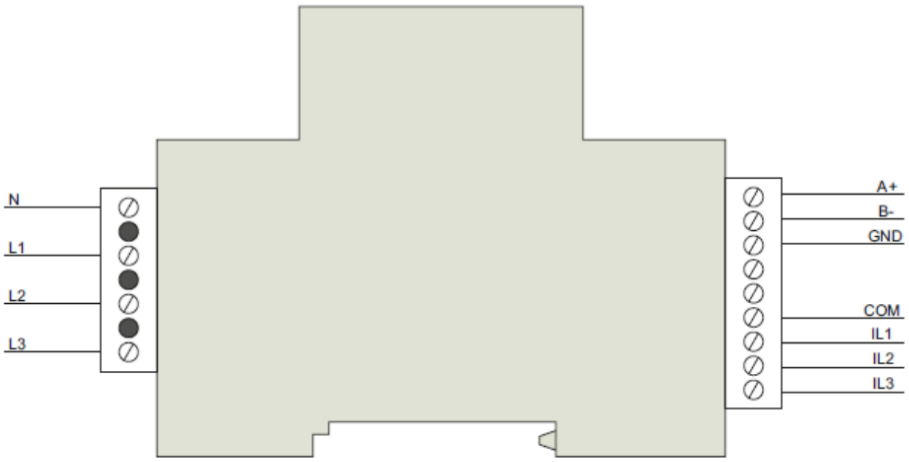
SKT8

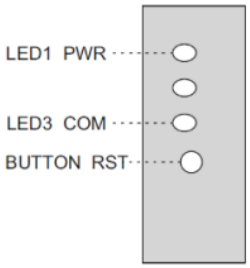
Description	
	SEM Three is a 4-quadrant three-phase network meter that monitors the parameters of active, reactive and apparent energy, power, voltage, current, frequency, cos phi and more; including single-phase and three-phase parameters. It allows to work as a three-phase analyzer or a triple single-phase analyzer.
Featured Features	
	-The smallest modular three-phase meter in the world -Configure it as a three-phase meter or as a triple single-phase meter -Operating time counter to monitor working hours of machinery -Energy measurement in 4 quadrants
Electrical data	
Power supply	110 .. 264 VAC
Frequency	47 .. 63 Hz
Consumption	2,5 .. 4,5 VA
Environmental conditions	
Temperature	-10 .. +60 ºC
Humidity	5% .. 95%
Mechanical data	
Surround material	UL94-V0 self-extinguishing plastic
Protection degree	IP30
Dimensions	18 x 70 x 109 mm
Weight	70 g
Mounting	DIN rail
Maximum working altitude	2000 m
Serial interface	
Type	RS-485 three threads (A+/S GND/ B-) (RX/GND/TX)
Transmission speed	9600 / 19200 bps configurable
Data bits	8
Parity	No Parity / Configurable Par
Stop bit	1 / 2 configurable
Characteristics and electrical safety	
External cover	CAT III 300 V according to EN 61010
Protection class	Class 2
External instrument transformers	TRA y TRC series (In / 0,250 A)
Regulations	
	UNE EN 61010-1:2010, UNE-EN 61000-6-2, UNE-EN 61000-6-4

Electrical wiring

The SKT8 is powered between the L1 and N terminals, and external current transformers are required for current measurement. Below is the detail of each terminal:



Leds



Installation

The installation of the equipment is carried out on a DIN rail mounting, leaving all the connections inside an electrical panel.
The equipment must be connected to a power circuit protected with type gL (IEC 269) or type M fuses, between 0.5 and 2 A. It must be provided with a magneto-thermal switch or equivalent device to disconnect it from the power supply network. The power supply circuit of the equipment is connected with a cable with a minimum section of 1 mm². The secondary line of the current transformer will have a minimum section of 2.5mm².
The insulation temperature of the cables that are connected to the equipment must be at least 62ºC.

Communication

The equipment has an RS-485 type communication port for reading and writing the device parameters. To do this, the equipment uses the Modbus/RTU communication protocol.

By default, it is configured with the peripheral number 72 (in decimal) and communication mode 4, that is, 9600 bps, 8, N, 1. By means of the address change command we can assign any other address (maximum FF in hexadecimal equivalent to peripheral 255). If you do not remember the slave number, you can retrieve the address that comes by default (72 decimal), for this you must:

- Remove auxiliary power to the equipment.
- Permanently activate the button located on the front of the equipment.
- Power it again and stop pressing the button, in this way the equipment will automatically recover the default peripheral number.

Working mode

SKT8 has up to 4 working modes for measuring the electrical parameters of an installation. To change the active work mode, the value of the Work Mode register must be changed between modes 0 (default), 1, 2 and 3. The details of each of these are shown below:

- Mode 0: L1, L2 and L3 single-phase. Sum of all measured values in triphasic variables.

