NETWORK ANALYZER

NETWORK ANALYZER

S.A. DE CONSTRUCCIONES INDUSTRIALES

PRODUCTS RANGE

- **NETWORK ANALYZERS – ALTERNATING CURRENT**

LCD DISPLAY

DIN RAIL MOUNTING — **LCAM, LABM, AR3AC**

PANEL (96 x 96) MOUNTING — **ANG96, LAB96, SNG96**

PANEL (144 x 144) MOUNTING — **LDA 144, LDA 144 (with memory)**

LED DISPLAY

DIN RAIL MOUNTING — **TCEM**

PANEL (96 x 96) MOUNTING — **MAR 96, MDA 96**

PANEL (144 x 144) MOUNTING — **MAR 144, MDA 144**

PRODUCTS RANGE

- **NETWORK ANALYZERS – DIRECT CURRENT**

  LCD DISPLAY

  DIN RAIL MOUNTING — **AR3DC**

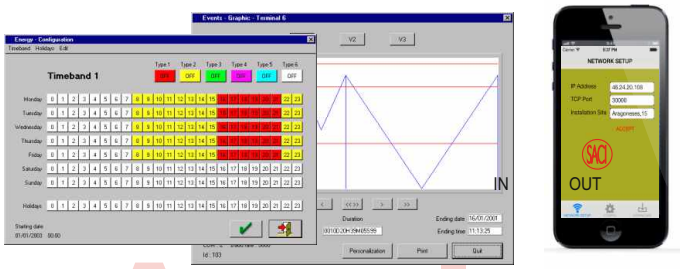
  LED DISPLAY

  PANEL (144 x 144) MOUNTING — **TMCC**

- **NETWORK QUALITY ANALYZER (144 x 144)** — **TMCQ**

- **RS232 / RS485 CONVERTER, RS485 REPEATER** — **IFR1, IFRA, IFR4, RT485, etherGATE**
  ETHERNET CONVERTER

- **MANAGEMENT SOFTWARE - APP iPHONE** — **SACIgest**



CONTENTS

NETWORK ANALYZER - ANG96 STANDARD VERSION

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 CUADRANT 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

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 capaitive react energy (Eq-)	kvarh				•

HOUR COUNTERS

2 hour counters:
- Active power + (consumed)
- Active power - (generated)
- Limit: 50.000 hours
- Resolution: 1 second

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

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

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

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

OVERLOAD

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

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

GENERAL

GENERAL FEATURES	
Case material	ABS,UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire section	2,5 mm²
Weight	0,4 Kg
Protection	IP20 Terminals
Optional protection	IP54 Front IP65 Front cover
Electrical safety	(EN 61010) Class 2 Category III

LCD DISPLAY

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

CONTACT OUTPUTS

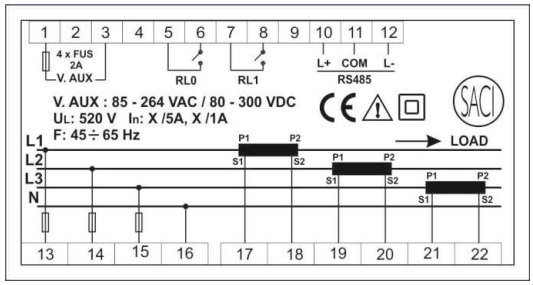
Contact outputs can be set as max. or min. alarm contacts associated to any measured parameter or as active energy and reactive enrgy pulses. They can also be set as contacts managed from the central unit.

ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120%	0,3%(read.+full sca.)
Current	1-120%	0,3%(read.+full scal.)
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

CONNECTIONS

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



NETWORK ANALYZER - ANG96 ETHERNET VERSION

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.

NEW

GENERAL FEATURES

- DIN SIZE 96 x 96
- LCD 128 x 64 DISPLAY WITH BACKLIGHT
- 4 CUADRANT 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
- ETHERNET TCP/IP PORT

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 capaitive react energy (Eq-)	kvarh				•

HOUR COUNTERS

2 hour counters:
- Active power + (consumed)
- Active power - (generated)
- Limit: 50.000 hours
- Resolution: 1 second

ETHERNET TCP/IP CONNECTOR

- TCP/IP protocol in a RJ45 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..

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

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
Ethernet port	TCP/IP

AUXILIARY VOLTAGE	
UNIVERSAL Aux. V.	85/264 V A.C.;80/300 V DC.
Burden	< 4 VA

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.

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

GENERAL

GENERAL FEATURES	
Case material	ABS,UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire section	2,5 mm²
Weight	0,4 Kg
Protection	IP20 Terminals
Optional protection	IP54 Front IP65 Front cover
Electrical safety	(EN 61010) Class 2 Category III

LCD DISPLAY

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

CONTACT OUTPUTS

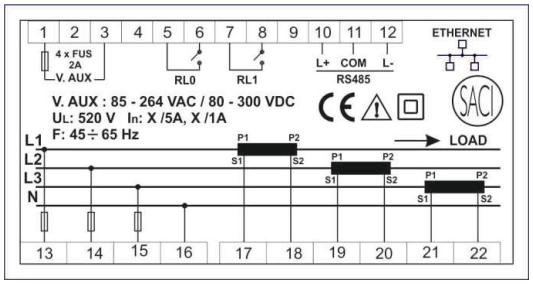
Contact outputs can be set as max. or min. alarm contacts associated to any measured parameter or as active energy and reactive enrgy pulses. They can also be set as contacts managed from the central unit.

ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120%	0,3%(read.+full sca.)
Current	1-120%	0,3%(read.+full scal.)
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

CONNECTIONS

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



NETWORK ANALYZER - ANG96 GENERATOR VERSION

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.

NEW

GENERAL FEATURES

- DIN SIZE 96 x 96
- LCD 128 x 64 DISPLAY WITH BACKLIGHT
- 4 CUADRANT 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
- 4 HOUR COUNTERS

	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	•	•	•	
Energy counters* Hour counters **	Import active energy (EP+),(DP+)*	kWh				•
	Hour counter active positive (T+)**	h-m-s				•
	Export active energy (EP-),(DP-)*	kWh				•
	Hour counter active negative (T-)**	h-m-s				•
	Import induct. react. energy (Eq+),(Dq+)*	kvarh				•
	Import capacit. react. energy (Eq-),(Dq-)*	kvah				•

*E: Normal operating mode; D: Generator mode.

** 2 Hour counter per operating mode.

HOUR COUNTERS

4 Hour counters:
- Active power +(consumed) Normal Mode
- Active power - (generated) Normal Mode
- Active power +(consumed) Generator Mode
- Active power - (generated) Generator Mode

- Limit: 50.000 hours
- Resolution: 1 second

GENERATOR ENERGY MEASUREMENT

- External voltage input to connect to an external generator. When voltage is detected, ANG96G 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
Generator Voltage	230 V AC.

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 A.C.;80/300 V DC.
Burden	< 4 VA

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 mm²
Weight	0,4 Kg
Protection	IP20 Terminals
Optional protection	IP54 Front IP65 Front cover
Electrical safety	(EN 61010) Class 2 Category III

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

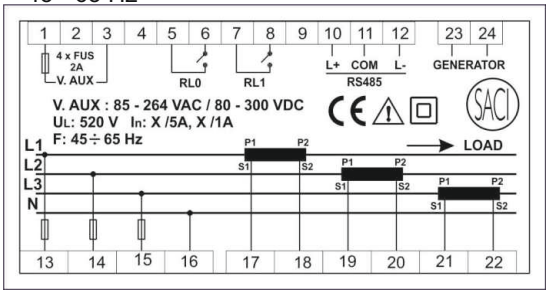
Contact outputs can be set as max. or min. alarm contacts associated to any measured parameter or as active energy and reactive enrgy pulses. They can also be set as contacts managed from the central unit.

ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120%	0,3%(read.+full sca.)
Current	1-120%	0,3%(read.+full scal.)
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

CONNECTIONS

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



NETWORK ANALYZER - LAB96

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

GENERAL FEATURES

- DIN 96 X 96 INSTRUMENT
- MEASUREMENT IN 4 QUADRANTS
- THREE-PHASE 3 or 4 WIRE
- NEUTRAL CURRENT
- HARMONIC DISTORTION (THD V and I)
- HARMONIC MEASURING (up to 15) (optional)
- MAXIMUM DEMAND A, kW, kVA
- MAX. and MIN. VALUES
- TRUE RMS.
- RS485 SERIEAL PORT
- 1 CONTACT OUTPUT

ELECTRICAL PARAMETER	SYMBOL	L1	L2	L3	TOTAL
Voltage (Line-to-neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Current and neutral current	A	•	•	•	•
Active power (P)	kW	•	•	•	•
Inductive reactive power (QL)	kvar	•	•	•	•
Capacitive reactive power (QC)	kvar	•	•	•	•
Apparent power (S)	kVA	•	•	•	•
Power factor (Cos φ)	PF	•	•	•	•
Maximum demand (I)	A	•	•	•	•
Maximum demand (P)	kW				•
Maximum demand (S)	kVA				•
Frequency	Hz				•
THD Current	A	•	•	•	15th
THD Voltage	V	•	•	•	15th
Import active energy (EP+)	kWh				•
Import capacitive react. energy (EQC+)	kvarh				•
Import inductive react. energy (EQL+)	kvarh				•
Import apparent energy (ES+)	kVAh				•
Export active energy (EP-)	kWh				•
Export capacitive react. energy (EQC-)	kvarh				•
Export inductive react. energy (EQL-)	kvarh				•
Export apparent energy (ES-)	kVAh				•

MODEL	LAB96	MODEL	LAB96
- LAB96-B	Basic model.	- LAB96-CH	LAB96-C Harmonic measuring. (up to 15)
- LAB96-BA	Basic model. Current insulated.		
- LAB96-C	Basic model. Current insulated. RS485 Serial port. 1 Relay.	- LAB96-U	LAB96-C Universal auxiliary power supplied.

MAXIMUM DEMAND FUNCTION

- Average values of I1, I2, I3, P and S.
- Integration period: 1 to 60 minutes.

SETTING

- Instrument identify code.
- Primary voltage.
- Primary current.
- Contact operating mode.

SERIAL PORT (LAB96-C,CH,U models)

- Type: RS 485.
- Connection: 2 wire.
- Protocol: MODBUS RTU.
- Baud rate: Programmable. 300 - 19200 Bauds. Standard 9600 Bauds.

MAX. AND MIN. VALUES.

- Maximum and minimum values of: V1, V2, V3, V12, V23, V31, I1, I2, I3, P, Q, S, Cos φ and Hz

OVERLOAD

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

TECHNICAL SPECIFICATIONS

INPUT	
3-Phase, 3 or 4 wire,balanced or unbalanced	
Rated Voltage (Un)	300 V (line to neutral) 520 V (line to line)
Burden	< 0,7 VA
Rated current (In)	5 A
Burden	< 0,75 VA
Operating range	0 - 110 % In
Frequency	45-65 Hz

CONTACT OUTPUT *(LAB96-C, -CH, -U)	
Number of outputs	1
Type	Opto-insulate transistor NPN 24 V D.C. 50 mA

*Contact output can be set as max. or min. alarm contacts associated to a measured parameter, or as active energy and reactive energy pulses.

