

SCEE AR 3 - Smart Analyzer 485/Ethernet with web visualization

Three-phase electricity meter with instantaneous reading of electrical variables.



- System variables: V, A, kW, kVA, kVAR, PF and Hz.
- Variables per phase: V, A, kW, kVA, kVAR and PF.
- Energy measurement system: kWh and kVARh.
- Energy measurement per phase kWh and kVARh.
- Time meter measuring.
- Measuring voltage and current: True RMS.
- Powered by 12 VDC external (4 W).
- Input current measurement: 5 A, 90 A, 150 A, 250 A (span by model).
- Measuring input maximum voltage: 260 Vac, Line-Neutral / 450 Vac, Line-Line
- Dimensions: 110 x 62 x 106 mm. 6-DIN Modules.
- Mounting: DIN Rail
- Degree of protection: IP50 (front) & IP20 (screw terminals).
- Continuous recording in memory snapshots and energy readings.
- Communication RS485 ModBus RTU and Ethernet TCP-IP for reading variables and continuous recording.

Input Specifications:

Rated Input: System type: 3-Phase	
Current type	Galvanic insulation by means of CT's
Current range by CT's, Span by Model	5 A, 90 A, 150 A, 250 A
Voltage range maximum	260 Vac, Line-Neutral / 450 Vac, Line-Line
Frecuency	50 / 60 Hz
Power input / Voltage input (without ethernet)	2W / 12 Vdc
Power input / Voltage input (with ethernet)	4W / 12 Vdc

Accuracy: (@25°C ±5°C, R.H. 60%, 50 ±5Hz/60 ±5Hz)	
Current	From 0.002In to 0.2In:±(0.5% RDG +3DGT) From 0.2In to I _{max} :±(0.5% RDG +1DGT)
Frecuency	± 5Hz @25°C ± 5°C
Phase-neutral voltage	In the range Un: ±0.5% RDG + 1DGT
Phase-phase voltage	In the range Un: ±1% RDG + 1DGT
Active and Apparent power	±1% RDG + 1DGT
Power factor	± [0.001 + 1% (1.000 - PF RDG)]
Reactive power	± (2% RDG +2DGT)
Active energy	Class 1 according to EN62053-21
Reactive energy	Class 2 according to EN62053-23

Energy additional errors	
Influence quantities	According to EN62053-21, EN50470-3, EN62053-23

Other specifications	
Temperature drift	≤ 200ppm/°C
Sampling rate	100 samples/s @ 50 Hz / 60 Hz (fr = 1 kHz)
Input voltage impedance	> 330 Kohm

Current overloads	
Continuous	1.2 Un
For 500 ms	2 Un

Voltage overloads	
Continuous	1.2 Un
For 500 ms	2 Un

Output Specifications:

RS485 PORT	
Type	Multidrop, bidirectional (static and dynamic variables)
Connections	2-wire Max. distance 1000m, RJ11 & screwer
Addresses	1 ... 247
Protocol	MODBUS / JBUS (RTU)
Data format	1 start bit, 8 data bit, no parity, 1 stop bit
Baud-rate	9600 bps ... 115200 bps
Driver input impedance	10 kohms
Insulation	By means of optocouplers 4000 VRMS output to measuring input & to power supply input

ETHERNET PORT	
Type	Drop-in module
Connection	RJ45 (with magnetics isolation)
Protocol	MODBUS / JBUS (RTU)
Baud-rate	50 bps to 230.4Kbps
Speed	10 / 100 Mbps
Magnetic Isolation Protection	1.5 KV built-in
LEDs	10BASE-T & 100BASE-TX Link Activity, Fault/In-Use
Transmission Format Local Port	RS485 2-wire Max
Network Protocols	ICMP, ARP, IP, TCP, UDP, DHCP, HTTP, SNMP V1, SMTP, TFTP, Auto IP, Telnet, BOOTP
Configuration Options	Web Console, Serial Console (Serial Command Mode), Telnet Console, Windows Utility
Windows Real COM Drivers	Windows 95/98/ME/NT/2000, Windows XP/2003/Vista/2008/7 x86/x64, Embedded CE 5.0/6.0, XP Embedded
Fixed TTY Drivers	SCO Unix, SCO OpenServer, UnixWare 7, SVR 4.2, QNX 4.25, QNX 6, Solaris 10, FreeBSD, AIX 5.x
Linux Real TTY Drivers	Linux kernel 2.4.x, 2.6.x
Operation Modes	Real COM, TCP Server, TCP Client, TCP Mixed, UDP, MCSC

