



NETWORK ANALYZER



LoRa®

NETWORK ANALYZER

S.A. DE CONSTRUCCIONES INDUSTRIALES

CONTENTS

GENERAL INFORMATION

NETWORK ANALYZER - MTA36

NETWORK ANALYZER - AHM3

NETWORK ANALYZER - AHM1

NETWORK ANALYZER - AHM1-B

NETWORK ANALYZER - SAM3000

NETWORK ANALYZER - TCIL2

NETWORK ANALYZER - ANG96

NETWORK ANALYZER - SNG96 and SNG96-C

NETWORK ANALYZER - MAR 144

NETWORK ANALYZER AND ENERGY METER - M2DL2

D.C. NETWORK ANALYZER - AR4DC

D.C. NETWORK ANALYZER - AR3DC

D.C. NETWORK ANALYZER - TMCC

RS 232 / RS 485 CONVERTER - IFR

REPEATER RS485/RS485 - RT

ETHERNET CONVERTER - etherGATE1

ACCESSORIES - IP 65 PROTECTION COVER

MANAGEMENT SOFTWARE - SACIGEST

NA.06

NA.07

NA.09

NA.13

NA.15

NA.17

NA.19

NA.21

NA.23

NA.25

NA.27

NA.29

NA.31

NA.33

NA.35

NA.37

NA.38

NA.39

NA.40

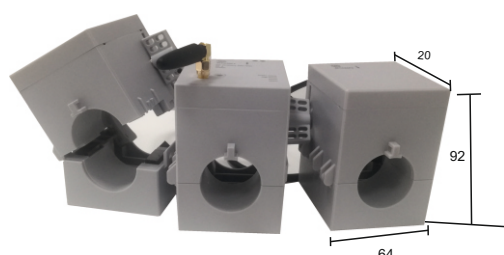
GENERAL INFORMATION

Network analyzers are equipment that measure the electrical parameters of the network. It also displays values for power, harmonics, energy, and other parameters that measure network quality.

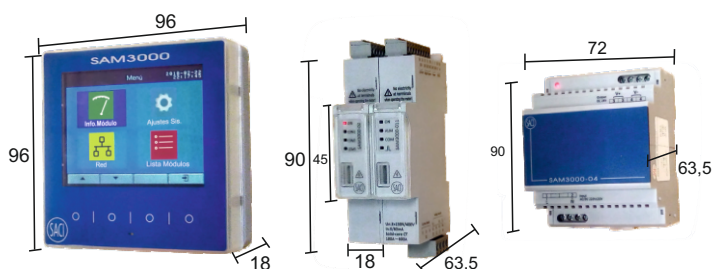
They allow to know the real state of the electrical systems that they measure and thus be able to take corrective actions that improve the quality of the network.

DIMENSIONS

MTA36



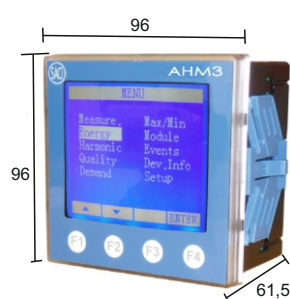
SAM3000



AHM1



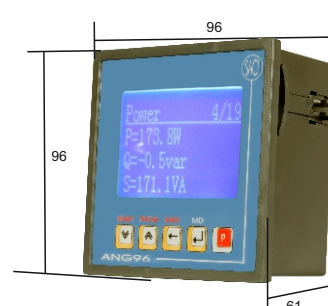
AHM3



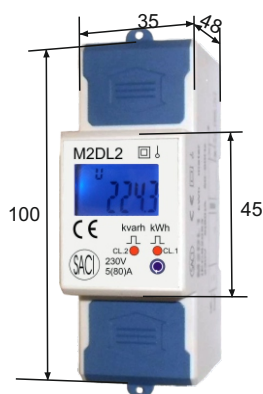
SNG96



ANG96



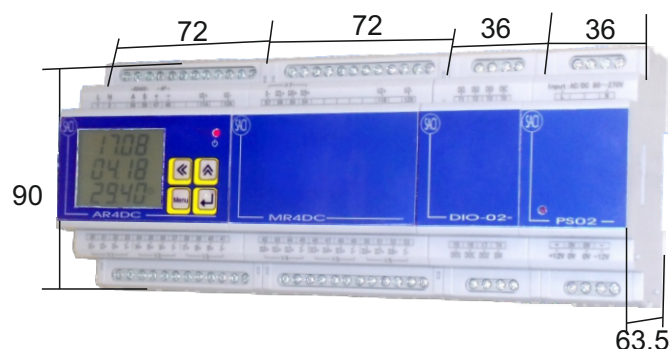
M2DL2



TCIL2



AR4DC

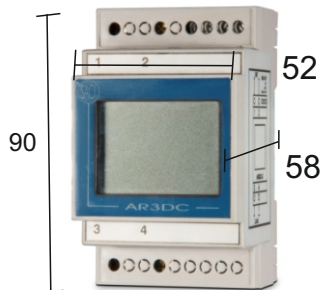


GENERAL INFORMATION

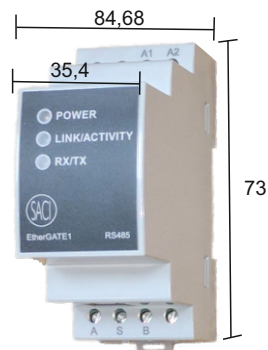
TMCC



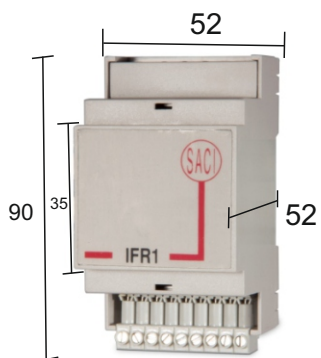
AR3DC



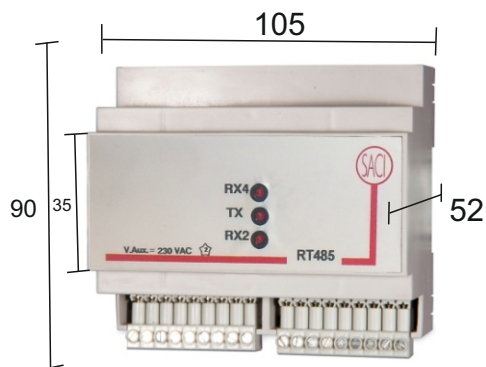
ETHERGATE



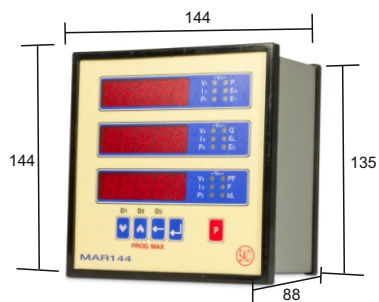
IFR



RS 485



MAR144



NETWORK ANALYZER - MTA36

MTA36 measuring transformers stand out because of their easy installation and the large number of network parameters it can measure. These measurements analyzers are designed for the calculation and measurement of the electrical variables, voltage, current, frequency, power, power factor, energy, harmonic components, etc; of a power distribution network. It is available for both single-phase and three-phase measurement.

Its revolutionary design brings together in the same device the measuring transformer and the network analyzer, which together with its communication possibilities create a versatile and easy to install device.

GENERAL FEATURES

- **EASY INSTALLATION**
- **"VAMPIRE" SYSTEM FOR VOLTAGE**
- **THD on V and I.**
- **HARMONIC RMS (2-31).**
- **LoRa® COMMUNICATION*.**
- **MAXIMUM DEMAND.**
- **4 QUADRANT MEASUREMENT.**
- **MAXIMUM AND MINIMUM VALUES.**
- **AVERAGE VALUES**



ELECTRICAL PARAMETER	UNIDAD	L1	L2	L3	TOTAL	V. MEDIOS	MAX/MIN	DEMANDA
Voltage (Phase - Neutral)	V, kV	•	•	•		•	•	
Voltage (Phase - Phase)	V, kV	•	•	•		•	•	
Current	A, kA	•	•	•		•	•	•
Neutral current	A, kA				•	•	•	
Active power (P)	kW, MW, GW	•	•	•	•	•	•	•
Reactive power (Q)	kvar, Mvar, Gvar	•	•	•	•	•	•	•
Apparent power (S)	kVA	•	•	•	•	•	•	•
Power factor (Cos φ)	PF	•	•	•	•	•	•	
Frequency	Hz				•			
Import active energy (EP+)	kWh, MWh, GWh				•			
Export active energy (EP-)	kWh, MWh, GWh				•			
Import reactive energy (Eq+)	kvarh, Mvarh, Gvarh				•			
Export reactive energy (Eq-)	kvarh, Mvarh, Gvarh				•			
Puncture Temperature	°C				•			
THD Current and Voltage	A, V	•	•	•				
Harmonic RMS-U and I (2-31)	%	•	•	•				
Unbalanced -U and I	%				•			

EASY INSTALLATION

- Analyzer integrated in the transformer
- "Vampire" system for measuring voltage
- Up to 36 mm diameter
- Wireless*

COMMUNICATION

- *Wireless communication via LoRa®
- Up to 16 difference communication channels
- RS485 communication
- ModBus-RTU protocol

MODEL	
MTA36L1	LoRa® single-phase analyzer
MTA36R1	Rs485 single-phase analyzer
MTA36L3	LoRa® three-phase analyzer
MTA36R3	Rs485 three-phase analyzer
MTA36F3	Auxiliary transformer
MTA36-IFLORA	RS-485/LoRa® Interface

NETWORK ANALYZERS



TECHNICAL SPECIFICATIONS

INPUT	
Rated voltage (Un)	3×230/400 V C.A.
Overload	1,2 Un
Impedance	≥ 1.7 MΩ/phase
Rated current	50 (600) A
Overload continuous	1.2 In
Overload instantaneous	10 In/5s
Burden	≤ 0.2 VA /phase
Rated value	< 20 mΩ/phase

AUXILIARY VOLTAGE	
Aux. V. AC/DC	80 - 270 V
Burden	≤ 5VA

OUTPUT	
Maximum port voltage	35V
Maximum port current	10mA
Energy pulse width	80 ± 20% ms
Pulse frequency	≤ 10Hz
Output object	Energía activa-reactiva importada
RS-485 port	ModBus
Transmission rate	Up to 9600 bps programmable
Connection	2 wire
LoRa®	Up to 9600 bps programmable

GENERAL FEATURES	
Dimensions	88.5 x 71 x 204 mm
Weight	0.489 kg
Protection	IP 54 - front panel
	IP 20 - meter body
Operating temperature	-10 - 55 °C
Storage temperature	-25 - 70 °C
Relative humidity	5 - 95 %

ACCURACY

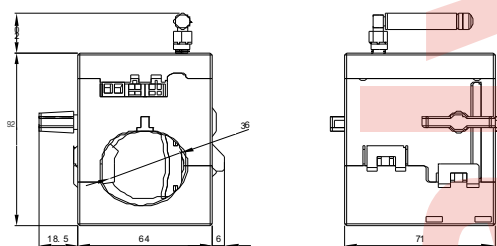
PARAMETER	OPERATING RANGE	ACCURACY
Voltage	2,5-120 %	0.5%
Current	0,1-120 %	0.5%
Active power	1-120 %	1%**
Reactive power	1-120 %	1 %**
Apparent power	1-120 %	1 %**
Power factor	± 0,5 %	1 %
Frequency	45-65 Hz	± 0,01 Hz
Active energy	1-120 %	Class 1
Reactive energy	1-120 %	Class 1

COMMUNICATION MODULE

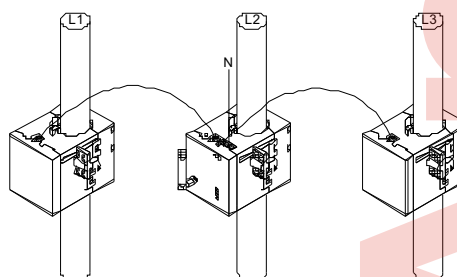


INPUT	
T/R frequency	860MHz~900MHz, 0.1MHz.
Transmitting power	+17.6dBm/100mW
Receiving sensitivity	-139dBm@0.81Kbps
Voltage range	AC/DC 80~270V
Consumption	<2VA

DIMENSIONS



CONNECTIONS



NETWORK ANALYZER - AHM3

The AHM3 is designed to be used for the measurement and calculation of electrical variables such as voltage, current, frequency, power, power factor, energy, harmonic components, etc. in low, medium and high voltage power distribution.