AUXILIARY VOLTAGE	
Aux. V. A.C.	230 V
Burden	5 VA
Operating range	85-110 % Un
Universal Aux. V.	85/265 V AC.;95/300 V DC.
Burden	5 VA
Frequency	50-60 Hz

GENERAL

GENERAL FEATURES	
Case material	UL94 V0
Dimensions	DIN 96 x 96 mm (Depth 63)
Terminals	Pluggable
Max. wire section	2,5 mm²
Weight	0,4 kg
Protection	IP51 Frontal IP31 terminals
Electrical safety	(EN 61010) Class 2 Category III

ACCESSORIES

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

OPTIONAL

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

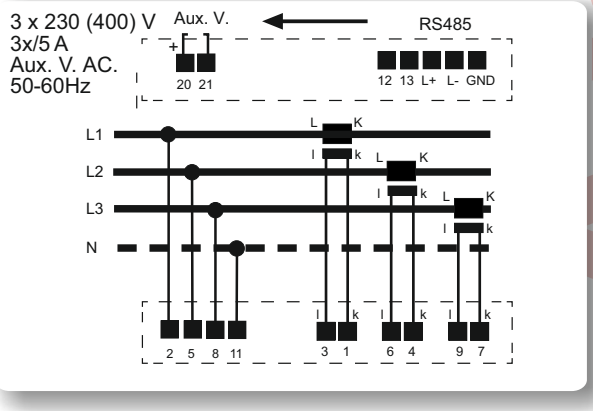
DISPLAY

- LCD display with built in keypad.
- Height of digits: 8 mm (4 parameters per page).
- Back lighting.

ACCURACY

Parameter	Operating range	Accuracy
Voltage	10-100%	0,5 ± 2 digits
Current	10-100%	0,5 ± 2 digits
Active power	10-100%	1% ± 2 digits
Reactive power	10-100%	1% ± 2 digits
Apparent power	10-100%	1% ± 2 digits
Power factor	0,5 - 1	± 6º
Frequency	45-65Hz	0,2% ± 2 digits
Active energy	10-100%	1% ± 2 digits
Reactive energy	10-100%	1% ± 2 digits

CONNECTIONS



NETWORK ANALYZER - LABM

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

GENERAL FEATURES

- MODULAR DIN INSTRUMENT
- MEASUREMENT IN 4 QUADRANTS
- THREE-PHASE 3 or 4 WIRE
- NEUTRAL CURRENT
- HARMONIC DISTORTION (THD V and I)
- HARMONIC MEASURING (up to 15) (optional)
- MAXIMUM DEMAND A, kW, kVA
- MAX. and MIN. VALUES
- TRUE RMS
- RS485 SERIAL PORT
- 2 CONTACT OUTPUTS
- CURRENTS, 100, 250 or 500 A (t/e)
- INTERNAL TEMPERATURE SENSOR

ELECTRICAL PARAMETER	SYMBOL	L1	L2	L3	TOTAL
Voltage (Line-to-neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Current and neutral current	A	•	•	•	•
Active power (P)	kW	•	•	•	•
Inductive reactive power (QL)	kvar	•	•	•	•
Capacitive reactive power (QC)	kvar	•	•	•	•
Apparent power (S)	kVA	•	•	•	•
Power factor (Cos φ)	PF	•	•	•	•
Maximum demand (I)	A	•	•	•	•
Maximum demand (P)	kW				•
Maximum demand (S)	kVA				•
Frequency	Hz				•
THD Current	A	•	•	•	15th
THD Voltage	V	•	•	•	15th
Import active energy (EP+)	kWh				•
Import capacitive react. energy (EQC+)	kvarh				•
Import inductive react. energy (EQL+)	kvarh				•
Import apparent energy (ES+)	kVAh				•
Export active energy (EP-)	kWh				•
Export capacitive react. energy (EQC-)	kvarh				•
Export inductive react. energy (EQL-)	kvarh				•
Export apparent energy (ES-)	kVAh				•

MODEL	LABM	MODEL	LABM
- LABM-B	Basic model.	- LABM-CH	LABM-C Harmonic measuring. (up to 15)
- LABM-BA	Basic model. Current insulated.		
- LABM-C	Basic model. Current insulated. RS485 Serial port. 1 Relay.	- LABM-U	LABM-C Universal auxiliary power supplied.

MAXIMUM DEMAND FUNCTION

- Average values of I1, I2, I3, P and S.
- Integration period: 1 to 60 minutes.

SETTING

- Instrument identify code.
- Primary voltage.
- Primary current.
- Contact operating mode.

CONTACTS OUTPUT (LABM-C,CH,U models)

- Type: RS485.
- Connection: 2 wire.
- Protocol: MODBUS RTU.
- Baud rate: Programmable. 300 - 19200 Bauds. Standard 9600 Bauds.

OVERLOAD

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

MAX AND MIN. VALUES.

- Maximum and minimum values of: V1, V2, V3, V 12, V23, V31, I1, I2, I3, P, Q, S, Cos φ and Hz.

TECHNICAL SPECIFICATIONS

INPUT	
Three-phase, 3 or 4 wire, balanced or unbalanced	
Rated Voltage (Un)	300 V (line to neutral) 520 V (line to line)
Burden	0,7 VA
Rated current (In)	100, 200 or 500 A
Burden	0,9 VA
Operating range	0- 110 % In
Frequency	50-60 Hz

CONTACTS OUTPUT *(LABM-C,CH,U)	
Number of outputs	2
Type	Opto-insulated transistor NPN 24 V DC. 50 mA

*Contact output can be set as max. or min. alarm contacts associated to a measured parameter, or as active energy and reactive energy pulses.

AUXILIARY VOLTAGE	
Aux. V. A.C.	230 V
Burden	5 VA
Operating range	85-110 % Un
Universal Aux. V.	85/265 V A.C.;95/300 V DC.
Burden	5 VA
Frequency	50-60 Hz

GENERAL

GENERAL FEATURES	
Case material	UL94 V0
Dimensions	3 modules, 52,5 x 85 mm
Terminals	Pluggable
Max. wire section	2,5 mm²
Weight	0,21 Kg
Protection	IP41 Frontal IP20 Terminals
Electrical safety	(EN 61010) Class 2 Category III

ACCESSORIES

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

OPTIONAL

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

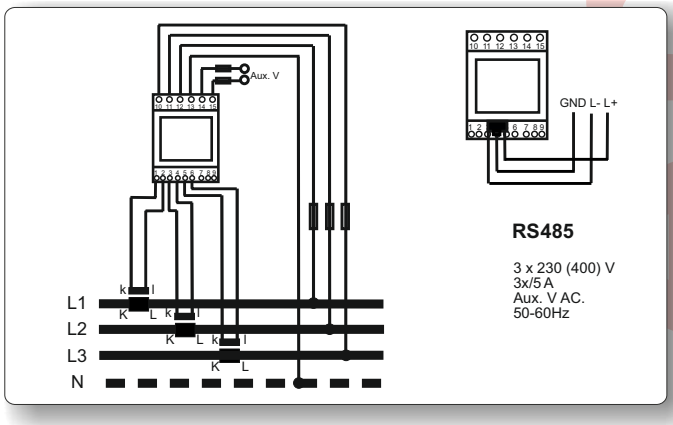
DISPLAY

- LCD display with built in keypad.
- Height of digits: 8 mm (4 parameters per page).
- Back lighting.

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.+full sca.)
Apparent power	1-120%	0,4%(read.+full sca.)
Power factor	± 0,5%	1%(F.S)
Frequency	45-65Hz	0,2%(F.S)
Active energy	5-120%	0,5% reading
Reactive energy	5-120%	1% reading

CONNECTIONS



NETWORK ANALYZER - AR3AC

Programmable instrument with microprocessor and LCD display indicator for measurements.

GENERAL FEATURES

- **DIN MODULAR INSTRUMENT**
- **SINGLE-PHASE**
- **TRUE RMS**
- **RS485 SERIAL PORT**
- **VALUE ALTERNATIVE MEASURE EVERY 4 S**
- **1 OPTOCOUPLER OUTPUT**

ELECTRICAL PARAMETER	SYMBOL	TOTAL
Voltage (Line-to-neutral)	V	•
Current	A	•
Active power (P)	kW	•
Reactive power (Q)	kvar	•
Apparent power (S)	kVA	•
Power factor (Cos φ)	PF	•
Frequency	Hz	•
Import active energy (EP+)	kWh	•
Export active energy (EP-)	kWh	•
Inductive reactive energy (EQ+)	kvarh	•
Capacitive reactive energy (EQ-)	kvarh	•

MODEL **AR3AC**

SETTING

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

The equipment is set through the serial port.

SERIAL PORT

- Type: RS 485.
- Protocol: MODBUS RTU.
- Baud rate: Optional. Standard 9600 Bauds.
- Max. Nº of instruments per line: 32.

LCD DISPLAY

- 1 LCD display (4 digits + sign).
- Height of digits: 8 mm.
- Up to 11 measuring parameters.

TECHNICAL SPECIFICATIONS

INPUT	
Rated Voltage (Un)	230 V AC.
Burden	1 mA
Operating range	20-120 % Un.
Rated current (In)	1 or 5 A
Direct connection	30 A AC.
Connection to external C.T	x/5 A
Operating range	1-120 % In

CONTACTS OUTPUT *	
Number of outputs	1
Type	Optocoupler 48 V DC 10 mA

* Contact output 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.

