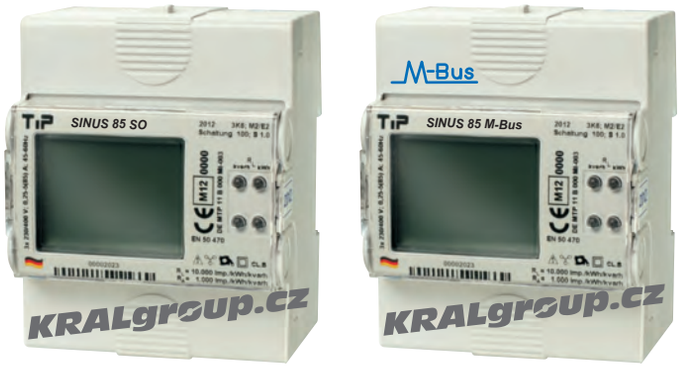

SINUS 85 S0 & SINUS 85 M-Bus
SINUS 5II1 S0 & SINUS 5II1 M-Bus

Three-phase static energy meter for alternating voltage

with changes valid to: 19.3.2014
Features and specifications are subject to change.

USER MANUAL

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WARNING!

Device installation and use must be carried out only by qualified staff.
Switch off the voltage before device installation.
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TYPE

SINUS 85 is an electronic, four-wires, three-phase energy meter, direct connected for active power measurement in AC unbalanced electricity network.
SINUS 5II1 is an electronic, four-wires, three-phase energy meter, indirect connected for active power measurement in AC unbalanced electricity network.

USAGE

The energy meter SINUS is fully electronic, four-wires meter working independently and to be permanently installed in three-phase four-wires electricity networks and designed to measure electrical active and reactive energy and register up to two energy tariffs. The meter is designed for indoor or residential installations and for installation in control cabinets for DIN rail mounting with size of the 4 modules (4-TE).
Type of connection: The energy meter SINUS 85 is designed for direct connection to low-voltage networks up to 85 A current limit.
The energy meter is equipped with terminals for control voltage for tariff switching and active energy pulse output. The meter. The energy meter SINUS 5II1 is designed for indirect connection to low-voltage network to be connected to the current transformers with secondary current of 5 A or 1 A.

VERIFIED TYPE

The energy meter SINUS with MID conformity marking on the basis of type test certificate can measure the electrical active energy as billing meter.
When used as a billing meter in the Approvals / Certificates for shared modes are observed and to observe the functionality according to the name plate!

MORE FEATURES

For the energy meter valid conditions of extended electromagnetic immunity in the range from 2 kHz to 150 kHz according to the requirements of the EMC Directive EN 50082-2 "Guidelines for the evaluation of the reliability and stability of the meters and ancillary measurement devices" (suitability of the inverter). Connect to the network without neutral conductor is allowed only for the type of SINUS 5II1, which does not affect the metrological characteristics of the meter in the measure borders of the exposure limit values. Special auxiliary power meter is not necessary. An optional second impulse output for reactive energy is idle or, alternatively, is used for data transmission over a data communications interface M-Bus.

REFERENCES TO REGULATIONS AND STANDARDS

The active energy unit measurement corresponds to the standards DIN EN 50470-1:2006 and EN 50470-3:2006
The reactive energy unit corresponds to the standards DIN EN 62052-11:2003 and DIN EN 62053-23:2003
The energy meter type test certificate meets the MID Directive 2004/221/ES
Based unit complies with the EMC Directive 2004/108/EC
Pulse output conforms to the standard DIN EN 62053-31:1999 for passive pulse output class A and or B
Width of the energy meter complies with the DIN 43880:1988 with size 1 and width of the meter cover 72mm
Mounting on 35 mm standard DIN rail (TH 35) according to DIN EN 60715:2001
Protection level for energy meter and its cover respect standard DIN EN 60529:1992
Capacity of cables and wires complies with DIN VDE 0298-4:2003 standards
Torques for terminal screws of the terminals are specified in DIN EN 60999-1:2000 standard
Slotted-head screwdriver standardized in DIN 5264:2006-01 and DIN ISO 8764-1:2006-01 standards

SAFETY INSTRUCTION

The energy meter complies with all safety requirements placed on it by law if used properly. Any use outside of its determination may cause interference, malfunctions, hazards or damage to the meter itself and or damage to other equipment. Meters with mechanical damage, manipulated or with open cover and or visibly dropped, in any case shall not be installed and or commissioned. The meter may be used only for its intended purpose. Work on the electrical equipment may only be performed by duly trained specialist personnel with the appropriate permissions. It is necessary to observe and respect the safety regulations and measures adopted and adhered to.

INSTALLATION PLACE

The meter can be firmly installed in the installation box (UV Cabinet, switchboard cabinet, small apartment switchboard etc.) with the protection class IP54 or higher on a standard DIN rail 35 mm according to DIN EN 60715:2001 standard. For billing measurement unobstructed view must be ensured permanently dependent on the on the meter register (readability of register). Installation on standard meter plate according to the DIN 43853 is not allowed without the mounting adapter and not possible without additional coverage.

DIRECT CONNECTED ENERGY METER SINUS 85

The installation of the meter is made directly in the measurement circuit of the customer. Consumption of auxiliary power and measuring voltage is designed internally before the current measuring sensor.

CONNECTION VALUES SINUS 85

Always valid all values and information given on the name plate of the meter!
The energy meter on which is the printed voltage on the name plate 3 x 230/400V applies:
Nominal voltage U_n = 3 x 230/400V in three-phase, four-wire three system electricity network.

For the energy meter on which is the printed current range on the name plate 0.25-5(85)A following applies:
Starting current I_{st} = 0.02 A
Minimum current I_{min} = 0.2 A
Trcking current I_{tr} = 0.5 A
Reference current I_{ref} = 5 A
Maximal current I_{max} = 85 A
In balanced load networks.

Variants

SINUS 5II1 SO with maximum current 6 A is one pulse output for active energy and one pulse output for reactive energy.
SINUS 5II1 M-Bus with maximum current 6 A is one pulse output for active energy and one data interface M-Bus.

PROVISIONS

It must be ensured in each case that the operating conditions of the energy meter do not exceed the limit values specified in the technical data and the nominal values specified on the energy meter name plate are observed in the installation location.

FUSES AND PROTECTION

Fuses for SINUS 85

The energy meter shall be installed with additional overcurrent protection devices not exceeding 80 A which will be installed in the power lines (e.g. full range fuses, circuit breaker).

Fuses for SINUS 5II1

The energy meter shall be installed with additional fuses with the value of max. 6A in the case of its direct connection into the electricity network. In case of installation the energy meter into the secondary current transformer circuit (i.e., the output terminals on the transformer) no overcurrent protective devices or circuit breaker must be present.

CABLE CROSS-SECTIONS

Cable cross-sections 80A

With regard to the current density of flow current the wires must be designed with regards to the ambient conditions so that the temperature does not exceed more than +55°C at a distance of 20 cm from the energy meter. Current density of cables is defined in the standard DIN VDE 0298-4.

Cable cross-sections 5A

The cross-section and the type of wiring to the energy meter must be taken into consideration in selecting the location and value of voltage fuse and installed cable length between the energy meter and current transformers and possibly regionally valid regulations. Current density of cables is defined in the standard DIN VDE 0298-4.
The choice of cable cross-sections of the power lines to the energy meter must take into account the secondary current of current transformers, apparent power and the overcurrent range of CT used, the installed cable length between the energy meter and current transformers specifications and, where applicable, possibly regionally valid regulations.