GENERAL FEATURES

- DIN 96 x 96 mm
- 13 ADDITIONAL MODULES
- 4 INTERFACES FOR MODULES
- THD on V and I
- HARMONIC RMS (1-63)
- MAXIMUM DEMAND, A, kW, kVA, kvar
- MAXIMUM AND MINIMUM VALUES
- PROGRAMMABLE RATED V AND I
- 4 QUADRANT MEASUREMENT
- WAVEFORM



ELECTRICAL PARAMETER	UNIT	L1	L2	L3	TOTAL	MAX/MIN	DEMANDA
Voltage Phase - Neutral)	V, kV	•	•	•		•	
Voltage (Phase - Phase)	V, kV	•	•	•		•	
Current	A, kA	•	•	•		•	•
Neutral current	A, kA				•		
Active power (P)	kW, MW, GW	•	•	•	•	•	•
Reactive power (Q)	kvar, Mvar, Gvar	•	•	•	•	•	•
Apparent power (S)	kVA	•	•	•	•	•	•
Power factor (Cos φ)	PF	•	•	•	•	•	
Frequency	Hz				•	•	
Import active energy (EP+)	kWh, MWh, GWh				•		
Export active energy (EP-)	kWh, MWh, GWh				•		
Reactive energy (Q1, Q2, Q3, Q4)	kvarh, Mvarh, Gvarh				•		
Backup energy	kWh				•		
Hour meter	h: min				•		
THD Current and Voltage	A, V	•	•	•			
Harmonic RMS-U and I (1-63)	%	•	•	•			
Unbalance -U and I	%				•		

ADDITIONAL MODULES

COMMUNICATION PROTOCOL	
DM 10	Profibus-DP V0
DM 11	Ethernet: Modbus/TCP
DM 12	Wifi: Modbus/TCP
DM 13	GPRS: Modbus/TCP, SMS

ANALOG I/O	
DM 2	2 analog inputs: mA
DM 5	2 analog outputs: mA

DATA RECORDER	
DM 1	Memory: 8MB, include RTC

DIGITAL I/O	
DM 6	2 digital inputs + 2 digital outputs
DM 7	4 digital inputs
DM 8	2 relay outputs
DM 9	1 AC digital input

TEMPERATURE MEASUREMENT	
DM 3	2 analog inputs: PT100
DM 4	2 analog inputs: TC (J, K or E)

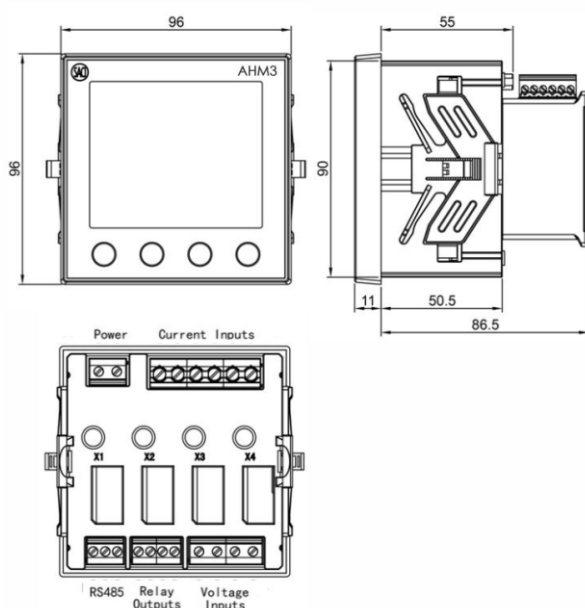
It is capable of single-phase, two-phase, or three-phase measurement and can be used in two-wire, three-wire, four-wire, TN, TT and IT systems. There are four interfaces on the meter for modules which are used to extend functions.

INPUT	
Rated voltage (Un)	3 x 400 / 690 V AC
Overload	1,2 Un
Impedance	> 1MΩ
Rated current (In)	1 A and 5 A
Overload continuous	2 In
Overload instantaneous	10 In/5s or 20 In/1s
Burden	< 0,1 VA
Rated value	< 20 mΩ

AUXILIARY VOLTAGE	
Aux. V. AC/DC	80 - 270 V
Burden	< 10 VA

OUTPUT	
Relay output	250V/5A AC; 30V/5A DC
Isolation	2500 V AC
Energy pulse width	80 ± 20% ms
RS 485 port	Modbus-RTU
Baud rate	Up to 38400 bps programmable

DIMENSIONS



Up to 4 modules combined at your choice at the same time

GENERAL FEATURES	
Case material	ABS, UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire section	2,5 mm ² General 4 mm ² Current (I)
Weight	0,4 Kg
Protection	IP 65 - front panel IP 20 - meter body
Operating temperature	-10 - 60 °C
Storage temperature	-25 - 70 °C
Relative humidity	5 - 95 %

ACCURACY

PARAMETER	OPERATING RANGE	ACCURACY
Voltage	2,5-120 %	0,2 %
Current	0,005-6 A	0,2 %
Active power	1-120 %	0,2 %*
Reactive power	1-120 %	0,2 %*
Apparent power	1-120 %	0,2 %*
Power factor	± 0,5 %	0,5 %
Frequency	45-65 Hz	± 0,01 Hz
Active energy	5-120 %	Class 0,5 S
Reactive energy	5-120 %	Class 2

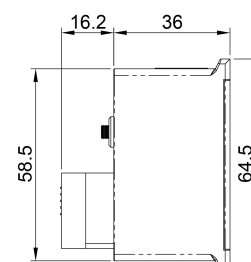
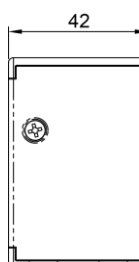
* Class 0,2 (25°C) and Class 0,5 (-10 - 60 °C)

DIMENSIONS OF MODULES

DM1-DM10



DM11-DM13



NETWORK ANALYZER - AHM3-SMTP

AHM3-SMTP: AHM3 analyzer with data reading and configuration remotely through your usual browser: Google Chrome, Internet Explorer, Mozilla Firefox ... You can also receive event alerts by email.

MAIN FEATURES

- **WEB ENVIRONMENT EASY TO MANAGE.**
- **WEB VISUALIZATION OF ELECTRICAL MAGNITUDES, EVENTS ...**
- **SENDING EVENTS. UP TO 3 MAIL ADDRESSES.**
- **13 ADDITIONAL MODULES.**
- **CAPACITY OF UP TO 4 ADDITIONAL MODULES.**
- **THD in V and I.**
- **HARMONICS RMS (1-63).**
- **MAXIMUM DEMAND, A, kW, kVA, kvar.**
- **CO2 CALCULATION + COSTS. THROUGH RS-485**
- **UP TO 16 TARIFFS + COSTS THROUGH RS-485 AND DM7 MODULE.**



WEB VISUALIZATION OF ELECTRICAL MAGNITUDES, EVENTS ...



You can control the consumption and quality of your installation's network **from any location.** Store up to 16 latest events on website and download in Excel format.



SENDING OF EMAIL



Receive in your mail the **events** you want:

Up to 3 email addresses at a time.

- Overvoltage, undervoltage.
- Overcurrent, undercurrent .
- Overload, underload.



ELECTRICAL PARAMETERS

ELECTRICAL PARAMETER	UNIT	L1	L2	L3	TOTAL	MAX/MIN	DEMANDA
Voltage Phase - Neutral)	V, kV	•	•	•		•	
Voltage (Phase - Phase)	V, kV	•	•	•		•	
Current	A, kA	•	•	•		•	•
Neutral current	A, kA				•		
Active power (P)	kW, MW, GW	•	•	•	•	•	•
Reactive power (Q)	kvar, Mvar, Gvar	•	•	•	•	•	•
Apparent power (S)	kVA	•	•	•	•	•	•
Power factor (Cos φ)	PF	•	•	•	•	•	
Frequency	Hz				•	•	
Import active energy (EP+)	kWh, MWh, GWh				•		
Export active energy (EP-)	kWh, MWh, GWh				•		
Reactive energy (Q1, Q2, Q3, Q4)	kvarh, Mvarh, Gvarh				•		
Backup energy	kWh				•		
Hour meter	h: min				•		
THD Current and Voltage	A, V	•	•	•			
Harmonic RMS-U and I (1-63)	%	•	•	•			
Unbalance -U and I	%				•		

ADDITIONAL MODULES

COMMUNICATION PROTOCOL	
DM10	Profibus-DP VO
DM11	Ethernet: Modbus/TCP SMTP
DM12	Wifi: Modbus/TCP
DM13	GPRS: Modbus/TCP, SMS

ANALOG I/O	
DM2	2 analog inputs: mA
DM5	2 analog outputs: mA

DATA RECORDER	
DM1	Memory: 8MB, include RTC

DIGITAL I/O	
DM6	2 digital inputs + 2 digital outputs
DM7	4 digital inputs
DM8	2 relay outputs
DM9	1 AC digital input

TEMPERATURE MEASUREMENT	
DM3	2 analog inputs: PT100
DM4	2 analog inputs: TC (J, K or E)

THROUGH TRANSFORMER X/1 or X/5 0 ROGOWSKI COIL



**EASY INTALLATION
RJ12**

NETWORK ANALYZER - AHM1

The AHM1 is designed to be used for the measurement and calculation of electrical variables such as voltage, current, frequency, power, power factor, energy, harmonic components, etc. Memory of 8 MB incorporated.

GENERAL FEATURES

- DIN 96 x 96 mm
- MEMORY 8 MB
- THD on V and I
- HARMONIC RMS (1-31)
- DIGITAL INPUT/OUTPUT
- MAXIMUM DEMAND, A, kW, kVA, kvar
- PROGRAMMABLE RATED V AND I
- 4 QUADRANT MEASUREMENT
- RS-485 PORT
- MAXIMUM AND MINIMUM VALUES
- ETHERNET TCP-IP (Optional)



ELECTRICAL PARAMETER	UNIT	L1	L2	L3	TOTAL	MAX/MIN	DEMAND
Voltage (Phase - Neutral)	V, kV	•	•	•		•	
Voltage (Phase - Phase)	V, kV	•	•	•		•	
Current	A, kA	•	•	•		•	•
Neutral current	A, kA				•		
Active power (P)	kW, MW, GW	•	•	•	•	•	•
Reactive power (Q)	kvar, Mvar, Gvar	•	•	•	•	•	•
Apparent power (S)	kVA	•	•	•	•	•	•
Power factor (Cos φ)	PF	•	•	•	•	•	
Frequency	Hz				•	•	
Import active energy (EP+)	kWh, MWh, GWh				•		
Export active energy (EP-)	kWh, MWh, GWh				•		
Import reactive energy (Eq+)	kvarh, Mvarh, Gvarh				•		
Export reactive energy (Eq-)	kvarh, Mvarh, Gvarh				•		
Hour meter	h: min				•		
THD Current and Voltage	A, V	•	•	•			
Harmonic RMS-U and I (1-31)	%	•	•	•			
Unbalanced -U and I	%				•		

2 DIGITAL INPUTS

- See input state
- Select tariff (Up to 4 tariff available)
- Pulse counter
- Maximum demand synchronization

OVERLOAD

- 2 Vn x 10 s
- 1,2 Vn permanent
- 20 In x 1 s
- 2 In permanent

2 CONTACT OUTPUTS

- Alarms
- Energy pulses
- Remote mode

TECHNICAL SPECIFICATIONS

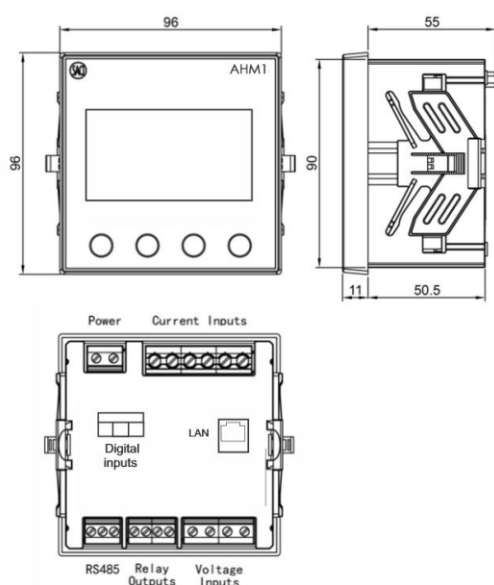
INPUT	
Rated voltage (Un)	3 x 400 / 690 V AC
Overload	1,2 Un
Impedance	> 1MΩ
Rated current (In)	1 A and 5 A
Overload continuous	2 In
Overload instantaneous	10 In/5s or 20 In/1s
Burden	< 0,1 VA
Rated value	< 20 mΩ

AUXILIARY VOLTAGE	
Aux. V. AC/DC.	80 - 270 V
Burden	< 10 VA

OUTPUT	
Relay output	250V/5A AC; 30V/5A DC
Isolation	2500 V AC
Energy pulse width	80 ± 20% ms
RS-485 port	Modbus-RTU
Baud rate	Up to 38400 bps programmable
Connection	2 wires
Ethernet port *	TCP Modbus

* Optional

DIMENSIONS



GENERAL FEATURES

Case material	ABS, UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire section	2,5 mm ² General 4 mm ² Current(I)
Weight	0,4 Kg
Protection	IP 65 - front panel IP 20 - meter body
Operating temperature	-10 - 60 °C
Storage temperature	-25 - 70 °C
Relative humidity	5 - 95 %

ACCURACY

PARAMETER	OPERATING RANGE	ACCURACY
Voltage	2,5-120 %	0,2 %
Current	0,005-6 A	0,2 %
Active power	1-120 %	0,2 %**
Reactive power	1-120 %	0,2 %**
Apparent power	1-120 %	0,2 %**
Power factor	± 0,5 %	0,5 %
Frequency	45-65 Hz	± 0,01 Hz
Active energy	5-120 %	Class 0,5 S
Reactive energy	5-120 %	Class 2

** Class 0,2 (25°C) and Class 0,5 (-10 - 60 °C)

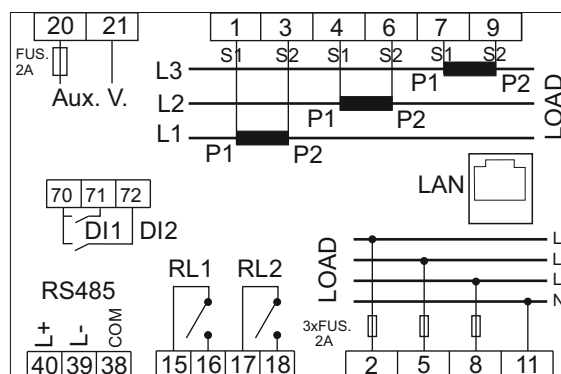
CONNECTIONS

AHM1

AC/DC 80-270V
3x400/690 VAC max.



In: x/5A, x/1A
45-65 Hz



NETWORK ANALYZER - AHM1-B and AHM1-BC

The AHM1 is designed to be used for the measurement and calculation of electrical variables such as voltage, current, frequency, power, power factor, energy, harmonic components, etc.