AUXILIARY VOLTAGE	
Aux. V. AC.	Self supplied

ACCESSORIES

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

OPTIONAL

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

CONNECTIONS

GENERAL

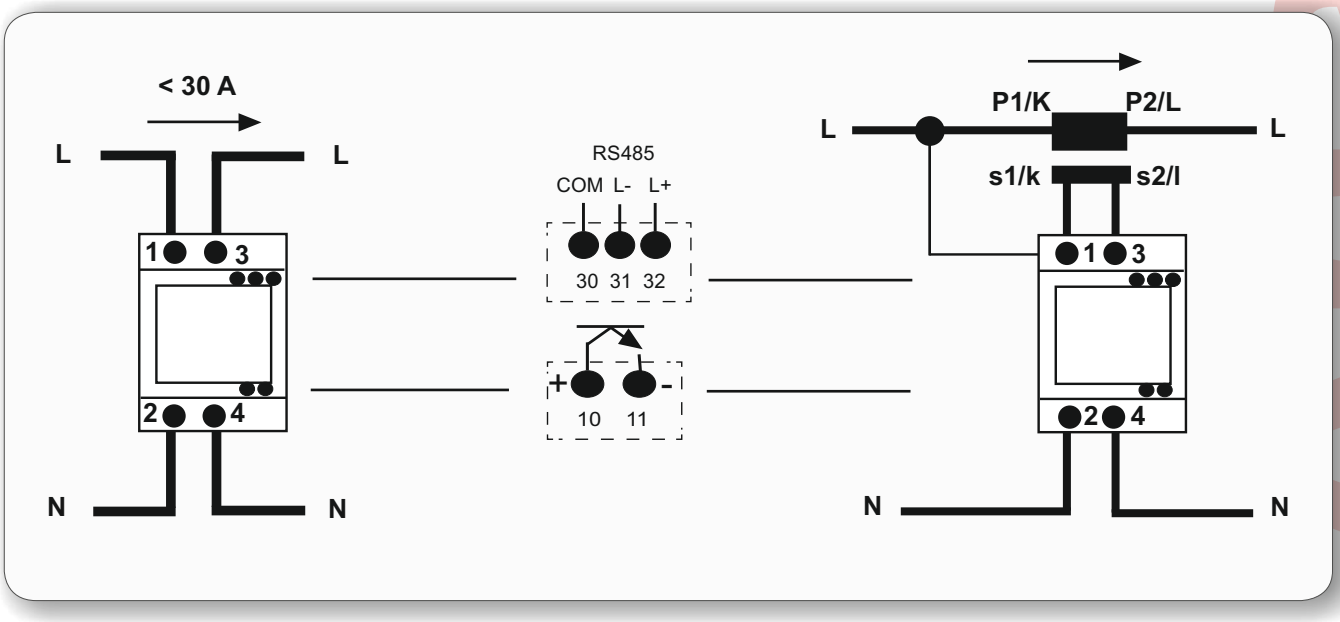
GENERAL FEATURES	
Mounting	DIN rail
Case material	ABS,UL94 V0
Dimensions	3 Modules DIN (52x90) mm
Terminals	With screws
Max. wire section	16 mm²
Weight	0,15 Kg
Temperature range	-10...60º C
Protection	IP54 Frontal IP20 Terminals
Electrical safety	(EN 61010) Class 2 Category III

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.)
Reactive power	1-120%	0,5%(read.+full sca.)
Apparent power	1-120%	0,5%(read.+full sca.)
Power factor	± 0,5%	1%(F.S)
Frequency	45-65Hz	0,2%(F.S)
Active energy	5-120%	1% reading
Reactive energy	5-120%	2% reading



NETWORK ANALYZER - LCAM

Programmable instrument with microprocessor , LCD display indicating three measurements, and built-in keypad.

GENERAL FEATURES

- DIN RAIL MOUNTING
- MEASUREMENT IN 4 QUADRANTS
- THREE-PHASE, 4 WIRE
- MAX. and MIN. VALUES
- TRUE RMS
- RS485 SERIAL PORT
- 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				•
Import active energy (EP+)	kWh				•
Export active energy (EP-)	kWh				•
Import inductive reactive energy (EQL+)	kvarh				•
Import capacitive reactive energy (EQC+)	kVAh				•

(*) Through serial port only

MODEL **LCAM**

- **LCAM-BA** Basic model. Current insulated.
- **LCAM-C** Basic model. Current insulated. RS485 Serial port. 2 Relays.

SETTING

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

The equipment is set through the serial port by keypad.

SERIAL PORT (LCAM-C model)

- Type: RS 485.
- Protocol: MODBUS RTU.
- Baud rate: Programmable. 300 - 19200 Bauds.
- Max. Nº of instruments per line: 32.
- Max. length of system per line (without amplifier): 1250 m.

LCD DISPLAY

- LCD display with built-in keypad.
- Over 30 measuring parameters in different pages.
- Pages selectable with un (↑) and down (↓).
- Back lighting.

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 or 60 Hz

OVERLOAD

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

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. They can also be set as contacts managed from the central unit.

AUXILIARY VOLTAGE	
Aux. V. A.C.	63,5/110 V or 230/400 V
Operating range	80-120% Un
Aux. V. C.C	18 - 72 V
Burden	3 VA

MAX. AND MIN. VALUES.

- Maximum and minimum values of: V12, V23, V31, I1, I2, I3, P, Q, S, Cos φ and Hz.

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.+full sca.)
Apparent power	1-120%	0,5%(read.+full sca.)
Power factor	± 0,5%	0,6%(F.S)
Frequency	45-65Hz	0,2%(F.S)
Active energy	5-120%	1% reading
Reactive energy	5-120%	2% reading

GENERAL

GENERAL FEATURES	
Mounting	DIN rail
Case material	ABS,UL94 V0
Dimensions	3 Modules DIN (52x90) mm
Terminals	With screws
Max. wire section	16 mm²
Weight	0,15 Kg
Temperature range	-10...60º C
Protection	IP54 Frontal IP20 Terminals
Electrical safety	(EN 61010) Class 2 Category III

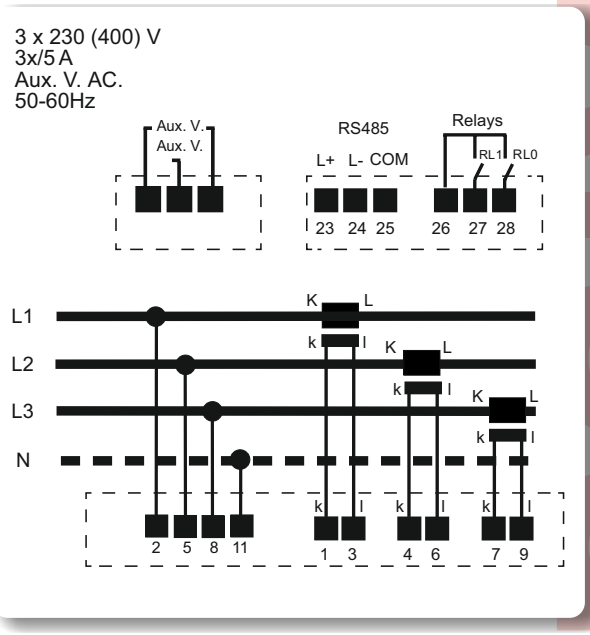
ACCESORIES

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

OPTIONAL

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

CONNECTIONS



NETWORK ANALYZER - LDA 144

Programmable instrument with microprocessor , LCD display indicating three measurements, and built-in keypad.

GENERAL FEATURES

- DIN 144x144 INSTRUMENT
- MEASUREMENT IN 4 QUADRANTS
- THREE-PHASE, 4 WIRE
- NEUTRAL CURRENT
- HARMONIC DISTORTION (THD V and I)
- MAXIMUM DEMAND, A, kW, kVA, kvar
- MAX. and MIN. VALUES
- TRUE RMS
- RS485 SERIAL PORT
- 2 CONTACTS OUTPUT

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				•
Export active energy (EP-)	kWh				•
Import reactive energy (EQ+)	kvarh				•
Export reactive energy (EQ-)	kvarh				•

MODEL

LDA 144

- **LDA 144-BA** — Basic model. Current insulated.
- **LDA 144-C** — Current insulated. RS485 Serial port. 2 Relays.

MAXIMUM DEMAND FUNCTION

- Average values of: I1, I2, I3, P, Q and S.
- Integration period: 15 or 30 Minutes.
- These values can be displayed as current average values and saved as maximums.

SETTING

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

SERIAL PORT (LDA 144-C model)

- Type: RS485.
- Protocol: MODBUS RTU.
- Baud rate: Programmable. Standard 9600 Bauds.

TECHNICAL SPECIFICATIONS

INPUT	
3-Phase, 4wire, unbalanced	
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

OVERLOAD

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

CONTACTS OUTPUT * (LDA-C)	
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 active energy and reactive energy pulses. They can also be set as contacts managed from the central unit.

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

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.+full sca.)
Apparent power	1-120%	0,5%(read.+full sca.)
Power factor	± 0,5%	0,6% reading
Frequency	45-65Hz	0,2%(rated freq.)
Active energy	5-120%	1% reading
Reactive energy	5-120%	2% reading

GENERAL

GENERAL FEATURES	
Display lighting	Back (optional)
Case material	Metal+ABS, UL94 V0
Dimensions	DIN 144x144 mm.
Connection	Pluggable
Max. wire section	2,5 mm²
Weight	0,85 kg
Protection	IP54 Frontal IP20 Terminals
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.

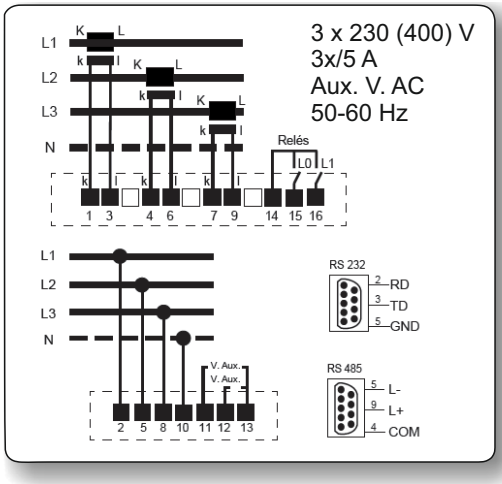
DISPLAY

- LCD display with built in keypad.
- Height of digits: 14 mm (3 parameters per page).
- Over 30 measuring parameters in differents pages.
- Pages selectable with up (↑) and down (↓).
- Back lighting (optional).

MAX. AND MIN. VALUES.

- Maximum and minimum values of: V1, V2, V3, V12, V23, V31, I1, I2, I3, P, Q, S, Cos φ and Hz

CONNECTIONS



NETWORK ANALYZER - LDA 144 with memory

Programmable instrument with microprocessor , LCD display indicating three measurements, and built-in keypad.

GENERAL FEATURES

- LOAD CURVE UP TO 60 DAYS
- RECORDING UP TO 4000 ALARM DATA
- MEASUREMENT IN 4 QUADRANTS
- THREE-PHASE. 4 WIRE
- NEUTRAL CURRENT
- HARMONIC DISTORTION (THD V and I)
- MAXIMUM DEMAND, A, kW, kVA, kvar
- MAX. and MIN. VALUES
- TRUE RMS
- RS232 (front) / RS485 (back) SERIAL PORT
  RS232 (back) optional
- 2 CONTACTS OUTPUT

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				•
Export active energy (EP-)	kWh				•
Import reactive energy (EQ+)	kvarh				•
Export reactive energy (EQ-)	kvarh				•

ROTATING MEMORY

The equipment is equipped with a rotating memory to store the following values:

1 - FIXED

1.1 - Average values of (I1, I2, I3, P, Q y S) at the end of a predeterminated period of time (5, 10, 15, 20, or 30 minutes, selectable) and their corresponding maximum values.

1.2 - Acumulated EP+ value.
- 60 days + 4000 alarms storage.

