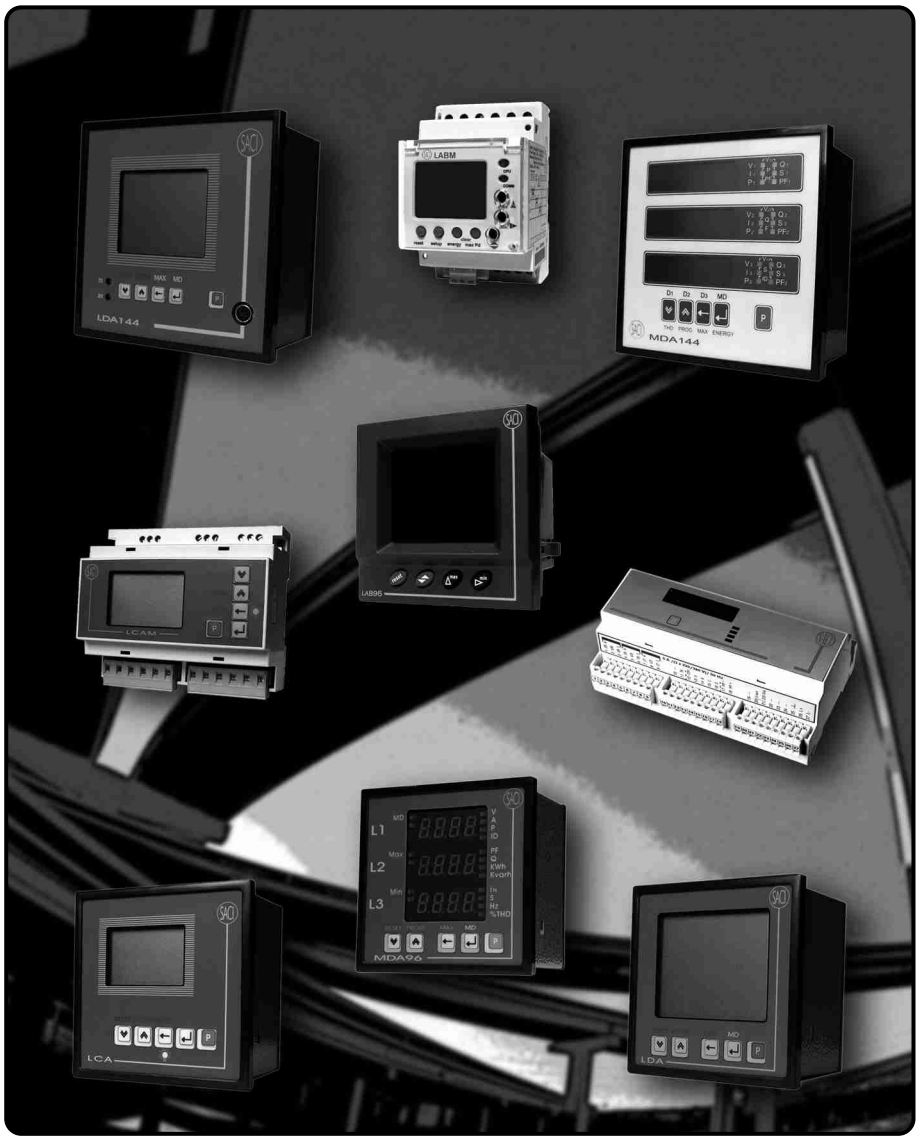
NETWORK ANALYZERS



Analyzers

NETWORK ANALYZERS

CONTENTS

NETWORK ANALYZERS

PRODUCTS RANGE

NETWORK ANALYZERS - ALTERNATING CURRENT

LCD DISPLAY		
DIN RAIL MOUNTING	LABM, LCAM, LCCM	
PANEL (96 x 96) MOUNTING	LCC, LCA, LDA, LAB 96	
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	

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	IFR1, IFRA, IFR4	
MANAGEMENT SOFTWARE	SACIgest	

NETWORK ANALYZERS

NETWORK ANALYZER - LCC

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

- DIN 96 x 96 INSTRUMENT
- MEASUREMENT IN 4 QUADRANTS
- BALANCED or UNBALANCED SYSTEMS
- NEUTRAL CURRENT
- MAXIMUM DEMAND, A, kW, kVA, kvar
- MAX.- and MIN.- VALUES
- TRUE EFFECTIVE VALUE (RMS)
- RS232 / RS485 SERIAL PORT (external module)
- 2 PULSE or ALARM OUTPUTS
- SELF SUPPLIED

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
Voltage (Line-to-Neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Neutral current	A				•
Current	A	•	•	•	
Active power (P)	kW	•	•	•	•
Reactive power (Q)	kVAr	•	•	•	•
Apparent power (S)	kVA	•	•	•	•
Power factor (cos ϕ)	PF	•	•	•	•
Maximum demand (Current)	A	•	•	•	
Maximum demand (P)	kW				•
Maximum demand (Q)	kVAr				•
Maximum demand (S)	kVA				•
Frequency	Hz				•
Consumed active energy (EP+)	kW-h				•
Generated active energy (EP-)	-kW-h				•
Consumed inductive reactive energy (EQC+)	kvarL-h				•
Consumed capacitive reactive energy (EQC-)	kvarC-h				•

MODEL

- **LCC-B** Basic model
- **LCC-BA** Basic model
  Current insulated

SETTING

- Instrument identity code.
- Primary voltage.
- Primary current.
- 2 outputs operating mode.
- Balanced or unbalanced system.

SERIAL PORT (OPTION)

- MODBUS RTU Protocol.
- RS232 or RS485 External module.
  Up to 16 LCC instruments per module.
  Up to 32 modules per line (32x16 LCC in parallel with RS485 multidrop system).

PULSE - ALARM OUTPUTS

Type: voltage free contacts.
The pulse - alarm outputs can be set as max. or min. alarm contacts associated to any measured parameter, or as active energy pulses (EP+) and reactive energy pulses (EQL).

LCD DISPLAY

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

MAX.- AND MIN.- VALUES

- Max. values of: V1, V2, V3, V 12, V23, V31, I1, I2, I3, IN , P, Q and S.
- Min. values of: V1, V2, V3, V12, V23, V31.

NETWORK ANALYZERS

MAXIMUM DEMAND

- Average values of I1, I2, I3, IN, P, Q and S.
- Integration Period: 5, 10, 30, 60, 300, 480, 600 or 900 s.
- These values can be displayed as current average values and saved as maximums.

TECHNICAL SPECIFICATIONS

INPUT

3-phase, 3 wire, balanced or
3-phase, 4 wire, unbalanced.

Rated voltage (Un)	400 V
Burden	20 mA per phase
Operating range	80-120 % 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	N.O. Optocoupler < 48Vc.c.(24Vc.c. 1 kΩ)
Pulse weight (Energy)	1 or 0,1 imp./kWh
Pulse length	100 ms

SERIAL PORT (OPTION)

- MODBUS RTU Protocol.
- RS232 or RS485 external module.
  Up to 16 LCC instruments per module.
  Up to 32 modules per RS 485 line (32x16 LCC in parallel with multidrop system)

Connection	2 wire
Baud rate	9600 bauds

ACCURACY

Parameter	Operating range	Accuracy
Voltage	80-120 %	0,3%(read.+ full scale)
Current	1-120%	0,3%(read.+ full scale)
Active power	1-120%	0,3%(read.+ full scale)
Reactive power	1-120%	0,3%(read.+ full scale)
Apparent power	1-120%	0,5%(read.+ full scale)
Power factor	-0,5/+0,5	0,6%(read.)
Frequency	45-65 Hz	0,2% (rated freq.)
Active energy	5-120%	1% read.
Reactive energy	5-120%	2% read.

GENERAL FEATURES

Display lighting	Back
Case material	ABS, UL94 V0
Dimensions	DIN 96 x 96 x 49 mm
Connections	Pluggable
Max. wire diameter	2,5 mm^2
Weight	0,30 kg
Protection	IP40 (front) IP20 (terminals)
Electrical safety (EN 61010)	Class 2 Category III

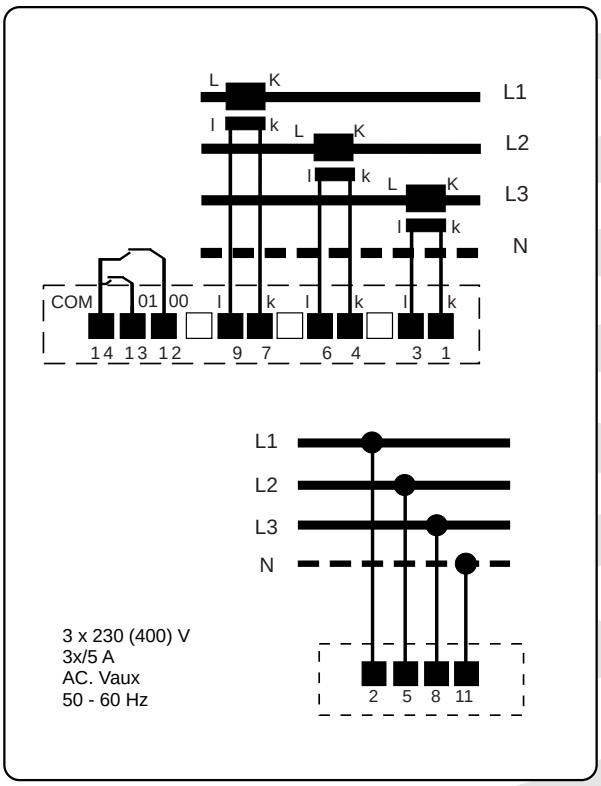
ACCESSORIES

RS232 Module
RS485 Module
x/5 A or x/1 A transformers
RS232 / RS485 converters
RS485 amplifiers

OPTIONAL

Reading software (at no additional cost).
Management software, SACIgest.