General Specifications:

Operating temperature	-25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C) according to EN62053-21, EN50470-1 and EN62053-23
Storage temperature	-30°C to +70°C (-22°F to 158°F) (R.H. < 90% noncondensing @ 40°C) according to EN62053-21, EN50470-1 and EN62053-23
Installation category	Cat. III (IEC60664, EN60664)
Insulation (for 1 minute)	4000 VRMS between measuring inputs and power supply 4000 VRMS between power supply and RS485
Dielectric strength	4000 VRMS for 1 minute
Noise rejection CMRR	100 dB, 48 to 62 Hz

EMC According to EN62052-11

Electrostatic discharges	15kV air discharge
Immunity to irradiated	Test with current: 10V/m from 80 to 2000MHz
Electromagnetic fields	Test without any current: 30V/m from 80 to 2000MHz
Burst	On current and voltage measuring inputs circuit: 4kV
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz
Surge	On current and voltage measuring inputs circuit: 4kV on "L" auxiliary power supply input: 1kV
Radio frequency suppression	According to CISPR 22

Standard compliance

Safety	IEC60664, IEC61010-1, EN60664, EN61010-1, EN62052-11
Metrology	EN62053-23, EN50470-3
Approvals	CE, RoHS

Connections Screw type

Cable cross-section area	measuring inputs max. 16 mm ² ; min. 2.5 mm ² (by cable lug). Min./Max. Screws tightening torque: 1.7 Nm / 3 Nm
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Housing DIN

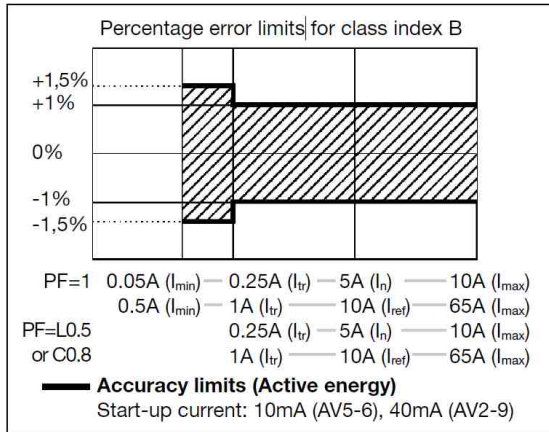
Dimensions (WxHxD)	110 x 62 x 106 mm
Material	Self-extinguishing Blend PC/ABS
Mounting	DIN-rail (Standard DIN 43880)
Weight	Approx. 400 g (packing included)
Color	Grey RAL 7035

Protection degree

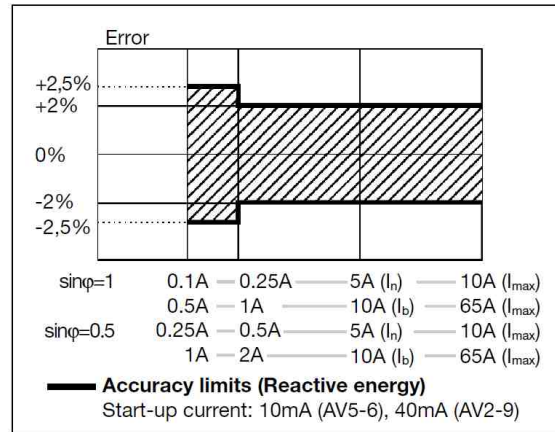
Front	IP50
Screw terminals	IP20

Accuracy (According to EN50470-3 and EN62053-23):