2 - PROGRAMMABLE

2.1 - Up to 9 variables can be selected from the folowing (V1, V2, V3, V12, V23, V31, P1, P2, P3, Q1, Q2, Q3, S1, S2, S3, cos φ1,cos φ2, cos φ3, Hz and I Neutral), plus the three energy values (EP-,EQL, EQC)

- 45 days + 4000 alarms storage.

Up to 4 alarms can be set and saved. These can be defined as maximum or minimum , as % of the rated value and measurement variable. Alarm data is recorded with satrt time, length and variable affected.

MODEL — LDA 144

- **LDA 144-M** — Current insulated. RS485 Serial port. 2 Relays

MAXIMUM DEMAND FUNCTION

- Average values of: I1, I2, I3, P, Q and S.
- Integration period: 5, 10, 15, 20 or 30 minutes.
- These values can be displayed as current average values and saved as maximums.

TECHNICAL SPECIFICATIONS

INPUT	
Three-phase, 4 wire, unbalanced	
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 * (LDA-C)	
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. They can also be set as contacts managed from the central unit.

OVERLOAD

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

AUXILIARY VOLTAGE	
Aux. V. A.C.	63,5/110 V or 230/400 V.
Burden	3 VA
Operating range	80-120 % Un
Aux. V. D.C	18-72 V
Burden	3 W
Universal Aux. V.	85/2654 V AC.;90/300 V DC
Burden	5 VA

SETTING

- Instrument identify code.
- Primary voltage.
- Primary current.
- Contact operating mode.

SERIAL PORT

- Type: RS485.
- Protocol: MODBUS RTU.
- Baud rate: Programable. Standard 9600 Bauds.
- RS232 Serial port (on the front): 9600 Bauds.
- RS485 (back), RS232 (optional)

GENERAL

GENERAL FEATURES	
Display lighting	Back (optional)
Case material	Metal+ABS, UL94 V0
Dimensions	DIN 144x144 mm.
Connection	Pluggable
Max. wire section	2,5 mm²
Weight	0,85 kg
Protection	IP54 Frontal IP20 Terminals
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.

DISPLAY

- LCD display with built in keypad.
- Height of digits: 14 mm (3 parameters per page).
- Over 30 measuring parameters in differents pages.
- Pages selectable with up (↑) and down (↓).
- Back lighting. (optional)

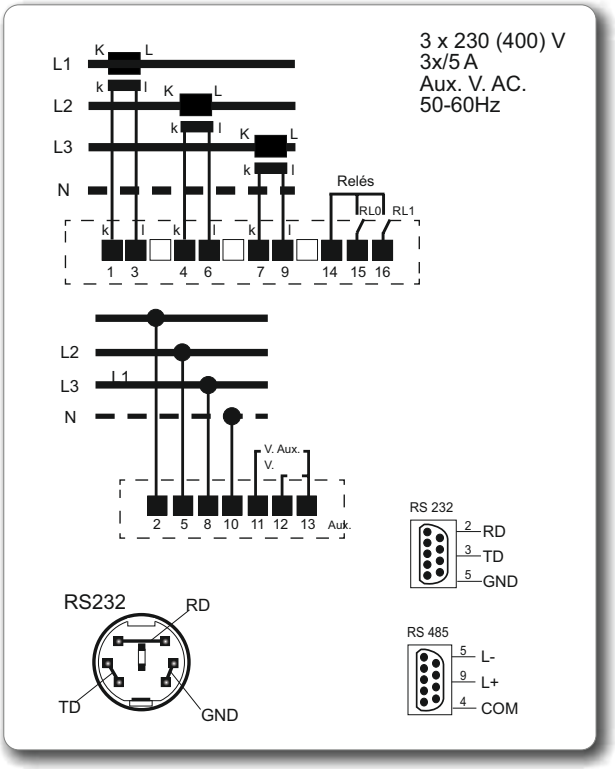
MAX. AND MIN. VALUES.

- Maximum and minimum values of: V1, V2, V3, V12, V23, V31, I1, I2, I3, P, Q, S, Cos φ and Hz

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.+full sca.)
Apparent power	1-120%	0,5%(lect.+fin esc.)
Power factor	± 0,5%	0,6% reading
Frequency	45-65Hz	0,2%(rated freq.)
Active energy	5-120%	1% reading
Reactive energy	5-120%	2% reading

CONNECTIONS



NETWORK ANALYZER - SNG96

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

GENERAL FEATURES

- **DIN 96X96 INSTRUMENT**
- **THREE-PHASE 4 WIRE**
- **MAXIMUM DEMAND, A**
- **TRUE RMS**

ELECTRICAL PARAMETER	SYMBOL	L1	L2	L3	TOTAL
Voltage (Line-to-neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Current	A	•	•	•	
Maximum demand (I)	A	•	•	•	
Import active energy (EP+)	kWh				•
Export active energy (EP-)	kWh				•

MODEL **SNG96**

TECHNICAL SPECIFICATIONS

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

AUXILIARY VOLTAGE

AUXILIARY VOLTAGE	
Aux. V. AC.	Self supplied
Burden	< 4 VA

SETTING

- Primary current.
- Integration time of maximum demand.

MAXIMUM DEMAND FUNCTION

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

GENERAL

GENERAL FEATURES	
Case material	ABS,UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire section	2,5 mm²
Weight	0,4 Kg
Protection	IP20 Terminals
Optional protection	IP54 Frontal IP65 with frontal cover
Electrical safety	(EN 61010) Class 2 Category III

ACCESSORIES

- x/5 A transformers.

DISPLAY

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

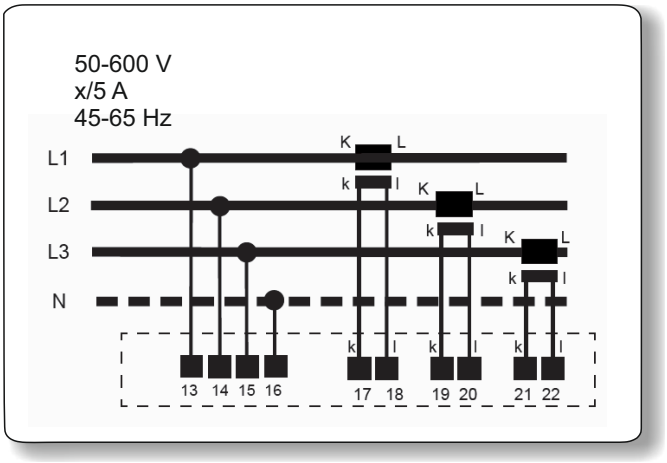
OVERLOAD

- 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%	0,3%(read.+full sca.)
Current	1-120%	0,3%(read.+full sca.)
Active energy	5-120%	0,5% reading
Reactive energy	5-120%	1% reading

CONNECTIONS



NETWORK ANALYZER - MAR96

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

GENERAL FEATURES

- **DIN 96 x 96 INSTRUMENT**
- **MEASUREMENT IN 4 QUADRANTS**
- **THREE- PHASE, 4 WIRE**
- **MAX. and MIN. VALUES**
- **TRUE RMS**
- **RS232/RS485 SERIAL PORTS**
- **2 CONTACTS OUTPUT**
- **4 DIGITAL INPUTS**

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				•
Import active energy (EP+)	kWh				•
Export active energy (EP-)	kWh				•
Inductive reactive energy (Eq+)	kvarh				•
Capacitive reactive energy (Eq-)	kvarh				•

(*) Through serial port only.

MODEL

- MAR96
- MAR96-I
- MAR96-II
- MAR96-3

MAR96

Single-phase.
Three-phase, 3 wire, balanced.
Three-phase, 3 wire, unbalanced.
Three-phase, 4 wire, unbalanced.
Current insulated.
2 Relays.

SETTING

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

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

- Type: RS 485.
- Protocol: MODBUS RTU.
- Connection: 2 or 4 wire.
- Baud rate: Programmable. 300 - 19200 Bauds. Standard 9600 Bauds.
- Max. Nº of instruments per line: 32.
- Max length of system per line (without amplifier): 1250 m. (On request RS232 serial port).

LED DISPLAY

- 3 LED displays (4 Digits + Sign).
- Height of digits: 10mm.
- 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 cantacts or alarms.
- Indicate energy consumption for external processes and synchronisation pulses for the maximum demand function.
- Pulse totalizer for external instruments.

TECHNICAL SPECIFICATIONS

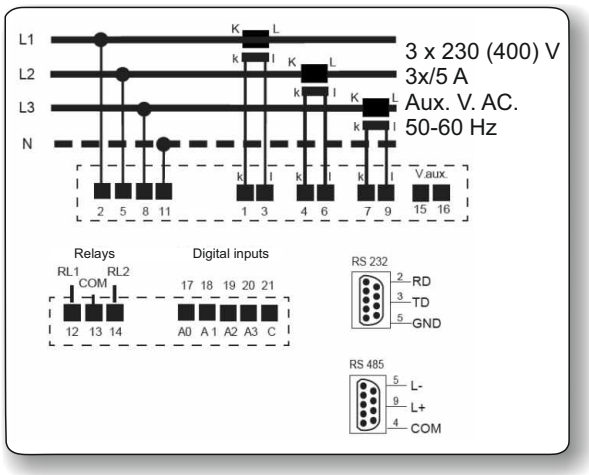
INPUT	
Rated Voltage (Un)	100, 110, 230 or 400 V
Burden	1 mA per phase
Operating range	20-120 % Un
Rated current (In)	1 or 5 A
Burden	0,2 VA per phase
Operating range	1- 120 % In
Frequency	50 - 60 Hz

CONTACTS OUTPUT *	
Number of outputs	2
Type	Relay N.O., 250 V, 8 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.

AUXILIARY VOLTAGE	
Aux. V. A.C.	63,5, 110, 230, 400 V
Burden	6 VA
Operating range	80-120 % Un

CONNECTIONS



GENERAL

GENERAL FEATURES	
Case material	ABS,UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire section	2,5 mm²
Weight	0,6 Kg
Protection	IP20 Terminals
Optional protection	IP54 Frontal IP65 with frontal cover
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.
- 20 In x 1 s.
- 2 In 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

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-BA
- MAR144
- MAR144-I
- MAR144-II
- MAR144-3

MAR144

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

SERIAL PORT (OPTIONAL)

- Type: RS 485.
- Protocol: MODBUS RTU.
- Connection: 2 or 4 wire.
- Baud rate: Programmable. 300 - 19200 Bauds. Standard 9600 Bauds.
- Max. Nº of instruments per line: 32.
- Max length of system per line (without amplifier): 1250 m. (On request RS232 serial port).

SETTING

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

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.

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

4 DIGITAL INPUTS (Optional)

Digital inputs can be used to:

- Signal the position of cantacts 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: 1.
Type: 4-20 mA.
Moperating range: programmable.
(*) Voltage isolation needed.