- Mode 1: L2 and L3 single-phase. Balanced triphasic L1. Sum of all measured values in triphasic variables.

- Mode 2: L3 single-phase. L1 and L2 balanced triphasic. Sum of all measured values in triphasic variables.

- Mode 3: L1, L2 and L3 balanced triphasic. Sum of all measured values in triphasic variables.

Run time counting

The operating time counting module allows counting how long a configured threshold value is exceeded that is significant for any type of time measurement related to the use of a machine, effectiveness of a shift or generation time during the day.
SKT8 has two independent counters per phase and for three-phase values, a partial operation time counter (resettable) and a total operation time counter, which will be activated according to the parameter configured in Parameter for Operating time, and once the Threshold value for Operating time has been exceeded for more time than the time configured in Counting delay for Operating time.
The value to configure in Parameter for Run Time is displayed in the Symbol column of the Modbus RTU Memory Map. For example, to configure the phase voltage, we must write the value 1 in the aforementioned register.

Modbus RTU memory map

Magnitude	Symbol	Registers	Unity	Function
Peripheral number	NPER	0x00	ID 72 (default)	3,6,16(0x10)
Communication parameters	COM	0x01	0: 9600, 8, E, 1 1: 19200, 8, E, 1 2: 9600, 8, N, 2 3: 19200, 8, N, 2 4: 9600, 8, N, 1 (default) 5: 19200, 8, N, 1	3,6,16(0x10)
Hardware version	HVER	0x07		3
Software version	SVER	0x08		3
Serial number	SERIAL	0x09-0x0A		3
Working mode	WRKM	0x0C	0: L1, L2, L3 (default) 1: L1(x3), L2, L3 2: L1(x3), L2(x3), L3 3: L1(x3), L2(x3), L3(x3)	3,6,16(0x10)
Current transformer XX/250mA phase 1	CT1	0x32	100 A (default)	3,6,16(0x10)
Current transformer XX/250mA phase 2	CT2	0xFA	100 A (default)	3,6,16(0x10)
Current transformer XX/250mA phase 3	CT3	0x1C2	100 A (default)	3,6,16(0x10)
Parameter for Operating time phase 1	OTVAR1	0x278		3,6,16(0x10)
Threshold for Operating time phase 1	OTVAL1	0x279-0x27A	V/mA/w/var/VA	3,6,16(0x10)
Delay on counting for Operating time phase 1	OTDLY1	0x27F	s	3,6,16(0x10)
Parameter for Operating time phase 2	OTVAR2	0x2DC		3,6,16(0x10)
Threshold for Operating time phase 2	OTVAL2	0x2DD-0x2DE	V/mA/w/var/VA	3,6,16(0x10)
Delay on counting for Operating time phase 2	OTDLY2	0x2E3	s	3,6,16(0x10)
Parameter for Operating time phase 3	OTVAR3	0x340		3,6,16(0x10)
Threshold for Operating time phase 3	OTVAL3	0x341-0x342	V/mA/w/var/VA	3,6,16(0x10)
Delay on counting for Operating time phase 3	OTDLY3	0x347	s	3,6,16(0x10)
Parameter for Operating time III	OTVART	0x3A4		3,6,16(0x10)
Threshold for Operating time III	OTVALT	0x3A5-0x3A6	V/mA/w/var/VA	3,6,16(0x10)
Delay on counting for Operating time III	OTDLYT	0x3AB	s	3,6,16(0x10)
Voltage phase 1	VI1 (1)*	0x02-0x03	V x 10	4
Current phase 1	AI1 (2)*	0x04-0x05	mA	4
Active power phase 1	APITOT1 (3)*	0x06-0x07	W	4
Reactive power phase 1	RPITOT1 (4)*	0x08-0x09	var	4
Apparent power phase 1	VAITOT1 (5)*	0x0A-0x0B	VA	4
Power factor phase 1	PFI1 (6)	0x0C-0x0D	x 1000	4
Maximum demand phase 1	MDI1 (7)*	0x0E-0x0F	W	4
Cos φ phase 1	COSI1 (8)*	0x26-0x27	x 1000	4
Frequency phase 1	FQI1 (9)*	0x28-0x29	Hz x 100	4
Active energy phase 1	AETOT1	0x3C-0x3D	Wh	4
Inductive reactive energy phase 1	IETOT1	0x3E-0x3F	varLh	4
Capacitive reactive energy phase 1	CETOT1	0x40-0x41	varCh	4
Apparent energy phase 1	VAETOT1	0x42-0x43	VAh	4
Active power consumed phase 1	API1 (10)*	0x258-0x259	w	4