TERMINAL SCREW

SINUS 85 A terminal screw

The size of the terminal holes for current/voltage and neutral is minimum 2.5mm^2 and maximum of 25 mm^2.
Best suited for these terminals is a screwdriver blade shape of a cross (SL) of size of 5.5 mm x 1.0 mm.
Recommended tightening torque for the clamping screws M5 in the terminal box is 2.5Nm.
The size of the terminal holes for upper terminals is minimum 0.25mm^2 and maximum of 1.5 mm^2.
Best suited for these terminals is a screwdriver blade shape of a cross (SL) of size of 3.5 mm x 0.6 mm.
Recommended tightening torque for the clamping screws M2.5 in the terminal box is 0.4Nm.
Twisted wire ends shall be finished by pressed endings corresponded to the terminal hole size.
Tightening torques for the terminal screws are listed in DIN EN 60999-1 standard.

SINUS 5II1 A terminal screw

The size of the terminal holes for current/voltage and neutral is minimum 0.5mm^2 and maximum of 6 mm^2.
Best suited for these terminals is a screwdriver blade shape of a cross (SL) of size of 4.0 mm x 0.6 mm.
Recommended tightening torque for the clamping screws M3 in the terminal box is 0.5Nm.
The size of the terminal holes for upper terminals is minimum 0.25 mm^2 and maximum of 1.5 mm^2.
Best suited for these terminals is a screwdriver blade shape of a cross (SL) of size of 3.5 mm x 0.6 mm.
Recommended tightening torque for the clamping screws M2.5 in the terminal box is 0.4Nm.
Twisted wire ends shall be finished by pressed endings corresponded to the terminal hole size.
Tightening torques for the terminal screws are listed in DIN EN 60999-1 standard.

MOUNTING

Mounting of the energy meter can be made in an electrical system only in voltage and current circuits. It is the need to respect the relevant standards, safety regulations and measures, and in case of any deviation it is necessary to immediately stop the installation. The meter may be fitted in the electrical equipment and connected to the components whose electrical parameters comply to the electrical parameters, indicated on the name plate of the energy meter, and comply with the conditions and specifications. An over-current protective device of voltage inputs must comply with the relevant regulations and the wiring circuits.

INSTALLATION INSPECTION

Diagnosis conformity of energy meter current and voltage parameters meter with the parameters of electrical connections. It is necessary to carefully check whether the energy meter connection type conforms with the appropriate wiring diagram and the conditions in the event of energy meter disconnection from the electricity network. The overcurrent protective device (fuse before the meter) must not exceed the maximum allowable value. The installed wires cross-sections must be selected according to applicable standards and must meet the requirements of the connection conditions. The conductor ends of the installation cables must be sufficiently far into the screw terminals of the energy meter and tightened the bolts to the required torque.
It can protrude bare (uninsulated) line areas of the terminal block insulating material in any terminal point. The clamping screw covers of the energy meter shall be closed after installation.

COMMISSIONING

Commissioning directly connected energy meter

The commissioning of the energy meter is gradual and it can be started only after fully completing the installation and subsequently complete diagnostics installation. Make sure the output fuses of the direct connected energy meter are in the off position before putting the energy meter into operation or before its no-load commissioning. Turning series fuses / measurement and supply voltage. Check the applied voltage on the energy meter terminals in all three phases and compare voltage parameters with data specified on the energy meter nameplate. Check availability and the correct phase sequence at the energy meter terminals. Checking the meter at a standstill - test LED (output RL) on the right side of the energy meter display must permanently lit red. Turn on the circuit breakers installed in the electricity circuit before and after the energy meter - starts commissioning and energy consumption metering.

Commissioning indirect connected energy meter (via current transformers)

The commissioning of the energy meter is gradual and it can be started only after fully completing the installation and subsequently complete diagnostics installation. Ballast fuses of measurement and supply voltage energy meter inputs must be switched off before commissioning or stress-free start-up is necessary to ensure a different way. Before energy meter commission, it is necessary to create a secure mode or free running (running without load) secondary circuit of the CT (eg. disconnecting the circuits on the current transformer primary side and securing short-circuit on the secondary side). Switch on the series fuses or the measurement and supply voltage. Check the applied voltage on the energy meter terminals in all three phases and compare voltage parameters with data specified on the energy meter nameplate. Check availability and the correct phase sequence at the energy meter terminals. Checking the meter at a standstill - test LED (output RL) on the right side of the energy meter display must permanently lit red. By sequence switching the primary current and secondary current release shortcut of the current transformers the energy meter start to operate - the energy meter tested power consumption, and verified the pairing measuring phase voltage with secondary current, which must correspond with the type of energy meter wiring in the electrical installation.

GET RESTART

The energy meter loads its operating program (firmware) from its internal memory after switching on. On the display of the energy meter is displayed for 3 seconds the display segment test (all display segments are displayed at the same time) and check the functionality of the output control LED (LED lights). After tests completion, the energy meter is ready for use in measuring mode of energy consumption and begins to record its consumption. At the same time, with the display segment test, will appear on the display the firmware for a few seconds and then the manufacturer ID (manufacturer's number) for a further period of 4 seconds. From approximately 10 seconds after switching on, the actual status of the energy meter register is displayed (kWh).

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ENERGY METER SWITCH-OFF

Voltage value below 180VAC (phase-to-neutral) will block the energy measurement in the phase in which the voltage drop has occurred. The resulting partial amount of energy is not registered also on the test output (LED) and also on the S0 pulse output. When the voltage drop in all phases drop under value of 180VAC (phase-to-neutral) any measuring of energy consumption will be blocked, while the display, the LED test output and the S0 pulse output will be switched off. The measured electricity consumption meter during the energy meter shutdown will be saved in non-volatile memory (EEPROM), in which will be stored for at least 10 years.

PHASE FAILURE DETECTION

The phase voltages presence on the energy meter display are indicated by the digits in a group (display segment) “L123”. By the absence of phase voltages, the respective numbers in the symbol group are hidden.

ENERGY METER STOP AND START-UP

Below the values of specified starting current (I_{st}) and at the rated voltage (U_n) starts permanently test output (LED) to shine, separately for active and reactive energy, and this means that the measurement of active and reactive energy has been stopped. Indicators on the energy meter display for the kind of energy and the energy flow direction are not visible when the measurement is stopped. Energy quantities, with a value less than the value for the starting current, will not be registered by the energy meter. When exceeding the value of the starting current (I_{st}) and exists the rated voltage (U_n) permanently lighting LED test output ends and the measurement of active and reactive energy has again began. Energy quantities above the value of the starting current (I_{st}) and at the rated voltage (U_n) are indicated by flashing the test output (LED) separately for active and reactive energy and this means that the measurement of active and reactive energy is in progress. The kind of energy and the energy flow direction are visible on the display, which are detected by the meter, due to its connection.

MEASUREMENT ERROR

Errors in measurements are specified in the EU directive no MID-2004/22/EC and are therefore permitted in the borders according to the energy meter accuracy class and in use within the permissible operating conditions.

REVERSE RUNNING STOP

The condition is that the energy meter will be marked as one-way meter, with the printed symbol on the name plate for the reverse running stop, which prevents the reverse movement. If the vectorial sum in all the three loaded phases is positive, the resulting energy amount is registered by energy meter. The energy meter behaviour will respect the form of the vectorial sum corresponds with Ferraris type (inductive energy meters). As soon as the vectorial sum is negative, the energy registration will be stopped by energy meter.