kWh, accuracy (RDG) depending on the current



kVARh, accuracy (RDG) depending on the current



Used calculation formulæ

Phase variables

Instantaneous effective voltage

$$\bar{V}_{1N} = \sqrt{\frac{1}{n} \cdot \sum_{i=1}^n (V_{1N})_i^2}$$

Instantaneous active power

$$W_1 = \frac{1}{n} \cdot \sum_{i=1}^n (V_{1N})_i \cdot (A_1)_i$$

Instantaneous power factor

$$\cos\varphi_1 = \frac{W_1}{VA_1}$$

Instantaneous effective current

$$A_1 = \sqrt{\frac{1}{n} \cdot \sum_{i=1}^n (A_1)_i^2}$$

Instantaneous apparent power

$$VA_1 = V_{1N} \cdot A_1$$

Instantaneous reactive power

$$\text{var}_1 = \sqrt{(VA_1)^2 - (W_1)^2}$$

System variables

Equivalent three-phase voltage

$$V_{\Sigma} = \frac{V_1 + V_2 + V_3}{3} \cdot \sqrt{3}$$

Voltage asymmetry

$$ASY_{LL} = \frac{(V_{LL,max} - V_{LL,min})}{V_{LL,\Sigma}}$$

$$ASY_{LN} = \frac{(V_{LN,max} - V_{LN,min})}{V_{LN,\Sigma}}$$

Three-phase reactive power

$$\text{var}_{\Sigma} = (\text{var}_1 + \text{var}_2 + \text{var}_3)$$

Three-phase active power

$$W_{\Sigma} = W_1 + W_2 + W_3$$

Three-phase apparent power

$$VA_{\Sigma} = \sqrt{W_{\Sigma}^2 + \text{var}_{\Sigma}^2}$$

Three-phase power factor

$$\cos\varphi_{\Sigma} = \frac{W_{\Sigma}}{VA_{\Sigma}} \quad (\text{TPF})$$

Energy metering

$$k \text{ var hi} = \int_{t_1}^{t_2} Q_i(t) dt \cong \Delta t \sum_{n_1}^{n_2} Q_{nj}$$

$$kWh_i = \int_{t_1}^{t_2} P_i(t) dt \cong \Delta t \sum_{n_1}^{n_2} P_{nj}$$

**Note:

i= considered phase (L1, L2 or L3)

P= active power;

Q= reactive power;

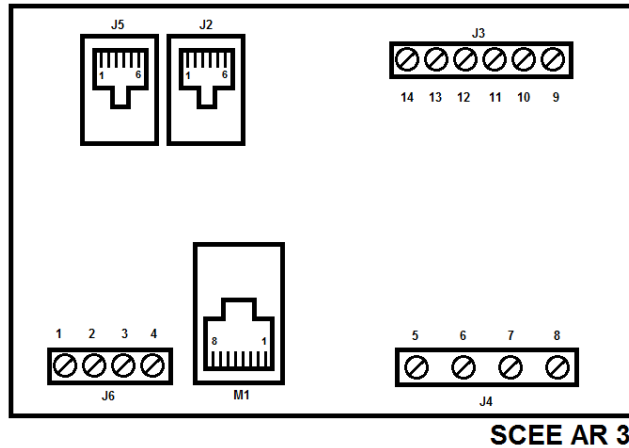
t1, t2 =starting and ending time points of consumption recording;

n= time unit

Increment t= time interval between two successive power consumptions;

n1, n2 = starting and ending discrete time points of consumption recording

Device connections



J2 y J5 Power Supply & RS485, RJ11 dual connector, Link 485

1,6	Power Supply +	+12 Vdc
2,5	Power Supply -	0 Vdc
3	RS485 signal +	A+
4	RS485 signal -	B-