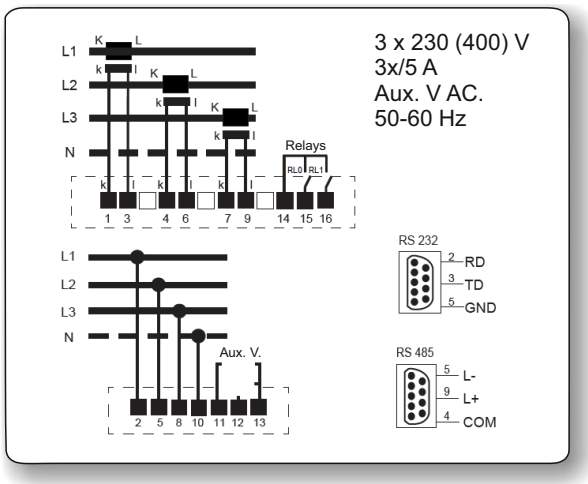
TECHNICAL SPECIFICATIONS

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 mm²
Weight	0,75 Kg
Protection	IP20 Terminals
Optional protection	IP54 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.
- 20 In x 1 s.
- 2 In 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

NETWORK ANALYZER - MDA96

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

GENERAL FEATURES

- **DIN 96 x 96 INSTRUMENT**
- **MEASUREMENT IN 4 QUADRANTS**
- **THREE-PHASE, 4 WIRE**
- **NEUTRAL CURRENT**
- **HARMONIC DISTORTION (THD V and I)**
- **MAXIMUM DEMAND, A, kW, kVA, kvar**
- **MAX and MIN VALUES**
- **TRUE RMS**
- **RS232/RS485 SERIAL PORT**
- **2 CONTACTS OUTPUT**

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	•	•	•	
Consumed active energy (EP+)	kWh				•
Generated active energy (EP-)	kWh				•
Inductive reactive energy (Eq+)	kvarh				•
Capacitive reactive energy (Eq-)	kvarh				•

MODEL

	MDA96
- MDA96-BA	Basic model. Current insulated.
- MDA96-C	Current insulated. RS485 Serial port. 2 Relays.

SETTING

- Instrument identify code.
- Primary voltage.
- Primary current.
- Contact operating mode.

SERIAL PORT

- Type: RS 485.
- Protocol: MODBUS RTU.
- Connection: 2 or 4 wire.
- Baud rate: Programmable.
  300 - 19200 Bauds.
  Standard 9600 Bauds.
- Max. Nº of instruments per line: 32.
- Max length of system per line (without amplifier): 1250 m.
  (On request RS232 serial port).

MAXIMUM DEMAND FUNCTION

- Average values of: I1, I2, I3, P, Q and S.
- Integration period: 15 or 30 minutes.
- These values can be displayed as current average values and saved as maximums.

DISPLAY LED

LED DISPLAY

- 3 LED displays (4 Digits + Sign).
- Height of digits: 14,5 mm.
- Built in keypad (5 Keys).
- 6 selectable parameters for each display.
- Over 43 measuring parameters.

MAXIMUM AND MINIMUM VALUES

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

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.

OVERLOAD

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

AUXILIARY VOLTAGE	
Aux. V. AC	63,5/110 V or 230/400 V
Burden	3 VA
Operating range	70-120 % Un
Aux. V. DC	18-72 V
Burden	3 W
Universal Aux. V.	85-264 V AC; 90-300 V DC
Burden	4 VA

GENERAL FEATURES	
Case material	Metal+ABS,UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire section	2,5 mm²
Weight	0,6 Kg
Protection	IP20 Terminals
Optional protection	IP54 Frontal IP65 frontal cover
Electrical safety	(EN 61010) Class 2 Category III

ACCESSORIES

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

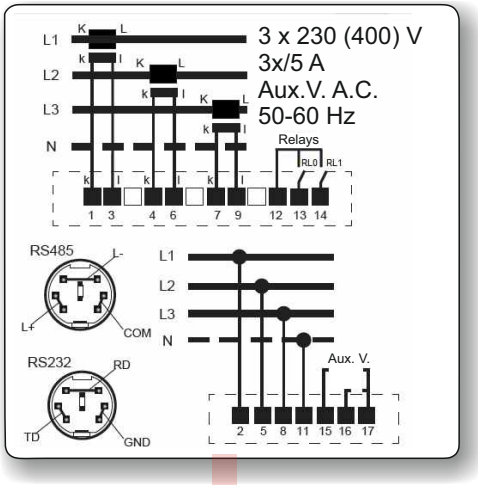
OPTIONAL

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

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.+full sca.)
Apparent power	1-120%	0,5%(read.+full sca.)
Power factor	±0,5	0,6% reading
Frequency	45-65 Hz	0,2%(rated freq.)
Active energy	5-120%	1% reading
Reactive energy	5-120%	2% reading

CONNECTIONS



NETWORK ANALYZER - MDA144

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**
- **NEUTRAL CURRENT**
- **HARMONIC DISTORTION (THD V and I)**
- **MAXIMUM DEMAND, A, kW, kVA, kvar**
- **MAX and MIN VALUES**
- **TRUE RMS**
- **RS232/RS485 SERIAL PORT**
- **2 CONTACTS OUTPUT**
- **OPTION: MDA144-M WITH MEMORY. See LDA144-M**

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	•	•	•	
Consumed active energy (EP+)	kWh				•
Generated active energy (EP-)	kWh				•
Inductive reactive energy (Eq+)	kvarh				•
Capacitive reactive energy (Eq-)	kvarh				•

MODEL **MDA144**

Current insulated.
RS485 Serial port.
2 Relays.
Burden insulated (optional)

SETTING

- Instrument identify code.
- Primary voltage.
- Primary current.
- Contact operating mode.
- Alarms.
- Integration time.

MAX AND MIN. VALUES.

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

SERIAL PORT

- Type: RS 485.
- Protocol: MODBUS RTU.
- Connection: 2 or 4 wire.
- Baud rate: Programmable. 300 - 19200 Bauds. Standard 9600 Bauds.
- Max. Nº of instruments per line: 32.
- Max length of system per line (without amplifier): 1250 m. (On request, RS232 serial port)
- Optional:
(1) Frontal connection of the back connector. (Copy of serial port)
(2) Independent serial port RS232C.

MAXIMUM DEMAND FUNCTION

- Average values of: I1, I2, I3, P, Q and S.
- Integration period: 15 or 30 minutes.
- These values can be displayed as current average values and saved as maximums.

4 DIGITAL INPUTS

Digital inputs can be used to:

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

DIGITAL OUTPUTS

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

ANALOGUE OUTPUT *

Number of outputs:	1.
Type:	4-20 mA.
Moperating range:	programmable.

(*) Voltage isolation needed.

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

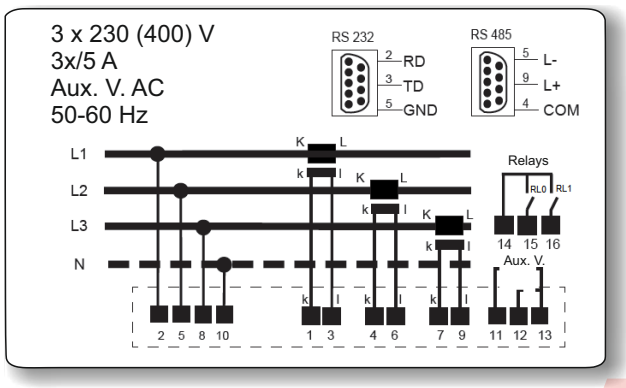
CONTACTS OUTPUT *	
Number of outputs	2
Type	Relay N.O., 250 V, 3 A

* 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.

OVERLOAD

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

CONNECTIONS



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

GENERAL

GENERAL FEATURES	
Case material	Metal+ABS,UL94 V0
Dimensions	DIN 144 x 144 mm
Terminals	Pluggable
Max. wire section	2,5 mm²
Weight	0,75 Kg
Protection	IP20 Terminals
Optional protection	IP54
Electrical safety	(EN 61010) Class 2 Category III

LED DISPLAY

- 3 LED displays (4 Digits + Sign).
- Height of digits: 14,5 mm.
- Built in keypad (5 Keys).
- Over 43 measuring parameters.
- Up to 9 variables by display through keyboard.

ACCESSORIES

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

OPTIONAL

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

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

NETWORK ANALYZER - TCEM

Instrument with microprocessor, programmable, in DIN rail and LED display.

GENERAL FEATURES

- DIN RAIL MOUNTING
- LED DISPLAY
- MEASUREMENT IN 4 QUADRANTS
- TRUE RMS
- CURRENT INSULATED
- RS232/RS485 SERIAL PORTS
- 1 OPTOCOUPLER 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+)	kWh				•
Generated active energy (EP-)	kWh				•
Inductive reactive energy (Eq+)	kvarh				•
Capacitive reactive energy (Eq-)	kvarh				•

* Only model TCEM-1 and TCEM-2

MODEL

TCEM	Single-phase.
TCEM-1	Three-phase, 3 wire, balanced.
TCEM-2	Three-phase, 3 wire, unbalanced.
TCEM-3	Three-phase, 4 wire, unbalanced.

SETTING

- Instrument identify code.
- Primary voltage.
- Primary current.
- Contact operating mode.

SERIAL PORT

- Type: RS485.
- Protocol: MODBUS RTU.
- Connection: 2 or 4 wire.
- Baud rate: 9600 Bauds.
- Max. Nº of instruments per line: 32.
- Max length of system per line (without amplifier): 1250 m.
  (On request, RS 232 serial port)

CONTACT OUTPUT

Type: Voltage-free contact (optocoupler).

4 DIGITAL INPUTS

Digital inputs can be used to:

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

LED DISPLAY

- LED Display (4 Digits + Sign).
- Built-in keypad
- 12 consecutive displayed parameters by pressing the rotate button.

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	1
Optocoupler	N.O. 5 - 48 V DC
Pulse length	≥ 100 ms

* Contact output can be set as pulse for active energy. It can also be set as contacts managed from the central unit.

AUXILIARY VOLTAGE	
Aux. V. AC.	110, 230 or 400 V
Burden	6 VA
Operating range	80-120 % Un

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

GENERAL

GENERAL FEATURES	
Modules	DIN rail
Case material	ABS,UL94 V0
Dimensions	9 modules 155 x 90 mm
Terminals	Pluggable
Max. wire section	2,5 mm²
Weight	0,65 Kg
Protection	IP40
Electrical safety	(EN 61010) Class 2 Category III

ACCESSORIES

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

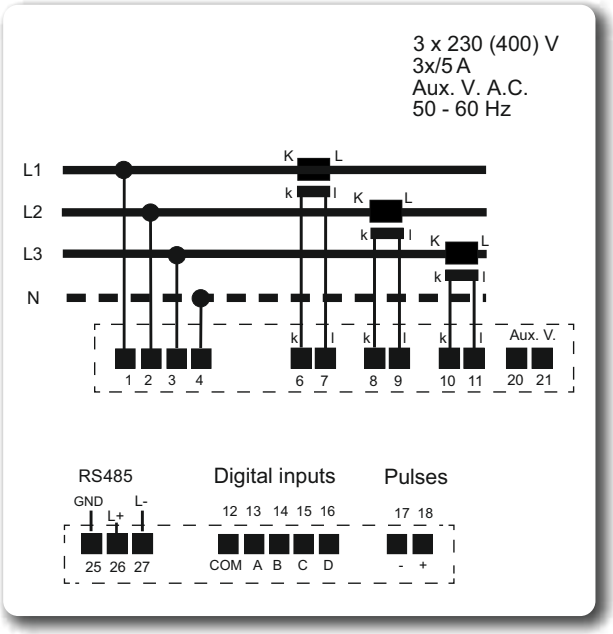
OPTIONAL

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

OVERLOAD

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

CONNECTIONS



D.C. 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**
- **RS485 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	•

MODEL **AR3DC**

SETTING

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

The equipment is set through the serial port.