BI-DIRECTIONAL REGISTRATION

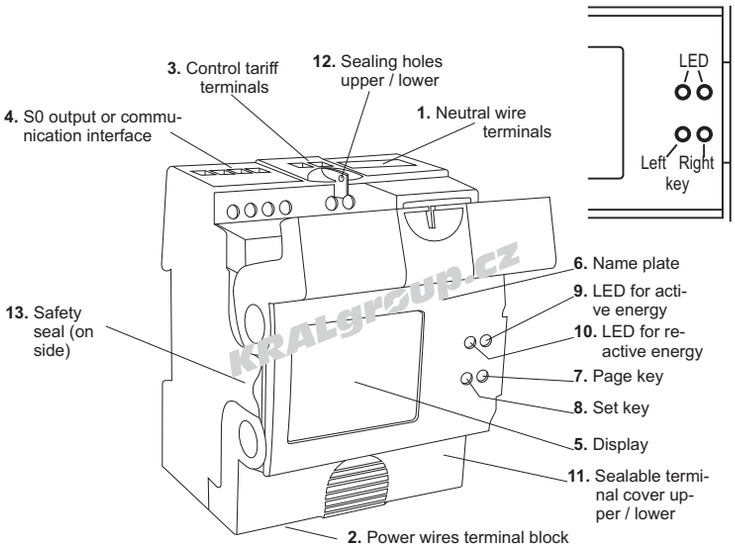
Requires the marking of the energy meter as reversible with the symbol of arrows. If the vectorial sum in all the three loaded phases is positive, the resulting energy amount is registered by energy meter as the energy delivery (Import) and if the vectorial sum is negative, then the energy amount is registered as the energy supply (Export). Reversible registering energy meter is not type-approved for billing (MID) and may be used only for the sub-metering.

ENERGY FLOW CONTROL

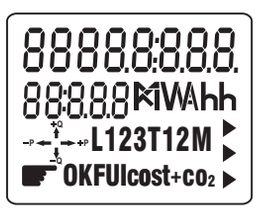
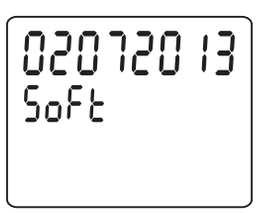
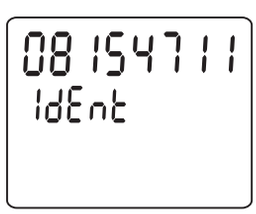
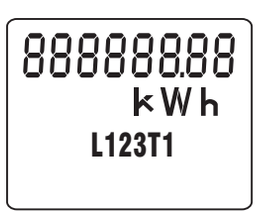
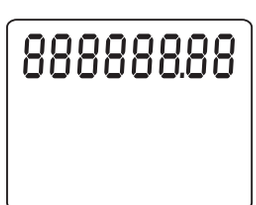
Change the direction of the load in one from the three phases of vectorial sum, i.e. if the energy flow in one connected phase to the energy meter is in the opposite direction (for example if the phase is wrongly connected to phase - input and - output on the energy meter terminals) then the energy meter will display the energy type / direction by flashing indicator of the different energy direction, however the final direction will respect the resulting vector sum of energy in all three phases by a permanent indicator arrow.

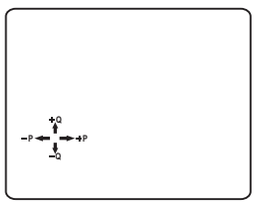
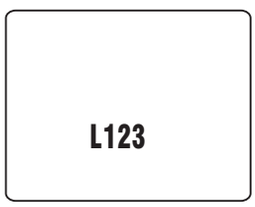
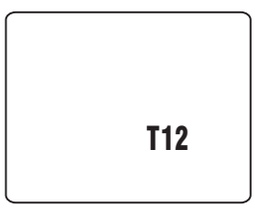
FUNCTIONAL ELEMENTS

LC-display (liquid crystal display) without a backlight for the display of the energy meter status and other information, as well as two test outputs with Red LEDs. Red illuminating LEDs are the test outputs for measured active and reactive energy and also show the meter idle status (separate for active and reactive energy) or by flashing pulses whose time interval, in proportion to the meter constant, is equal to the related active and or reactive energy for which the measurement continuously in progress.



VIEW OF ENERGY METER DISPLAY

Segment test	all possible segments are shown at the same time for 3 seconds on meter display after its connection to the electricity network	
Software release	example: "02072013" will be shown on display only for 4 seconds after energy meter operation starts and also the identification "SoFt"	
Serial (manufacturer) number	example: "08154711" will be shown on display for 4 seconds after energy meter operation starts and also displayed the identification "IdEnt"	
Main menu during the energy meter idle (standstill)	example: counter balance with 88888,888 kWh; connected voltages at L1, L2 and L3; active Tariff 1; energy meter idle (standstill)	
Display area 1	for energy meter reading, measured values, the menu name, results and navigation in menu	

Display area 2	display identifier, supplementary information	
Units	unit for display area 1	
Symbol for the type / flow direction of energy	energy meter idle (standstill) or in case of current and direction of energy flow in vectorial sum outside conditions in which the energy meter operates (separated for +P, -P, +0, -0) and or for energy direction control	
Phase voltage	momentary phase voltages and connected rotation field with indication of direction of rotation left or right	
Actual tariff	used tariff in progress or actual-registering tariff or tariff identification of the measured values	
Additional quantities	assignment to the auxiliary values	
Control arrows	displays the statuses of the mode control buttons for a long (2 > 5 sec.) button press and for longer (<5 sec.) button press	
Hand symbol	It appears only when the CT connected energy meters have not yet completed setting of the CT ratio and the hand symbol is flashing, after completing CT ratio and saving it the hand symbol disappears (CAUTION: the CT ratio can be saved only ones, after saving it is not possible to amend it!).	

COUNTER CAPACITY

SINUS 85

The display register for the measured energy, in case of new energy meter, has 6 full places (before the decimal point) and 2 decimal places after the decimal point, and is located in the display area 1. In case of possible register overflow at the end of the register capacity the register is automatically reduced to one decimal place. At the next register overflow capacity the maximum value is automatically set to 8 whole decimal places.

SINUS 5II1

The display register for the measured energy, in case of new energy meter, has 5 full places (before the decimal point) and 3 decimal places after the decimal point, and is located in the display area 1. In case of possible register overflow at the end of the register capacity the register is automatically reduced to one decimal place. At the last register overflow capacity maximum value of the counter is automatically sets the counter to 8 whole decimal places for kilowatt-hours (kWh) and 0 decimal digits.

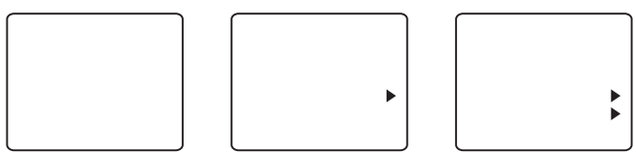
The maximum value of the meter display register are 8+0 places, which is 99,999,999 kWh and corresponds approximately to the amount of energy measured during the operating time of about 4000 hours (approximately 5.5 months) by maximal secondary current, rated voltage , power factor 1 and the value for 6000 CT ratio for the current transformer.

DISPLAY NAVIGATION

Displaying of the measured values can be controlled by two buttons on the energy meter. A distinction is made in navigating menus which button is pressed and how long the button is held down. The indicator arrows on the display determine the diagnosed functionality by the meter after pressing the button:

Short: shorter than 2 seconds - permitted different functionality is described below.

Long: more than 2 seconds and less than 5 seconds - displays the top indicator arrow. Permitted different functionality is described below.



Key press: *Short* | Key press: *Long* | Key press: *Longer*

Longer: more than 5 seconds - after 4 seconds, under the upper arrow the bottom (second) arrow is displayed, after more than 5 seconds without releasing the button, the display returns to the basic display.

