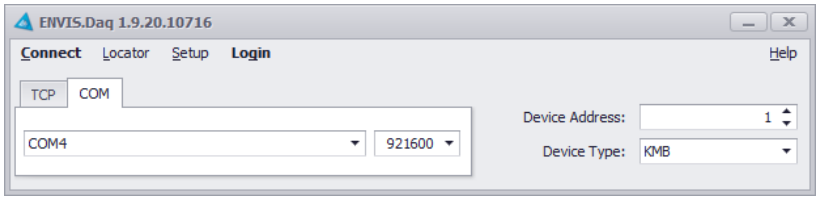


Figure 6: Main window of ENVIS.Daq application after its launch — select the type of communication used, set its parameters and press Connect in menu to continue.

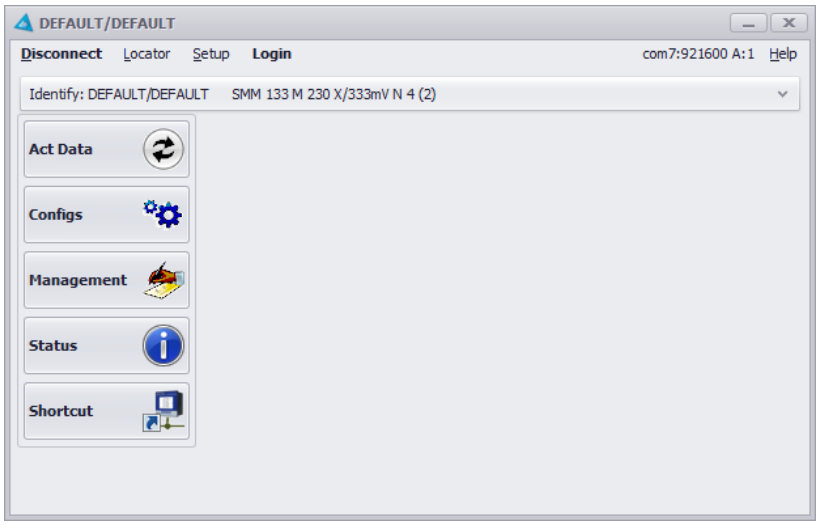


Figure 7: ENVIS.Daq application window with connected SMM 133 instrument.

speed is higher (about 20 kbit/s), it is advisable to use a shielded communication cable with twisted pairs, which has a defined wave impedance (usually about 100 Ω). Signals A and B are connected by one pair, signal G by the other pair.

The RS-485 interface requires impedance termination of the end nodes using terminating resistors, especially at higher communication speeds and distances. Terminating resistors are only installed at the end points of the line (e.g. one at the PC and the other at the most remote device). They are connected between terminals A and B. A typical value of the terminating resistor is 120 Ω.

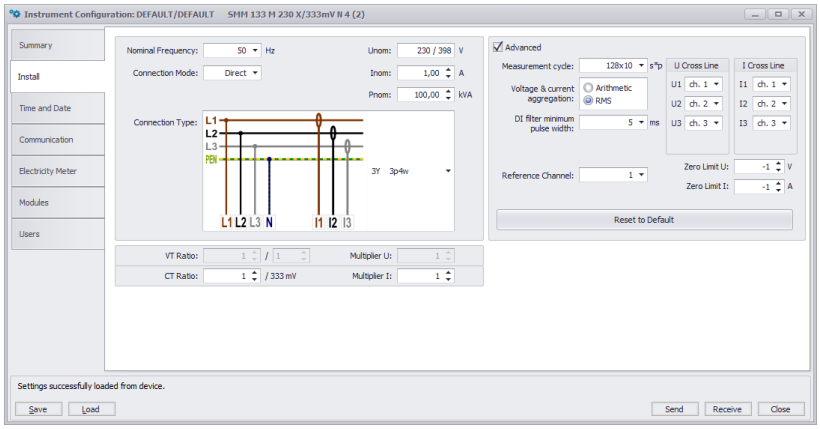
Recommended type of conductor	shielded twisted pair 2×2×0,2 mm^2, e.g. Belden 9842
Recommended minimum conductor cross-section:	0,5 mm^2
Maximum conductor cross section:	2,5 mm^2

2.3 Detailed instrument settings on the PC

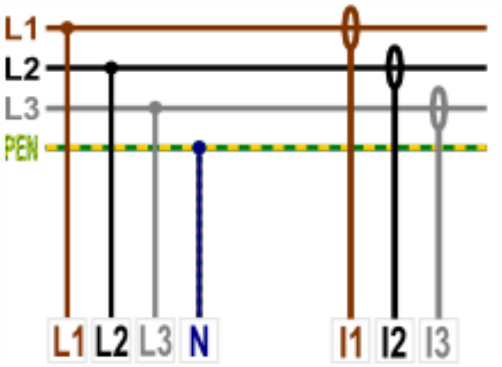
It is advisable to set the SMM 133 instrument before starting the measurement. The settings can be made from the computer in the ENVIS.Daq application[2].