GENERAL FEATURES

- DIN 96 x 96 mm
- THD on V and I
- HARMONIC RMS (1-31)
- MAXIMUM DEMAND, A, kW, kVA, kvar
- PROGRAMMABLE RATED V AND I
- 4 QUADRANT MEASUREMENT
- MAXIMUM AND MINIMUM VALUES
- RS-485 PORT (AHM1-BC)



ELECTRICAL PARAMETER	UNIT	L1	L2	L3	TOTAL	MAX/MIN	DEMAND
Voltage (Phase - Neutral)	V, kV	•	•	•		•	
Voltage (Phase - Phase)	V, kV	•	•	•		•	
Current	A, kA	•	•	•		•	•
Neutral current	A, kA				•		
Active power (P)	kW, MW, GW	•	•	•	•	•	•
Reactive power (Q)	kvar, Mvar, Gvar	•	•	•	•	•	•
Apparent power (S)	kVA	•	•	•	•	•	•
Power factor (Cos φ)	PF	•	•	•	•	•	
Frequency	Hz				•	•	
Import active energy (EP+)	kWh, MWh, GWh				•		
Export active energy (EP-)	kWh, MWh, Gwh				•		
Import reactive energy (Eq+)	kvarh, Mvarh, Gvarh				•		
Export reactive energy (Eq-)	kvarh, Mvarh, Gvarh				•		
Hour meter	h: min				•		
THD Current and Voltage	A, V	•	•	•			
Harmonic RMS-U and I (1-31)	%	•	•	•			
Unbalanced -U and I	%				•		

BASIC MODEL - B

- The AHM1-B is a basic version of the AHM1 network analyzer that does not include digital inputs and contact outputs. It does not have RS485 port neither.

MODEL BC-BASIC WITH RS485 PORT COMMUNICATION

- The AHM1-BC has RS485 port communication.

OVERLOAD

- 2 Vn x 10 s
- 1,2 Vn permanent
- 20 In x 1 s
- 2 In permanent

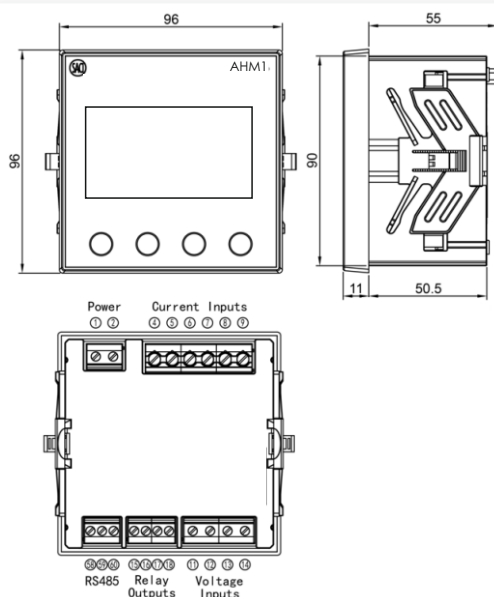
TECHNICAL SPECIFICATIONS

INPUT	
Rated voltage (Un)	3 x 400 / 690 V AC.
Overload	1,2 Un
Impedance	> 1MΩ
Rated current (In)	1 A and 5 A
Overload continuous	2 In
Overload instantaneous	10 In/5s or 20 In/1s
Burden	< 0,1 VA
Rated value	< 20 mΩ

AUXILIARY VOLTAGE	
Aux. V. AC/DC.	80 - 270 V
Burden	< 10 VA

GENERAL FEATURES	
Case material	ABS, UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire section	2,5 mm ² General 4 mm ² Current(I)
Weight	0,4 Kg
Protection	IP 65 - front panel IP 20 - meter body
Operating temperature	-10 - 60 °C
Storage temperature	-25 - 70 °C
Relative humidity	5 - 95 %

DIMENSIONS



ACCURACY

PARAMETER	OPERATING RANGE	ACCURACY
Voltage	2,5-120 %	0,2 %
Current	0,005-6 A	0,2 %
Active power	1-120 %	0,2 %**
Reactive power	1-120 %	0,2 %**
Apparent power	1-120 %	0,2 %**
Power factor	± 0,5 %	0,5 %
Frequency	45-65 Hz	± 0,01 Hz
Active energy	5-120 %	Class 0,5 S
Reactive energy	5-120 %	Class 2

** Class 0,2 (25°C) and Class 0,5 (-10 - 60 °C)

CONNECTIONS

AHM1-B

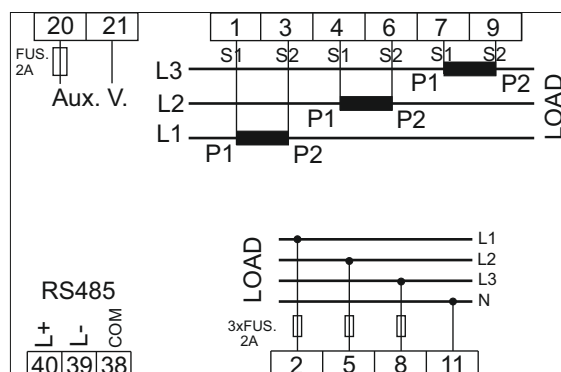


AC/DC 80-270V

In: x/5A, x/1A

3x400/690 VAC max.

45-65 Hz



NETWORK ANALYZER - SAM3000

SAM3000 is a new generation of electrical parameter monitoring product that can measure real-time electrical parameter, energy metering, power quality analysis, status monitoring and off-limit alarm functions. It can measure up to 32 three-phase circuits or 96 single-phase circuits.

GENERAL FEATURES

- MULTI-LOOP MEASUREMENT.
- UP TO 32 THREE-PHASE OR 96 SINGLE-PHASE
- EASY INSTALLATION.
- ONE DISPLAY MODULE: FRIENDLY INTERFACE
- THD V and I
- HARMONICS UP TO 63rd
- 4 QUADRANT MEASUREMENT
- VOLTAGE CREST FACTOR & CURRENT K FACTOR



APPLICATIONS



REMOTE POWER MONITORING



DATA ACQUISITION



ENERGY MANAGEMENT

	SAM3000-01		
ELECTRICAL PARAMETERS	_1	_2	_3
Three phase voltage	•	•	•
Three phase current	•	•	•
Demand Max/Min/Average	•	•	•
Active power (P)	•	•	•
Reactive power (Q)	•	•	•
Apparent power (S)	•	•	•
Power factor (Cos φ)	•	•	•
Frequency	•	•	•
Fundamental V, I, P and PF	-	-	•
Bi-direction active and apparent energy	•	•	•
4 quadrant reactive energy	•	•	•
Tariff	-	•	•
Fundamental active and reactive energy	-	-	•

	SAM3000-01_		
POWER QUALITY	_1	_2	_3
THD Voltage and Current	•	•	•
Harmonics RMS-U and I (1-63)	-	•	•
Unbalance-U and I	-	•	•
Crest factor	-	•	•
k factor	-	•	•
Swell/sag voltage	-	-	•
Fluctuation and flicker	-	-	•
Voltage and frequency deviation	-	•	•

	SAM3000-01_		
DATA RECORD	_1	_2	_3
Demand record	-	•	•
Max/Min & average value record	-	•	•
Off-limit alarm record	-	•	•
SOE event record	-	•	•
Voltage swell/sag & interruption record	-	•	•

SAM3000

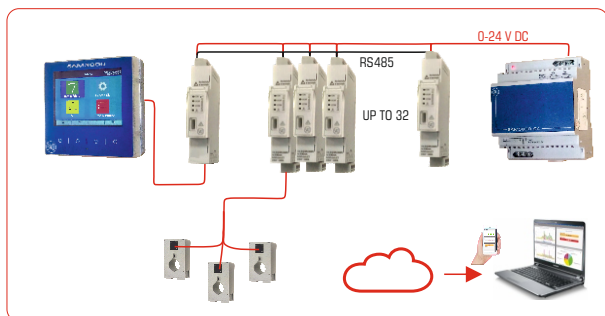


COMPONENTS

COMPONENTS	QUANTITY	DIMENSIONS
SAM3000-01 Measurement m.	1-32	1 Module: 18 mm
SAM3000-02 Communication m.	1	1 Module: 18 mm
SAM3000-03 Display m.	1	96x96x38 mm
SAM3000-04 Power m.	1	4 Modules: 72 mm

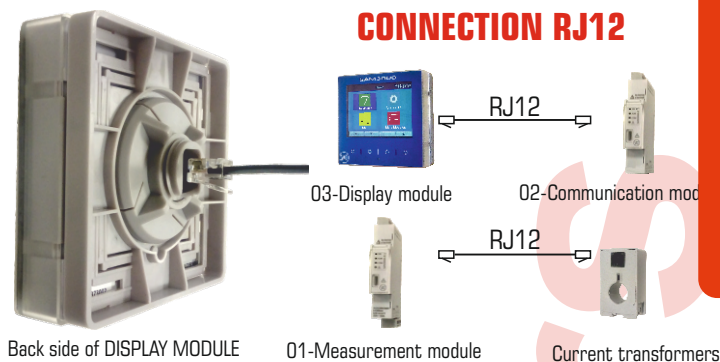
GENERAL FEATURES				
SAM3000-	-01	-02	-03	-04
IP	IP20	IP20	IP67	IP20
Operating temperature	-20 - 70 °C			
Storage temperature	-30 - 80 °C			
Relative humidity	<95% , no condensation			

EXAMPLE OF CONNECTION



EASY WIRE RJ12

EASY-WIRE CONNECTION RJ12



TECHNICAL SPECIFICATIONS

INPUT - SAM3000-01	
Rated voltage (Un)	3 x 220 / 380 V AC
Overload	1,2 Un or 2Un/10s
Impedance	> 1,7 MΩ / Phase
Frequency	45-65 Hz
Burden	< 0,1 VA / Phase

WORKING POWER SUPPLY - SAM3000-01	
Rated range	24 V ± 20% DC
Burden	< 0,5 W

OUTPUT - SAM3000-01	
Relay output	280V/0.12A AC; 400V/0.12A DC
Relay Isolation voltage	5000 V AC
Pulse output width	80 ± 20% ms
RS-485 port	Modbus-RTU
Baud rate	Up to 19200 bps programmable
Communicate Isolation voltage	4000 V AC

POWER SUPPLY MODULE -SAM3000-04	
Aux. V. AC/DC	80 - 270 V
Burden	< 5 VA



SAM3000-01			
CURRENT INPUTS AVAILABLE*	_1	_2	_3
2,5 mA	•	•	•
80 mA	•	•	•
330 mV Rogowski coil	•	•	•
330 mV Mini splits 5 A	•	•	•
330 mV Mini splits 100-600 A	•	•	•

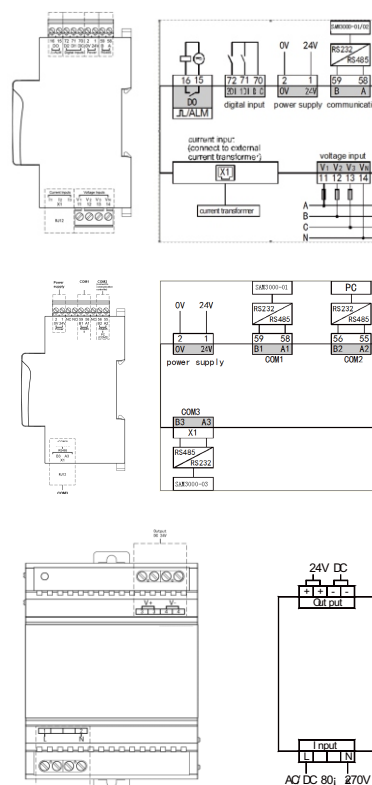
* Current input should be chosen from this table.

ACCURACY

PARAMETER	ACCURACY
Voltage & Current	0,2 %
Power	0,5 %
Power factor	0,5 %
Active energy	Class 0,5S
Reactive energy	Class 2
Apparent energy	Class 0,5

PARAMETER	ACCURACY
V & I THD	Class A
V & I Harmonic	Class A
V & I Unbalance	Class B
V & I sequence comp..	Class 0,5
V & I phase	0,1°

WIRING DIAGRAM



* Dimensions on page 5.

TCIL2 & TCIL2B - THREE PHASE ENERGY METER + ANALYZER - INDIRECT INPUT - RS485

The energy meter + network analyzer **TCIL2** and **TCIL2B** measure the energy meter of a three phase network and other parameters such as **voltage, current active power, reactive power, apparent, power factor, frequency and maximum demand***, in low voltage.

It has **RS-485** with the capacity to connect up to 32 devices in the same loop or 128 through a converter, being able to be controlled from any computer or networked device.