The basic display can be scrolled only by a *short* pressing of a button and no one display identifier is shown. The other function menus are operated either by *short* or *long* pressing a button based on the type of display identifier. The choice of the functional menus can be proceeded either first by *long* pressing the left or right button from the main menu or by the automatic transition from the last main menu screen. Among the options in the menu functions (the first screen loops) Std-dAtA, AbL-dAtA, SEt or PArA can scroll through a *short* pressing the left button. Entry into individual loops occurs after *long* pressing either the left or right button.

only available with SINUS 5II1

Meter idle (standstill) | energy direction +P and +Q | no voltage on L2 | connection error +P and -P

BASIC DISPLAY

In the basic display (after switching the meter to the network or manually, and or automatically after a return to basic display) are simultaneously displayed: the active energy meter reading of purchased energy in kWh and in active energy tariff, unit "kWh", connected phase voltages in order "L123", tariff "T1" and or "T2" in which the measured energy consumption is registered and energy flow direction (shown by the type of energy and by the symbol for the direction of energy flow). Displaying the display identifier (display area 2) remains hidden.

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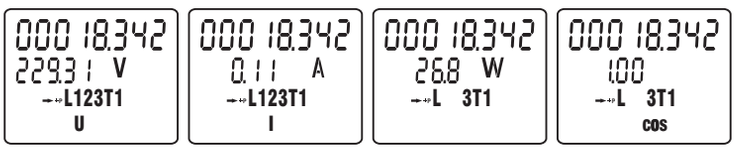
MAIN MENU

The main menu is used for simultaneous display of active energy consumption in the given active tariff and up to date on upcoming electric counter values. No other distinctive symbols are used for naming the displayed values. Move on the main menu occurs immediately after the *short* pressing the left button and followed by *short* pressing left or right buttons. The *short* pressing of the left button will display one after the other the electrical quantities V, A, W, VA, var, frequency and power factor (cos φ). *Short* pressing the right button will displays one after the other the phase assignment L123 or individually phase L1, L2 and L3. Actual value of appropriate current selection connected to the energy meter is displayed in area 2. In the display area 1, as well as in the basic display, is always displayed on the current status of the measured active energy in the relevant tariff and in kWh.



Voltage display in L123 | Current display in L123 | Power display in L3 | Power Factor in L3

Std-dAtA MENU

Function menu Std-dAtA contains the billing recorded values by the energy meter (billing meter readings) - if the meter meets the statutory parameters for verification - and that necessary or pivotal information. The energy meter display shows also identifying symbols available for naming of displayed values. The choice is carried out either from the basic menu or from the main menu after the first *long* pressing the left or right button on the energy meter. For further scrolling among menus Std-dAtA, AbL dAtA, SEt or PArA is necessary to press *shortly* the left button. Entry into the menu loop Std-dAtA is done after one *long* pressing either the left or right button on the energy meter. Scrolling through the pages with the values in the loop menu Std-dAtA occurs for the subsequent page menu after *short* pressing the left button or for the previous page after *short* pressing the right button on the energy meter.

Menu name	Display identifier	Meaning
Std-dAtA		*Standard billing record*
	0.0.0	Energy meter manufacturer number
	0.2.0	Software ID (firmware version)
	0.3.0	Pulse constant LED for active and reactive energy
	0.3.3	Pulse constant output S0 for active and reactive energy
	1.8.1	+A, active energy value in tariff T1 [kWh]
	1.8.2	+A, active energy value in tariff T2 [kWh]
	2.8.1.	-A, active energy value in tariff T1 [kWh]
	2.8.2	-A, active energy value in tariff T2 [kWh]
	3.8.1	+R, reactive energy value in tariff T1 [kvarh]
	3.8.2	+R, reactive energy value in tariff T2 [kvarh]
	4.8.1	-R, reactive energy value in tariff T1 [kvarh]
	4.8.2	-R, reactive energy value in tariff T2 [kvarh]

4.2.4.4 AbL-dAtA MENU

The function menu AbL dAtA contains the service information of the energy meter. There are indicators for naming used and displayed values. The choice is carried out either from the basic menu or from the main menu after the first *long* pressing the left or right button on the energy meter. For further scrolling among menus Std-dAtA, AbL-dAtA, SEt or PArA is necessary to press *shortly* the left button. Entry into the menu loop AbL-dAtA is done after one *long* pressing either the left or right button on the energy meter. Scrolling through the pages with the values in the loop menu AbL-dAtA occurs for the subsequent page menu after *short* pressing the left button or for the previous page after *short* pressing the right button on the energy meter.

Menu name	Display identifier	Meaning
AbL-dAtA		*Service record*
	0.0.0	Energy meter manufacturer number
	0.0.1	M-Bus primary address (only available at SINUS M-BUS)
	0.0.2	M-Bus secondary address (only available at SINUS M-BUS)
	0.4.2	Current transformer ratio
	32.7.0	Voltage in phase L1 [V]
	52.7.0	Voltage in Phase L2 [V]
	72.7.0	Voltage in phase L3 [V]
	31.7.0	Current in phase L1 [A]
	51.7.0	Current in phase L2 [A]
	71.7.0	Current in phase L3 [A]
	33.7.0	Power factor in phase L1
	53.7.0	Power factor in phase L2
	73.7.0	Power factor in phase L3
	13.7.0	Power factor all 3 phases
	21.7.0	Active power + in phase L1 [W]
	41.7.0	Active power + in phase L2 [W]
	61.7.0	Active power + in phase L3 [W]
	1.7.0	Active power + all 3 phases [W]
	23.7.0	Reactive power + in phase L1 [var]
	43.7.0	Reactive power + in phase L2 [var]
	63.7.0	Reactive power + in phase L3 [var]
	3.7.0	Reactive power + all 3 phases [var]
	9.7.0	Apparent power + all 3 phases [VA]

SEt MENU

The function menu SEt containes adjustable by the energy meter interface values (outputs) which are programmable. There are indicators for naming used and displayed values. The choice is carried out either from the basic menu or from the main menu after the first *long* pressing the left or right button on the energy meter. For further scrolling among menus Std-dAtA, AbL-dAtA, SEt or PArA is necessary to press *shortly* the left button. Entry into the menu loop SEt is done after one *long* pressing either the left or right button on the energy meter. Scrolling through the pages with the values in the loop menu SEt occurs for the subsequent page menu after *short* pressing the left button or for the previous page after *short* pressing the right button on the energy meter.

Menu name	Display identifier	Meaning	Range of values
SEt		*Settable values*	
	0.0.1	M-Bus primary address	00000000 ... 00000250
	0.0.2	M-Bus secondary address	00000000 ... 99999999
	c90.9	M-Bus optional baud rate [Bd]	300 ... 19200
	0.3.8	S0 output pulse width t_i max	00000 ... 59999

The setting values are programmable and repeatable, access to the settings is not protected and did not perform any record of changes in the settings.

PArA MENU

PArA menu function is available only in indirect connected energy meter SINUS 5II1.
PArA menu function contains set values by the energy meter, which are programmable.
There are indicators for naming used and displayed values. The choice is carried out either from the basic menu or from the main menu after the first *long* pressing the left or right button on the energy meter. For further scrolling among menus Std-dAtA, AbL-dAtA, SEt or PArA is necessary to press *shortly* the left button. Entry into the menu loop SEt is done after one *long* pressing either the left or right button on the energy meter.
PArA menu function contains only one entry.