1. Turn the power on.
2. Connect SMM 133 to a computer via RS-485. The device is now ready for configuration.
3. Run the ENVIS.Daq application and select the COM communication interface type tab (Fig. 6).
4. Select the appropriate serial port, speed, address, and device type from the list.
   (a) 10 seconds after power-up the device waits for service communication — it communicates with a fixed baud rate of 9600 Bd and also listens at address 250. If SMM 133 does not receive any command at this time, the communication port will be reset to the current configuration and go to normal mode. If the communication occurs, the service communication will be extended by

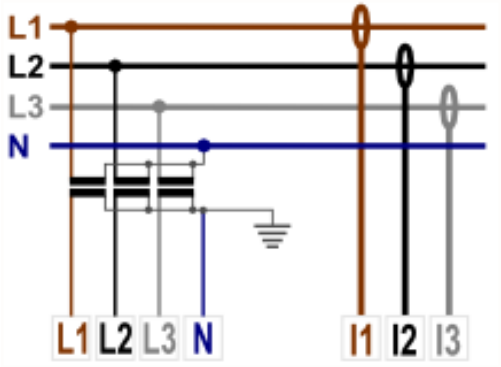
[2]ENVIS.Daq is also part of the ENVIS installation package. A detailed description can be found in the ENVIS user manual.



(a) Setting of basic device connection parameters in ENVIS.Daq application.



(b) Connection of the device in LV networks (direct connection).



(c) Indirect connection of the device via voltage measuring transformer (in HV, HV networks, etc.).

Figure 8: ENVIS.Daq — device installation settings.

60 s after each processed message. SMM 133 also listens on the user-set address through the start time so that it is posible to communicate with the device immediately after power-up.

(b) The default address is *1*. If the device address is forgotten, it is possible to use the *Find on 232/485* function, which is part of the *Locator* window.

(c) Device type is KMB.

5. Press *Connect* on menu or *ENTER*. The application attempts to connect to the specified device. If the connection is successful, it loads the settings stored in the device and displays a summary window (fig. 7).

6. Press the *Configs* button in the left column of the menu. A new window with device settings tabs appears.

The *Instrument Configuration* contains individual tabs with device parameters divided by meaning. User can change any parameters in individual tabs. Changes to settings are made only in the application and uploaded to the device by pressing the *Send* button. The *Receive* button can be used to retrieve the current valid settings from the device at any time. Bookmarks that have been changed locally and have not yet been written to the device are marked with a warning symbol ⚠. The *Save* and *Load* buttons are used to archive the current settings to or from a file.

In particular, the *Installation* tab is essential for proper operation.

2.3.1 Installation (fig. 8a)

- *Nominal frequency* — set according to the nominal frequency of the measured network (50 or 60 Hz).
- *Connection mode* — Sets how the device is connected either as a voltage measurement directly or via a voltage measuring transformer (usually a HV and VHV network).