- **Bidirectional three phase energy meter**
- **RS-485 communication. MODBUS Protocol**
- **Active energy counter resettable**
- **Accuracy CL.1 Active CL.2 reactive (En62053)**
- **Indirect input (x/5 or x/1 A) programmable**
- **Led indicator**
- ***Maximum demand (only TCIL2 model, not TCIL2B)**
- **Pulse output: SO (DIN 43864)**
- **Harmonic RMS (1-32) (optional)**

ELECTRICAL PARAMETER

ELECTRICAL PARAMETER	UNIT	TCIL2	TCIL2B
3 phase Voltages	V	•	•
3 phase Currents	A	•	•
Total and phase active power (P)	kW	•	•
Total and phase reactive power (Q)	kvar	•	•
Total and phase apparent power (S)	kVA	•	•
Total and phase Power factor (Cos φ)	PF	•	•
Frequency	Hz	•	•
Active energy import/export (EP+) (EP-)	kWh	•	•
Reactive energy import/export (Eq+) (Eq-)	kvarh	•	•
Reactive energy (Q1, Q2, Q3, Q4)	kvarh	•	•
4 tariff	kWh	•	
THD V and I	%	•	•
Maximum demand V, P, Q, S	-	•	

TECHNICAL SPECIFICATIONS

VOLTAGE INPUT	
Rated voltage (Un)	3x230/ 400 V AC
Burden per phase	< 3 W
Operating range	± 20% Un
Frequency	50-60 Hz

CURRENT INPUT	
Imin - IB (IMAX)	1,5(6) A
Burden per phase	< 0,1 VA
Operating range	0-100 % IMAX
Starting current (In)	3 mA



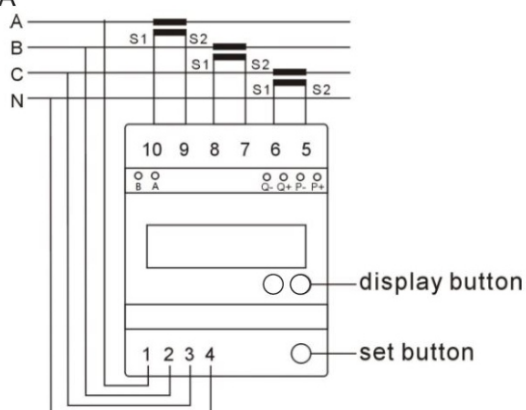
GENERAL FEATURES

GENERAL FEATURES	
Counter type	LCD Display
Digits	Up to 8
2 active energy counter	Total and parcial
Class	1 active - 2 reactive
Operating temperature	-10 to +55 °C
Energy indicator	LED
RS-485 Port	Modbus-RTU
Baud rate programmable	1200 - 19200 bps
Case material	ABS, UL94 V0
Dimensions	76 mm
Terminals	Sealable
Connection	With screw
Max. wire section:	
Input phase terminals I /V	20 / 5 mm ²
Pulses and communications	1,5 mm ²
Pulse weight	5000 pulses/KWh

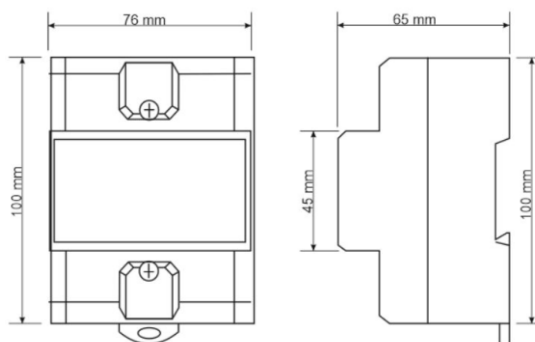
PULSE OUTPUT	
Pulse weight	Programmable
Type	SO (DIN 43864)
Insulation	3 kV, 1 min.
Maximum current	<20 mA
Voltage	< 24 V DC.
Pulse length	> 50 ms

CONNECTIONS DIAGRAM

3x230V/400V
50-60Hz
x/5 A



DIMENSIONS



NETWORK ANALYZER - ANG96

The ANG96 is a digital device, able to measure all the variables associated with an electrical line. It accepts the three currents and three voltage signal in a four-wire configuration. It is also possible to use it in a three-wire configuration, using two or three current transformers.

GENERAL FEATURES

- DIN SIZE 96 x 96
- LCD 128 x 64 DISPLAY WITH BACKLIGHT
- 4 QUADRANT MEASUREMENT
- NEUTRAL CURRENT MEASUREMENT
- HARMONIC DISTORTION (THD on V and I)
- MAXIMUM DEMAND (A, kW, kVA and kvar)
- MAXIMUM AND MINIMUM VALUES
- TRUE RMS VOLTAGE AND CURRENT
- SERIAL PORT RS485
- 2 HOUR COUNTERS
- TCP/IP (OPTIONAL: ANG96-TCP)*
- 4 HOUR COUNTERS (OPTIONAL: ANG96-G)**



ELECTRICAL PARAMETER	SYMBOL	L1	L2	L3	TOTAL
Voltage (Line-to-neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Current	A	•	•	•	
Neutral current	A				•
Active power (P)	kW	•	•	•	•
Reactive power (Q)	kvar	•	•	•	•
Apparent power (S)	kVA	•	•	•	•
Power factor (Cos φ)	PF	•	•	•	•
Maximum demand (I)	A	•	•	•	
Maximum demand (P)	kW				•
Maximum demand (Q)	kvar				•
Maximum demand (S)	kVA				•
Frequency	Hz				•
THD Current	A	•	•	•	
THD Voltage	V	•	•	•	
Import active energy (EP+)	kWh				•
Hour counter active positive (T+)	h-m-s				•
Export active energy (EP-)	kWh				•
Hour counter active negative (T-)	h-m-s				•
Import inductive react energy (Eq+)	kvarh				•
Import capacitive react energy (Eq-)	kvarh				•

HOURLY COUNTERS

- Limit: 50.000 hours
- Resolution: 1 second

* ETHERNET TCP/IP CONNECTOR (Optional)

- TCP/IP protocol in a RJ 45 connector for a LAN network The device only needs to be configured with its own IP, the Netmask, the gateway and a free TCP port to communicate with any internal or external equipment..

** GENERATOR ENERGY MEASUREMENT (Optional)

- External voltage input to connect to an external generator. When voltage is detected, ANG96-G accumulates energy in independent counters of those used when it is connected to the main network..

TECHNICAL SPECIFICATIONS

INPUT	
Rated voltage (Un)	0-520 V AC.
Burden	< 1 mA per phase
Rated current (In)	1 and 5 A
Burden	< 0,3 VA per phase
Operating range	10 - 120% In
Frequency	45 - 65 Hz
Overload	2 In permanent, 20 In 1 s 1,2 Vn permanent, 2 Vn 10 s

MAXIMUM/ MINIMUM MODE

Maximum and minimum values of:

- 3 Currents I1, I2, I3
- 3 Voltages V1, V2, V3
- 3 Single phase powers. P1, P2, P3
- 3 Three phase powers P, Q and S
- Power factor Cos (φ) and Hz

OVERLOAD

- 2 Vn x 10 s.
- 1,2 Vn permanent.
- 20 In x 1 s.
- 2 In permanent.

GENERAL

GENERAL FEATURES	
Case material	ABS, UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire section	2,5 mm ²
Weight	0,4 Kg
Protection	IP 20 Terminals
Optional protection	IP 54 Front IP 65 Front cover
Electrical safety	(EN 61010) Class 2 Category III

ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120%	0,3%(read. + full sca.)
Current	1-120%	0,3%(read. + full sca.)
Active power	1-120%	0,3%(read. + full sca.)
Reactive power	1-120%	0,3%(read. + fin sca.)
Apparent power	1-120%	0,4%(read. + fin sca.)
Power factor	± 0,5%	1%(Full scale)
Frequency	45-65Hz	0,2%(Full scale)
Active energy	5-120%	0,5% reading
Reactive energy	5-120%	1% reading

OUTPUT

Relays	250 V AC., 3A
Pulse weight	60 ms
Serial port	RS485
Protocol	MODBUS RTU
Baud rate	Programmable 1200-19200 bps Standard 9600 bps
Connection	2 wires

AUXILIARY VOLTAGE

UNIVERSAL Aux. V.	85/264 V AC.; 80/300 V DC.
Burden	< 4 VA

MAXIMUM DEMAND FUNCTION

The maximum demand is calculated as the mean value reached during the time specified of the next parameters.

- I1, I2, I3, P, Q and S
- Integration period: 15 or 30 Minutes

LCD DISPLAY

- 4 parameters per page
- Built-in keypad (5 keys)
- Selectable pages with up and down buttons
- Back lighting

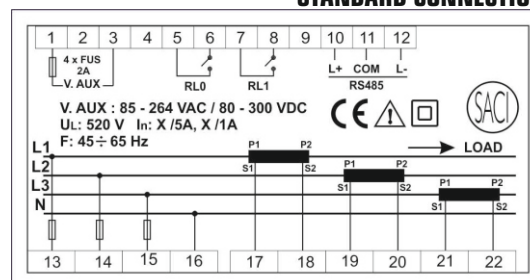
CONTACT OUTPUTS

Contact outputs can be set as max. or min. alarm contacts associated to any measured parameter or as active energy and reactive energy pulses. They can also be set as contacts managed from the central unit.

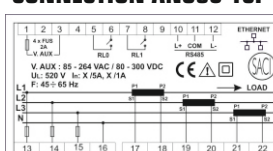
CONNECTIONS

Max. 3 x 300 (520) V X/5 A, X/1A
Universal Aux. V 45-275 V AC/DC 45 - 65 Hz

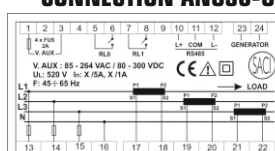
STANDARD CONNECTION



CONNECTION ANG96-TCF



CONNECTION ANG96-G



NETWORK ANALYZER - SNG96 and SNG96C

Programmable instrument with microprocessor and LCD display indicator for measurements and built-in keypad.

GENERAL FEATURES

- DIN 96X96 INSTRUMENT
- RS485 COMMUNICATION (SNG96C)
- THREE-PHASE 4 WIRE
- MAXIMUM DEMAND, CURRENT
- TRUE RMS



ELECTRICAL PARAMETER	SYMBOL	L1	L2	L3	TOTAL	SNG96	SNG96C
Voltage (Line - Line)	V	•	•	•		•	•
Voltage (Line- Neutral)	V	•	•	•		•	•
Current	A	•	•	•		•	•
Maximum demand (I)	A	•	•	•		•	•
Active power (P)	kW				•		•
Reactive power (Q)	kvar				•		•
Apparent power (S)	kVA				•		•
Power factor (Cos φ)	PF				•		•
Frequency (F)	Hz				•		•
Import active energy (EP+)	kWh				•	•	•
Export active energy (EP-)	kWh				•	•	•
Import reactive energy (EQ+)	kvarh				•		•
Export reactive energy (EQ-)	kvarh				•		•

TECHNICAL SPECIFICATIONS

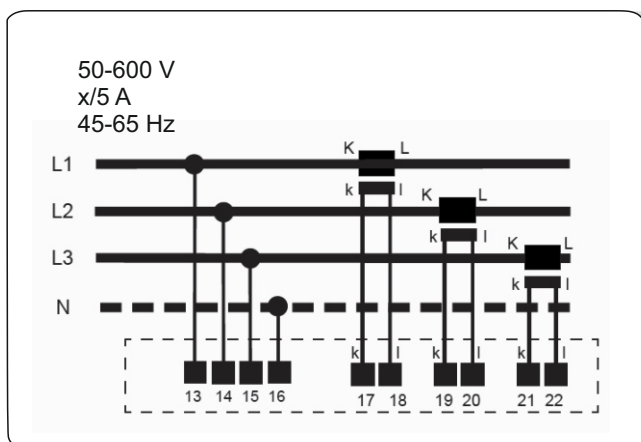
INPUT	
3 Phase 4 wire, unbalanced	
Rated voltage (Un)	400 V
Burden	1 mA per phase
Operating range	50-600 V (phase-phase)
Rated current (In)	5 A
Burden	0,3 VA per phase
Operating range	0-120 % In
Frequency	45-65 Hz

AUXILIARY VOLTAGE	
V. aux. C.A.	Self supplied
Burden	< 4 VA

GENERAL

GENERAL FEATURES	
Case material	ABS, UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Máx. wire section	2,5 mm ²
Weight	0,4 Kg
Temperature range	-10 °C - 70 °C
Protection	IP 20 Terminales
Optional protection	IP 54 Frontal IP 65 with frontal cover
Electrical safety	(EN 61010) Class 2 Category III

CONNECTIONS



SETTING

- Primary current: x/5 A
- Integration time of maximum demand: 1 to 30 min.
- Baud rate: 1200 - 9600 bps (SNG96C)
- Parity: N81, N82, E81, O81. (SNG96C)

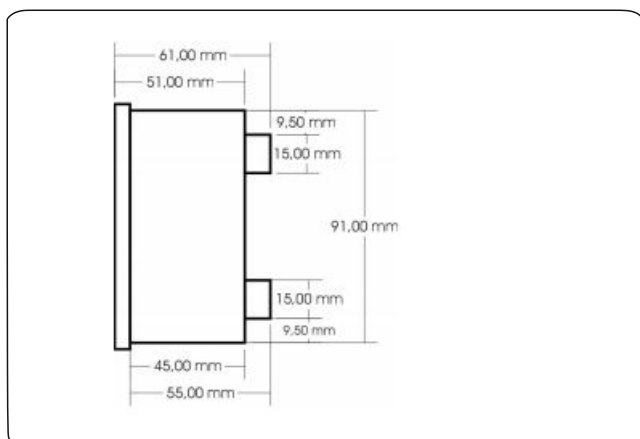
MAXIMUM DEMAND FUNCTION

- Average values of: I1, I2, I3
- Integration period: 15 or 30 minutes.

OVERLOAD

- 2 Vn x 10 s.
- 1,2 Vn permanent.
- 20 In x 1 s.
- 2 In permanent.

DIMENSIONS



OUTPUT SNG96C

Serial port	RS485
Protocol	MODBUS RTU
Baud rate	Programmable 1200-9600 bps Standard 9600 bps
Connection	2 wires.

ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120%	0,3%(read. + full sca.)
Current	1-120%	0,3%(read. + full sca.)
Active energy	5-120%	0,5% reading.
Reactive energy	5-120%	1% reading.

ACCESSORIES

- x/5 A transformers.

DISPLAY

- LCD display built-in keypad (5 Keys)
- Selectable pages with up (↑) and down (↓).
- Back lighting.

NETWORK ANALYZER - MAR144

Instrument with microprocessor, programmable, with three LED display indicating measurements and built-in keypad.

GENERAL FEATURES

- **DIN 144 x 144 INSTRUMENT**
- **MEASUREMENT IN 4 QUADRANTS**
- **THREE- PHASE, 4 WIRE**
- **MAX. and MIN. VALUES**
- **TRUE RMS**
- **RS232/RS485 SERIAL PORTS**
- **2 CONTACTS OUTPUT**



ELECTRICAL PARAMETER	SYMBOL	L1	L2	L3	TOTAL
Voltage (Line-to-neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Current	A	•	•	•	
Active power (P)	kW	•	•	•	•
Reactive power (Q)	kvar	(*)	(*)	(*)	•
Apparent power (S)	kVA	(*)	(*)	(*)	(*)
Power factor (Cos φ)	PF	(*)	(*)	(*)	•
Frequency	Hz				•
Consumed active energy (EP +)	kW-h				•
Generated active energy (EP -)	kW-h				•
Inductive reactive energy (Eq +)	kvar-h				•
Capacitive reactive energy (Eq -)	kvar-h				•

(*) Through serial port only.

MODEL MAR144

- MAR144-BA Basic model.
Current insulated.
- MAR144 Single-phase
- MAR144-I Three-phase, 3 wire, balanced.
- MAR144-II Three-phase, 3 wire, unbalanced.
- MAR144-3 Three-phase, 4 wire, unbalanced.
Current insulated.
2 Relays
Barden insulated (optional)

SETTING

- Instrument identify code.
- Primary voltage.
- Primary current.
- Contact operating mode.
- Energy references.
- Alarms.