CONNECTIONS



NETWORK ANALYZERS

NETWORK ANALYZER - LCA

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

- DIN 96 x 96 INSTRUMENT
- MEASUREMENT IN 4 QUADRANTS
- THREE-PHASE, 4-WIRE
- HARMONIC DISTORTION (THD V and I)
- MAX.- and MIN.- VALUES
- TRUE EFFECTIVE VALUE (RMS)
- RS232 / RS485 SERIAL PORT
- 2 CONTACTS OUTPUT

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
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				•
THD Current	A	•	•	•	
THD Voltage	V	•	•	•	
Consumed active energy (EP+)	kW-h				•
Generated active energy (EP-)	-kW-h				•
Consumed inductive reactive energy (EQC+)	kvarL-h				•
Consumed capacitive reactive energy (EQC-)	kvarC-h				•

(*) Via serial port only

MODEL

- **LCA-B** Basic model
- **LCA-BA** Basic model
  Current insulated
- **LCA-C** Basic model
  Current insulated
  RS485 Serial port
  2 relays

SETTING

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

SERIAL PORT (Model LCA-C)

- Type: RS485
- Protocol MODBUS RTU
- Baud rate Programmable
  300 – 19200 bauds

CONTACTS OUTPUT (Model LCA-C)

Type: Voltage free contacts (Relays).
CONTACTS OUTPUT can be set as max or min alarm contacts associated to any measured parameter, or as active energy (EP+) and reactive energy (EQL) pulses. They also can be set as contacts operated from the central unit.

NETWORK ANALYZERS

LCD DISPLAY

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

MAX.- and MIN.- VALUES

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

TECHNICAL SPECIFICATIONS

INPUT

3-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 or 60 Hz

CONTACTS OUTPUT (LCA-C model)

Number of outputs	2
Type	N.O. relay 250 V, 3 A

SERIAL PORT (LCA-C model)

Type	RS485
Connection	2 wire
Baud rate (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)

ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120 %	0,3%(read.+ full scale)
Current	1-120%	0,3%(read.+ full scale)
Active power	1-120%	0,3%(read.+ full scale)
Reactive power	1-120%	0,3%(read.+ full scale)
Apparent power	1-120%	0,5%(read.+ full scale)
Power factor	-0,5/+0,5	0,6%(read.)
Frequency	45-65 Hz	0,2% (rated freq.)
Active energy	5-120%	1% read.
Reactive energy	5-120%	2% read.

AUXILIARY VOLTAGE

- A.C. Vaux.	63,5/110 V or 230/400 V
Burden	3 VA
Operating range	80-120 % Un
- DC. V.aux	18/72 V
Burden	3 W
- UNIVERSAL Vaux.	85...265 V A.C./95...300 V D.C.
Burden	

GENERAL FEATURES

Display lighting	Back
Case material	Metal+ABS, UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
Weight	0,35 kg
Protection	IP54 (front)
	IP20 (terminals)
Electrical safety (EN 61010)	Class 2
	Category III

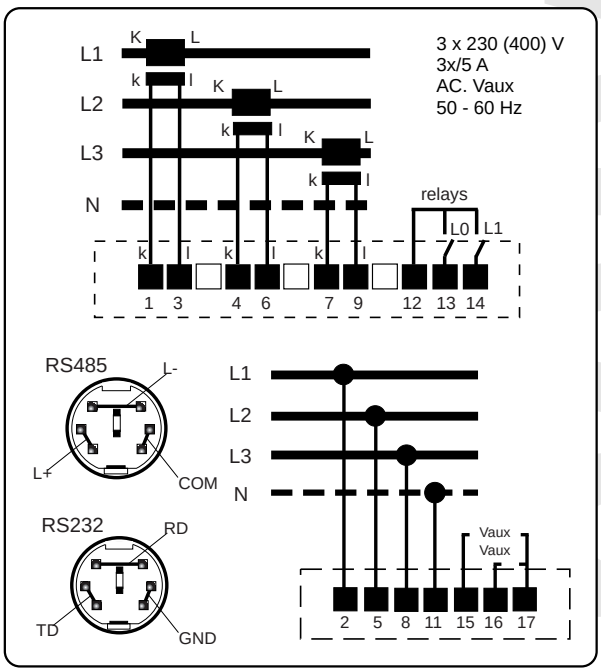
ACCESSORIES

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

OPTIONAL

Reading software (at no additional cost).
Management software, SACIgest.

CONNECTIONS



NETWORK ANALYZERS

NETWORK ANALYZER - LDA

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

- 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 EFFECTIVE VALUE (RMS)
- RS232 / RS485 SERIAL PORTS
- 2 CONTACTS OUTPUT

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
Voltage (Line-to-Neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Neutral current	A				•
Current	A	•	•	•	
Active power (P)	kW	•	•	•	•
Reactive power (Q)	kVAr	•	•	•	•
Apparent power (S)	kVA	•	•	•	•
Power factor (cos ϕ)	PF	•	•	•	•
Maximum demand (Current)	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+)	kW-h				•
Generated active energy (EP-)	-kW-h				•
Consumed inductive reactive energy (EQC+)	kvarL-h				•
Consumed capacitive reactive energy (EQC-)	kvarC-h				•

MODEL

- **LDA-B** Basic model
- **LDA-BA** Basic model
  Current insulated
- **LDA-C** Basic model
  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 identity code.
- Primary voltage.
- Primary current.
- Contact operating mode.

SERIAL PORT (Model LDA-C)

- Type: RS485
- Protocol MODBUS RTU
- Baud rate Programmable
  300 – 19200 bauds
  Standard 9600 bauds

NETWORK ANALYZERS

CONTACTS OUTPUT (LDA-CModel)

Type : Voltage free contacts (relays).
CONTACTS OUTPUT can be set as max or min alarm contacts associated to any measured parameter, or as active energy (EP+) and reactive energy (EQL) pulses. They also can be set as contacts operated from the central unit.

LCD DISPLAY

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

MAX.- and MIN.- VALUES

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

TECHNICAL SPECIFICATIONS

INPUT

3-Fases 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 Model)

Number of outputs	2
Type	N.O. relay
	250 V, 3 A

ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120 %	0,3%(read.+ full scale)
Current	1-120%	0,3%(read.+ full scale)
Active power	1-120%	0,3%(read.+ full scale)
Reactive power	1-120%	0,3%(read.+ full scale)
Apparent power	1-120%	0,5%(read.+ full scale)
Power factor	-0,5/+0,5	0,6%(read.)
Frequency	45-65 Hz	0,2% (rated freq.)
Active energy	5-120%	1% read.
Reactive energy	5-120%	2% read.

CONTACTS OUTPUT (Model LDA-C)

Type	RS485
Connection	2 wire
Baud rate	Programmable
Baud rate (standard)	9600 bauds
Max. No. of instruments per line	32
Max. length of system per line (without amplifier)	1250m
(On request, RS232 serial port)	5VA

AUXILIARY VOLTAGE

- A.C. Vaux.	63,5/110 V or 230/400 V
Burden	3 VA
Operating range	80-120 % Un
- DC. V.aux	18/72 V
Burden	3 W
- UNIVERSAL Vaux.	85...265 V A.C./95...300 V D.C.
Burden	

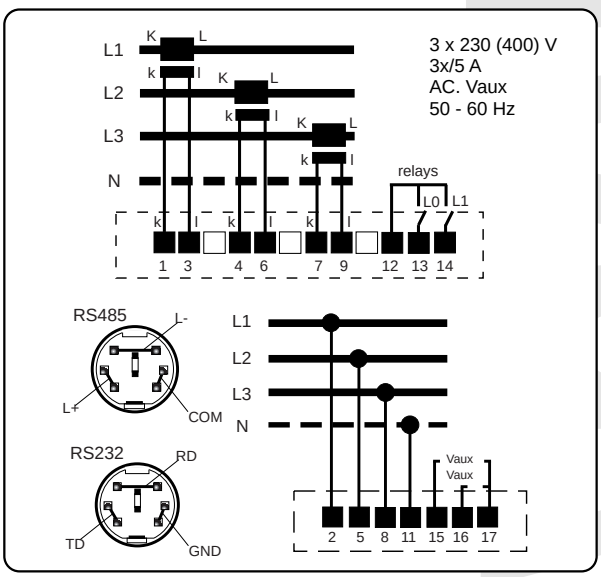
GENERAL FEATURES

Display lighting	Back
Case material	Metal+ABS, UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
Weight	0,35 kg
Protection	IP54 (front)
	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 (at no additional cost).
Management software, SACIgest.

CONNECTIONS



NETWORK ANALYZERS

NETWORK ANALYZER - LAB 96

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

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

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
Voltage (Line-to-Neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Neutral current	In				•
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 (Current)	A	•	•	•	•
Maximum demand (P)	kW				•
Maximum demand (S)	kVA				•
Frequency	Hz				•
THD Current	% A	•	•	•	15th
THD Voltage	% V	•	•	•	15th
Consumed active energy (E_{P+})	kW-h				•
Consumed inductive reactive energy (E_{QL})	KvarL-h				•
Consumed capacitive reactive energy (E_{QC})	KvarC-h				•
Consumed apparent energy (ESC+)	kVA-h				•
Generated active energy (E_{P-})	-kW-h				•
Generated inductive reactive energy (EQC+)	-kvarL-h				•
Generated capacitive reactive energy (EQC-)	-kvarC-h				•
Generated apparent energy (Es-)	-kVA-h				•

MODEL

- **LAB96-B** Basic model
- **LAB96-BA** Basic model
  Current insulated
- **LAB96-C** Basic model
  Current insulated
  Output Serie RS-485
  1 contacts output

MODEL

- **LAB96-CH** LAB96-C
  Harmonic measuring (up to15)
- **LAB96 - U** LAB96-C
  UNIVERSAL auxiliary power supply

MAXIMUM DEMAND FUNCTION

- Average values of I_1, I_2, I_3, P and S.
- Integration Period: de 1 a 60 minutes.

SETTING

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

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

- Type:	RS485
- Protocol	MODBUS RTU
- Baud rate	Programmable
	300 – 19200 bauds
	Standard 9600 bauds

CONTACTS OUTPUT (LAB96-C, CH, -U models)

Type : Opto-insulated transistor (open collector).
CONTACTS OUTPUT can be set as max or min alarm contacts associated to a measured parameter, or as active energy (EP+) and reactive energy (EQL) pulses.

LCD DISPLAY

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

MAX.- and MIN.- VALUES

Max. and min. values of: V_1, V_2, V_3,V_{12}, V_{23}, V_{31}, I_1, I_2, I_3, P_1, P_2, P_3, P, Q, S, cos ϕ, and Hz.