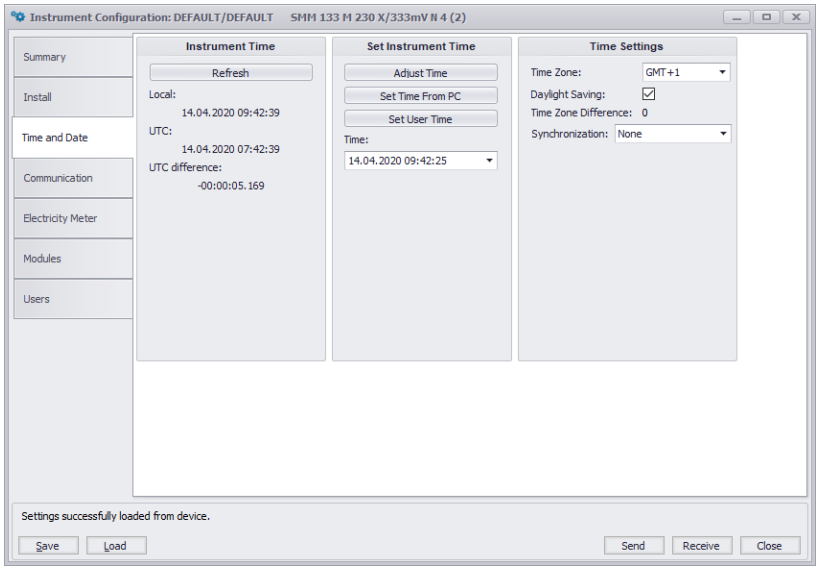


Figure 9: ENVIS.Daq — set date, time and time synchronization options in the device.

- *Connection type* — connection method in three-phase systems — star connection. The connection options for the instrument are illustrated in Fig. 8 a 8c.
- U_{NOM}, P_{NOM} (nominal voltage and power) — Correct setting of U_{NOM} and P_{NOM} affects the relatively displayed values and how the measurement is interpreted in ENVIS.
  - U_{NOM} determine according to the nominal voltage of the measured network.
  - P_{NOM} set at the measuring point according to the nominal power of the power transformer, circuit breaker or installed protection.
- VT ratio — if the *connection mode via VT* is selected, the conversion according to the used voltage transformers must also be set. The ratio you enter is:
  - Rated primary voltage: usual value is 22 000.
  - Nominal secondary voltage: usual value is 100 (other common 110, 120, 230 V, ...)
- *Multiplier U* — this coefficient is rarely changed, but it can be used for corrections when measuring the voltage at the VT output with a non-standard ratio. The default is *1*.
- CT ratio — the parameter determines the current range of the device.
  - For standard instruments for indirect measurement with X/333 mV transformers, the nominal primary current of the used CT is entered. The default value is 1 A/333 mV.
- *Multiplier I* — this coefficient is rarely changed, but it can be used for corrections when measuring the current using CT with non-standard ratio. The default is *1*. Another example of using a multiplier is when we pull a measured wire through a measuring transformer several times to increase the sensitivity of the measurement (the range is reduced accordingly). For 4 turns, *Multiplier I* should be set to $\frac{1}{4} = 0.25$.

2.3.2 Date and time (fig. 9)

This tab contains settings related to the date and time on your device.

The *Instrument Time* panel displays the current date and time in the machine and the difference with the PC time. When you open the tab, it immediately loads the time from the device which is then updated regularly. Pressing the *Refresh* button will reload the current time from the device.

The *Set Instrument Time* panel offers elements for changing the time on your device.

- *Set time from PC* — sets the time in the device according to the current time on the computer.

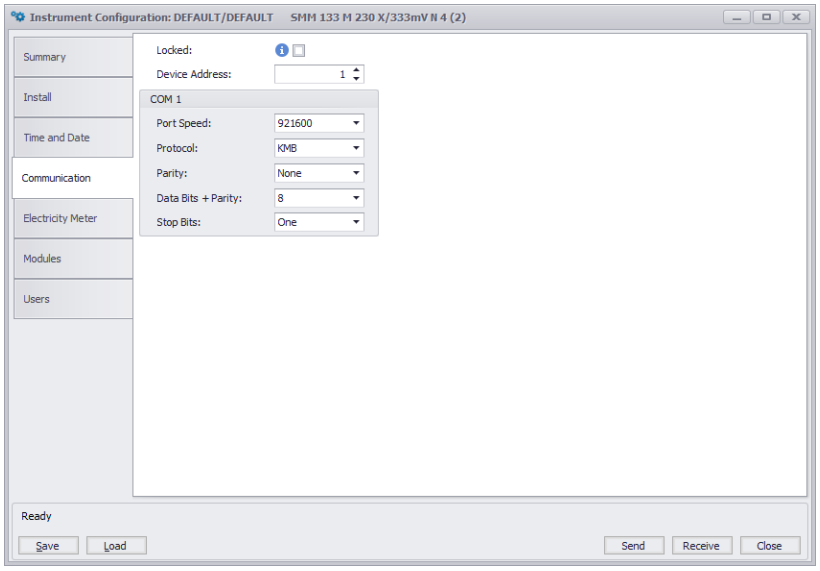


Figure 10: ENVIS.Daq — setting of communication line parameters.