J3 Cts, Current transformer measures, screw connector

10	Current Line 1	K1
12	Current Line 2	K2
14	Current Line 3	K3
9, 11, 13	Return of CTs	L1, L2, L3

J4 Voltage measures, screw connector

5	Neutral	N
6	Line 1	L1
7	Line 2	L2
8	Line 3	L3

J6 Power Supply & RS485, screw connector

1	RS485 signal +	A+
2	RS485 signal -	B-
3	Power Supply -	0 Vdc
4	Power Supply +	+12 Vdc

M1 Ethernet connection, RJ45 connector

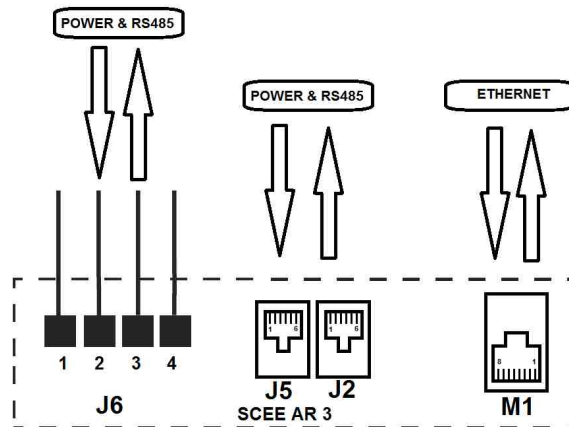
Connection to UTP cable	RJ45 conector
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Installation

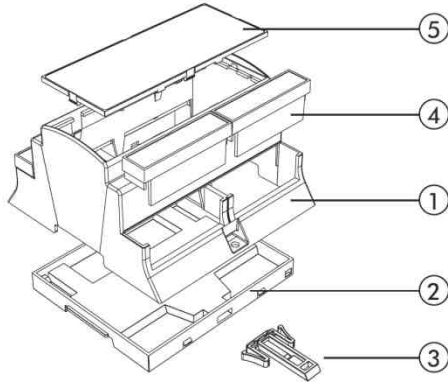
To electric network.



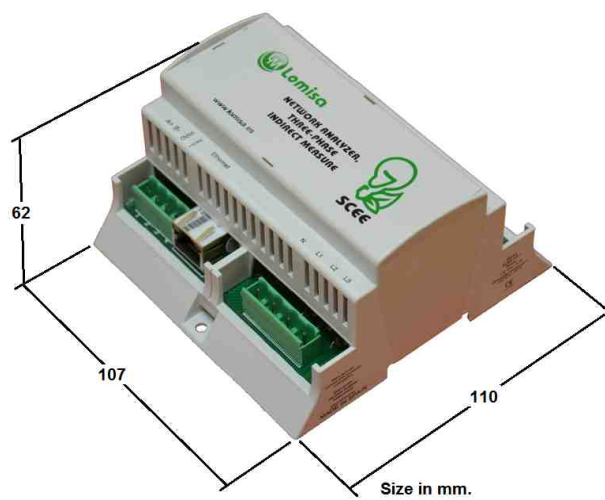
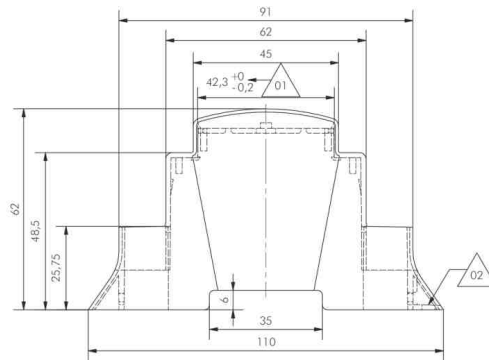
To communication nodes.