TECHNICAL SPECIFICATIONS

INPUT

3-Fases 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 % I_n
Frequency	45-65 Hz

CONTACTS OUTPUT

Number of outputs	1
Type	Opto-insulated transistor (open collector) NPN
	24 V D.C., 50 mA

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	45~65 Hz	0,2% ± 2 digits
Active energy	10-100%	1% ± 2 digits
Reactive energy	10-100%	1% ± 2 digits

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

Type	RS485
Connection	2 wire
Baud rate	Programmable
Baud rate (standard)	9600 bauds
Max. No. of instruments per line	32
Max. length of system per line (without amplifier)	1200 m

AUXILIARY VOLTAGE

- A.C. Vaux.	230 V
Burden	5 VA
Operating range	85-110 % Un
- UNIVERSAL Vaux.	85...265 V A.C./95...300 V D.C.
Burden	5 VA
Frequency	50- 60 Hz AC.

GENERAL FEATURES

Case material	UL94 V0
Dimensions	DIN 96 x 96 mm (depth 63)
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
Weight	0,40 kg
Protection	IP51 (front)
	IP31 (terminals)
Electrical safety (EN 61010)	Class 2
	Category III

ACCESSORIES

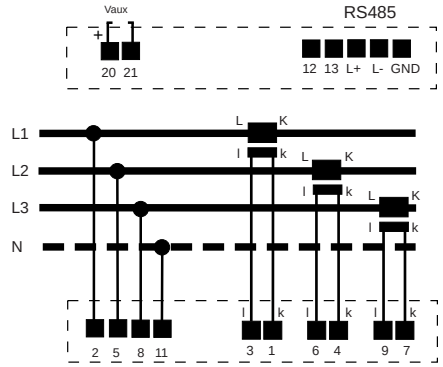
x/5 A or x/1 A transformers
RS232 / RS485 converters
RS485 amplifiers

OPTIONAL
Management software, SACIgest.

NETWORK ANALYZERS

CONNECTIONS

3 x 230 (400) V
3x/5 A
AC. Vaux
50 - 60 Hz



NETWORK ANALYZER - LABM

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

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

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
Voltage (Line-to-Neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Neutral current	In				•
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 (Current)	A	•	•	•	•
Maximum demand (P)	kW				•
Maximum demand (S)	kVA				•
Frequency	Hz				•
THD Current	% A	•	•	•	15th
THD Voltage	% V	•	•	•	15th
Consumed active energy (E_{P+})	kW-h				•
Consumed inductive reactive energy (E_{QL})	KvarL-h				•
Consumed capacitive reactive energy (E_{QC})	KvarC-h				•
Consumed apparent energy (ESC+)	kVA-h				•
Generated active energy (E_{P-})	-kW-h				•
Generated inductive reactive energy (EQC+)	-kvarL-h				•
Generated capacitive reactive energy (EQC-)	-kvarC-h				•
Generated apparent energy (Es-)	-kVA-h				•

MODEL

- **LABM-B** Basic model
- **LABM-BA** Basic model
  Current insulated
- **LABM-C** Basic model
  Current insulated
  RS-485 Serial port
  1 contacts outputs

MODEL

- **LABM-CH** LABM-C
  Harmonic measuring (up to15)
- **LABM-U** LABM-C
  UNIVERSAL auxiliary power supply

NETWORK ANALYZERS

MAXIMUM DEMAND FUNCTION

- Average values of I1, I2, I3, P and S.
- Integration Period: de 1 a 60 minutes.

SETTING

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

SERIAL PORT (Models LABM-C, -CH, -U)

- Type:	RS485
- Protocol	MODBUS RTU
- Baud rate	Programmable 300 – 19200 bauds Standard 9600 bauds

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

Type : Opto-insulated transistor (open collector).
CONTACTS OUTPUT can be set as max or min alarm contacts associated to a measured parameter, or as active energy (EP+) and reactive energy (EQL) pulses.

LCD DISPLAY

- LCD display with built-in keypad.
- 4 parameters per page.
- Back lighting.

MAX.- and MIN.- VALUES

Max. and min. values of: V_1, V_2, V_3,V_{12}, V_{23}, V_{31}, I_1, I_2, I_3, P_1, P_2, P_3, P, Q, S, cos ϕ, and Hz.

TECHNICAL SPECIFICATIONS

INPUT

3-Fases 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, 250 or 500 A
External current transformers (included)	
Burden	0,75 VA
Operating range	0- 120 % In
Burden	0,9 VA
Frequency	45-65 Hz

CONTACTS OUTPUT

Number of outputs	2
Type	Opto-insulated transistor (open collector) NPN 24 V D.C., 50 mA

ACCURACY

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

SERIAL PORT (Models LABM-C, -CH,-U)

Type	RS485
Connection	2 wire
Baud rate	Programmable
Baud rate (standard)	9600 bauds
Max. No. of instruments per line	32
Max. length of system per line (without amplifier)	1200 m

AUXILIARY VOLTAGE

- A.C. Vaux.	230 V
Burden	5 VA
Operating range	85-110 % Un
- UNIVERSAL Vaux.	85...265 V A.C./95...300 V D.C.
Burden	5 VA
Frequency	50- 60 Hz A.C.

GENERAL FEATURES

Case material	UL94 V0
Dimensions	(3 Modules) 52,5 x 85 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm2
Weight	0,21 kg
Protection	IP41 (front) IP20 (terminals)
Electrical safety (EN 61010)	Class 2 Category III

ACCESSORIES

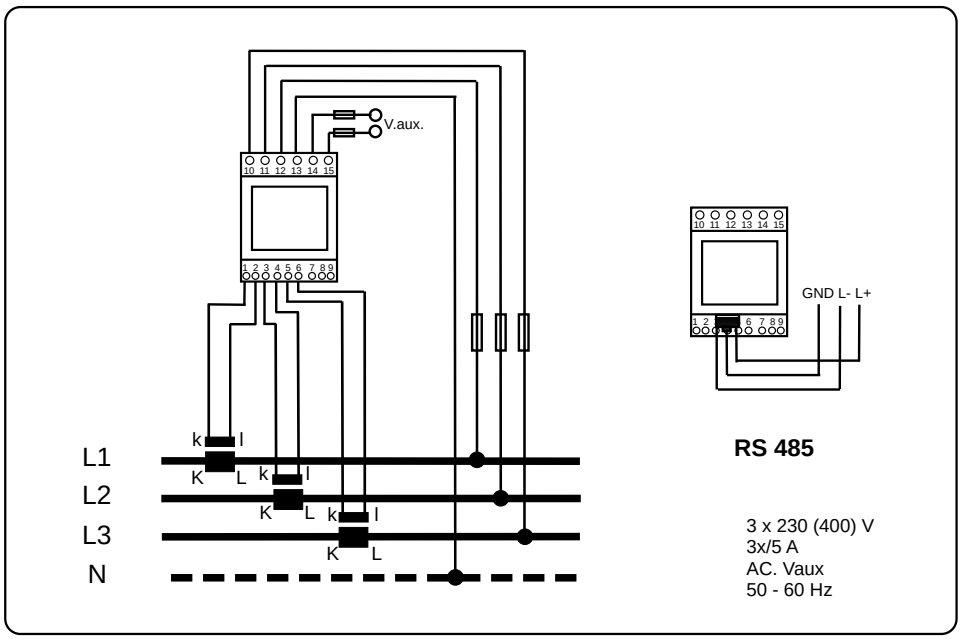
x/5 A or x/1 A transformers
RS232 / RS485 converters
RS485 amplifiers

OPTIONAL

Management software, SACIgest.

NETWORK ANALYZERS

CONNECTIONS



RS 485

3 x 230 (400) V
3x/5 A
AC. Vaux
50 - 60 Hz

NETWORK ANALYZERS

NETWORK ANALYZER - LCCM

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

- DIN RAIL MOUNTING
- MEASUREMENT IN 4 QUADRANTS
- BALANCED or UNBALANCED SYSTEMS
- NEUTRAL CURRENT
- MAXIMUM DEMAND, A, kW, kVA, kvar
- MAX.- and MIN.- VALUES
- TRUE EFFECTIVE VALUE (RMS)
- RS232/RS485 SERIAL PORT (external module)
- 2 PULSE or ALARM OUTPUTS
- SELF SUPPLIED

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
Voltage (Line-to-Neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Neutral current	A				•
Current	A	•	•	•	
Active power (P)	kW	•	•	•	•
Reactive power (Q)	kVAr	•	•	•	•
Apparent power (S)	kVA	•	•	•	•
Power factor (cos ϕ)	PF	•	•	•	•
Maximum demand (Current)	A	•	•	•	
Maximum demand (P)	kW				•
Maximum demand (Q)	kVAr				•
Maximum demand (S)	kVA				•
Frequency	Hz				•
Consumed active energy (EP+)	kW-h				•
Generated active energy (EP-)	-kW-h				•
Consumed inductive reactive energy (EQC+)	kvarL-h				•
Consumed capacitive reactive energy (EQC-)	kvarC-h				•

MODEL

- **LCCM**

SETTING

- Instrument identity code.
- Primary voltage.
- Primary current.
- 2 outputs operating mode.
- Balanced or unbalanced system.

SERIAL PORT (OPTION)

- MODBUS RTU Protocol.
- RS232 or RS485 External module.
  Up to 16 LCC instruments per module
  Up to 32 modules per line (32x16 LCC in parallel with RS485 multidrop system).

PULSE - ALARM OUTPUTS

Type: voltage free contacts.
The pulse - alarm outputs can be set as max. or min. alarm contacts associated to any measured parameter, or as active energy pulses (EP+) and reactive energy pulses (EQL).

DISPLAY LCD

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

MAX.- AND MIN.- VALUES

- Max. values of: V1, V2, V3, V 12, V23, V31, I1, I2, I3, IN , P, Q and S.
- Min. values of: V1, V2, V3, V12, V23, V31.

NETWORK ANALYZERS

MAXIMUM DEMAND

- Average values of I1, I2, I3, IN, P, Q and S
- Integration Period: 5, 10, 30, 60, 300, 480, 600, or 900 s.
- These values can be displayed as current average values and saved as maximums.

TECHNICAL SPECIFICATIONS

INPUT

3-phase, 3 wire, balanced or
3-phase, 4 wire, unbalanced.