SERIAL PORT

- Type: RS485.
- Protocol: MODBUS RTU.
- Connection: 2 wire.
- Baud rate: Standar 9600 Bauds.
- Max Nº of instruments per line: 32.

LCD DISPLAY

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

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

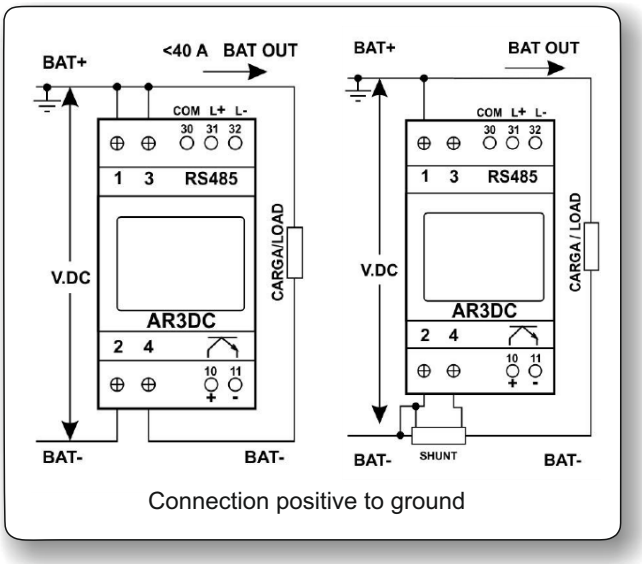
* Optional 125 V D.C.

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



Connection positive to ground

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 mm²
Weight	0,15 Kg
Temperature range	0 - 40 ºC
Protection	IP20 terminals
Optional protection	IP54 frontal
Electrical safety	(EN 61010) Class 2 Category III

ACCESSORIES

- Shunt x/60 mV.
- RS232/RS485 converters.
- RS485 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.

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.)

D.C. 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**
- **RS485 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	•

MODEL **TMCC**

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. Nº 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

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

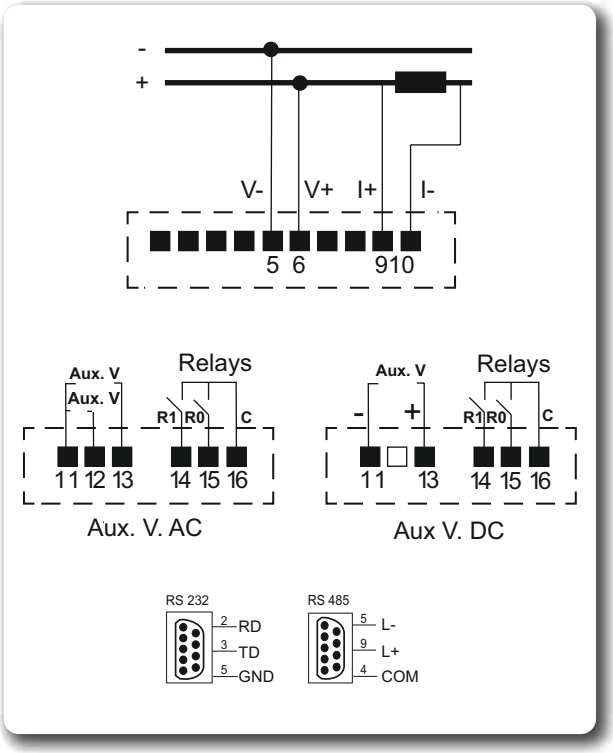
* Optional 1000 V D.C.

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 mm²
Weight	0,72 Kg
Temperature range	0 - 40 ºC
Protection	IP20 terminals
Optional protection	IP54 frontal
Electrical safety	(EN 61010) Class 2 Category III

ACCESSORIES

- Shunts x/60mV.
- RS232/RS485 converters.
- RS485 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.)

NETWORK QUALITY ANALYZER - TMCQ

Instrument with microprocessor, programmable, four-line LCD display and integrated keyboard. It detects and records defects voltage supply network, such as overvoltage or undervoltage, Dips and microcuts that exceeds programmed limits.

GENERAL FEATURES

- **DIN 144 x 144 INSTRUMENT**
- **MEASUREMENT OF TRUE RMS**
- **THREE-PHASE 3 or 4 WIRE**
- **OVERVOLTAGES**
- **UNDERVOLTAGES**
- **DIPS and MICROCUTS**
- **EVENTS RECORDING**
- **RS232 / RS485 SERIAL PORTS**
- **ANALYSIS SOFTWARE**

MODEL	**TMCQ**
- TMCQ II	Three-phase, 3 wire
- TMCQ 3	Three-phase, 4 wire

OPERATING MODE

The equipment measures the true effective value of the voltage (RMS) of a three-phase system, taking 128 samples per period. The measured values are compared with the predefined upper and lower values (both programmable). If the values measured are within the preset limits, they are not considered and therefore not recorded. On the other hand, if the predefined limits are exceeded, the detection process begins, the event is classified and measured, the detection process begins, the event is classified and measured and once finished, data is saved in a memory powered by a rechargeable battery.

Events contai the following information.

- Nº.
- Type.
- Phase.
- Date.
- Time.
- Length.
- Maximum or minimum value.
- Average value.

While operating, the equipment displays the following information:

- Voltage per phase.
- Date.
- Time.
- Battery voltage.
- Device identity.

SETTING

- Device identity code.
- Rated voltage.
- Primary voltage.
- Secondary voltage
- Upper and lower limit values (% of rated value) (Setting software on request).

SERIAL PORT

- Type: RS485 (optional RS232).
- Connections: 2 or 4 wire.
- Protocol: MODBUS RTU.
- Standard baud rate: 9600 Bauds.
- Insulation by optocoupler between output and measurement inputs.

LCD DISPLAY

- 4 lines, 20 characters.
- Built-in keypad (5 keys)
- Allows recorded data to be displayed.

ROTATING MEMORY

The RAM standard rotating memory allows up to 1360 events to be saved. DATA recovery can be via the serial port and MODBUS protocol output or via a SW/Driver in a file format compatible with Excel.

TECHNICAL SPECIFICATIONS

INPUT	
Rated voltage (Un)	100,110,230 or 400 V DC
Burden	1mA per phase
Operating range	0-150 % Un

AUXILIARY VOLTAGE	
Self supplied in any of the three phases. 4 wire version	
Self supplied between phases. 3 wire version	
Burden	< 3 VA
Frequency	50 or 60 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 144 x 144 mm
Depth	88 mm
Terminals	Pluggable
Max. wire section	2,5 mm²
Weight	0,72 Kg
Temperature range	0 - 40 ºC
Protection	IP20 terminals
Optional protection	IP54 frontal
Electrical safety	(EN 61010) Class 2 Category III

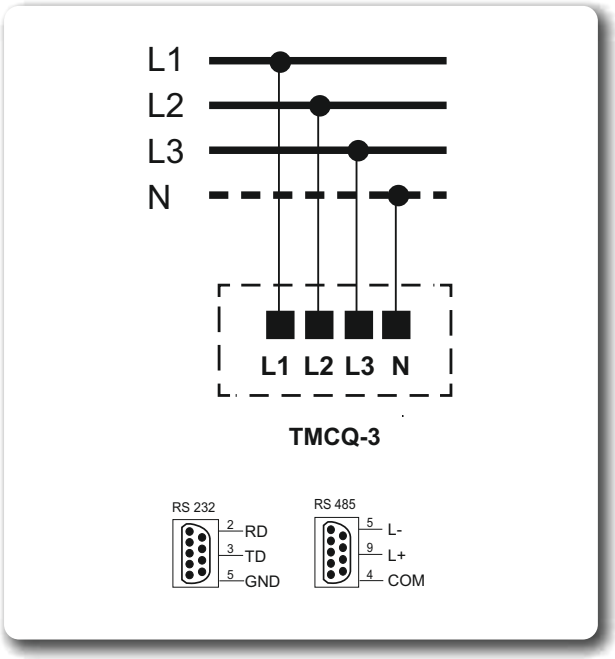
ACCESSORIES

- RS232/RS485 converters.
- RS485 amplifiers.

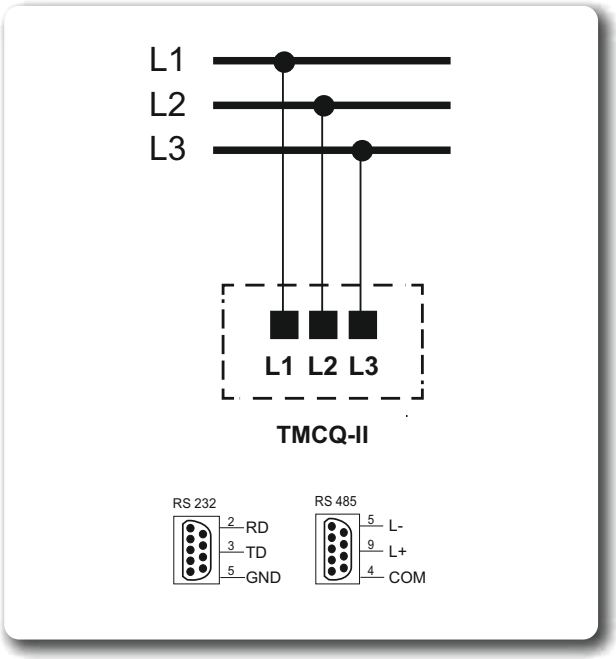
OPTIONAL

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

CONNECTIONS



CONNECTIONS



RS232/RS485 CONVERTER - IFR

IFR equipment converts the RS232 standard levels to the corresponding levels in the RS485 standard.