Inductive reactive power consumed phase 1	IPI1 (11)*	0x25A-0x25B	varL	4
Capacitive reactive power consumed phase 1	CPI1 (12)*	0x25C-0x25D	varC	4
Apparent power consumed phase 1	VAI1 (13)*	0x25E-0x25F	VA	4
Active power generated phase 1	NAPI1 (14)*	0x260-0x261	w	4
Inductive reactive power generated phase 1	NIPI1 (15)*	0x262-0x263	varL	4
Capacitive reactive power generated phase 1	NCPI1 (16)*	0x264-0x265	varC	4
Apparent power generated phase 1	NVAI1 (17)*	0x266-0x267	VA	4
Active energy consumed phase 1	AE1	0x268-0x269	wh	4
Inductive reactive energy consumed phase 1	IE1	0x26A-0x26B	varLh	4
Capacitive reactive energy consumed phase 1	CE1	0x26C-0x26D	varCh	4
Apparent energy consumed phase 1	VAE1	0x26E-0x26F	VAh	4
Active energy generated phase 1	NAE1	0x270-0x271	wh	4
Inductive reactive energy generated phase 1	NIE1	0x272-0x273	varLh	4
Capacitive reactive energy generated phase 1	NCE1	0x274-0x275	varCh	4
Apparent energy generated phase 1	NVAE1	0x276-0x277	VAh	4
Operating time partial counter phase 1	OTP1	0x27B-0x27C	s	4,6,16(0x10)
Operating time total counter phase 1	OTT1	0x27D-0x27E	s	4
Voltage phase 2	VI2 (1)*	0x66-0x67	V x 10	4
Current phase 2	AI2 (2)*	0x68-0x69	mA	4
Active power phase 2	APITOT2 (3)*	0x6A-0x6B	W	4
Reactive power phase 2	RPITOT2 (4)*	0x6C-0x6D	var	4
Apparent power phase 2	VAITOT2 (5)*	0x6E-0x6F	VA	4
Power factor phase 2	PFI2 (6)*	0x70-0x71	x 1000	4
Maximum demand phase 2	MDI2 (7)*	0x72-0x73	W	4
Cos φ phase 2	COSI2 (8)*	0x8A-0x8B	x 1000	4
Frequency phase 2	FQI2 (9)*	0x8C-0x8D	Hz x 100	4
Active energy phase 2	AETOT2	0xA0-0xA1	Wh	4
Inductive reactive energy phase 2	IETOT2	0xA2-0xA3	varLh	4
Capacitive reactive energy phase 2	CETOT2	0xA4-0xA5	varCh	4
Apparent energy phase 2	VAETOT2	0xA6-0xA7	VAh	4
Active power consumed phase 2	API2 (10)*	0x2BC-0x2BD	w	4
Inductive reactive power consumed phase 2	IPI2 (11)*	0x2BE-0x2BF	varL	4
Capacitive reactive power consumed phase 2	CPI2 (12)*	0x2C0-0x2C1	varC	4
Apparent power consumed phase 2	VAI2 (13)*	0x2C2-0x2C3	VA	4
Active power generated phase 2	NAPI2 (14)*	0x2C4-0x2C5	w	4
Inductive reactive power generated phase 2	NIPI2 (15)*	0x2C6-0x2C7	varL	4
Capacitive reactive power generated phase 2	NCPI2 (16)*	0x2C8-0x2C9	varC	4
Apparent power generated phase 2	NVAI2 (17)*	0x2CA-0x2CB	VA	4
Active energy consumed phase 2	AE2	0x2CC-0x2CD	wh	4
Inductive reactive energy consumed phase 2	IE2	0x2CE-0x2CF	varLh	4
Capacitive reactive energy consumed phase 2	CE2	0x2D0-0x2D1	varCh	4
Apparent energy consumed phase 2	VAE2	0x2D2-0x2D3	VAh	4
Active energy generated phase 2	NAE2	0x2D4-0x2D5	wh	4
Inductive reactive energy generated phase 2	NIE2	0x2D6-0x2D7	varLh	4
Capacitive reactive energy generated phase 2	NCE2	0x2D8-0x2D9	varCh	4
Apparent energy generated phase 2	NVAE2	0x2DA-0x2DB	VAh	4
Operating time partial counter phase 2	OTP2	0x2DF-0x2E0	s	4,6,16(0x10)
Operating time total counter phase 2	OTT2	0x2E1-0x2E2	s	4
Voltage phase 3	VI3 (1)*	0xCA-0xCB	V x 10	4
Current phase 3	AI3 (2)*	0xCC-0xCD	mA	4
Active power phase 3	APITOT3 (3)*	0xCE-0xCF	W	4
Reactive power phase 3	RPITOT3 (4)*	0xD0-0xD1	var	4
Apparent power phase 3	VAITOT3 (5)*	0xD2-0xD3	VA	4
Power factor phase 3	PFI3 (6)*	0xD4-0xD5	x 1000	4
Maximum demand phase 3	MDI3 (7)*	0xD6-0xD7	W	4
Cos φ phase 3	COSI3 (8)*	0xEE-0xEF	x 1000	4
Frequency phase 3	FQI3 (9)*	0XF0-0xF1	Hz x 100	4
Active energy phase 3	AETOT3	0x104-0x105	Wh	4
Inductive reactive energy phase 3	IETOT3	0x106-0x107	varLh	4
Capacitive reactive energy phase 3	CETOT3	0x108-0x109	varCh	4