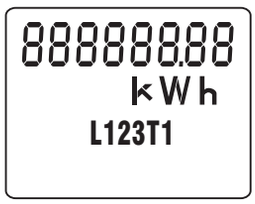
Menu name	Display identifier	Meaning	Range of values
PArA		*Settable value*	
	0.4.2	Current transformer ratio	00001 ... 06000

ATTENTION setting programmable value ratio is only possible ones and, after its saving, furthermore is not possible the set CT ratio either to amend and or to set again!!!!

PROGRAMMING - SET-UP FUNCTIONS

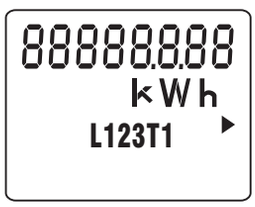
Basic display, energy meter is idle (standstill)

Example: meter register status is 88,888.888 kWh; voltage connected at L1, L2 and L3; active Tariff 1; energy meter idle (standstill)



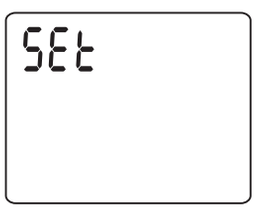
Leaving the basic display with the first *long* press left or right button - picture shows main display with the top control arrow and the energy meter is idle (standstill)

once, after 2 seconds holding the button pressed, will appear control arrow on the screen immediately release the button



It appears the page with indicator Std-dAtA after *short* key press between choices to menu SEt

Menu options:
Std-dAtA, AbL-dAtA, SEt, PArA

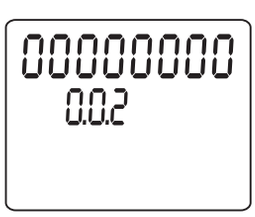


Entry to the function menu is possible after a *long* pressing the left or right button - picture shows the entrance to the menu function SEt in display area 1 is displayed control arrow to enter the menu loop

once, after 2 seconds holding the button pressed, will appear control arrow on the screen immediately release the button

The menu scroll by pressing *short* key press between menus to display the required identifier - picture shows an identifier 0.0.2 for the M-Bus secondary address in the display area 2

Options in display identifiers:
0.0.1
0.0.2
C90.9
0.3.B

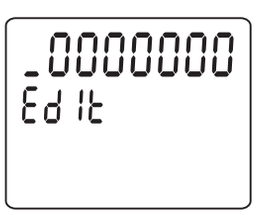


To entry into selected menu is possible after *long* pressing either the left or right button - picture shows a display identifier 0.0.2 for the change of M-Bus secondary addresses 00000000

once, after 2 seconds holding the button pressed, will appear control arrow on the screen immediately release the button

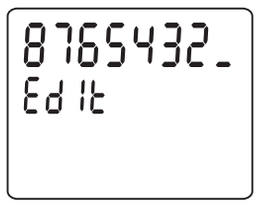
***Short* press the right button flashingnumber increases the number for 1 above, *short* press the left button for moving for one position to the right. Proceed editing the numbers until the last position on the right side of the display**

editable position flashes:
0 ... 0 ... _ ... _ ...
Identifier EdIt flashes:
EdIt ... 0.0.2 ... EdIt ...



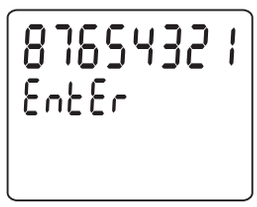
***Short* press the rightbutton on the flashing number increases the number for 1 higher - the last digit on the right side will be set to eg. " 1". Short press the left button to change the identifier EntEr**

editable position flashes:
1 ... 1 ... _ ... _ ...
Identifier EdIt flashes:
EdIt ... 0.0.2 ... EdIt ...



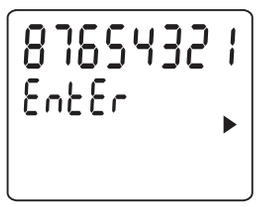
Change identifier Edit to EntEr *options:* Correction settings or new values set-up

set secondary address: 87654321
Identifier EntEr flashes:
Enter … 0.0.2 … enter …



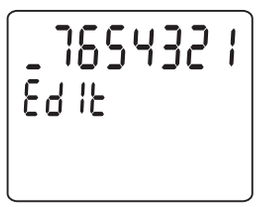
assumption:
***Long* button press of the left or right button closes and saves the set value**

once, after 2 seconds holding the button pressed, will appear control arrow on the screen immediately release the button

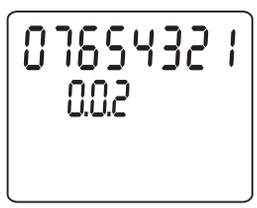


settings repeating:
***Short* key press of the left button changes the identifier again to EdIt and number can be set up again from the left to the new number**

editable position flashes:
8 … _ … 8 … _ …
Identifier EdIt flashes:
EdIt ... 0.0.2 ... EdIt ...



On picture example: the newly selected M-Bus secondary address to 87654321 in the upper line and the bottom line displays appropriate identifier



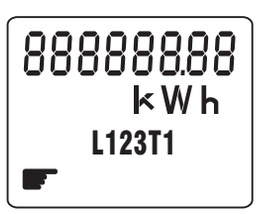
If the setting process is interrupted for any reason and has not yet completed, the energy meters automatically returns after 5 minutes after the last key press to the basic display. Until then every changes, to be made, will be lost. Since then, all changes will be ineffective and will be lost.

PARAMETER SETTING (PArA)

- is not available on the direct connected energy meters

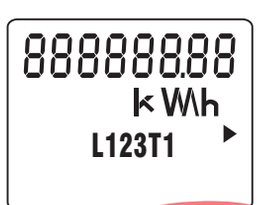
Basic display, energy meter is idle (standstill)

Example: meter register status is 88,888.888 kWh; voltage connected at L1, L2 and L3; active Tariff 1; energy meter idle (standstill)



Leaving the basic display with the first *long* press left or right button - picture shows main display with the top control arrow and the energy meter is idle (standstill)

once, after 2 seconds holding the button pressed, will appear control arrow on the screen immediately release the button



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It appears the page with indicator Std-dAtA after *short* key press between choices to menu PArA

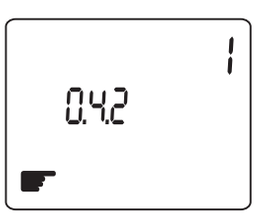
Menu options:
Std-dAtA
AbL-dAtA
SEt
PArA

Entry to the function menu is possible after a *long* pressing the left or right button - picture shows the function menu PArA in display area 1 with displayed control arrow to enter the menu loop

once, after 2 seconds holding the button pressed, will appear control arrow on the screen immediately release the button

Display identifier 0.4.2 is shown on display for the actual set-up current transformer ratio in the display area 2 and hand symbol as setting request

Options in display identifiers:
0.4.2



The entry for change of the current transformer ratio is possible after *long* press either left or right button - the selection of display identifier 0.4.2 so that it is possible to change the value 000001 of the current transformer ratio corresponding to the actual set current transmission ratio of the current transformer

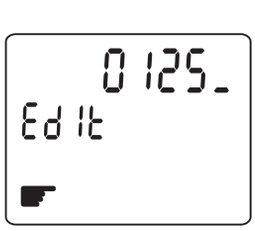
once, after 2 seconds holding the button pressed, will appear control arrow on the screen immediately release the button

***Short* press the right button increases the editable number by one number up**
***Short* press the left button moves cursor on new editable number locating to one place to the right**
Setting a new CT ratio number is necessary until the last number place on the right side

editable position flashes:
0 ... 0 ... _ ... _ ...
Identifier EdIt flashes:
EdIt ... 0.0.2 ... EdIt ...