- *Set user time* — sets the time in the device to the user-specified value.

Time settings panel — sets type of synchronization and how the device interprets and displays the time and date.

- *Synchronization* — this parameter determines how the device synchronizes its time. Supported methods include:
  - *None* — the device does not synchronize the internal clock. This is the default setting.
  - *System frequency* synchronization is performed by measuring the network frequency for a period of one month and defining the time deviation therefrom, if this value differs from the current time by more than 40 s, the time in the following measurement interval is adjusted.
- *Time zone* — Time zone must be set according to local requirements. The setting is important for the correct interpretation of local time, which determines the current tariff zone allocation of the meter.
- *Daylight Saving* — This parameter can be set to automatically switch local time according to the season (summer or winter time).

2.3.3 Communication (fig. 10)

The device is always equipped with a RS-485 communication interface for parameterization and data download.

- *Device Address* — Assign a unique address to each device on one serial line.

COM

- *Port speed* — baud-rate of a communication line. The default is 9600 Bd.
- *Protocol* — select default settings for KMB or M-Bus.
- *Parity* — even, odd or none.
- *Data bits + parity* — specifies the number of data bits including parity bits. For 8 bit + parity, select 9. For 8 bit without parity, select 8.
- *Stop Bits* — specifies the number of synchronization bits transmitted by the interface after each character sent.

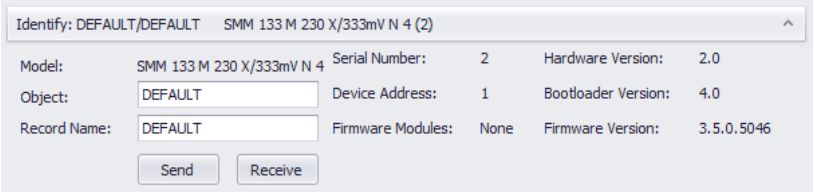


Figure 11: ENVIS.Daq — identification.

2.4 Setting measurement identification

This setting is done in the main window of the ENVIS.Daq application. It is used to correctly identify and categorize measurement data while processing on a computer.

- *Object* - Naming the measurement location. This is a text string value of up to 32 characters. With this identifier, records are stored in a database or file.
- *Record Name* — Record naming helps todifferentiate multiple measurements in one object (e.g. using the ID of the transformer to be measured). Again, this is a text string value of up to 32 characters. With this identifier, records are stored in a database or file.

To write the *Object* and *Record Name* to the instrument, press the *Send* button in the *Identify* panel. Other parameters displayed in this tab are only informational and cannot be changed. Displayed type of connected device (model, serial number, firmware version and hardware, etc.)

2.5 Transfer of measured data to PC

Connect the device to your computer and start ENVIS.Daq (fig. 6). Select the appropriate communication parameters (as described in 2.3) and connect to the device.

SMM 133 does not allow recording of archives and it is necessary to use the ENVIS.Online application or any application reading data via Modbus to transfer data to the PC.

However, using the *Act data* button it is possible to display all measured quantities from SMM 133 (see fig. 12).

2.6 Display of electricity meter reading

SMM 133 has a built-in three-phase, four-quadrant electricity meter with registration at various tariffs. The instrument separately registers the active imported EP+ and exported EP- energy. For reactive energy, it registers character — capacitive EQC and inductive EQL resp. capacitive EQC+, EQC- and inductive EQL+, EQL- especially in case of active energy import or export. Primarily it offers the sum values of all phases. For star-connection and single-phase connection, it also registers the values of all energy types in each individual phase.

Values can be recorded and processed in ENVIS or via the ModBus communication protocol in any other program.