MAX. AND MIN. VALUES

- Maximum and minimum values of: V12, V23, V31, V1, V2, V3, I1, I2, I3, P1, P2, P3, P, Q, Cosφ and Hz

SERIAL PORT (OPTIONAL)

- Type: RS 485.
- Protocol: MODBUS RTU.
- Connection: 2 or 4 wire.
- Baud rate: Programmable.
300 - 19200 Bauds.
Standard 9600 Bauds.
- Max. N° of instruments per line: 32.
- Max length of system per line (without amplifier): 1250 m.
(On request RS 232 serial port).

LED DISPLAY

- 3 LED displays (4 Digits + Sign).
- Height of digits: 14,5 mm.
- Built in keypad (5 Keys).
- 7 selectable parameters for each display.
- Over 30 measuring parameters.

4 DIGITAL INPUTS

Digital inputs can be used to:

- Signal the position of contacts or alarms.
- Indicate energy consumption for external processes and synchronisation pulses for the maximum demand function.
- Pulse totalizer for external instruments.

DIGITAL OUTPUTS (Optional)

10 independent programmable relays, for assigning variables and alarm setting.

ANALOGUE OUTPUT (Optional)*

Number of outputs:

Type:

Operating range:

(*) Voltage isolation needed.

1.
4-20 mA.
programmable.

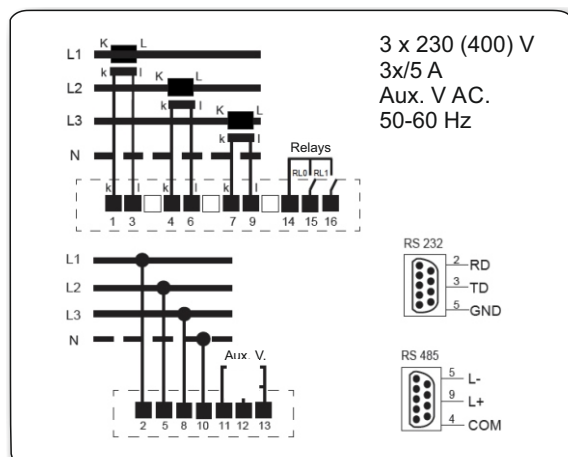
TECHNICAL SPECIFICATIONS

INPUT	
Rated Voltage (Un)	100, 110, 230 or 400 V
Burden	1 mA per phase
Operating range	20-120 % Un
Rated current (In)	1 or 5 A
Burden	0,2 VA per phase
Operating range	1- 120 % In
Frequency	50 - 60 Hz

CONTACTS OUTPUT *	
Number of outputs	2
Type	Relay N.O., 250 V, 3 A

* Contact output can be set as max. or min. alarm contacts associated to any measured parameter, or as energy pulses imported by the receptor connected to the device. (Ep+ and Eq+). They can also be set as contacts managed from the central unit.

CONNECTIONS



AUXILIARY VOLTAGE	
Aux. V. AC.	63,5/110 V or 230/400 V
Burden	6 VA
Operating range	80-120 % Un
Aux. V. DC.	18-72 V
Burden	3 W
UNIVERSAL Aux. V.	85/264 V A.C.; 90/300 V DC
Burden	4 VA

GENERAL

GENERAL FEATURES	
Case material	Metal+ABS,UL94V0
Dimensions	DIN 144 x 144 mm
Terminals	Pluggable
Max. wire section	2,5 mm ²
Weight	0,75 Kg
Protection	IP 20 Terminals
Optional protection	IP 54 Frontal
Electrical safety	(EN 61010) Class 2 Category III

ACCESSORIES

- x/5 A or x/1 A transformers.
- RS232/RS485 converters.
- RS485 amplifiers.

OPTIONAL

- Reading software (without additional cost).
- Management software SACIgest.

OVERLOAD

- 2 Vn x 10 s.
- 1,2 Vn permanent.

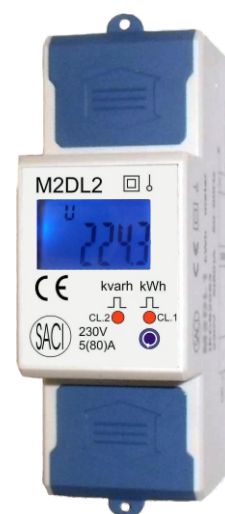
ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120%	0,2%(read. + full sca.)
Current	1-120%	0,2%(read. + full sca.)
Active power	1-120%	0,2%(read. + full sca.)
Reactive power	1-120%	0,2%(read. + full sca.)
Apparent power	1-120%	0,4%(read. + full sca.)
Power factor	±0,5	0,4% reading
Frequency	45-65 Hz	0,2%(rated freq.)
Active energy	5-120%	1% reading
Reactive energy	5-120%	2% reading

AC ANALYZER AND ENERGY METER RS-485 - M2DL2

GENERAL FEATURES

- ANALYZER AND SINGLE-PHASE ENERGY METER
- ACCURACY CL.1 ACTIVE CL.2 REACTIVE (EN 62053)
- DIRECT MEASUREMENT UP TO 80 A
- RS-485 COMMUNICATION. MODBUS PROTOCOL
- ENERGY CONSUMPTION LED
- LCD DISPLAY 6 DIGITS
- PULSE OUTPUT: SO (DIN43864)
- 2 DIN MODULES
- PARTIAL ACTIVE ENERGY COUNTER RESETTABLE



Energy totalizer

Voltage

Current

Frequency

RS485 communication

Active power

Reactive power

Power factor

TECHNICAL SPECIFICATIONS

VOLTAGE INPUT	
Rated voltage (Un)	230 V AC
Burden	< 8 VA, 2 W
Operating range	± 30% Un
Frequency	50 - 60 Hz

CURRENT INPUT	
Current IB (IMAX)	5 (80) A
Burden	< 1 VA
Operating range	0-100 % IMAX
Starting current (In)	< 0,4 % IB

PULSE OUTPUT	
Pulse weight	1600 pulses / kWh
Type	SO (DIN 43864)
Insulation	3 kV, 1 min.
Voltage	18 - 27 V C.C.
Pulse length	> 30 ms

GENERAL FEATURES

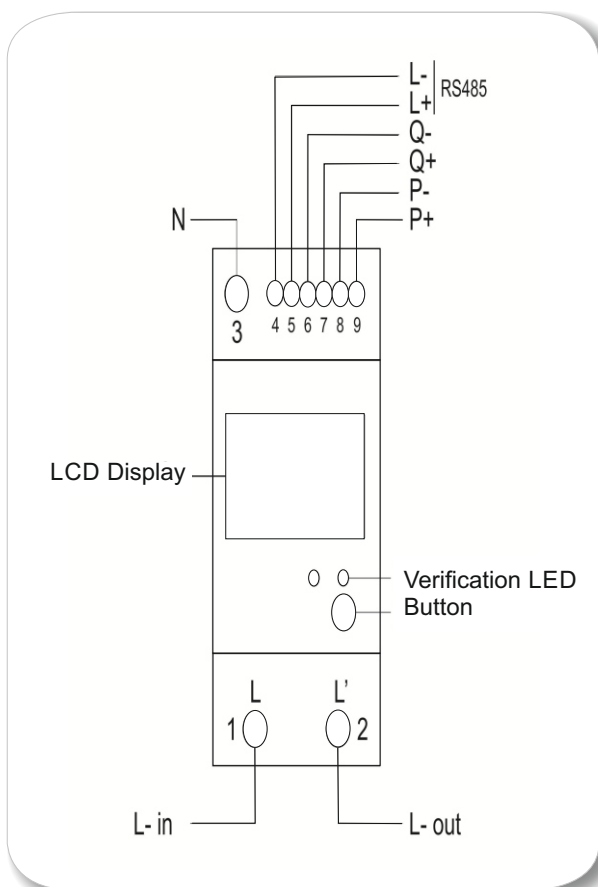
GENERAL FEATURES	
Counter type	LCD Display
Digits	5 + 1 decimal
2 active energy counter	total and parcial
Class	1 active - 2 reactive
Operating temperature	-20 to +60 °C
Energy indicator	LED
Case material	ABS, UL94 V0
Dimensions	2 modules (35 mm)
Terminals	Sealable
Connection	With screw
Max wire section:	
Phase input terminals	6x6 mm ²
Neutral terminals	3,5x3,5 mm ²
Terminals SO and RS-485	1,8 mm Ø

The **M2DL2** energy meter and network analyzer is designed to act as an energy meter and also measure parameters of a single phase network, such as **voltage, current, active power, reactive power factor and frequency** in low voltage.

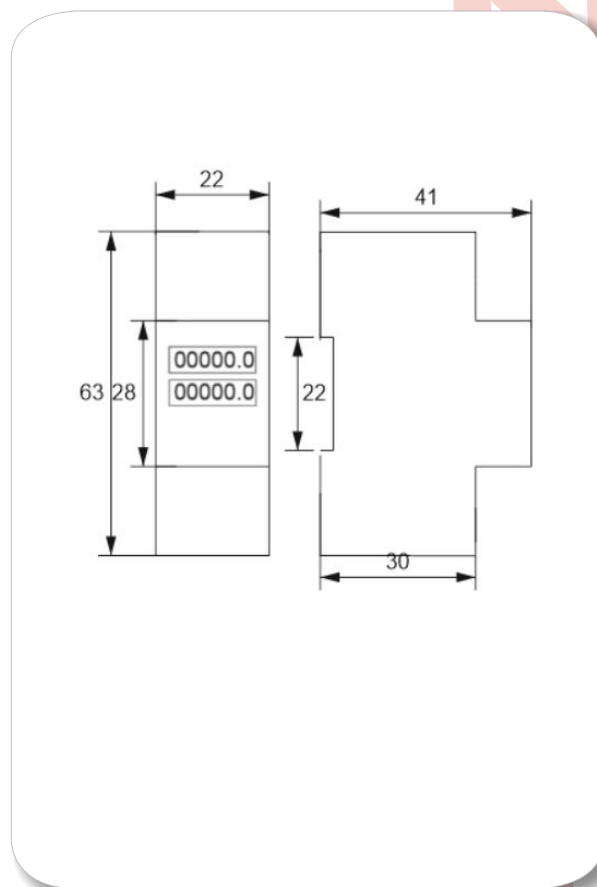
The M2DL2 is characterized through its **RS-485 communication** with potential to connect up to 32 computers in a same loop or 128 through converter, being able to be controlled from any computer or any other network device.

ELECTRICAL PARAMETER	UNIT	TOTAL
Voltage	V	•
Current	A	•
Active power (P)	kW	•
Reactive power (Q)	kvar	•
Power factor (Cos φ)	PF	•
Frequency	Hz	•
Import active energy (EP+)	kWh	•
Export active energy (EP-)	kWh	•
Reactive energy (Q1, Q2, Q3, Q4)	kvarh	•

CONNECTION DIAGRAM



DIMENSIONS

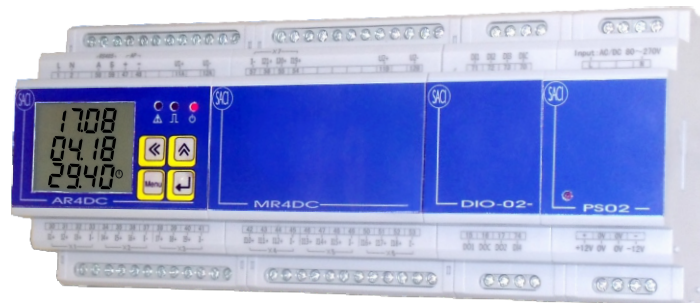


HALL EFFECT DC NETWORK ANALYZER AR4DC

The AR4DC Hall effect network analyzer is designed for voltage, current, power and energy measuring in DC systems using hall effect sensors. Its RS485 port allows monitoring easily. It includes temperature sensor and nominal voltage of 1500 V C.C.

GENERAL FEATURES

- **DIN RAIL MOUNTED.**
- **DC.**
- **HALL EFFECT SENSORS: 9 CURRENTS (UP TO 21*).**
- **RS485 PORT**
- **BIDIRECTIONAL ENERGY.**
- **OPTIONAL: 4 DIGITAL INPUTS AND 2 OUTPUTS**



ELECTRICAL PARAMETER	UNIT	SYMBOL	MAX/MIN	DEMAND	AR4DC	AR4DCT
Voltage	V	•	•		•	•
Current (9 extendable to 21)*	A	•	•	•	•	•
Power	kW	•	•	•	•	•
Import active energy	kWh	•			•	•
Export active energy	kWh					
Outdoor temperature measurement	°C	•				•

*Module MR4DC and MR4DCT available to extend from 9 to 21 current inputs using 1 module MR4DC or up to 33 current inputs using 2 modules MR4DC

APPLICATIONS

- **FOR HALL EFFECT SENSORS.**
- **PHOTOVOLTAIC SYSTEM.**

NOMENCLATURES

- **AR4DC** - DC Network analyzer with Temperature sensor.
- **MR4DC** - Current input extendable module (optional).
- **DIO-02** - Digital inputs and relay output extendable module (optional).
- **PS02** - 12 V Power supply.