IFR converters allow a PC with RS232 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 RS232 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 RS232 and RS485 SERIAL PORTS**
- **UP TO RS485 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	RS232 (RD, TD, RTS, CTS)

OUTPUT	
Number of outputs	
IFR1, IFRA, IFRA3	1
IFR4	4
Type	RS485
Baud rate	300-76800 Bauds

OVERLOAD

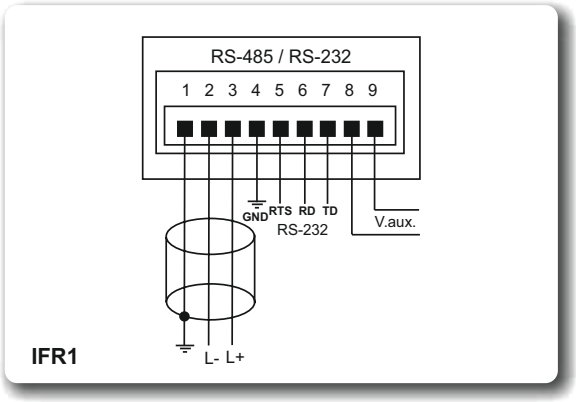
- 2 Vn x 10 s.
- 1,2 Vn permanent.
- 20 In x 1 s.
- 2 In permanent.

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

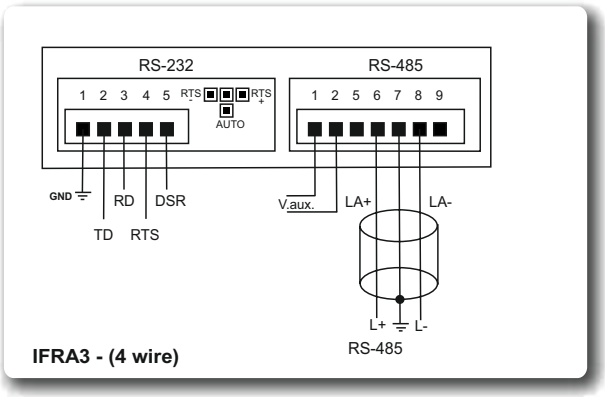
GENERAL

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 mm²
Weight	
IFR1-IFRA3	0,30 kg
IFRA	0,45 kg
IFR4	0,65kg
Mounting	DIN rail

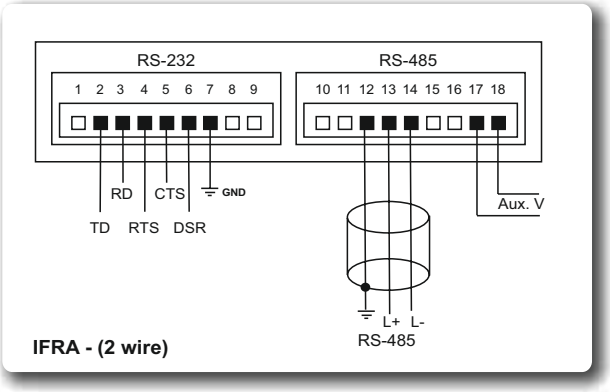
CONNECTIONS



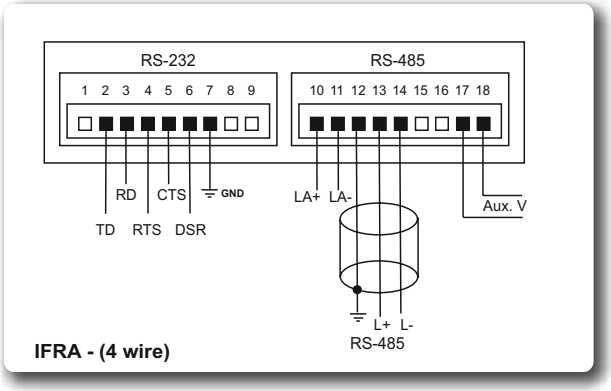
IFR1



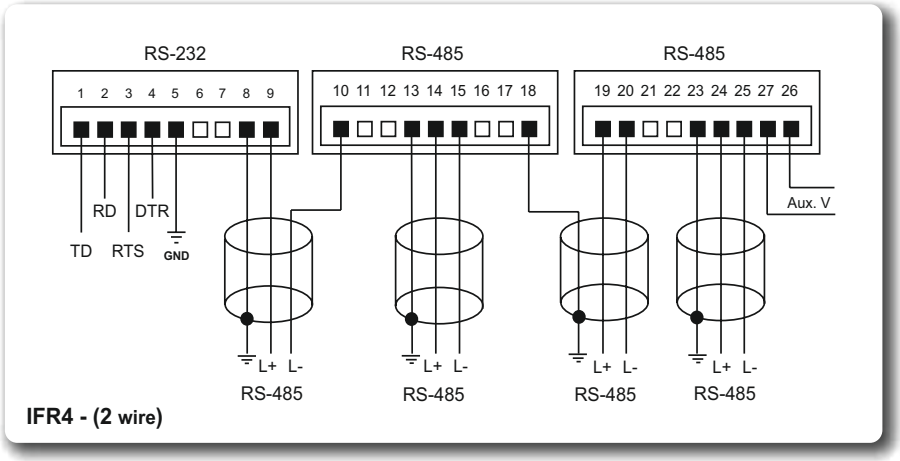
IFRA3 - (4 wire)



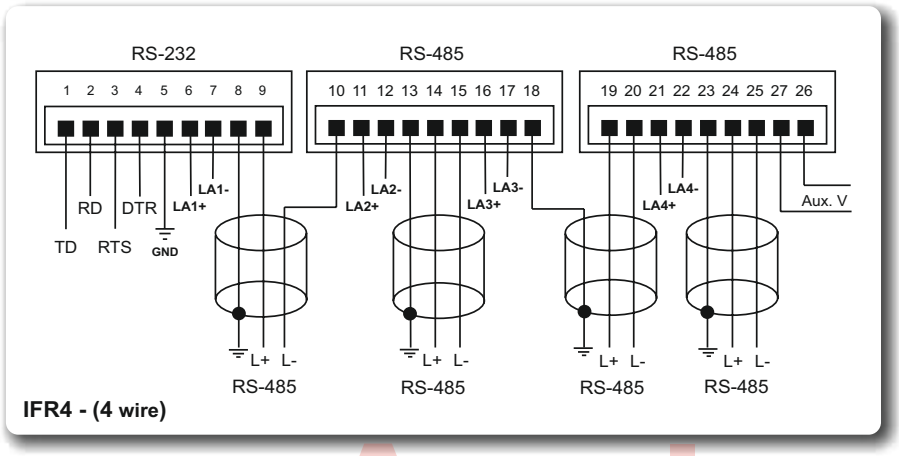
IFRA - (2 wire)



IFRA - (4 wire)



IFR4 - (2 wire)

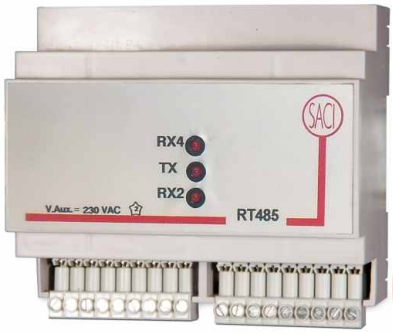


IFR4 - (4 wire)

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**

MODEL **RT485**
2 or 4 wire.

TECHNICAL SPECIFICATIONS

INPUT	
Number of outputs	1
Type	RS485

OUTPUT	
Number of outputs	1
Type	RS485
Baud rate	300-19200 Bauds

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

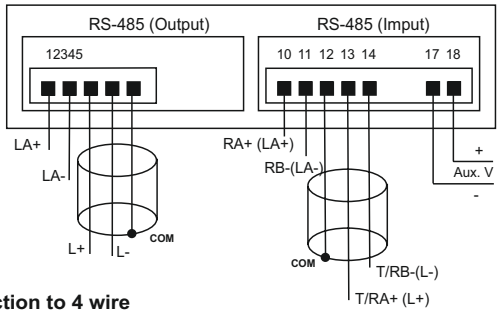
GENERAL

GENERAL FEATURES	
Case material	ABS,UL94 V0
IFRA	(6 Modules), 105 x 90 mm.
Terminals	Pluggable
Max. wire section	1,5 mm²
Weight	0,45 kg
Mounting	DIN rail
LED indication	
Rx4	Received data (4wire)
Rx2	Received data (2wire)
TX	Sent data

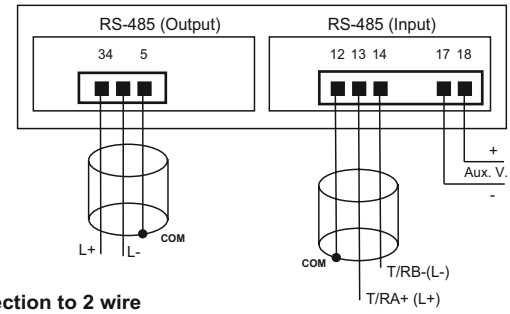
OVERLOAD

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

CONNECTIONS



Connection to 4 wire



Connection to 2 wire

ETHERNET CONVERTER - etherGATE

The etherGATE is a communications gateway used to convert the physical Ethernet environment to serial RS-485 or RS-232 communications or vice versa in the routing mode.

NEW

GENERAL FEATURES

- **CONVERT ETHERNET TO RS485 or RS232**
- **TRANSPARENT CONVESION UNDER TCP or UPD CONNECTIONS**
- **NETWORK PROTOCOLS MODBUS/TCP, TCP, UPD - 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 ºC

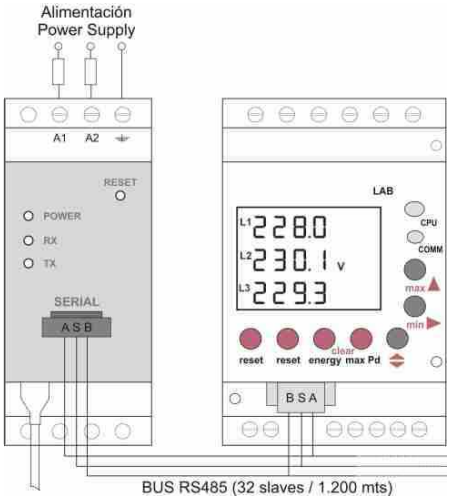
NETWORK INTERFACE	
Type	Ethernet 10 BaseT / 100Base TX
Connector	RJ 45
Network protocols	TCP / UDP / Modbus/TCP - HTTP

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 / RS-232 three wires
Transmission speed	4.800 - 115.200 bps
Data bits	7, 8
Parity	No parity, odd, even
Stop bit	1 or 2

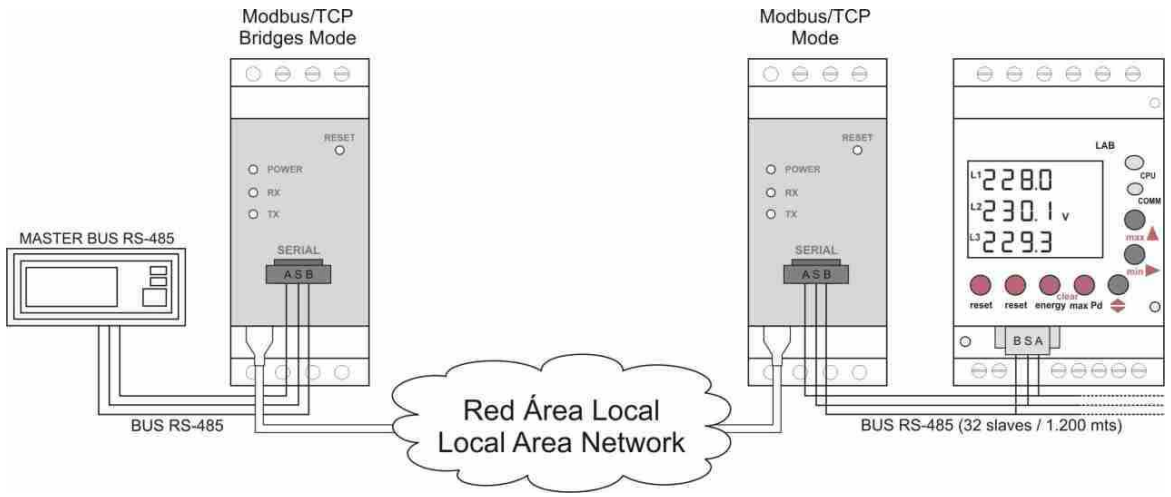
CONNECTIONS

Figure 1. Standard connection of serial equipment



CONNECTIONS

Figure 2. Systems over Ethernet infrastructures (Modbus/TCP Bridges Mode)



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:

MAR, TMC
MDA
LCA_, LDA_, LAB, ANG
TCEM,
CP2000, CP3000, CP4000
TMCQ
M1D, M2D, TCID, TCI, TCIV (*)
TMC-C TMCC-H
TTI
VIRTUAL
(*) Via TTI.