Rated voltage (Un)	400 V
Burden	20 mA per phase
Operating range	80-120 % 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	N.O. Optocoupler < 48Vc.c.(24Vc.c. 1 kΩ)
Pulse weight (Energy)	1 or 0,1 imp./kWh
Pulse length	100 ms

SERIAL PORT (OPTION)

- MODBUS RTU Protocol.
- RS232 or RS485 external module.
  Up to 16 LCC instruments per module.
  Up to 32 modules per RS485 line (32x16 LCC in parallel with multidrop system).

Connection	2 wire
Baud rate	9600 bauds

ACCURACY

Parameter	Operating range	Accuracy
Voltage	80-120 %	0,3%(read.+ full scale)
Current	1-120%	0,3%(read.+ full scale)
Active power	1-120%	0,3%(read.+ full scale)
Reactive power	1-120%	0,3%(read.+ full scale)
Apparent power	1-120%	0,5%(read.+ full scale)
Power factor	-0,5/+0,5	0,6%(read.)
Frequency	45-65 Hz	0,2% (rated freq.)
Active energy	5-120%	1% read.
Reactive energy	5-120%	2% read.

GENERAL FEATURES

Display lighting	Back
Case material	ABS, UL94 V0
Dimensions	(6 Modules) 105 x 90 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
Weight	0,35 kg
Protection	IP54 (front) IP20 (terminals)
Electrical safety (EN 61010) Category III	Class 2

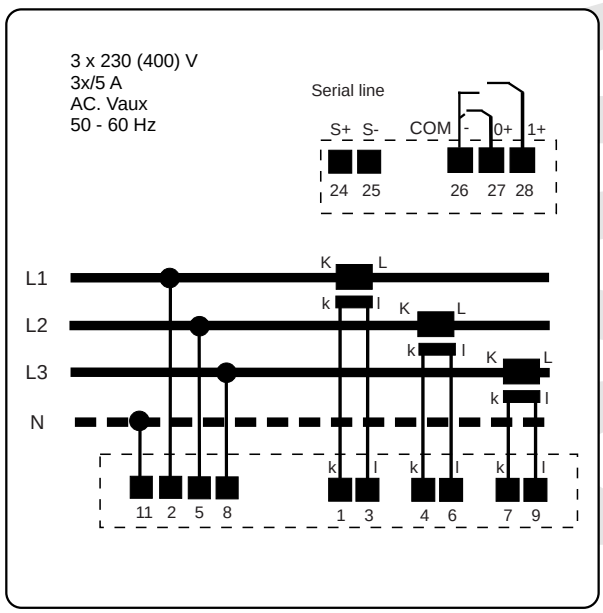
ACCESSORIES

RS232 Module
RS485 Module
x/5 A or x/1 A transformers
RS232 / RS485 converters
RS485 amplifiers

OPTIONAL

Reading software (at no additional cost).
Management software, SACIgest.

CONNECTIONS



NETWORK ANALYZERS

NETWORK ANALYZER - LCAM

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

- DIN RAIL MOUNTING
- MEASUREMENT IN 4 QUADRANTS
- THREE-PHASE, 4-WIRE
- HARMONIC DISTORTION (THD V and I)
- MAX. and MIN. VALUES
- TRUE EFFECTIVE VALUE (RMS)
- RS232 / RS485 SERIAL PORTS
- 2 CONTACTS OUTPUT

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
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				•
THD Current	A	•	•	•	
THD Voltage	V	•	•	•	
Consumed active energy (EP+)	kW-h				•
Generated active energy (EP-)	-kW-h				•
Consumed inductive reactive energy (EQC+)	kvarL-h				•
Consumed capacitive reactive energy (EQC-)	kvarC-h				•

(*) Via serial port only

MODEL

- **LCAM-B** Basic model
- **LCAM-BA** Basic model
  Current insulated
- **LCAM-C** Basic model
  Current insulated
  RS485 Serial port
  2 relays

SETTING

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

SERIAL PORT (Model LCAM-C)

- TYPE RS485
- Protocol MODBUS RTU
- Baud rate Programmable
  300 – 19200 bauds

CONTACTS OUTPUT (Model LCAM-C)

Type : Voltage free contacts (relays).
CONTACTS OUTPUT can be set as max or min alarm contacts associated to any measured parameter, or as active energy (EP+) and reactive energy (EQL) pulses. They also can be set as contacts operated from the central unit.

NETWORK ANALYZERS

LCD DISPLAY

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

MAX.- and MIN.- VALUES

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

TECHNICAL SPECIFICATIONS

INPUT

3-Fases 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 or 60 Hz

CONTACTS OUTPUT

Number of outputs	2
MODEL	N.O. relay
250 V, 3 A	

SERIAL PORT (only LCAM-C)

Type	RS485
Connection	2 wire
Baud rate (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)

ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120 %	0,3%(read.+ full scale)
Current	1-120%	0,3%(read.+ full scale)
Active power	1-120%	0,3%(read.+ full scale)
Reactive power	1-120%	0,3%(read.+ full scale)
Apparent power	1-120%	0,5%(read.+ full scale)
Power factor	-0,5/+0,5	0,6%(read.)
Frequency	45-65 Hz	0,2% (rated freq.)
Active energy	5-120%	1% read.
Reactive energy	5-120%	2% read.

AUXILIARY VOLTAGE

A.C. Vaux.	63,5/110 V or 230/400 V
Burden	3 VA
Operating range	80-120 % Un

GENERAL FEATURES

Display lighting	Back
Mounting	DIN rail
Case material	ABS, UL94 V0
Dimensions	(6 Modules) 105 x 90 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
Weight	0,35 kg
Protection	IP54 (front)
	IP20 (terminals)
Electrical safety (EN 61010)	Class 2
	Category III

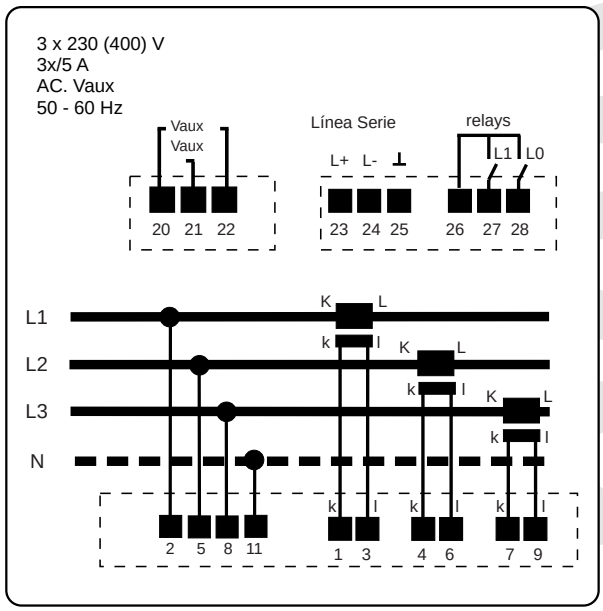
ACCESSORIES

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

OPTIONAL

Reading software (at no additional cost).
Management software, SACIgest.

CONNECTIONS



NETWORK ANALYZERS

NETWORK ANALYZER - LDA 144

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

- 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 EFFECTIVE VALUE (RMS)
- RS232 / RS485 SERIAL PORTS
- 2 CONTACTS OUTPUT

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
Voltage (Line-to-Neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Neutral current	A				•
Current	A	•	•	•	
Active power (P)	kW	•	•	•	•
Reactive power (Q)	kVAr	•	•	•	•
Apparent power (S)	kVA	•	•	•	•
Power factor (cos ϕ)	PF	•	•	•	•
Maximum demand (Current)	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+)	kW-h				•
Generated active energy (EP-)	-kW-h				•
Consumed inductive reactive energy (EQC+)	kvarL-h				•
Consumed capacitive reactive energy (EQC-)	kvarC-h				•

MODEL

- **LDA144-B** Basic model
- **LDA144-BA** Basic model
  Current insulated
- **LDA144-C** Basic model
  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 identity code.
- Primary voltage.
- Primary current.
- Contacts operating mode.

SERIAL PORT (Model LDA144-C)

- Type: RS485
- Protocol MODBUS RTU
- Baud rate Programmable
  300 – 19200 bauds
  Standard 9600 bauds

NETWORK ANALYZERS

CONTACTS OUTPUT (only LDA144-C)

Type : Voltage free contacts (relays).
CONTACTS OUTPUT can be set as max or min alarm contacts associated to any measured parameter, or as active energy (EP+) and reactive energy (EQL) pulses. They also can be set as contacts operated from the central unit.

DISPLAY LCD

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

MAX.- and MIN.- VALUES

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

TECHNICAL SPECIFICATIONS

INPUT

3-Fases 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 (Model LDA144-C)

Number of outputs	2
Type	N.O. relay 250 V, 3 A

ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120 %	0,3%(read.+ full scale)
Current	1-120%	0,3%(read.+ full scale)
Active power	1-120%	0,3%(read.+ full scale)
Reactive power	1-120%	0,3%(read.+ full scale)
Apparent power	1-120%	0,5%(read.+ full scale)
Power factor	-0,5/+0,5	0,6%(read.)
Frequency	45-65 Hz	0,2% (rated freq.)
Active energy	5-120%	1% read.
Reactive energy	5-120%	2% read.

SERIAL PORT (Model LDA144-C)

Type	RS485
Connection	2 or 4 wire
Baud rate	Programmable
Baud rate (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)	

AUXILIARY VOLTAGE

- A.C. Vaux.	63,5/110 V or 230/400 V
Burden	3 VA
Operating range	80-120 % Un
- DC. V.aux	18/72 V
Burden	3 W
- UNIVERSAL Vaux.	85...265 V A.C./95...300 V D.C.
Burden	5 VA

GENERAL FEATURES

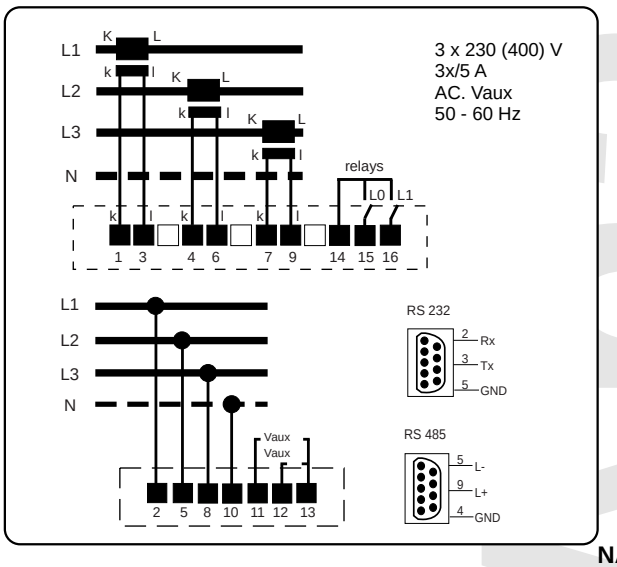
Display lighting	Back
Case material	Metal+ABS, UL94 V0
Dimensions	DIN 144 x 144 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
Weight	0,85 kg
Protection	IP54 (front) IP20 (terminals)
Electrical safety (EN 61010) Category III	Class 2

ACCESSORIES

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

OPTIONAL

Reading software (at no additional cost).
Management software, SACIgest.