***Short* pressing of the right button sets the position of one number up - the last position on the right side will be set to e.g. "0". *Short* pressing of the left button changes the identifier to EntEr**

editable position flashes:
0 ... 0 ... _ ... _ ...
Identifier EdIt flashes:
EdIt ... 0.0.2 ... EdIt ...



Change identifier Edit to EntEr *options*: Correction settings or new values set-up

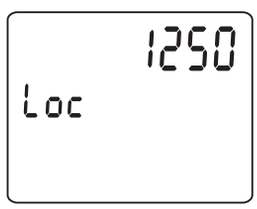
Set CT ratio:
01250
Identifier EntEr flashes:
EntEr ... 0.4.2 ... EntEr ...

assumption:
***Long* button press of the left or right button closes and saves the set value**

once, after 2 seconds holding the button pressed, will appear control arrow on the screen immediately release the button

Confirmation of completion of the CT ratio change of the current transformer to the new value will change symbol identifier from EntEr to Loc - the flashing hand symbol disappears

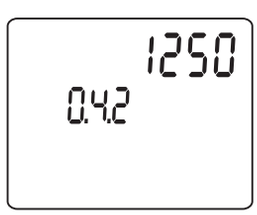
Acknowledgement of change ratio settings CT:
01250
Identifier Loc flashes:
Loc ... 0.4.2 ... Loc ...



settings repeating:
***Short* press of the left button changes the identifier again to EdIt and number can be set up again from the left to the new number**

editable position flashes:
0 ... 0 ... _ ... _ ...
Identifier EdIt flashes:
EdIt ... 0.0.2 ... EdIt ...

In the example once set value of current transformer ratio to the value in the upper line display number 1250 - corresponding identifier is 0.4.2 - the invisible hand symbol indicates that the setting value ratio current transformer was successful



If the setting process is interrupted for any reason and has not yet completed, the energy meters automatically returns after 5 minutes after the last key press to the basic display. Until then every changes, to be made, will be lost. Since then, all changes will be ineffective and will be lost.
Notes: If the hand symbol is flashing, then all registered values by the energy meter cannot be used for billing purposes - because first must be completed setting of CT ratio! When CT ratio is set to the value = 1, it is possible to connect to the energy meter any sets of current transformers, but in such a case is necessary to multiple the register value by CT ratio value of actually connected current transformers to the energy meter in order to get the right value of the measured consumption. A set for the CT ratio value is > 1 it changes the energy meter to primary measurements - assuming that the attached set of current transformers have each identical value of the CT ratio of the connected current transformer. Then, in this case, the energy consumption registered by the energy meter is already multiplied by the meter and the measurement corresponds to the actual consumption.

INPUT TARIFF CONTROL

A common control input for tariff switching is equipped in each energy meter of series SINUS. The tariff control input is used to switch between the two possible energy tariffs T1 and T2 for tariffed registration of the measurement. The tariff switching affects simultaneously on the tariff classification for all types and directions of the measured energy. The tariff control input for tariff switching is electrically passive and insulated. Without applied voltage control (0 V) the energy meter registers a power consumption only in tariff T1. The control for changing tariff over to T2 is done with AC voltage rms value range 180V ... 260V. The amount of power consumption for tariff switching is about 0.3VA at 230VAC. During a power cut or improper connection terminals for tariff control may be completely lost the registered consumption divided into tariffs. However, the influence or change of the measuring parameters or calculation results will not be affected by the energy cut. The size of the terminal holes for tariff control terminals is minimum 0.25 mm^2 and maximum of 1.5 mm^2. Twisted wire ends shall be finished by pressed endings corresponded to the terminal hole size. Best suited for these terminals is a screwdriver blade shape of a cross (SL) of size of 3.5 mm x 0.6 mm. Recommended tightening torque for the clamping screws in the terminal box is 0.4Nm. Tightening torques for the terminal screws are listed in DIN EN 60999-1 standard.

S0 PULSE OUTPUT

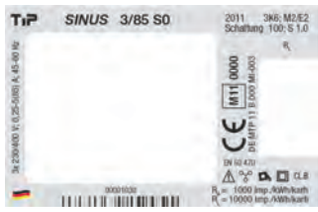
The energy meter of type SINUS S0 always has one pulse output for active and one pulse output for reactive energy, without any other additional output for communication interface. Pulse outputs provide a proportional pulse output sequence in relation to output pulse constant R_A and, depending on the amount of the measured meter of both types of energy consumption. Impulses are electrically passive, galvanic insulated and with power from an external source, providing DC voltage from 5V to 27V, maximal current 27mA, the pre-set maximum output pulse width (t_i max) is 35 ms. The maximum pulse output width (t_i max) is settable in milliseconds, in the SEt menu at display identifier 0.3.8, from 1ms by set value 00000 to 30s by set value 30000 or by ration 1 : 1 when setting exceed the value of 30000. The respective minimum impulse width (t_i min) and minimum delay (t_i min) between impulses resulted from the energy meter constant for the output pulse R_A and the momentary energy consumption, which is measured by the energy meter. The impulse output corresponds to the standard DIN EN 62053-31 when the impulse width output (t_i max) is set to over than 30ms, and is compatible with the classes A and B for passive pulse generators. Faulty and or incorrect impulse output connection and or its incorrect operation may be limitation for the impulse output function or can make its total destruction, but this does not effect to the metrological parameters of the energy meter and to the accuracy of the results of energy consumption measurement. The size of the terminal holes for impulse output terminals is minimum 0.25 mm^2 and maximum of 1.5 mm^2. Twisted wire ends shall be finished by pressed endings corresponded to the terminal hole size. Best suited for these terminals is a screwdriver blade shape of a cross (SL) of size of 3.5 mm x 0.6 mm. Recommended tightening torque for the clamping screws in the terminal box is 0.4Nm. Tightening torques for the terminal screws are listed in DIN EN 60999-1 standard.

DATA COMMUNICATION INTERFACE

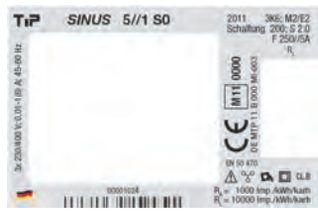
The energy meter of type SINUS M-BUS has one impulse output for active energy and one output for data communication M-Bus interface, a impulse output for reactive energy is not available. Data communication interface is designed in accordance with DIN EN 13757-2 and DIN EN 13757-3 standards. The wiring is made by twisted pair cable, serial data transmission is asynchronous (mode: start-stop) with a half-duplex communications. To use the M-Bus data communication interface in a M-Bus data network, it is necessary to unequivocally assign to each energy meter by unique communication address, size and data transmission speed for data communications. The default transmission speed is 2400 baud and is set by manufacturer, secondary M-Bus address is identical to the serial number of the meter. Change the pre-set data communication values in the meter, e.g. if necessary for customizing the values for M-Bus communication network, can be done in the function menu SEt on the page with display identifier 0.0.1 for M-Bus primary address, on the page with display identifier 0.0.2 for M-Bus secondary address and on the page with display identifier C90.9 for the communication speed. Data communication speed is selectable between 300, 600, 1200, 2400, 4800, 9600 and 19200 baud, the data format contains 11 bits per data information (1 start bit, 8 data bits, 1 parity bit [even], and 1 stop bit). Faulty and or incorrect communication interface connection and or its incorrect operation may be limitation for the communication interface function or can make its total destruction, but this does not effect to the metrological parameters of the energy meter and to the accuracy of the results of energy consumption measurement. The size of the terminal holes for communication interface terminals is minimum 0.25 mm^2 and maximum of 1.5 mm^2. Twisted wire ends shall be finished by pressed endings corresponded to the terminal hole size. Best suited for these terminals is a screwdriver blade shape of a cross (SL) of size of 3.5 mm x 0.6 mm. Recommended tightening torque for the clamping screws in the terminal box is 0.4Nm. Tightening torques for the terminal screws are listed in DIN EN 60999-1 standard.