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

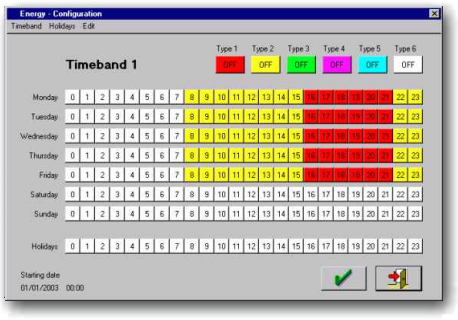
All definition and setting operations can be password protected. The software is capable of handling up to 4 communication ports (COM1 - COM4), as well as using a modem to communicate with the different terminals installed on the network. The communication speed with the terminals can also be configured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

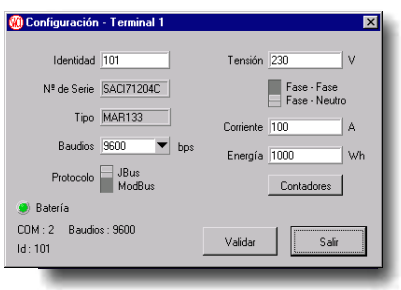
The Client - Server operating mode via an Ethernet network can be selected.

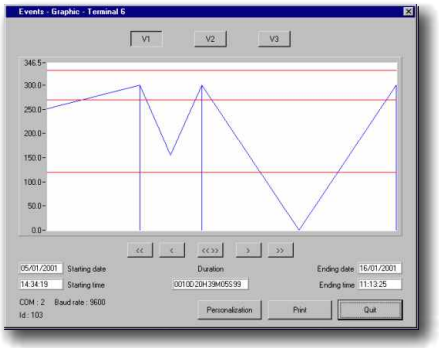
Minimum requirements:

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 phisically or through a converter USB-RS232.







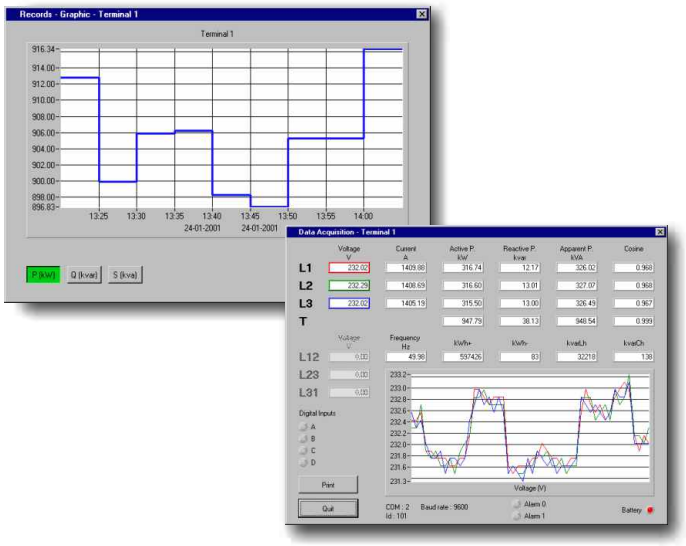
MANAGEMENT SOFTWARE - SACIGEST

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 instalation 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

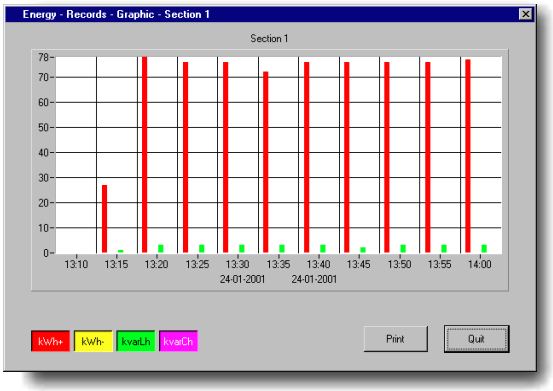
Within each SACIgest version there are different subversions which shall be defined below.

- 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.

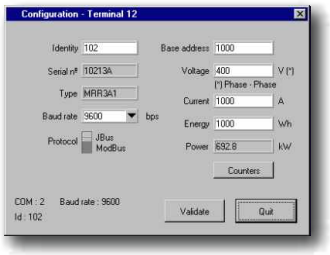
The depth of section graph has to be edited by the final user with any graphic design program or with digital photographs.

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 to program the communication speed and to program it via modem. Equipment in the first four communication ports on the PC can be managed.

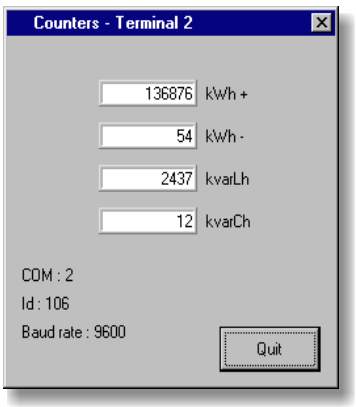


With this version, the two digital outputs of the instrument, maximums and minimums, harmonics and maximum required values (LDA) can be managed. It takes data for 30 electrical parameters and displays the variables as a graph.

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.



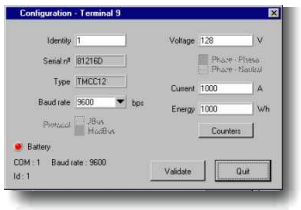
With this version, the two digital outputs of the instrument, maximums and minimums, harmonics, maximum required values (LDA and LCC) and the historical values of the LDA144 with memory can be managed. It takes data for 30 electrical parameters and displays the variables as a graph.

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.

APPLICATION - APP FOR iPHONE - SACIGEST

NEW

New APP for iPhone, SACIgest v1.0 with which making accuracte readings of SACI equipments of the installation, is possible from anywhere in the world.
The new APP has 3 main screens

- **Network setup:**

This menu is to configurate, the public IP address, the TCP port location Software SACIgest. and a geographical place where facility is located.(Last one just to clarify)

- **Configuration:**

In this menu, it will be necessary, SACI devices used in the installation and their MODBUS ID identification.

Once accepted, the equipment must be identified within the application and you can visualize the corresponding readings.

- **Download:**

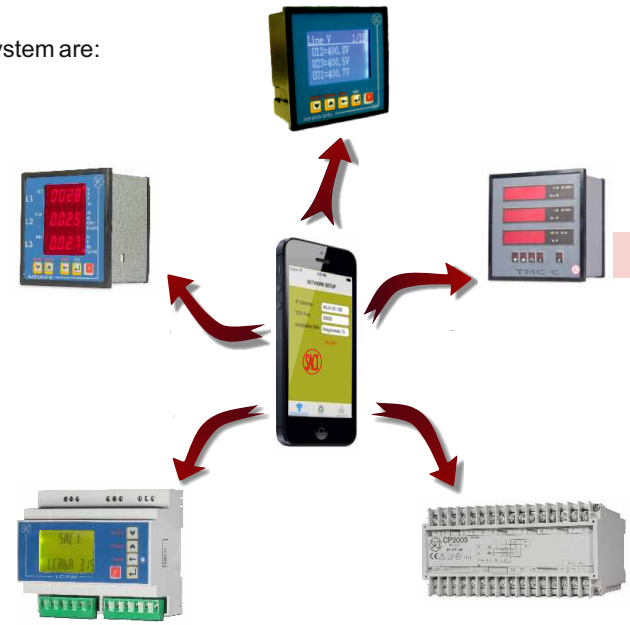
If the device is configured correctly, in this third screen will appear the corresponding readings in real time.
It accepts as many devices as devices in the installation.

- SACIgest program is a system that allows management of SACI terminals installed on a network in a simple and graphic way
The electrical installation is grouped by sections, each one with a different visualization, in which the corresponding terminals are inserted.

Models of terminals managed by the system are:

Network analyzers:
ANG96
LCC, LCCM
LCA, LCAM, LDA, LDA144
LAB96, LABM
MAR96, MAR144
MDA96, MDA144
TCEM,TMCC, TMCQ

Measuring transducers
CP 2000, CP 3000, CP 4000...



ACCESSORIES - IP65 PROTECTION COVER

Protective cover IP65 for panel mounting devices.

GENERAL FEATURES

- **EASY ASSEMBLY.**
- **PROTECCTION AGAINST BUMPS, SCRATCHES OR ANY OTHER EXERNAL EXPOSURE, RAIN, LIQUIDS...**
- **FULLY ADJUSTABLE.**
- **AVAILABLE IN 2 STANDAD SIZES.**

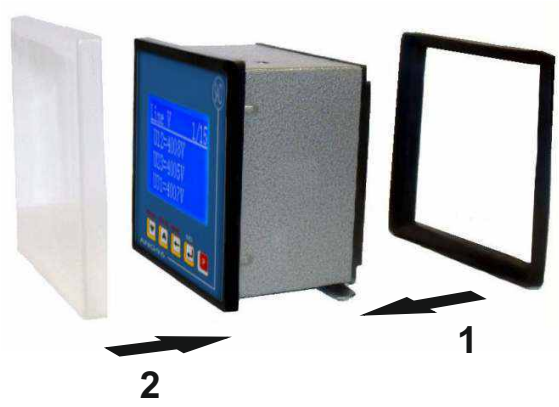
Model	Dimension	Ordering code
3V	96x96 mm	YVARSV193
4V	72x72 mm	YVARSV194

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.

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