NETWORK ANALYZER - LDA 144 with Memory

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

- 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 EFFECTIVE VALUE (RMS)
- RS232 (front) / RS485 (rear) SERIAL PORT
- 2 CONTACTS OUTPUT

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 and S) at the end of a predetermined period of time (5, 10, 15, 20 or 30 minutes, selectable) and their corresponding maximum values.

1.2 - Accumulated EP+ Value.

- 60 days + 4000 alarms storage.

2 - PROGRAMMABLE

2.1 - Up to a maximum of 9 variables can be selected from the following (V1, V2, V3, V12, V23, V31, P1, P2, P3, Q1, Q2, Q3, S1, S2, S3, cos ϕ1, cos ϕ2, cos ϕ3, cos ϕ Hz and INeutral), 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 start time, length and variable affected.

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
Voltage (Line-to-Neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Neutral current	A				•
Current	A	•	•	•	
Active power (P)	kW	•	•	•	•
Reactive power (Q)	kVAr	•	•	•	•
Apparent power (S)	kVA	•	•	•	•
Power factor (cos ϕ)	PF	•	•	•	•
Maximum demand (Current)	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+)	kW-h				•
Generated active energy (EP-)	-kW-h				•
Consumed inductive reactive energy (EQC+)	kvarL-h				•
Consumed capacitive reactive energy (EQC-)	kvarC-h				•

NETWORK ANALYZERS

MODEL

- **LDA 144 with Memory**
  Current insulated.
  RS485 Serial port (rear).
  RS232 Serial port (front).
  2 relays.

MAXIMUM DEMAND FUNCTION

- Average values of I1, I2, I3, P, Q and S.
- Integration Period: the time selected.
- These values can be displayed as current average values and saved as maximums.

SETTING

- Instrument identity code.
- Primary voltage.
- Primary current.
- Contacts operating mode.

SERIAL PORT

- Type: RS485
- Protocol MODBUS RTU
- Baud rate Programmable
  300 – 19200 bauds
  Standard 9600 bauds

CONTACTS OUTPUT

Type : Voltage free contacts (relés).
CONTACTS OUTPUT can be set as max or min alarm contacts associated to any measured parameter, or as active energy (EP+) and reactive energy (EQL) pulses. They also can be set as contacts operated from the central unit.

LCD DISPLAY

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

MAX.- MIN.-VALORES

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

TECHNICAL SPECIFICATIONS

INPUT

3-Fases 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

OUTPUT CONTACTS

Number of outputs	2
Type	N.O. relay
	250 V, 3 A

ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120 %	0,3%(read.+ full scale)
Current	1-120%	0,3%(read.+ full scale)
Active power	1-120%	0,3%(read.+ full scale)
Reactive power	1-120%	0,3%(read.+ full scale)
Apparent power	1-120%	0,5%(read.+ full scale)
Power factor	-0,5/+0,5	0,6%(read.)
Frequency	45-65 Hz	0,2% (rated freq.)
Active energy	5-120%	1% read.
Reactive energy	5-120%	2% read.

SERIAL PORT

Type	RS485
Connection	2 or 4 wire
Baud rate	Programmable
Baud rate (standard)	9600 bauds
Max. No. of instruments per line	32
Max. length of system per line (without amplifier)	1250 m
RS232 Serial port	on the front

AUXILIARY VOLTAGE

- A.C. Vaux.	63,5/110 V or 230/400 V
Burden	3 VA
Operating range	80-120 % Un
- DC. V.aux	18/72 V
Burden	3 W
- UNIVERSAL Vaux.	85...265 V A.C./95...300 V D.C.
Burden	5 VA

NETWORK ANALYZERS

GENERAL FEATURES

Display lighting	Back
Case material	Metal+ABS, UL94 V0
Dimensions	DIN 144 x 144 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
Weight	0,85 kg
Protection	IP54 (front)
	IP20 (terminals)
Electrical safety (EN 61010)	Class 2
	Category III

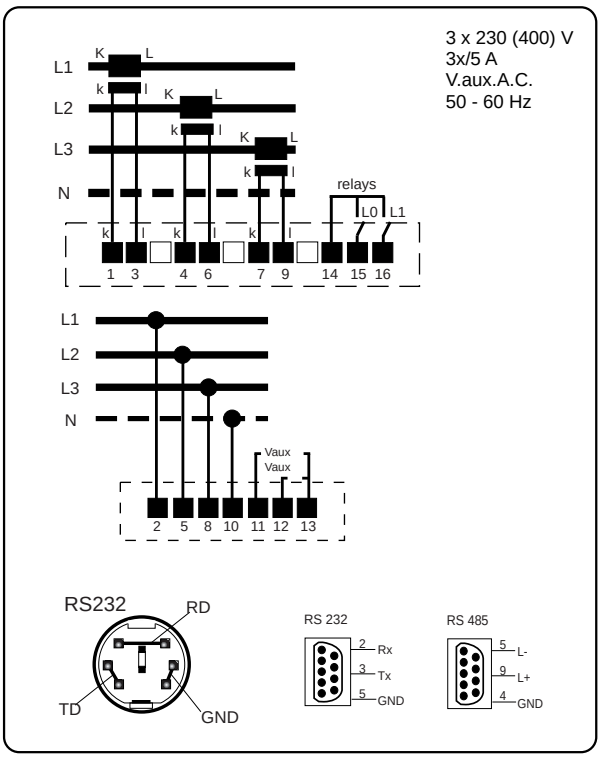
ACCESSORIES

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

OPTIONAL

Reading software (at no additional cost).
Management software, SACIgest.

CONNECTIONS



NETWORK ANALYZERS

NETWORK ANALYZER - MAR 96

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

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

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
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				•
Consumed inductive reactive energy (EQC+)	kvarL-h				•
Consumed capacitive reactive energy (EQC-)	kvarC-h				•

(*) Via serial port only

MODEL

- **MAR96** Current insulated, 2 relays, RS485 Serial port
- **MAR96-0** Single-phase
- **MAR96-I** Three-phase, 3 wire, balanced
- **MAR96-II** Three-phase, 3 wire, unbalanced
- **MAR96-3** Three-phase, 4 wire, unbalanced

SETTING

- Instrument identity code.
- Primary voltage.
- Primary current.
- Contacts operating mode.

SERIAL PORT

- Type: RS485
- Protocol MODBUS RTU
- Baud rate Programmable, 300 – 19200 bauds, Standard 9600 bauds

CONTACTS OUTPUT

Type : Voltage free contacts (relés).
CONTACTS OUTPUT can be set as max or min alarm contacts associated to any measured parameter, or as active energy (EP+) and reactive energy (EQL) pulses. They also can be set as contacts operated from the central unit.

NETWORK ANALYZERS

DISPLAY LED

- 3 LED displays (4 digits + sign).
- Height of digits: 12.5 mm.
- Built-in keypad (5 keys).
- 7 selectable parameters for each display.
- Over 30 measuring parameters.

MAX.- and MIN.- VALUES

- Max. and min. values of: V1, V2, V3, I1, I2, I3, P1, P2, P3, P, Q, cos ϕ, and Hz.

4 DIGITAL INPUTS

The digital inputs can operate to:

- Signal the position of contacts or alarms.
- Indicate energy consumption for external processes and synchronisation pulse 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	N.O. relay
	250 V, 8 A

ACCURACY

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

SERIAL PORT

Type	RS485
Connection	2 or 4 wire
Baud rate	Programmable
Baud rate (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)	

AUXILIARY VOLTAGE

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

GENERAL FEATURES

Case material	ABS, UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
Weight	0,75 kg
Protection	IP54 (front)
	IP20 (terminals)
Electrical safety (EN 61010)	Class 2
	Category III

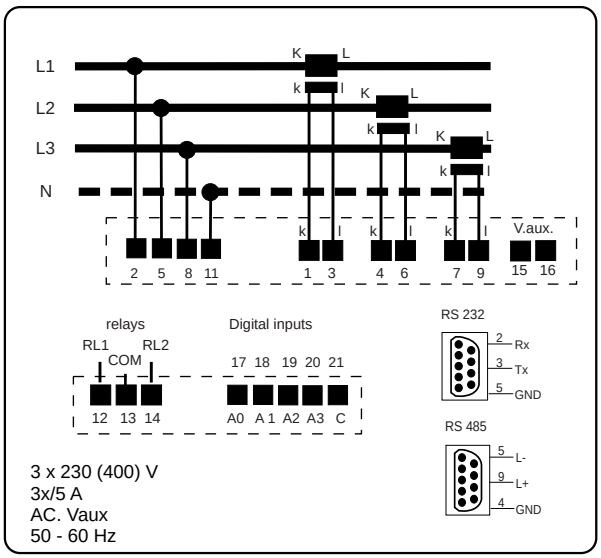
ACCESSORIES

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

OPTIONAL

Reading software (at no additional cost).
Management software, SACIgest.

CONNECTIONS



NETWORK ANALYZER - MAR 144

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

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

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
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				•
Consumed inductive reactive energy (EQC+)	kvarL-h				•
Consumed capacitive reactive energy (EQC-)	kvarC-h				•

(*) Via serial port only

MODEL

- **MAR144-B** Basic model
- **MAR144-BA** Basic model
  Current insulated
- **MAR144** Current insulated
  2 relays
- **MAR144-0** Single-phase
- **MAR144-I** Three-phase, 3 wire, balanced
- **MAR144-II** Three-phase, 3 wire, unbalanced
- **MAR144-3** Three-phase, 4 wire, unbalanced

SETTING

- Instrument identity code.
- Primary voltage.
- Primary current.
- Contacts operating mode.