NAMEPLATE

Nameplate example:



SINUS 85 S0



SINUS 5II1 S0

BASIC TECHNICAL DATA

TIP	name of the manufacturer
SINUS 85 S0 / SINUS 5II1 S0	type designation of the meter
R_L = 5000 Imp./kWh/kvarh	basic information about the meter constant (R_L) of impulse output
R_L = 20.000 Imp./kWh/kvarh	LED pulse output for active (imp/kWh) and reactive energy (imp/kvarh)
R_A = 500 Imp./kWh/kvarh	basic information about the meter constant (R_A) of electric check output
R_A = 5.000 Imp./kWh/kvarh	electrical test output pulses in imp/kWh or imp/kvarh
Connection 4712 14702	basic wiring diagram (see wiring diagram)
FW.13032014	indication of the firmware version in the meter
CL.B	indication of the meter accuracy class
EN 50470	design standards used as the basis for the meter features
TIP0814006672	serial number of the meter
2014	year of the production

METROLOGICAL PARAMETERS

3x 230/400V	measured voltage indication: nominal voltage
0,25-5(85)A resp. 0.01-1(6)A	measured current indication: minimal current, reference current, maximal current
50 Hz	indication of the frequency: the reference frequency range

ENVIRONMENTAL CONDITIONS

3K6	environment class for the limiting operating temperature range (-25°C to + 55°C)
M2IE2	environment classes for the permissible mechanical and electromagnetic environment (significant or high levels of vibration and shock; electromagnetic disturbances in industrial buildings)

CONFORMITY MARKING

CE M13 0000	"CE" conformity and Metrology marking in accordance with European directives applicable to the year 2013 (the year of putting into operation of the product is just an example)
DE MTP 11 B000 MI-003	metrology type test certificate, on the basis of which it is considered a conformity for the meter

SYMBOLS

Symbol No. 1		meter for use in three-phase, four-wires electrical networks
Symbol No. 2		meter for use in single-phase, two-wires electrical networks - only type SINUS 85 without MID (for sub-metering)
Symbol No. 3		register with reverse-running stop - for measuring of one-way flow of electricity consumption
Symbol No. 4		meter for measuring flow in both directions of the electric power consumption (without the MID only for sub-metering purposes)
Symbol No. 5		device with protective insulation respecting protection class 2
Symbol No. 6		need to observe the safety warning

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CONSTRUCTION

The energy meter cover consists of more plastic parts. On the cover cover of the energy meter is one part made from crystal transparent plastic and covers only energy meter parts, which must be visible: LCD (liquid crystal display) and the name plate of the energy meter. To connect the energy meter to the electricity network are available externally accessible clamps screws. The energy meter electronic circuits are located on printed circuit boards that are sealed in a plastic material inside the energy meter.

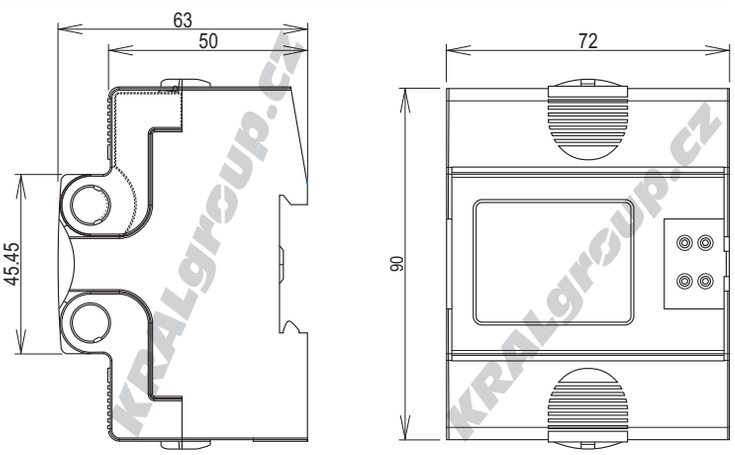
METER COVER

The energy meter cover consists of a few, in more places together united individual parts, which may not be removed during the installation of the energy meter into the electricity network. For access to the terminal screws first open (softly) hinged terminal covers which must be closed again as soon as the wires are connected.
WARNING: If you try to remove any other part on the meter, the energy meter will be irreversibly destroyed.
Terminal covers can be secured (for example by seals) against unauthorized access.

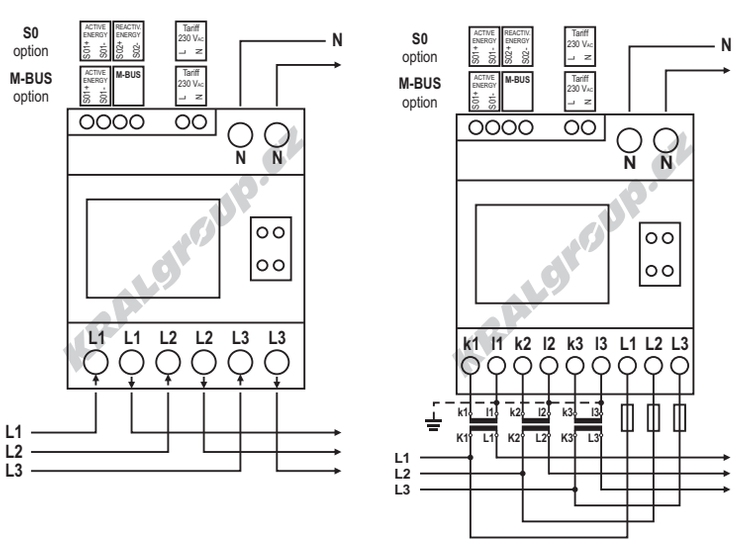
MATERIAL USED

The display cover and the energy meter name plate cover are made from crystal transparent polycarbonate. The energy meter cover, terminal covers and terminal brackets are made from coloured polycarbonate with fibre glass fractions. All materials used for the manufacture of the energy meter cover parts are self-extinguishing capability.