Dimensions



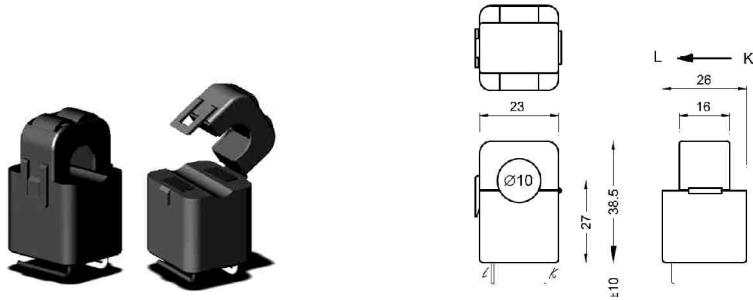
- 1) Body enclosure
- 2) Base
- 3) Hook
- 4) Terminal Cover (optional)
- 5) Panel



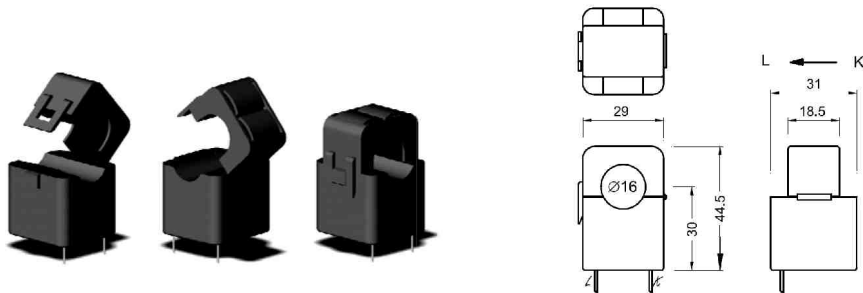
Accesorios

Current transformers, SCEE CT

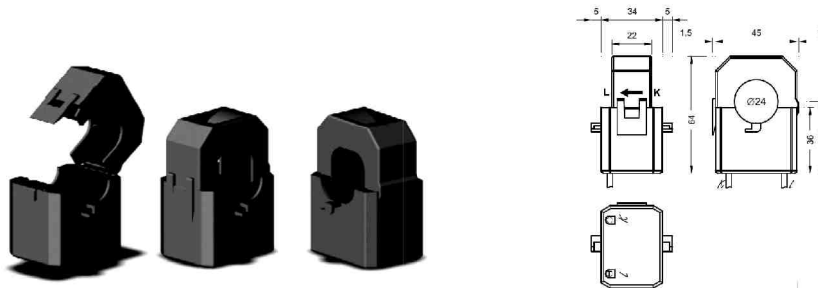
Model: **SCEE CT 10-090**, for cables up to **10 mm** diameter and currents up to **90 Arms** .



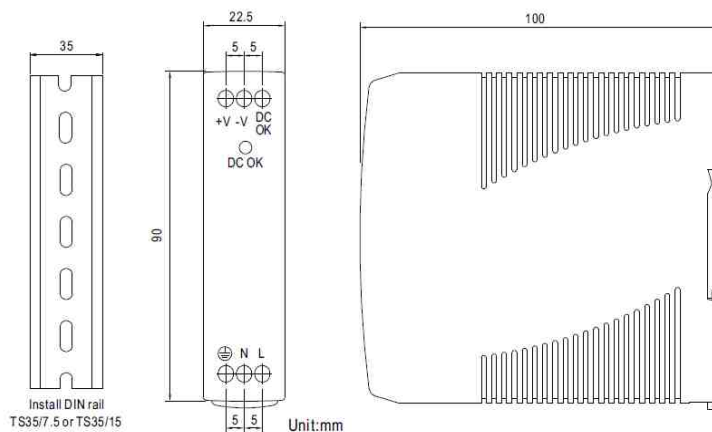
Model: **SCEE CT 16-150**, for cables up to **16 mm** diameter and currents up to **150 Arms** .



Model: **SCEE CT 24-250**, for cables up to **24 mm** diameter and currents up to **250 Arms** ..



Power supply, SCEE PS 2



- > Output voltage: 12 Vdc.
- > Maximum output current: 850 mA.
- > Input voltage: 100 to 240 VAC.
- > Electric Network Frequency: 50 or 60Hz
- > DIN rail mounting.
- > IP50 protection.