SERIAL PORT

- Type: RS485
- Protocol MODBUS RTU
- Baud rate Programmable
  300 – 19200 bauds
  Standard 9600 bauds

CONTACTS OUTPUT

Type : Voltage free contacts (relays).
CONTACTS OUTPUT can be set as max or min alarm contacts associated to any measured parameter, or as active energy (EP+) and reactive energy (EQL) pulses. They also can be set as contacts operated from the central unit.

NETWORK ANALYZERS

DISPLAY LED

- 3 LED displays (4 digits + sign).
- Height of digits: 12.5 mm.
- Built-in keypad (5 keys).
- 7 selectable parameters for each display.
- Over 30 measuring parameters.

MAX.- and MIN.- VALUES

- Max. and min. values of: V1, V2, V3, I1, I2, I3, P1, P2, P3, P, Q, cos ϕ, and Hz.

4 DIGITAL INPUTS (Optional)

The digital inputs can operate to:

- Signal the position of contacts or alarms.
- Indicate energy consumption for external processes and synchronisation pulse 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
Magnitud de range:	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 or 60 Hz

ACCURACY

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

CONTACTS OUTPUT

Number of outputs	2
Type	N.O. relay, 250 V, 3 A

SERIAL PORT (OPTIONAL)

Type	RS485
Connection	2 or 4 wire
Baud rate	Programmable
Baud rate (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)

AUXILIARY VOLTAGE

- A.C. Vaux.	63,5/110 V or 230/400 V
Burden	6 VA
Operating range	70-120 % Un
- DC. V.aux	18/72 V
Burden	3 W
- UNIVERSAL Vaux.	85...265 V A.C./95...300 V D.C.
Burden	5 VA

GENERAL FEATURES

Case material	Metal+ABS, UL94 V0
Dimensions	DIN 144 x 144 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
WEIGHT	0,75 kg
Protection	IP54 (front), IP20 (terminals)
Electrical safety (EN 61010)	Class 2
	Category III

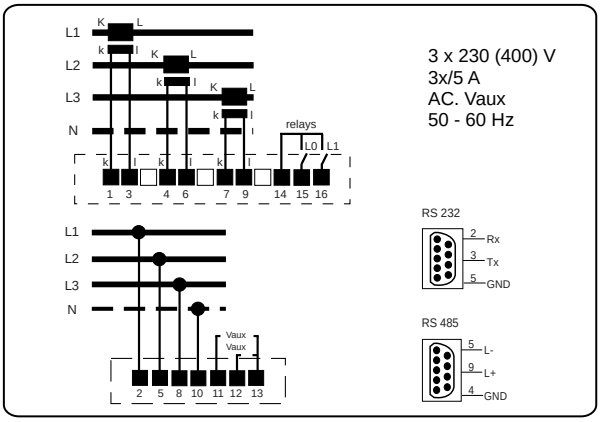
ACCESSORIES

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

OPTIONAL

Reading software (at no additional cost).
Management software, SACIgest.

CONNECTIONS



NETWORK ANALYZERS

NETWORK ANALYZER - MDA 96

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

- 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 EFFECTIVE VALUE (RMS)
- RS232 / RS485 SERIAL PORTS
- 2 CONTACTS OUTPUT

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
Voltage (Line-to-Neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Neutral current	A				•
Current	A	•	•	•	
Active power (P)	kW	•	•	•	•
Reactive power (Q)	kVAr	•	•	•	•
Apparent power (S)	kVA	•	•	•	•
Power factor (cos ϕ)	PF	•	•	•	•
Maximum demand (Current)	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+)	kW-h				•
Generated active energy (EP-)	-kW-h				•
Consumed inductive reactive energy (EQC+)	kvarL-h				•
Consumed capacitive reactive energy (EQC-)	kvarC-h				•

MODEL

- **MDA96-B** Basic model
- **MDA96-BA** Basic model Current insulated
- **MDA96-C** Current insulated RS485 Serial port 2 relays

CONTACTS OUTPUT

Type : Voltage free contacts (relés).
CONTACTS OUTPUT can be set as max or min alarm contacts associated to any measured parameter, or as active energy (EP+) and reactive energy (EQL) pulses. They also can be set as contacts operated from the central unit.

SETTING

- Instrument identity code.
- Primary voltage.
- Primary current.
- Contacts operating mode.

NETWORK ANALYZERS

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 instant values or saved as maximums.

SERIAL PORT

- Type:	RS485
- Protocol	MODBUS RTU
- Baud rate	Programmable
	300 – 19200 bauds
	Standard 9600 bauds

DISPLAY LED

- 3 LED displays (4 digits + sign).
- Height of digits: 12.5 mm.
- Built-in keypad (5 keys).
- 6 selectable parameters for each display.
- Up to 83 measuring parameters.

MAX.- and MIN.- VALUES

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

TECHNICAL SPECIFICATIONS

INPUT

3-Fases 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 or 60 Hz

CONTACTS OUTPUT

Number of outputs	2
Type	N.O. relay
	250 V, 3 A

SERIAL PORT (MDA96-C)

Type	RS485
Connection	2 wire
Baud rate	Programmable
Baud rate (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)

ACCURACY

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

AUXILIARY VOLTAGE

- A.C. Vaux.	63,5/110 V or 230/400 V
Burden	3 VA
Operating range	70-120 % Un
- DC. V.aux	18/72 V
Burden	3 W
Universal Vaux:	85/264 V A.C.; 90/300 V D.C.
Burden	5 VA

GENERAL FEATURES

Case material	Metal+ABS, UL94 V0
Dimensions	DIN 96 x 96 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
WEIGHT	0,75 kg
Protection	IP54 (front)
	IP20 (terminals)
Electrical safety (EN 61010)	Class 2
	Category III

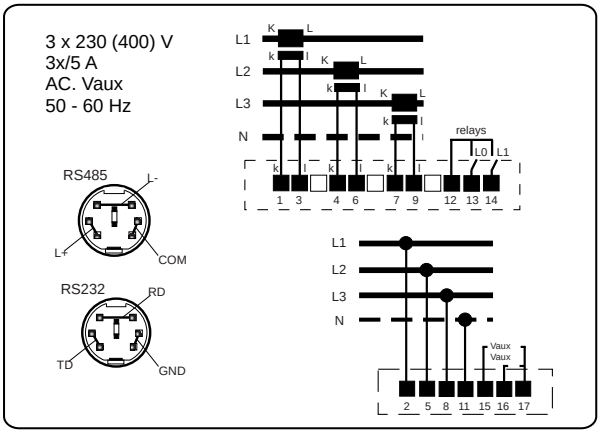
ACCESSORIES

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

OPTIONAL

Reading software (at no additional cost).
Management software, SACIgest.

CONNECTIONS



NETWORK ANALYZERS

NETWORK ANALYZER - MDA 144

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

- 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 EFFECTIVE VALUE (RMS)
- CURRENT INSULATED
- RS232 / RS485 SERIAL PORTS
- 2 CONTACTS OUTPUT

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
Voltage (Line-to-Neutral)	V	•	•	•	
Voltage (Line-to-Line)	V	•	•	•	
Neutral current	A				•
Current	A	•	•	•	
Active power (P)	kW	•	•	•	•
Reactive power (Q)	kVAr	•	•	•	•
Apparent power (S)	kVA	•	•	•	•
Power factor (cos ϕ)	PF	•	•	•	•
Maximum demand (Current)	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+)	kW-h				•
Generated active energy (EP-)	-kW-h				•
Consumed inductive reactive energy (EQC+)	kvarL-h				•
Consumed capacitive reactive energy (EQC-)	kvarC-h				•

MODEL

- **MDA144** Current insulated
  RS485 Serial port
  2 relays

SETTING

- Instrument identity code.
- Primary voltage.
- Primary current.
- Contacts operating mode.

CONTACTS OUTPUT

Type : Voltage free contacts (relés).
CONTACTS OUTPUT can be set as max or min alarm contacts associated to any measured parameter, or as active energy (EP+) and reactive energy (EQL) pulses. They also can be set as contacts operated from the central unit.

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 instant values or saved as maximums.

NETWORK ANALYZERS

SERIAL PORT

- Type: RS485
- Protocol MODBUS RTU
- Baud rate Programmable
  300 – 19200 bauds
  Standard 9600 bauds

Optional: Serial port on front (DIN mini connecter)

DISPLAY LED

- 3 LED displays (4 digits + sign).
- Height of digits: 14.5 mm.
- Built-in keypad (5 keys).
- 6 selectable parameters for each display.
- Up to 83 measuring parameters.

MAX.- and MIN.- VALUES

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

4 DIGITAL INPUTS (OPTIONAL)

The digital inputs can operate to:

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

DIGITAL INPUTS (OPTIONAL)

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

ANALOGUE OUTPUT (OPTIONAL)

Number of outputs :	1
Type:	4-20 mA
Operating range:	programable

TECHNICAL SPECIFICATIONS

INPUT

3-Fases 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 or 60 Hz

OPTIONAL

Reading software (at no additional cost).
Management software, SACIgest.