DIMENSIONS



WIRING DIAGRAM - examples



SINUS 85 TECHNICAL SPECIFICATIONS

Manufacturer	TIP Thüringer Industrie Produkte GmbH
Product type design	**SINUS 85 S0** and **SINUS 85 M-BUS**
Short description	electronic three-phase four-wires AC active energy meter of 4TE modules on DIN rail
Type test certificate No.	**DE MTP 13 B009 MI-003**
Reference active energy meter standards	EN 50470-1:2006; EN 50470-3:2006
Circuit type	three-wattmeter energy meter (three transducer)
Electricity network connection	three-phase four-wire three-phase system, direct connected
Reference voltage range (see meter imprint)	U_n = 3x230/400 (1 ± 10%) V
Reference frequency range (see meter imprint)	f_n = 50 (1 ± 2%) Hz
Current information on the meter imprint	I_{min} - I_{ref}(I_{max}) A
Starting current	I_{st} = 0.02 A (balanced each phase)
Minimum current (see meter imprint)	I_{min} = 0.15 A or 0.25 A
Transition current	I_{tr} = 0.5 A
Reference current (see meter imprint)	I_{ref} = 5 A or 10 A or 20 A
Current limit (see meter imprint)	I_{max} = 60 A or 65 A or 80 A or 85 A
Accuracy class (see meter imprint)	class A (MPE = ± 3.5%) or Class B (MPE = ± 2%)
Indicator/test output, optical	LED, flashing red, t_{min} = 30 ms
Inactivity indicator / reverse running detection, optical	LED, red permanent lighting
Register display	LCD (liquid crystals)
Register	6 digits for kWh and 2 decimal places
Pulse constant, optical (see meter imprint)	R_L; standard 5000 imp/kWh (0.2 Wh/imp)
Pulse constant, electrical (see meter imprint)	R_A; standard 500 imp/kWh (2 Wh/imp)
Number of pulses/measurement time for repeatability	least 2 pulses and 20 seconds integration time
Pulse output, electrically passive	potential-free, according to DIN EN 62053-31 standard class A and B
Pulse parameters, electrical	U_{max} = 30 V, I_{max} = 30 mA, reverse polarity protection
Pulse length, configurable	$t_{i\ max}$ = see contents in menu index 0.3.8, section 6.2
Working voltage range extended	180 V up to 265 V; single-phase or three-phase voltage
Extended frequency range	40 Hz up to 65 Hz
Effective power consumption in voltage circuit	at U_n and f_n ≤ 0,5 W per phase
Apparent power consumption in voltage circuit	at U_n and f_n ≤ 0.6 VA per phase, power factor cosφ 0,8K
Apparent power consumption in current circuit	at I_{ref} ≤ 0.25 VA per phase at I_{max} ≤ 2.5 VA per phase
Real starting current (three-phase)	**I**≈ 18 mA in each phase at U_n, f_n, and power factor (cosφ) 1
Considering harmonics frequency	metrologically on about up to 4 kHz
Operating temperature range	3K6 (-25°C up to +55°C), interior
Maximum humidity	yearly average ≤ 75%, for a short time 95%, non-condensing
Permissible ambient conditions	mechanical M2, electromagnetic E2
Protection class	protection class 2, protection insulation
Protection level	cover IP 51, terminal cover closed
Overall dimensions	size 2, depth 56 mm, 4 units on DIN rail
External dimensions	72 mm wide, 90 mm high, 63 mm deep
Fixing	DIN rail TH 35 horizontally (but independent on position)
Usage	installation unit; electric energy meter
Current measurement	current transmitter with shunt
Power supply internal	three-phase power supply
Processing of measurement values	1 measuring-IC with integrated CPU
Cover material	polycarbonate with 6% glass fiber >PC GF6<
Terminal assets accessory terminals	minimum: 0.25 mm²; maximum: 1.5 mm²

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Terminal screws accessory terminals	thread M2.5; tightening torque of 0.4 Nm; SL 3.5 mm x 0.6 mm
Terminal assets current / voltage connections	minimum: 2.5 mm^2; maximum: flexible 25mm^2
Terminal screws power / voltage connections	thread M5; tightening torque of 2.5 Nm; SL 5.5 mm x 1.0 mm
Connection	direct connection, without disconnection between current and voltage system of the respective phases
Fuse current / voltage connections	full-range, maximum 80 A
Weight	approx. 0.27 kg

SINUS 5II1 TECHNICAL SPECIFICATIONS,different from SINUS 85

Product type design	**SINUS 5II1S0** and **SINUS 5II1 M-BUS**
Short description	electronic three-phase four-wires indirect-connected (via CT) AC active energy meter of 4TE modules on DIN rail
Circuit type	three-wattmeter energy meter (three transducer)
Electricity network connection	three-phase four-wire three-phase system, indirect connected (via CT)
Starting current	I_{st} = 0.002 A (balanced each phase)
Minimum current (see meter imprint)	I_{min} = 0.01 A
Transition current	I_{tr} = 0.05 A
Rated current (see meter imprint)	I_n = 1 A or 5 A
Current limit (see meter imprint)	I_{max} = 6 A
Register	5 digits for kWh and 3 decimal places
Pulse constant, optical (see meter imprint)	R_L; standard 20000 imp/kWh (0.05 Wh/imp)
Pulse constant, electrical (see meter imprint)	R_A; standard 5000 imp/kWh (0.2 Wh/imp)
Apparent power consumption in current circuit	at $I_n \leq$ 0,004 VA per phase at $I_{max} \leq$ 0,06 VA per phase
Real starting current (three-phase)	$I \approx$ 1.8 mA in each phase at U_n, f_n, and power factor (cosφ) 1
Current measurement	current transmitter
Terminal assets current / voltage connections	minimal: 0.5 mm^2; maximal: flexible 6 mm^2
Terminal screws power / voltage connections	thread M3; tightening torque of 0.5 Nm; SL 4.0 mm x 0.6 mm
Connection	semi-direct, connection to current transformer and direct connected to voltage

MAINTENANCE

The energy meter is required after proper commissioning for the proper operation no maintenance.

ERROR DETECTION FUNCTION

The energy meter has no inherent error detection and resulting messages. Following exception: the meter readings cannot be properly registered and stored, the counter is to be considered as "technically defective" and the display will flash.

MALFUNCTION

Assuming a partial or total failure of the energy meter function first is necessary the presence and value of the supply voltage at the terminals must be checked. If the voltage is within the specified range and the amount (must be compared with the figure imprinted on the meter), the manufacturer must be informed. Any repairs will be carried out exclusively by the manufacturer.

SECURITY POINTS

The damage or removal of cover components, conformity mark, manufacturer - body security brands, verifiable legal main or backup stamps/tags or changes on the meter cover or inscriptions lead to premature termination of the calibration validity of the instrument (EO 1988, part 4 , § 13) and furthermore to the warranty and product liability lost.

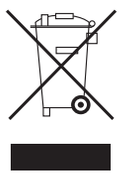
STORAGE AND TRANSPORT

The storage and transportation are to be made at temperature range from -40°C up to +70°C (1K5 respectively 2K4) and at relative humidity from 0% up to 95% non-condensing. Humidity condensation inside or outside the device is necessary to prevent in any way as well as mechanical stress during acceleration exceeding values above 200 m/s-2.

WASTE DISPOSAL

ATTENTION - Dispose of ecologically!
Does not belong to the mixed waste!

This product may not be, at the end of its useful life, disposed of with normal household waste but must be returned to a collection point for recycling of electronic equipment. Please check with your dealer or local authorities for disposal of the competent authority.



EU-DECLARATION OF CONFORMITY

Product name: **THREE-PHASE STATIC WATT-HOUR METER OF ACTIVE ENERGY**

Type designation: **SINUS 85 S0 & SINUS 85 M-Bus**
SINUS 5II1 S0 & SINUS 5II1 M-Bus

EC-Type test certificate: **DE MTP 13 B009 MI-003**

Producer: **TIP Thüringer Industrie Produkte GmbH**

The designated products to which the declaration relates, conform with the following standards or other normative documents:
Directive 2004/22/EC of the European Parliament and of the European Council dated 31 March 2004 on measuring instruments and is evidenced by full compliance with the standard:
EN 50470 Part 1 (Electromechanical meter, accuracy classes A, B and C)
EN 50470 Part 3 (Electronic meter, accuracy classes A, B and C)

EC-Type Type Examination Certificate: **SINUS 85 SINUS 85 M-Bus**
SINUS 5II1 SINUS 5II1 M-Bus

Notified Body: (for module B + D) 0188

Metrological marking: **CE-M14-0118**
With the expiry date 31.12.2022 are the meter labeled M14 metrological examination shall be subjected to re-examination (national verification).

Issuer: TIP Thüringer Industrie Produkte GmbH and KRALgroup

Place and date: Ruhla 01.04.2014 *Signature* Uwe Liebergeld, managing director Signature
Praha 08.04.2014 Ing. Leoš Rosol,managing directorl Signature

This declaration certifies compliance with the indicated directives but implies no warranty of properties. Safety supplied product documentation must be observed.

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