Apparent energy phase 3	VAETOT3	0x10A-0x10B	VAh	4
Active power consumed phase 3	API3 (10)*	0x320-0x321	w	4
Inductive reactive power consumed phase 3	IPI3 (11)*	0x322-0x323	varL	4
Capacitive reactive power consumed phase 3	CPI3 (12)*	0x324-0x325	varC	4
Apparent power consumed phase 3	VAI3 (13)*	0x326-0x327	VA	4
Active power generated phase 3	NAPI3 (14)*	0x328-0x329	w	4
Inductive reactive power generated phase 3	NIPI3 (15)*	0x32A-0x32B	varL	4
Capacitive reactive power generated phase 3	NCPI3 (16)*	0x32C-0x32D	varC	4
Apparent power generated phase 3	NVAI3 (17)*	0x32E-0x32F	VA	4
Active energy consumed phase 3	AE3	0x330-0x331	wh	4
Inductive reactive energy consumed phase 3	IE3	0x332-0x333	varLh	4
Capacitive reactive energy consumed phase 3	CE3	0x334-0x335	varCh	4
Apparent energy consumed phase 3	VAE3	0x336-0x337	VAh	4
Active energy generated phase 3	NAE3	0x338-0x339	wh	4
Inductive reactive energy generated phase 3	NIE3	0x33A-0x33B	varLh	4
Capacitive reactive energy generated phase 3	NCE3	0x33C-0x33D	varCh	4
Apparent energy generated phase 3	NVAE3	0x33E-0x33F	VAh	4
Operating time partial counter phase 3	OTP3	0x343-0x344	s	4,6,16(0x10)
Operating time total counter phase 3	OTT3	0x345-0x346	s	4
Active power III	APITOTT (1)**	0x132-0x133	W	4
Reactive power III	RPITOTT (2)**	0x134-0x135	var	4
Apparent power III	VAITOTT (3)**	0x136-0x137	VA	4
Power factor III	PFIT (4)**	0x138-0x139	x 1000	4
Maximum demand III	MDIT (5)**	0x13A-0x13B	W	4
Cos φ III	COSIT	0x152-0x153	x 1000	4
Active energy III	AETOTT	0x168-0x169	Wh	4
Inductive reactive energy III	RETOTT	0x16A-0x16B	varLh	4
Capacitive reactive energy III	CETOTT	0x16C-0x16D	varCh	4
Apparent energy III	VAETOTT	0x16E-0x16F	VAh	4
Active power consumed III	APIT (6)**	0x384-0x385	w	4
Inductive reactive power consumed III	IPIT (7)**	0x386-0x387	varL	4
Capacitive reactive power consumed III	CPIT (8)**	0x388-0x389	varC	4
Apparent power consumed III	VAIT (9)**	0x38A-0x38B	VA	4
Active power generated III	NAPIT (10)**	0x38C-0x38D	w	4
Inductive reactive power generated III	NIPIT (11)**	0x38E-0x38F	varL	4
Capacitive reactive power generated III	NCPIT (12)**	0x390-0x391	varC	4
Apparent power generated III	NVAIT (13)**	0x392-0x393	VA	4
Active energy consumed III	AET	0x394-0x395	wh	4
Inductive reactive energy consumed III	IET	0x396-0x397	varLh	4
Capacitive reactive energy consumed III	CET	0x398-0x399	varCh	4
Apparent energy consumed III	VAET	0x39A-0x39B	VAh	4
Active energy generated III	NAET	0x39C-0x39D	wh	4
Inductive reactive energy generated III	NIET	0x39E-0x39F	varLh	4
Capacitive reactive energy generated III	NCET	0x3A0-0x3A1	varCh	4
Apparent energy generated III	NVAET	0x3A2-0x3A3	VAh	4
Operating time partial counter III	OTPT	0x3A7-0x3A8	s	4,6,16(0x10)
Operating time total counter III	OTTT	0x3A9-0x3AA	s	4

*Only for parameters of Operating time phase 1, 2 and 3
**Only for parameters of Operating time III (three-phase)