ACCURACY

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

CONTACTS OUTPUT

Number of outputs	2
Type	N.O. relay
	250 V, 3 A

SERIAL PORT (Opcional)

Type	RS485
Connection	2 or 4 wire
Baud rate	Programmable
Baud rate (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)

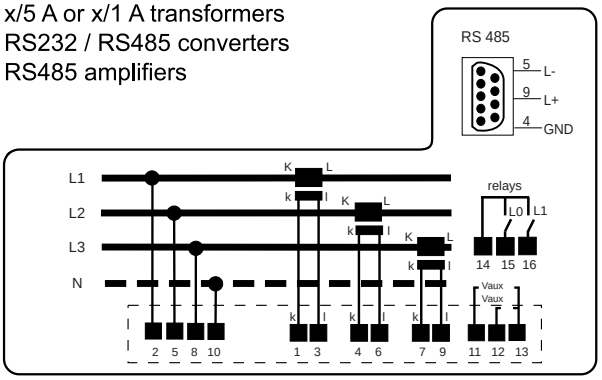
AUXILIARY VOLTAGE

- A.C. Vaux.	63,5/110 V or 230/400 V
Burden	3 VA
Operating range	70-120 % Un
- DC. V.aux	18/72 V
Burden	3 W
Universal Vaux:	85/264 V A.C.; 90/300 V D.C.
Burden	5 VA

GENERAL FEATURES

Case material	Metal+ABS, UL94 V0
Dimensions	DIN 144 x 144 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
WEIGHT	0,75 kg
Protection	IP54 (front)
	IP20 (terminals)
Electrical safety (EN 61010)	Class 2
	Category III

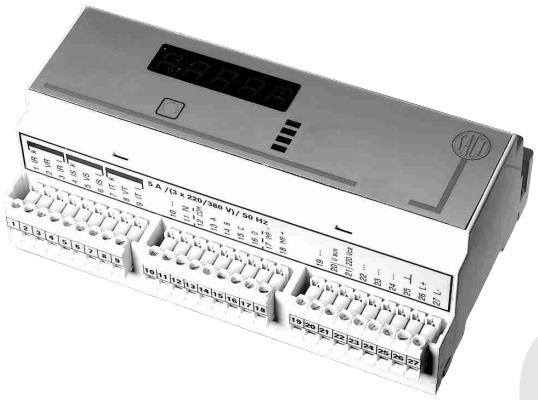
ACCESSORIES
x/5 A or x/1 A transformers
RS232 / RS485 converters
RS485 amplifiers



NETWORK ANALYZER - TCEM

Programmable instrument with microprocessor.

- DIN RAIL MOUNTING
- LED DISPLAY
- MEASUREMENT IN 4 QUADRANTS
- TRUE EFFECTIVE VALUE (RMS)
- CURRENT INSULATED
- RS232 / RS485 SERIAL PORTS
- 1 CONTACT OUTPUT



MEASURING ENVIRONMENT

ELECTRICAL PARAMETER	Symbol	L1	L2	L3	SYSTEM
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				•
Consumed inductive reactive energy (EQC+)	kvarL-h				•
Consumed capacitive reactive energy (EQC-)	kvarC-h				•

MODEL

- **TCEM** Single-phase
- **TCEM-I** Three-phase, 3 wire, balanced
- **TCEM-II** Three-phase, 3 wire, unbalanced
- **TCEM-3** Three-phase, 4 wire, unbalanced

SETTING

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

SERIAL SERIAL PORT

- Type: RS485
- Protocol MODBUS RTU
- Baud rate 9600 bauds

CONTACTS OUTPUT

Type: Voltage-free contact (optocoupler).
Contact output can be set as pulse for active energy (EP+).
It also can be set as contact operated from the central unit.

4 DIGITAL OUTPUTS

The digital inputs can operate to:

Signal the position of contacts or alarms.

- Indicate energy consumption for external processes and synchronisation pulse for the maximum demand function.
- Pulse totalizer for external instruments.

NETWORK ANALYZERS

DISPLAY LED

- LED display (4 digits + sign).
- Built-in keypad.
- 12 consecutively 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 or 60 Hz
Current insulated	

CONTACTS OUTPUT

Number of outputs	1
Type	N.O. Optocoupler 5-48 V D.C.
Pulse length	• 3d30 ms

SERIAL PORT

MODEL	RS485
Connection	2 or 4 wire
Baud rate (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)

ACCURACY

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

AUXILIARY VOLTAGE

A.C. Vaux.	110, 230, or 400 V
Burden	6 VA
Operating range	80-120 % Un

GENERAL FEATURES

Mounting	DIN rail
Case material	ABS, UL94 V0
Dimensions	(9 Modules) 155 x 90 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
WEIGHT	0,65 kg
Protection	IP40
Electrical safety (EN 61010)	Class 2 Category III

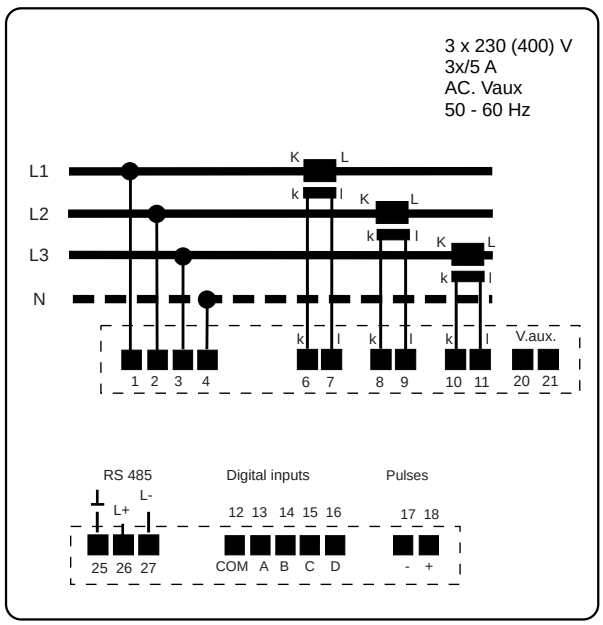
ACCESSORIES

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

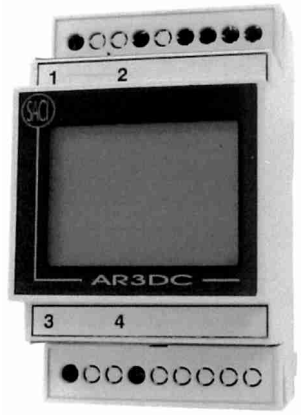
OPTIONAL

Management software, SACIgest.

CONNECTIONS



DC. NETWORK ANALYZER - AR3DC



Programmable instrument with microprocessor.

- DIN RAIL MOUNTING
- LCD DISPLAY
- V and I MEASUREMENT ALTERNATING EVERY 2 s
- HIGH IMMUNITY TO ELECTRICAL FIELDS
- RS232 SERIAL PORT WITH OPTICAL INSULATION

MODEL

- AR3DC

DISPLAY LCD

- Display LCD, 8 mm digit.

TECHNICAL SPECIFICATIONS

INPUT

Voltage nominal	12, 24 or 48 V D.C.
Rated current (In)	
Direct connection	10, 20 and 40 A
Connection to external shunt	50 - 1000 A
Burden	<1 W

SERIAL PORT

Digital output	Bidirectional
	By pulses
	Insulated by optocoupler

GENERAL FEATURES

Mounting	DIN rail
Case material	ABS, UL94 V0
Dimensions	(3 modules) 52 x 90 mm
Terminals	with screws
Max. wire diameter	16 mm^2

MCAR3 MODULE

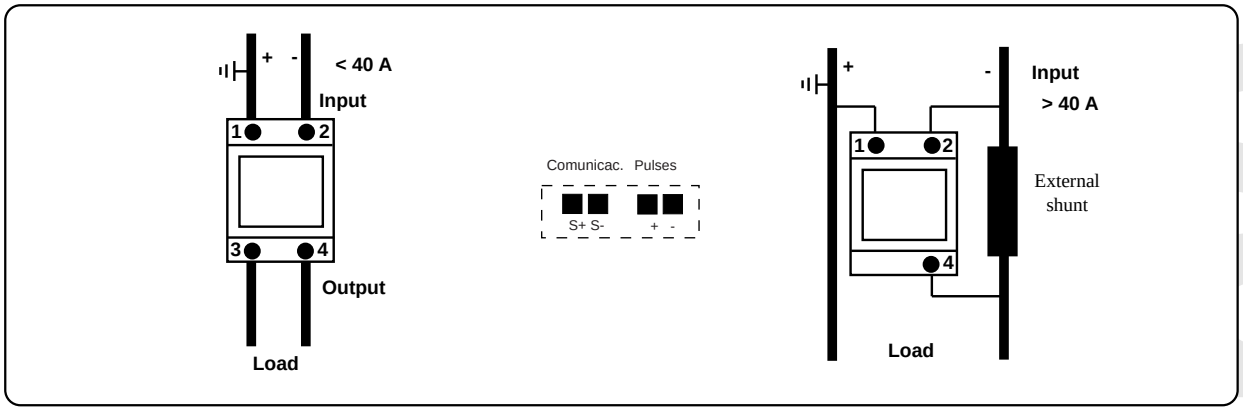
The MCAR3 module allows up to 32 AR3DC devices to be connected and the data transfer of each of them to the control computer.

The communication protocol between the module and the computer is MODBUS and as their own protocol between the module and Instrument.

The operating voltage for the MCAR3 module is the same as the AR3DC module.

The serial port is optically insulated to prevent earth loops forming.

CONNECTIONS



COMMUNICATIONS MODULE - MCAR3

Communication module with microprocessor.

- DIN RAIL MOUNTING
- LCD DISPLAY
  DATA RECEIVER FROM AN AR3DC SYSTEM
- DIRECT OR MODEM DATA TRANSMITTER TO COMPUTER
- CONTINUALLY INDICATES THE NUMBER OF INSTRUMENTS CONNECTED AND THE NUMBER OF THEM OPERATING CORRECTLY.
- TWO SERIAL PORTS
- ALLOWS LARGE DISTANCES BETWEEN MODULE AND INSTRUMENTS

The MCAR3 is a communication module for data transfer from an AR3DC system to a control computer. It has two serial communication lines, one dedicated to the instruments and the other for the computer connection.

AR3DC and module connection is made via an optically coupled bus with slow transmission speed. As it is a current link, the distance between the units is not critical and can be up to several hundreds of metres. The MCAR module is set as an active master and AR3DC devices as passive slaves. The maximum number of devices per line is 32 and each must have their own address.

The connection for the RS232 serial port to the control computer can be direct or via modem. The communication protocol is MODBUS. The MCAR module stores data from each AR3DC and sends them as a complete block. The module also has a fault recorder and gives information on which equipment is connected and the latest to transfer data.

MODEL

- MCAR3

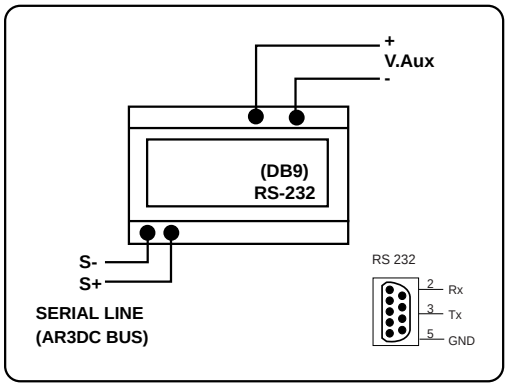
LCD DISPLAY

- LCD display, 8 mm digit.