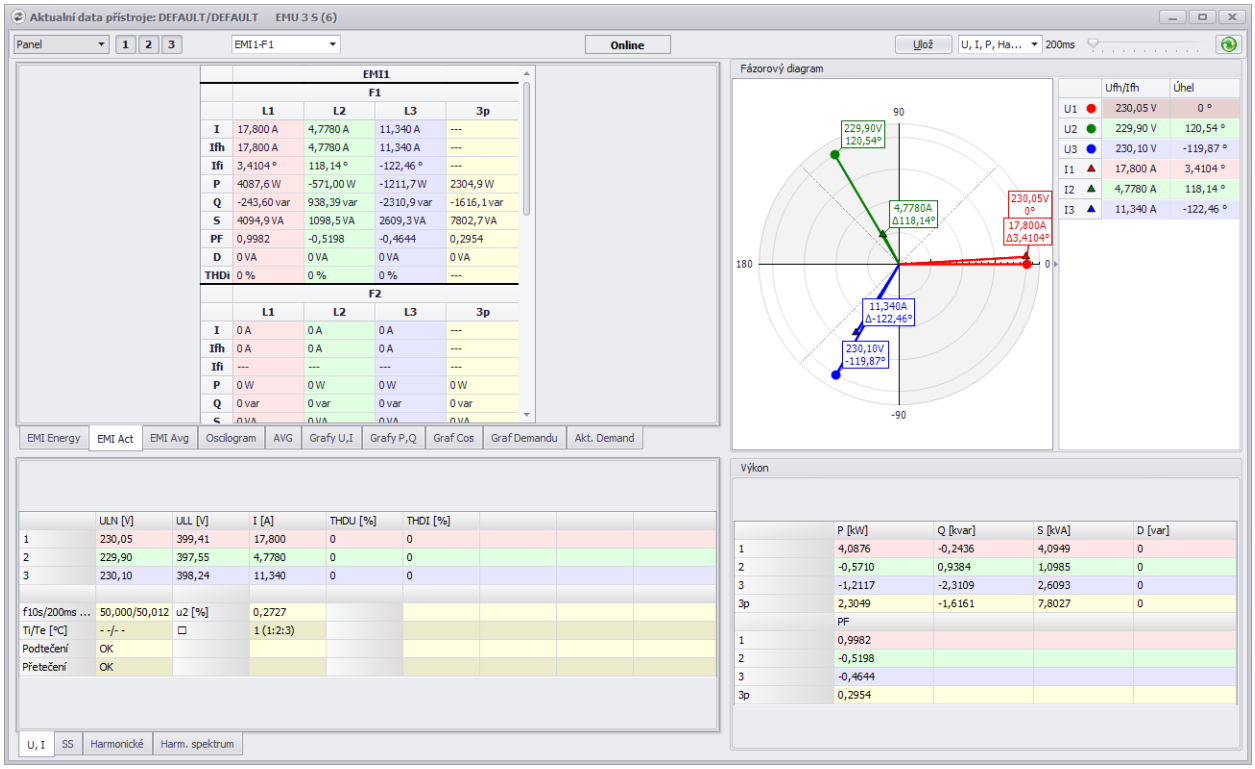


Figure 12: ENVIS.Daq — Actual data window.

3 Technical parameters

3.1 Basic parameters

Auxiliary Voltage	
	model „M“
rated auxiliary voltage range	115 – 280 VAC 115 – 300 VDC
AC auxiliary voltage range, f: 40 ÷ 100 Hz	100 – 310 VAC
DC auxiliary voltage range	100 – 330 VDC
power supply	7 VA / 2 W
overvoltage category	III (300 V)
pollution degree	2
maximum operating altitude	2000 m
connection	isolated, polarity free

Other Specifications	
operational temperature	-25 ÷ 70°C
storage temperature	-40 ÷ 80°C
operational and storage humidity	< 95 % - non-condensable environment
EMC – immunity	TBD
EMC – emissions	TBD
communication ports	RS-485 (2400 ÷ 921600 Bd)
communication protocols	KMB, Modbus RTU and TCP
sampling frequency 50 Hz (60 Hz)	6,4 kHz (5,76 kHz)
accuracy of RTC	± 2 seconds per day
capacity of RTC backup battery	> 5 years (without supply voltage applied)
ingress protection front panel whole instrument	 IP 40 IP 20
protection class	II
dimensions front panel whole instrument	 54 x 45 m 54 x 90 x 61 mm
weight	max. 0.13 kg