INPUT	
Rated Voltage (Un)	1500 V DC.
Continuous overload	1,2 Un
Burden	< 1 VA
Impedance	> 4 MΩ
Rated Current (In)	4 V C.C.
Continuous overload	1,2 In
Burden	< 1 VA

AUXILIARY VOLTAGE	
Aux. V. AC/DC	80 - 270 V
Burden	< 5 VA

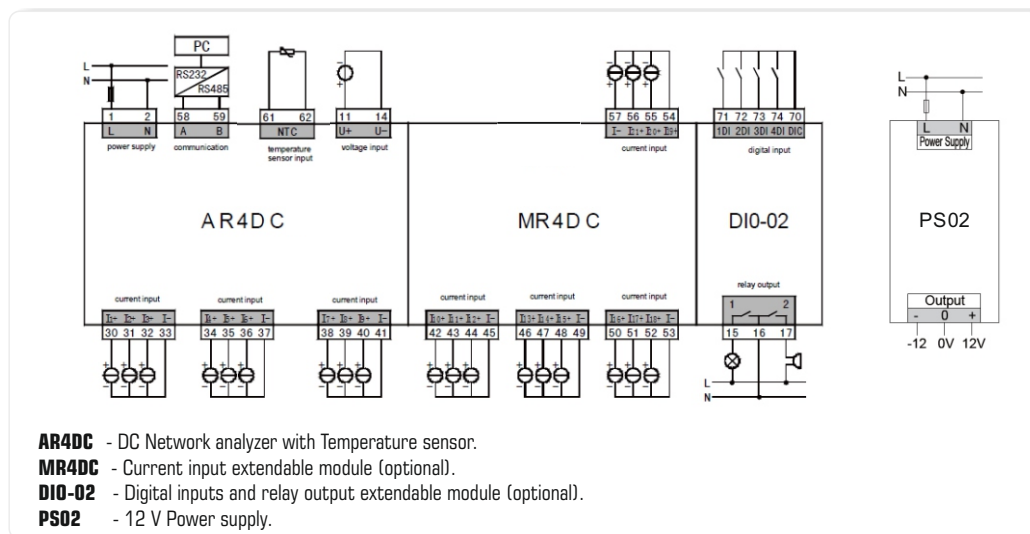
OUTPUT	
Relays	250 V/5A AC , 30V/5 A DC
Pulse weight	80 ± 20% ms
Serial port	RS485
Protocol	MODBUS RTU
Baud rate	Programmable 1,2-19,2 kbps
Connection	2 wires

GENERAL FEATURES	
Case material	ABS, UL94 V0
Dimensions	4 modules DIN (70 mm)
Terminals	With screws
Máx. wire section	2,5 mm²
Weight	0,15 Kg
Protection	IP 20
Operating temperature	-25 - 70 °C
Storage temperature	-30 - 80 °C
Relative humidity	< 93 %
Insulation	> 2 kV AC.

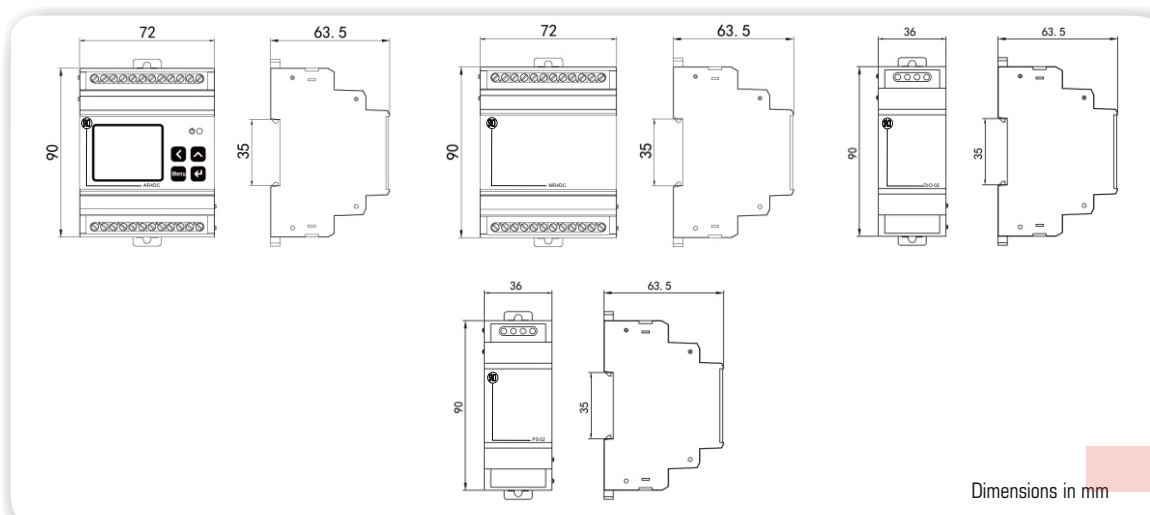
DIGITAL INPUT (DIO-02)	
Number of inputs	4
Type	Open-Contact or Open NPN Photo transistor

CONTACT OUTPUT (DIO-02)	
Number of outputs	2
Type	Relay N.O., 250 V, 3 A

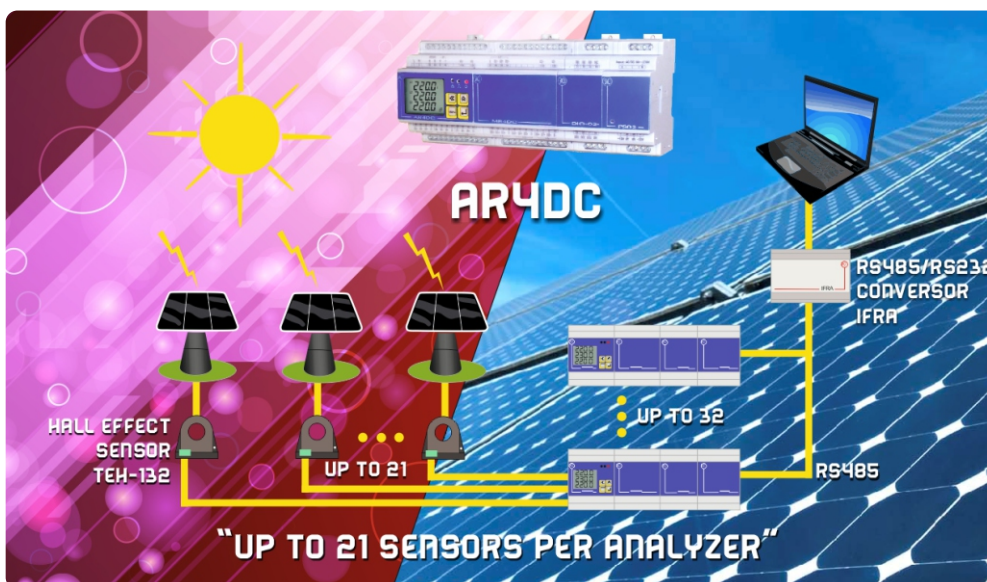
CONNECTION



DIMENSIONS



EXAMPLE OF APPLICATION



DC NETWORK ANALYZER - AR3DC

Instrument with microprocessor, programmable, LCD display, designed for measuring variables in a network of low voltage DC.

GENERAL FEATURES

- **DIN MODULAR INSTRUMENT**
- **DIRECT CURRENT**
- **RS 485 SERIAL PORT**
- **VALUE ALTERNATIVE MEASURE EVERY 2 S.**
- **1 OPTOCOUPLER OUTPUT**



ELECTRICAL PARAMETER	SYMBOL	TOTAL
Voltage	V	•
Current	A	•
Active power (P)	kW	•
Consumed active energy (EP+)	kWh	•
Generated active energy (EP-)	kWh	•
Ampere Hour (+)	Ah+	•
Ampere Hour (-)	Ah-	•
Shunt rated current	Ip	•

SETTING

- Instrument identify code.
- Primary current.
- Contacts operating mode.
- Energy pulse value.

The equipment is set through the serial port.

LCD DISPLAY

- LCD display (4 digits + Sign).
- Height of digits: 8 mm.
- Up to 8 measuring parameters.

SERIAL PORT

- Type: RS 485.
- Protocol: MODBUS RTU.
- Connection: 2 wire.
- Baud rate: Standar 9600 Bauds.
- Max N° of instruments per line: 32.

TECHNICAL SPECIFICATIONS

INPUT	
Rated Voltage (Un)	12, 24, or 48 V DC.
Burden	<1 W
Operating range	80-120 % Un
Rated current (In)	
Direct connection	10, 20, or 40 A D.C
Connection to external shunt	50-1000 A/60mV DC
Operating range	1- 120 % In

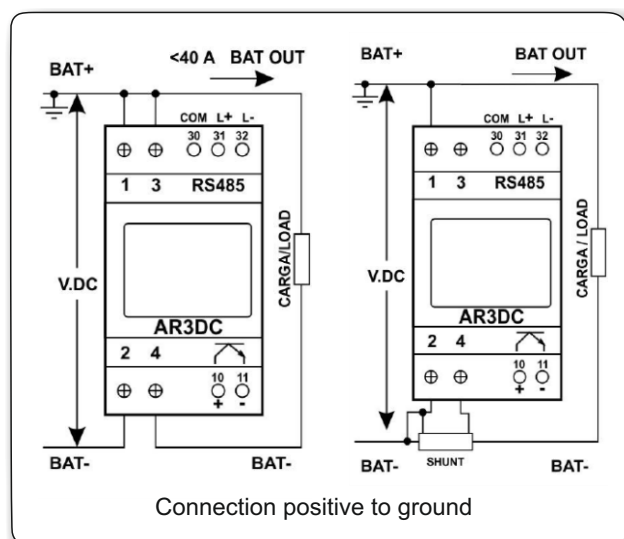
* Optional 125 V D.C.

CONTACTS OUTPUT *	
Number of outputs	1
Optocoupler	< 48 V DC.(24 V DC. 1 kΩ)

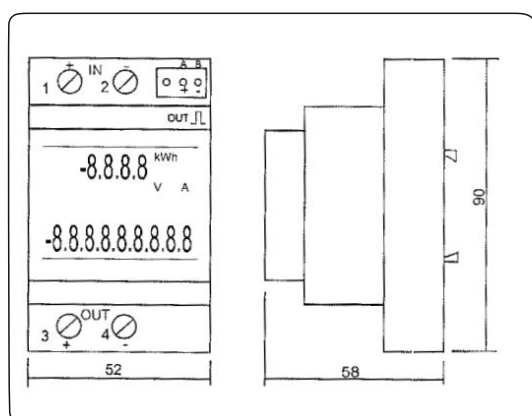
* Contact output can be set as max. or min. alarm contacts associated to any measured parameter, or as energy. They can also be set as contacts managed from the central unit.

AUXILIARY VOLTAGE	
Aux. V. D.C.	Self supplied

CONNECTIONS



DIMENSIONS



GENERAL

GENERAL FEATURES	
Mounting	DIN rail
Case material	ABS,UL94 V0
Dimensions	3 modules 52 x 90 mm
Terminals	With screws
Max. wire section	16 mm ²
Weight	0,15 Kg
Temperature range	0 - 40 °C
Protection	IP 20 terminals
Optional protection	IP 54 frontal
Electrical safety	(EN 61010) Class 2 Category III

ACCESSORIES

- Shunt x/60 mV.
- RS232/RS485 converters.
- RS 485 amplifiers.

OPTIONAL

- Reading software (without additional cost).
- Management software SACIgest.
- Connection negative to ground.

OVERLOAD

- 2 Vn x 10 s.
- 1,2 Vn permanent.
- 20 In x 1 s.
- 2 In permanent.

ACCURACY

Parameter	Operating range	Accuracy
Voltage	80-120%	0,5%(read. + full sca.)
Current	1-120%	0,5%(read. + full sca.)
Active power	1-120%	0,5%(read. + full sca.)
Active energy	1-120%	1%(read. + full sca.)
Reactive energy	1-120%	1%(read. + full sca.)
Ampere hour (+)	1-120%	1%(read. + full sca.)
Ampere hour (-)	1-120%	1%(read. + full sca.)

DC NETWORK ANALYZER - TMCC

Instrument with microprocessor, programmable, with three LED display indicating measurements and built-in keypad.

GENERAL FEATURES

- **DIN 144 x 144 INSTRUMENT**
- **DIRECT CURRENT**
- **RS 485 SERIAL PORT**
- **2 CONTACTS OUTPUT**
- **1 ANALOGUE OUTPUT 4-20 mA**



ELECTRICAL PARAMETER	SYMBOL	TOTAL
Voltage	V	•
Current	A	•
Active power (P)	kW	•
Consumed active energy (EP+)	kWh	•
Generated active energy (EP-)	kWh	•
Ampere Hour (+)	Ah+	•
Ampere Hour (-)	Ah-	•
Shunt rated current	Ip	•

SETTING

- Instrument identify code.
- Primary voltage.
- Primary current.
- Contacts operating mode.
- Energy pulse value.

Setting the device can be by keypad or through serial port.

SERIAL PORT (OPTIONAL)

- Type: RS 485.
- Protocol: MODBUS RTU.
- Connection: 2 wire.
- Baud rate: Optional.
Standard 9600 Bauds.
- Max. N° of instruments per line: 32.

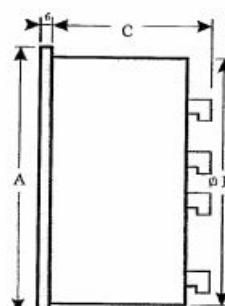
ANALOGUE OUTPUT

- Number of outputs: 1.
- Type: 4-20 mA.
- Accepted measurement: parameters.

LED DISPLAY

- 3 LED Display (4 digits + Sign)
- Height of digits: 14,5 mm
- Built in keypad (5 Keys)
- Up to 8 measuring parameters

DIMENSIONS



mm	TMCC
A	144x144
B	135 ^{+0,6}
C	88
D	6

TECHNICAL SPECIFICATIONS

INPUT	
Rated voltage (Un)	24, 48, 110, 230 or 400 V DC.*
Burden	1mA per phase
Operating range	20-120 % Un
Rated current (In)	In / 60mV DC
Operating range	1- 120 % In

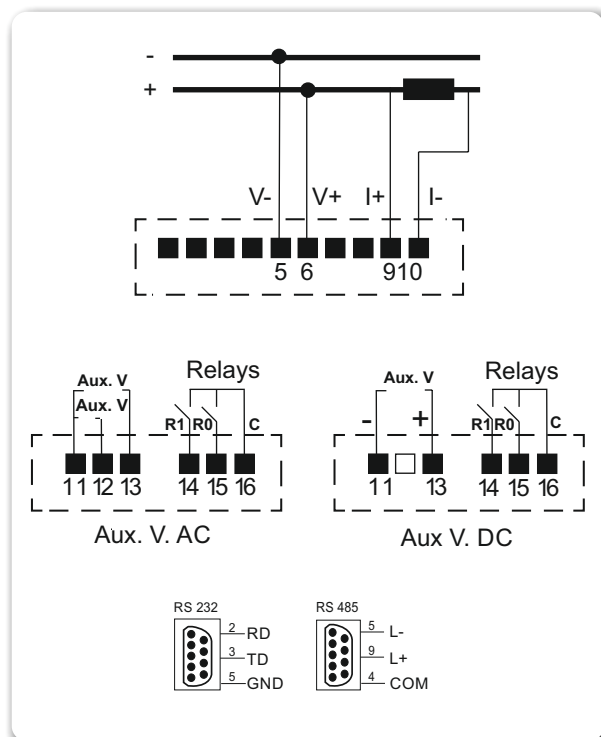
* Optional 1000 V D.C.