spec-Other-en

3.2 Measured quantities

Measured Quantities – Voltage	
Frequency	
f_{NOM}– nominal frequency	50 / 60 Hz
measuring range	40 ÷ 70 Hz
uncertainty	± 10 mHz
Voltage	
voltage input option	**standard variant („230“)**
U_{NOM} (U_{DIN})– rated voltage	180 ÷ 280 VAC
crest factor at U_{NOM}	2
measuring range line-to-neutral	4 ÷ 420 VAC
measuring range line-to-line	7 ÷ 720 VAC
intrinsic uncertainty (t_A=23±2ºC)	+/- 0.05 % of rdg ± +/- 0.05 % of rng
temperature drift	+/- 0.03 % of rdg ± +/- 0.01 % of rng / 10 ºC
measurement category	300V CAT IV
permanent overload	1252 VAC (UL–N)
peak overload, 1 second	2800 VAC (UL–N)
burden power (impedance)	< 0.03 VA (Ri = 7.84 MΩ)
Voltrage Unbalance	
measuring range	0 ÷ 10 %
measuring uncertainty	± 0.3% of rdg or ± 0.3
THDU	
measuring range	0 ÷ 20 %
measuring uncertainty	± 0.5
Harmonics up to 50th order (40th order @ 60 Hz)	
reference conditions	other harmonics up to 200 % of class 3 acc. to IEC 61000–2-4 ed. 2
measuring range	10 ÷ 100 % of class 3 acc. to IEC 61000–2-4 ed. 2
measuring uncertainty	twice the levels of class II acc. to IEC 61000–4-7 ed. 2

Measured Quantities – Current, Temperature	
Current	
current input option	**„X/333mV“**
I_{NOM} (I_B) – rated (basic) current	xxx A_{AC} => 333 mV
crest factor at I_{NOM} (I_B)	1.8
measuring range	0.003 ÷ 1.2 xxx A_{AC}
intrinsic uncertainty (t_A=23 ±2 ºC)	+/- 0.1% of rdg ± +/- 0.05% of rng
temperature drift	+/- 0.03% of rdg ± +/- 0.01% of rng / 10 ºC
measurement category	Depends on CT
permanent overload	2 x I_{NOM}, 666 mV_{AC}
peak overload 1 second, maximum repetition frequency > 5 minutes	10 × I_{NOM}
burden power (impedance)	< 5 μVA (Ri = 39 kΩ)
Current Unbalance	
measuring range	0 ÷ 100 %
measuring uncertainty	± 0.5
Harmonics up to 50th order (40th order @ 60 Hz)	
reference conditions	other harmonics up to 1000 % of class 3 acc. to IEC 61000–2-4 ed.2
measuring range	500 % of class 3 acc. to IEC 61000–2-4 ed.2
measuring uncertainty	Ih <= 10 % I_{NOM}: ± 1 % I_{NOM}
	Ih > 10 % I_{NOM}: ± 1 % of rdg
THDI	
measuring range	0 ÷ 200 %
measuring uncertainty	THDI <= 100 %: ± 0.6
	THDI > 100 %: ± 0.6 % of rdg
Temperature (internal sensor, measured value affected by the instrument power dissipation)	
measuring range	- 40 ÷ 80°C
measuring uncertainty	± 2ºC

Measured Quantities – Power, Power Factor, Energy	
Active / Reactive Power, Power Factor (PF), cos φ ($P_{NOM} = U_{NOM}$ x I_{NOM})	
reference conditions “A”: ambient temperature (t_A) U, I for active power, PF, cos φ for reactive power	 23 ± 2 ºC U = 80 ÷ 120% U_{NOM}, I = 1 ÷ 120% I_{NOM} PF = 1.00 PF = 0.00
act. / react. power uncertainty	± 0.5% of rdg ± 0.01% P_{NOM}
PF & cos φ uncertainty	± 0.01
reference conditions ”B”: ambient temperature (t_A) U, I for active power, PF, cos φ for reactive power	 23 ± 2 ºC U = 80 ÷ 120% U_{NOM}, I = 2 ÷ 120% I_{NOM} PF >= 0.5 PF <= 0.87
act. / react. power uncertainty	± 1% of rdg ± 0.01% P_{NOM}
PF & cos φ uncertainty	± 0.01
temperature drift of powers	± 0.05% od rdg ± 0.02% P_{NOM} / 10 ºC
Energy	
measuring range	corresponds to U & I measuring ranges 4 quadrant energy counters for both active and reactive energies
active energy uncertainty	class 1 acc. to EN 62053 – 21
reactive energy uncertainty	class 2 acc. to EN 62053 – 23

Table 2: IEC 61557-12: Equipment for measuring and monitoring electrical parameters

Instrument characteristics according to IEC 61557-12	
power quality assessment function	
classification according to par. 4.3 direct voltage connection voltage connection via VT	 SD SS
temperature according to par. 4.5.2.2	K55
humidity + altitude according to par. 4.5.2.3	< 95% - noncondensation conditions < 2000 m
active power/energy function performance class	1