CONTACTS OUTPUT *	
Number of outputs	2
Type	Relay N.O 250 V, 3 A

* Contact output can be set as max. or min. alarm contacts associated to any measured parameter, or as energy. They can also be set as contacts managed from the central unit.

AUXILIARY VOLTAGE	
Aux. V. DC	24 or 48 V (*)
Aux. V. AC	110, 230 or 400 V
Universal Aux. V.	85-264 V A.C 90-300 V DC
Burden	2,8 VA
Operating range	85-110 % Un
Frequency	50 or 60 Hz

CONNECTIONS



GENERAL

GENERAL FEATURES	
Case material	ABS, UL94 V0
Dimensions	DIN 144 x 144 mm
Depth	88 mm
Terminals	Pluggable
Max. wire section	16 mm ²
Weight	0,72 Kg
Temperature range	0 - 40 °C
Protection	IP 20 terminals
Optional protection	IP 54 frontal
Electrical safety	(EN 61010) Class 2 Category III

ACCESSORIES

- Shunts x/60mV.
- RS232/RS485 converters.
- RS 485 amplifiers.

OPTIONAL

- Reading software (without additional cost).
- Management software SACIgest.

OVERLOAD

- 2 Vn x 10 s.
- 1,2 Vn permanent.
- 20 In x 1 s.
- 2 In permanent.

ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120%	0,5%(read. + full sca.)
Current	1-120%	0,5%(read. + full sca.)
Active power	1-120%	0,5%(read. + full sca.)
Active energy	1-120%	1%(read. + full sca.)
Reactive energy	1-120%	1%(read. + full sca.)
Ampere hour (+)	1-120%	1%(read. + full sca.)
Amperio hour (-)	1-120%	1%(read. + full sca.)

RS232/RS485 CONVERTER - IFR

IFR equipment converts the RS 232 standard levels to the corresponding levels in the RS485 standard.

IFR converters allow a PC with RS 232 to be connected to an RS485 bus.

RS232 drivers activations can be with RTS or automatically if this option has been selected with internal bridges.

For the automatic option, data from the RS 232 line activates the drivers.

When data transfer finishes, the IFR converters return to receive mode.



GENERAL FEATURES

- **DIN RAIL MOUNTING**
- **CONNECTIONS: 2 or 4 WIRE**
- **OPTICAL INSULATION BETWEEN RS 232 and RS 485 SERIAL PORTS**
- **UP TO RS 485 SERIAL PORTS**

MODEL IFR

- **IFR1** 2 WIRE.
1 serial port RS232.
1 Serial port RS485.
- **IFRA3**
- **IFRA** 2 or 4 wire.
Optically insulated.
1 serial port RS232.
1 Serial port RS485.
- **IFR4** 2 or 4 wire.
Optically insulated.
1 serial port RS232.
4 serial port RS485.

TECHNICAL SPECIFICATIONS

INPUT	
Number of outputs	1
Type	RS 232 (RD, TD, RTS, CTS)

OUTPUT	
Number of outputs	
IFR1, IFRA, IFRA3	1
IFR4	4
Type	RS 485
Baud rate	300-76800 Bauds

AUXILIARY VOLTAGE	
Aux. V. AC.	110 or 220 V.
Aux. V. DC.	12, 24 or 48 V
Burden	
IFR1	3 VA
IFRA, IFR4	6 VA
IFRA	3 W

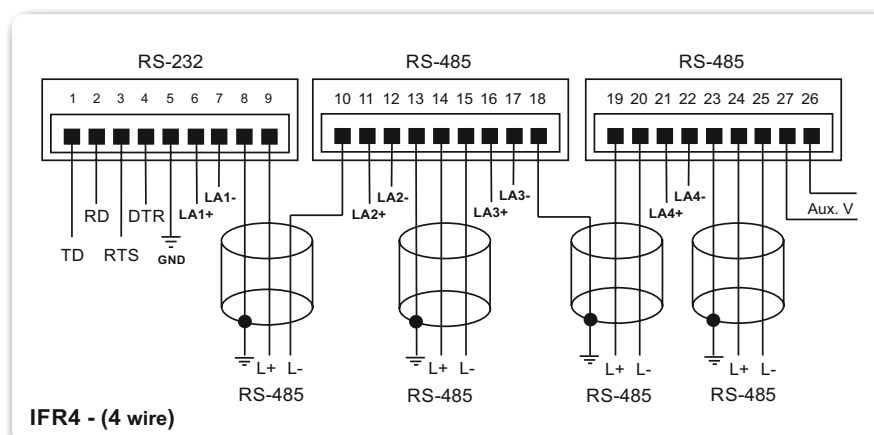
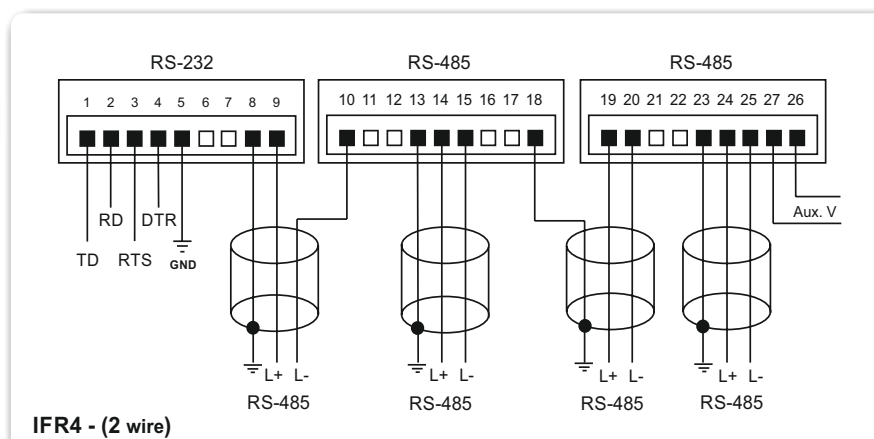
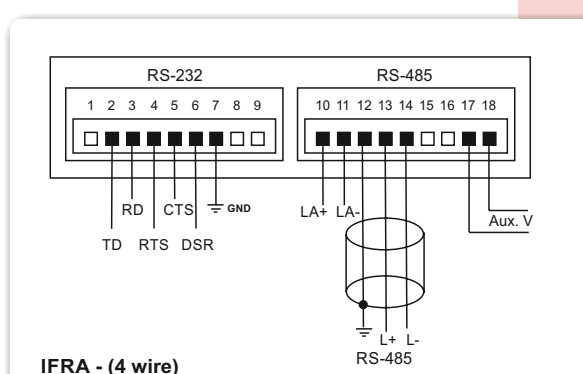
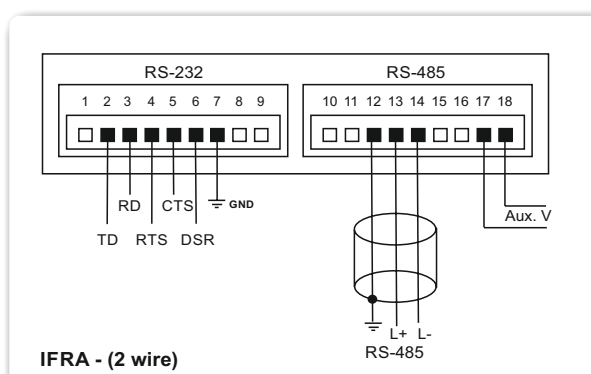
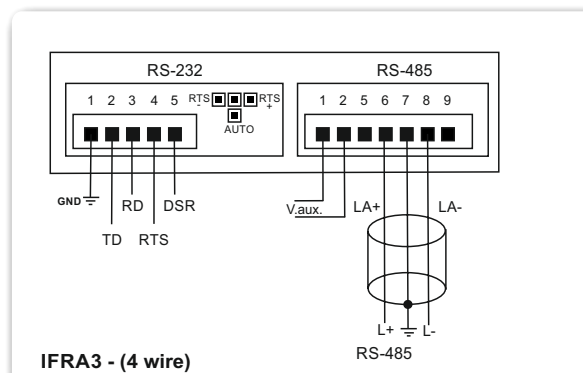
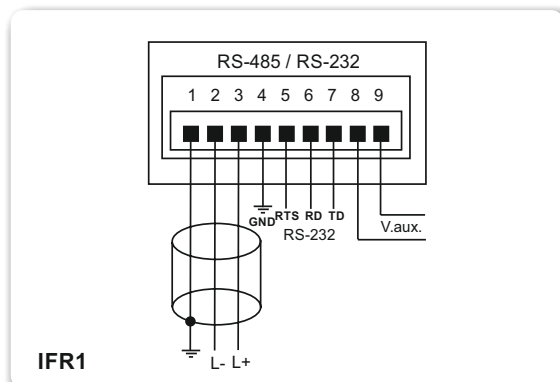
GENERAL

GENERAL FEATURES	
Case material	ABS, UL94 V0
Dimensions	
IFR1	(3 Modules), 52 x 90 mm.
IFRA3	(3 Modules), 52 x 90 mm.
IFRA	(6 Modules), 105 x 90 mm.
IFR4	(9 Modules), 155 x 90 mm.
Terminals	Pluggable
Max wire section	2,5 mm ²
Weight	
IFR1-IFRA3	0,30 kg
IFRA	0,45 kg
IFR4	0,65 kg
Mounting	DIN rail

OVERLOAD

- 2 Vn x 10 s.
- 1,2 Vn permanent.
- 20 In x 1 s.
- 2 In permanent.

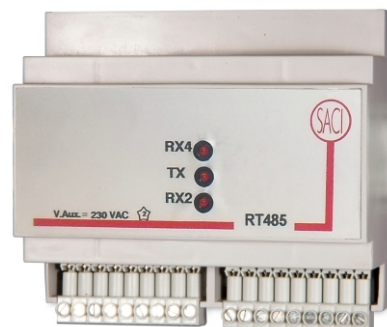
CONNECTIONS



REPEATER RS485/RS485 - RT485

The RT485 repeater is a communication equipment that allows the extension of a RS485 bus in order to increase communication distance, or the maximum recommended number of terminals.

It receives a communication from the bus and sends it to the other bidirectionally. It allows two or four wires connection and due to an auxiliary power supply it separates the two communications buses electrically. LEDs on the front display operation signals.



GENERAL FEATURES

- **DIN RAIL MOUNTING**
- **CONNECTIONS: 2 or 4 WIRE**
- **OPTICAL INSULATION BETWEEN RS232 and RS485 SERIAL PORT**
- **2 or 4 WIRE**

TECHNICAL SPECIFICATIONS

INPUT	
Number of outputs	1
Type	RS 485

OUTPUT	
Number of outputs	1
Type	RS 485
Baud rate	300-19200 Bauds

AUXILIARY VOLTAGE	
A.C.	110, 220 or 400 V
D.C.	24, 48, 110 or 220 V

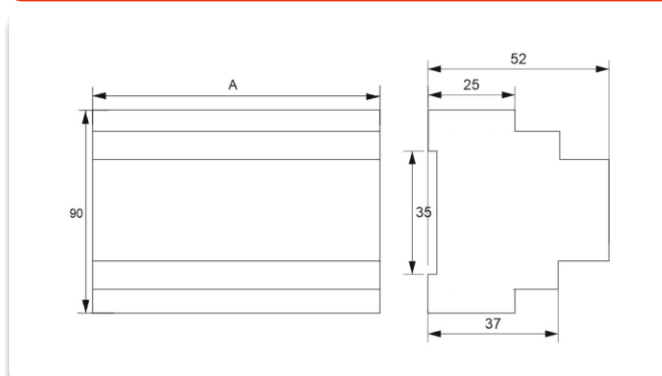
GENERAL

GENERAL FEATURES	
Case material	ABS, UL94 V0
IFRA	(6 Modules), 105 x 90 mm.
Terminals	Pluggable
Max. wire section	1,5 mm ²
Weight	0,45 kg
Mounting	DIN rail
LED indication	
Rx4	Received data (4wire)
Rx2	Received data (2wire)
TX	Sent data

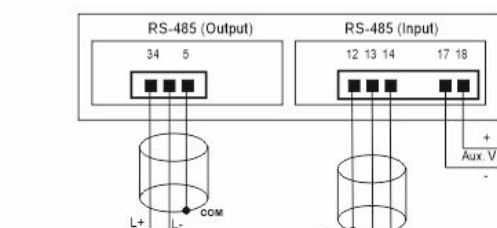
OVERLOAD

- 2 Vn x 10 s.
- 1,2 Vn permanent.
- 20 In x 1 s.
- 2 In permanent.

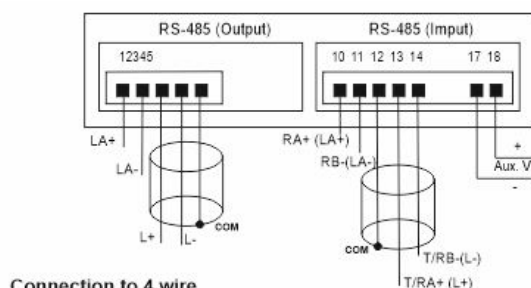
DIMENSIONS



CONNECTIONS



Connection to 2 wire



Connection to 4 wire

ETHERNET CONVERTER - etherGATE1

The etherGATE is a communications gateway used to convert the physical Ethernet environment to serial RS-485.