Function characteristics according to IEC 61557-12 Model **„X/333mV“** with **„xxx/333mV“** CTs, I_{NOM} = xxx A, U_{NOM} = 230 V				
Symbol	Function	Class	Measuring range	Notes
P	total effective power	1	0 ÷ (993.6 * I_{NOM}) W	
Q_A, Q_V	total reactive power	2	0 ÷ (993.6 * I_{NOM}) var	
S_A, S_V	total apparent power	1	0 ÷ (993.6 * I_{NOM}) VA	
E_a	total active energy	1	0 ÷ (993.6 * I_{NOM}) Wh	
E_{rA}, E_{rV}	total reactive energy	2	0 ÷ (993.6 * I_{NOM}) varh	
E_{apA}, E_{apV}	total apparent energy	1	0 ÷ (993.6 * I_{NOM}) Vah	
f	frequency	0.02	40 ÷ 70 Hz	
I	phase current	0.5	0.1 ÷ 1.2 * I_{NOM} A_{AC}	
I_N	neutral current measured	–	–	
I_{Nc}	neutral current calculated	0.5	0.1 ÷ 1.2 * I_{NOM} A_{AC}	
U_{LN}	line-to-neutral voltage	0.05	40 ÷ 280 V_{AC}	
U_{LL}	line-to-line voltage	0.05	70 ÷ 480 V_{AC}	
PF_A, PF_V	power factor	0.5	0 ÷ 1	
P_{st}, P_{lt}	flicker	–	–	
U_{dip}	voltage dips	–	–	
U_{swl}	voltage swells	–	–	
U_{tr}	transients overvoltage	–	–	
U_{int}	voltage interruption	–	–	
U_{nba}	voltage unbalance (amp.)	0.5	0 ÷ 10%	
U_{nb}	voltage unbalance (ph. & amp.)	0.5	0 ÷ 10%	
U_h	voltage harmonics	1	up to 25th order	1)
THD_u	voltage total harmonic distortion (rel. to fund.)	1	0 ÷ 20%	1)
$THD\text{-}R_u$	voltage total harmonic distortion (rel. to RMS)	1	0 ÷ 20%	1)
I_h	current harmonics	–	–	1)
THD_i	current total harmonic distortion (rel. to fund.)	5	0 ÷ 200%	1)
$THD\text{-}R_i$	voltage total harmonic distortion (rel. to RMS)	5	0 ÷ 200%	1)
M_{SV}	mains signalling voltage	TBD	TBD	1, 2)

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1) … according to IEC 61000-4-7

2) … with optional firmware module „RCS“

4 Maintenance, service and warranty

Maintenance The instrument SMM 133 does not require any special maintenance. For reliable operation, it is only necessary to adhere to the specified operating conditions and not to expose it to rough handling and exposure to water or various chemicals that could cause damage.

The lithium battery installed in the instrument is capable of backing up memory and RTC for approximately 5 years without a power supply at an average temperature of 20^{o}C and a typical load current in the instrument ($< 10\,\mu A$). If the battery is discharged, it is necessary to to send the instrument to the manufacturer for battery replacement.

Service In case of product failure, a warranty must be claimed with the manufacturer at:

K M B systems, s.r.o.
Tř. dr. M. Horákové 559
460 05 Liberec 7
Czech republic
Tel.: +420 485 130 314
E-mail: kmb@kmb.cz
Web: www.kmb.cz

The product must be properly packed to avoid shipping damage. A description of the fault must be provided with the product.

If warranty repair is claimed, the warranty card must also be sent. If an out-of-warranty repair is required, an order for this repair must be attached.

Warranty card: The device is warranted for a period of 24 months from the date of purchase, but no longer than 30 months from the manufacturer's delivery date. Defects that arise within these time limits demonstrably due to defective design, faulty construction or unsuitable material will be repaired free of charge by the manufacturer or authorized service organization.

The warranty also expires during the warranty period if the user performs unauthorized modifications or changes on the device, if the device connects to incorrectly selected values, if the device has been violated by unauthorized falls or improper handling, or if it has been operated in contrary to the specified technical parameters.

Product type:	.....	Serial number:	.....
Delivery date:	.....	Checkout control:	.....
		Manufacturer's stamp:	.....
Date of sale:	.....	Seller's stamp:	.....