GENERAL FEATURES

- **CONVERT ETHERNET TO RS485**
- **TRANSPARENT CONVERSION UNDER TCP or UDP CONNECTIONS**
- **NETWORK PROTOCOLS MODBUS/TCP, TCP, UDP - HTTP**
- **CONFIGURATION THROUGH FIXED IP or DHCP NAME**
- **DIN RAIL 2 MODULES**



TECHNICAL SPECIFICATIONS

POWER CIRCUIT	
Single-phase (A1 – A2)	1
Frequency	47...63 Hz
Maximum consumption	4,6...7,5 V.A
Working temperature	-10+ 60 °C

NETWORK INTERFACE	
Type	Ethernet 10 BaseT / 100Base TX
Connector	RJ 45
Network protocols	TCP / UDP / Modbus/TCP - HTTP

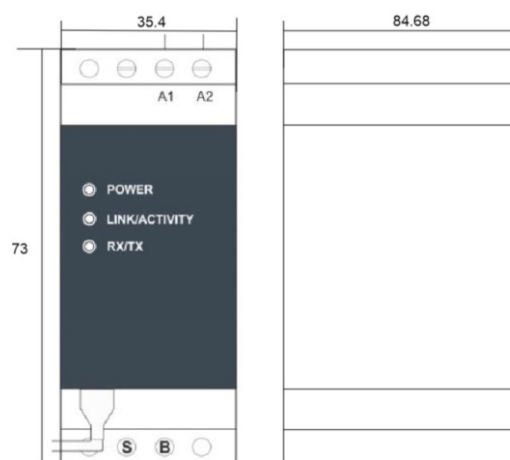
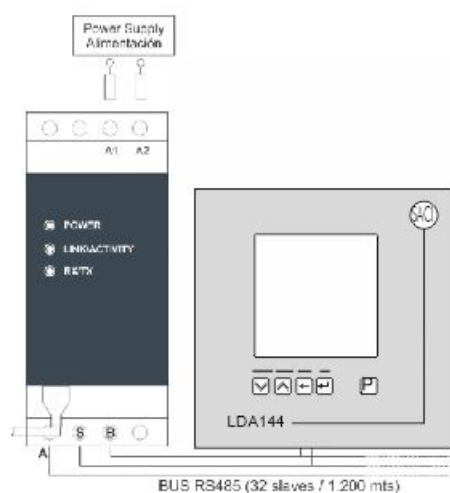
MECHANICAL FEATURES	
Case material	UL94 - V0 Plastic
Protection degree	IP 20.
Dimensions (mm)	35,4 x 73 x 84,7 (2 modules)
Weight (g)	120 g
Maximum operating height	2.000 m

SERIAL INTERFACE	
Type	RS-485 three wires
Transmission speed	4.800 - 115.200 bps
Data bits	7, 8
Parity	No parity, odd, even
Stop bit	1 or 2

CONNECTIONS

DIMENSIONS

Figure 1. Standard connection of serial equipment



ACCESSORIES - IP65 PROTECTION COVER

Protective cover IP65 for panel mounting devices.

GENERAL FEATURES

- **EASY ASSEMBLY.**
- **PROTECTION AGAINST BUMPS, SCRATCHES OR ANY OTHER EXTERNAL EXPOSURE, RAIN, LIQUIDS...**
- **FULLY ADJUSTABLE.**
- **AVAILABLE IN 3 STANDARD SIZES.**

Model	Dimension	Ordering code
3V	96x96 mm	YVARSV193
4V	72x72 mm	YVARSV194
5V	48x48 mm	YVARSV266



MOUNTING

1- Insert the rubber into the device through the back area. Then introduce the device into the panel hole intended, and help yourself to him to bring the rubber at the front area of the device.

2- Fit the plastic cover from the front. The pressure between the rubber, the device and the panel will make sure it is securely attached

3- Hold the device to the panel with the corresponding fixing system.

- The device will be fully adjusted and protected. The material composed it makes it completely waterproof against dust, liquids ... avoiding the risk that may occur against rain or another external exposures.



MANAGEMENT SOFTWARE - SACIGEST

The SACIgest program is a system allowing the SACI terminals installed on the net to be easily managed as graphs. The electrical installation is grouped by sections, each of which is displayed differently, in the way they are inserted in their corresponding terminals.

A variable for each terminal can be monitored on the screen and placed in an appropriate position on the graph.

The system includes the easy creation of virtual terminals based on actual terminals by simply applying a definition formula.

Given the possible inclusion of direct current analyzer terminals, alternating current sections and direct current sections can be created.

Terminal models handling the system are as follows.

**SAM3000, AHM1, AHM3, ANG96, MAR
MDA
LCA_, LDA_, LAB
CP2000, CP3000, CP4000
TMCQ
M2DL2, M1DL1, M2DL1, M2DM1
TCIDL1, TCIL1(*)
meters of water, gas, etc,
with pulse output (*)
TMC-C TMCC-H
TTI
VIRTUALS
(*) Through TTI.**



The SACIgest software can work in several languages, initially prepared in Spanish and English. The customer can choose or define his own language.

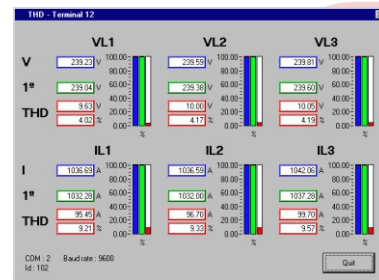
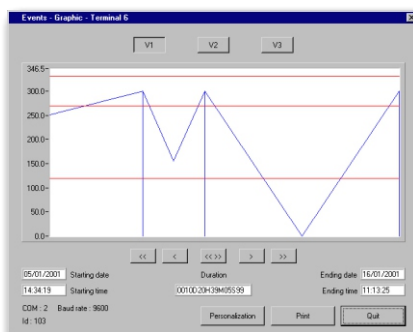
All definition and setting operations can be password protected. The software is capable of handling up to 4 communication ports (COM1 - COM4), as well as using a modem to communicate with the different terminals installed on the network. The communication speed with the terminals can also be configured (where possible).

The Client- Server operating mode via an Ethernet network can be selected.

Minimum requirements:

CPU: Microprocessor: Pentium III
RAM: 128 Mb
Video card: SVGA
Monitor: Colour, 15" 800 x 600
Software: XP, Win, Vista, Win 8, 32 bits,

It must also have a serial port for the RS-232 - Rs485 converter connection (IFRxx Model). It can be physically or through a converter USB-RS232



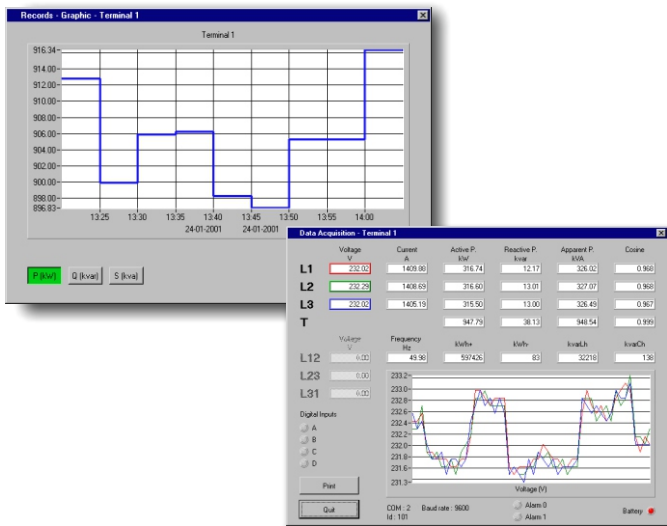
MANAGEMENT SOFTWARE - SACIGEST

Versions

The system has different versions according to its applications:

- **SACIgest 01:** Version for terminal monitoring and setting options. All terminal parameters can be set and the monitoring data can be accessed. It has a numerical indicator next to the terminal where the value of the selected variable appears.

- **SACIgest 02:** Version which adds the Energies option to 01. The energy consumption of the installation can be displayed using the terminals or sections. The values can be shown as a graph. Energy closures can be generated and displayed. Setting of up to 6 types of different tariffs for 12 time periods with holidays defined. The sampling period is programmable by the user in intervals of 5, 10, 15, 20, 30 and 60 minutes based on the PC clock for terminals directly connected to a PC. Also, a different sampling interval can be defined for terminals connected via modem.



- **SACIgest 03:** The possibility of having historical values is added to version 02. The voltage, current and power variables are sampled and their historical values are generated. The sampling interval can be defined by the end user. In fact, all parameters are quickly sampled and when it is time to generate the history, the values sampled during the selected interval are averaged.

- **SACIgest 04:** Alarm option is added to 03. Different alarms on the system can be defined for each terminal allowing actions to be taken on the digital outputs of the terminal or on any other terminal. Pending alarm recordings and already registered alarms are shown. A button on the main screen will indicate if any alarm has been set off.

Sub-versions

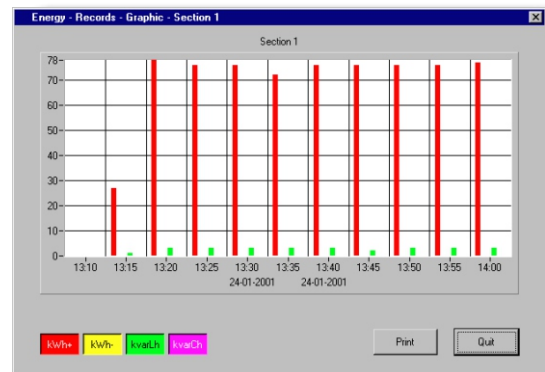
Within each SACIgest version there are different subversions which shall be defined below.

- Normal: This is the version for the majority of users. It consists of a single PC connected to the SACI instrument network.

- Server: The SACIgest software can operate in a Client.

- Server environment using an Ethernet interface with NetBios and TCP/IP protocol. This is the Server version which is physically installed in the terminals and provides the service to the clients.

- Client: Within the Client - Server operating mode, this is the client version which accesses the terminals and data allocated on the server. The client version is free, as many clients as required can be installed, but the Server version is required to operate.



There are also the following installation options for all of the above mentioned versions:

- Normal: This is the normal installation with no limit on terminals.

- Reduced: Same as above, but with a limit of 6 terminals in the installation. The price is also lower.

- Demo: There are completely operational trial versions, which exits after using it for 60 minutes.

All versions, except for the DEMO and Client versions require hardware protection to operate. Each version has its specific protection and it cannot operate without its protection.

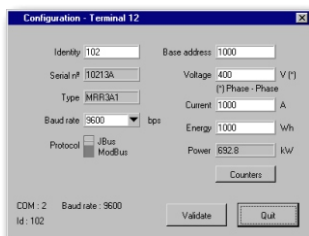
The depth of section graph has to be edited by the final user with any graphic design program or with digital photographs.

MANAGEMENT SOFTWARE - SACIGEST

SOFTWARE - LCDA

LCDA software is designed to manage the most common LCA, LCAM, LCC, LCCM, LDA96 and LDA144 versions.

This version can manage different equipment on the network with the option option to program the communication speed and to program it via modem. Equipment in the first four communication port on the PC can be managed.

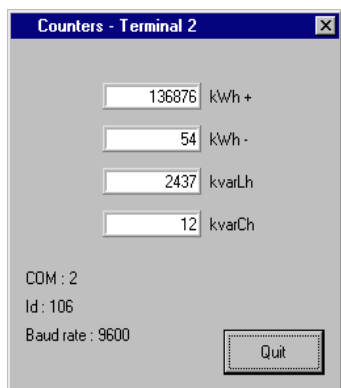


With this version, the two digital outputs of the instrument, maximums and minimums, harmonics and maximum required values (LDA) can be managed. It takes data for 30 electrical parameters and displays the variables as a graph.

This software version operates on a 32 bit platform, i.e. for Win 7, Win 8, XP, Vista

SOFTWARE - LCDAM

LCDAM software is designed to manage the more common versions of LCA, LCAM, LCC, LCCM, LDA96, LDA144 and LDA144 with memory. This version can manage different equipment on the system with the option to set the communication speed and program it via modem. It allows to manage any equipment connected to the first four communication ports on the PC.



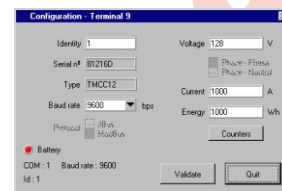
With this version, the two digital outputs of the instrument, maximums and minimums, harmonics, maximum required values (LDA and LCC) and the historical values of the LDA144 with memory can be managed. It takes data for 30 electrical parameters and displays the variables as a graph

SOFTWARE - REMREADER

This is a software for remote readings at a predetermined time of all connected and configured terminals showing their values as a text file. It saves and registers the configuration of the terminals.

RemReader software manages all SACI terminals except for the TMCQ and TTI, although it includes meters connected to the TTI.

The program allows showing the results and the use of a modem to establish communications.

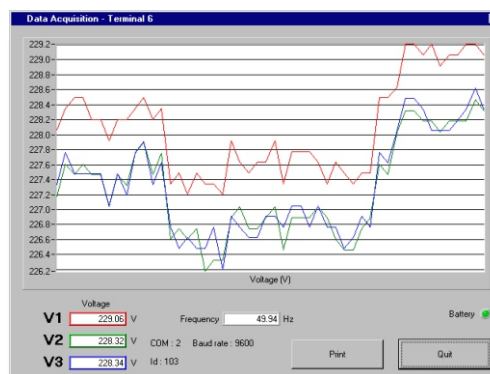


This software version operates on a 32 bit platform, i.e. for Win 7, Win 8, XP, Vista...

SOFTWARE - MODEMCFG

This software allows to choose the optimal way to properly operate with the network.

Given that two identical modems do not exist and that not all modems accept the same commands, this software has been created to extract the existing configuration in Windows and to reconfigure it. It is easy to assume that the modem has to be installed previously using Windows to allow this configuration software to receive its information.



THE Solution TO MONITOR YOUR DEVICES "DG"

This solution is able to calculate ratios of many devices, high-speed data processing, generate real-time alarms, send email notifications instantly....



ETHERNET
RS-485