TECHNICAL SPECIFICATIONS

INPUT	
DC. auxiliary voltage	12, 24 or 48 V
AR3DC Bus	Current loop Insulation by optocoupler Allows both short circuit and open loop
SERIAL PORT	
Serial port	RS232 Insulation by optocoupler DB9 Terminals TD, RD, RTS, and CTS signals required
Burden	<2 W
GENERAL FEATURES	
Mounting	DIN rail
Case material	ABS, UL94 V0
Dimensions	(6 Modules) 105 x 90 mm
Terminals	Pluggable
Max. wire diameter	2,5 mm^2

CONNECTIONS



DC. NETWORK ANALYZER - TMCC

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

- DIN 144 x 144 INSTRUMENT
- DIRECT CURRENT
- RS232 / RS485 SERIAL PORTS
- 2 CONTACTS OUTPUT
- 1 CONTACT OUTPUT

MEASURING ENVIRONMENT

ELECTRICAL PARAMETER D.C.	Symbol
Voltage	V
Current	A
Active power (P)	kW
Active energy (EP+)	Kwh+
Active energy (EP-)	kWh-
Ampere Time (+)	Ah+
Ampere Time (-)	Ah-
Current primaria nominal del Shunt	Ip

MODEL

- TMCC

SETTING

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

Setting the device can be by keypad or via the serial port

SERIAL PORT

- Type: RS485
- Protocol MODBUS RTU
- Baud rate Optional
  Standard 9600 bauds

CONTACTS OUTPUT

Type : Voltage free contacts (relays).
CONTACTS OUTPUT can be set as max or min alarm contacts associated to any measured parameter or as pulses for positive energy (kWh+) and negative energy (kWh-). They also can be set as contacts operated from the central unit.

LED DISPLAY

- LED display (3 digits + sign).
- Height of digits: 14.5 mm.
- Built-in keypad (5 keys).
  Up to 8 measuring parameters.

TECHNICAL SPECIFICATIONS

INPUT

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

NETWORK ANALYZERS

ACCURACY

Parameter	Operating range	Accuracy
Voltage	20-120%	0,5%(read.+ full scale)
Current	1-120%	0,5%(read.+ full scale)
Active power (P)	1-120%	0,5%(read.+ full scale)
Active energy (EP+)	1-120%	0,5%(read.+ full scale)
Active energy (EP-)	1-120%	0,5%(read.+ full scale)
Amperio Hora (+)	1-120%	0,5%(read.+ full scale)
Amperio Hora (-)	1-120%	0,5%(read.+ full scale)

SERIAL PORT (OPTIONAL)

MODEL	RS485
Connection	2 or 4 wire
Baud rate	Optional
Baud rate (standard)	9600 bauds
Max. No. of instruments per line	32

CONTACTS OUTPUT

Number of outputs	2
Type	N.O. relay 250 V, 3 A

AUXILIARY VOLTAGE

- A.C. Vaux.	110, 230 or 400 V
Burden	2,8 VA
Operating range	85-110 % Un
Frequency	50 or 60 Hz

GENERAL FEATURES

Case material	Metal+ABS, UL94 V0
Dimensions	DIN 144 x 144 mm
Depth	88 mm.
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
Weight	0,72 kg
Operating temperature	0-40º C
Protection	IP54 (front) IP20 (terminals)
Electrical safety (EN 61010)	Class 2 Category III

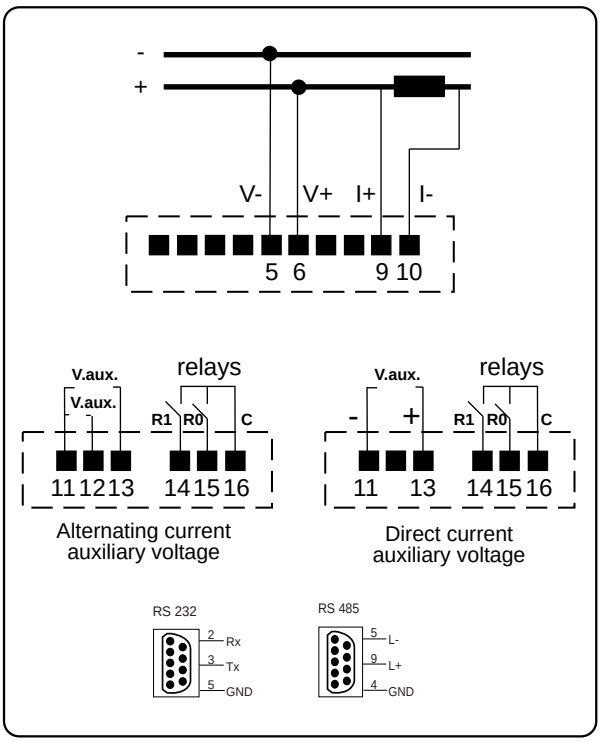
ACCESSORIES

Shunts x/60 mV
Converters RS232 / RS485
RS485 amplifiers

OPTIONAL

Reading software (at no additional cost).
Management software, SACIgest.

CONNECTIONS



RS232 / RS485 CONVERTERS - IFR

- DIN RAIL MOUNTING
- CONNECTIONS: 2 or 4 WIRE
- OPTICAL INSULATION BETWEEN RS232 and RS485 SERIAL PORTS
- UP TO 4 RS485 SERIAL PORTS

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.

Activating the RS485 drivers can be with RTS, 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.

MODEL

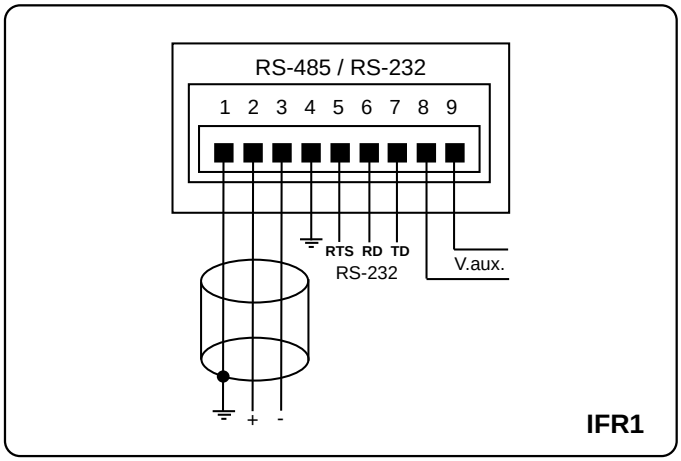
- IFR1	2 wire 1 Output serie RS232 1 RS485 Serial port
- IFRA3	
- IFRA	2 or 4 wire Optically insulated 1 Output serie RS232 1 RS485 Serial port
- IFR4	2 o 4 wire Optically insulated 1 Output serie RS232 4 RS485 Serial port

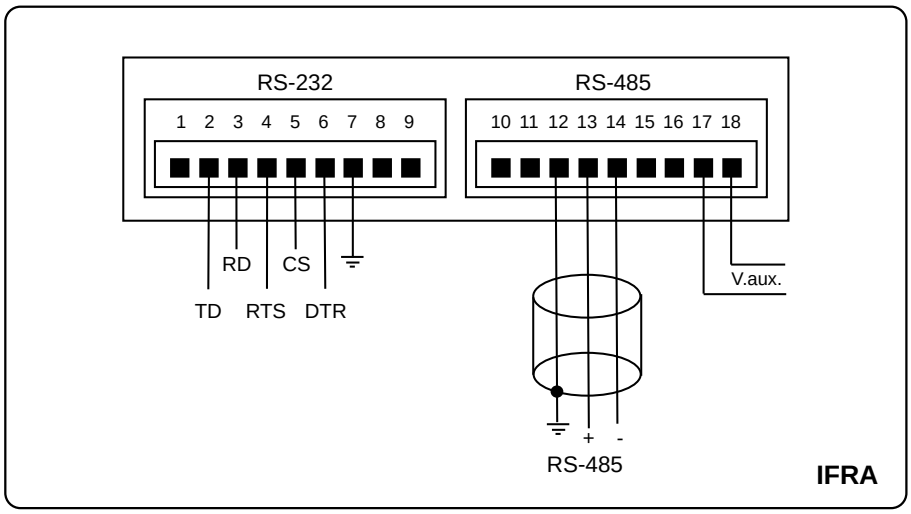
TECHNICAL SPECIFICATIONS

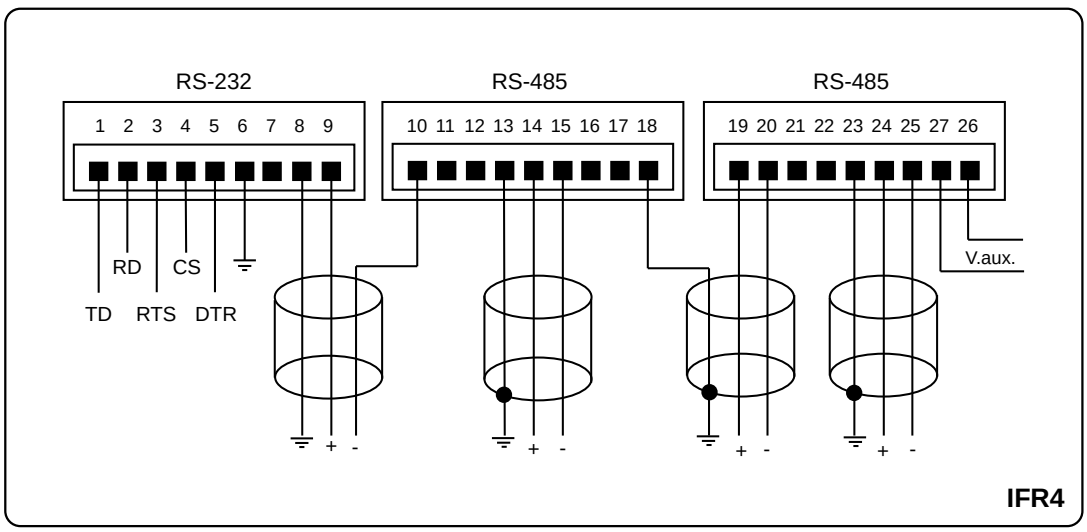
INPUT	
Number of outputs	1
Type	RS232 (RD, TD, RTS, CTS)
OUTPUT	
Number of outputs	
IFR1, IFRA	1
IFR4	4
Type	RS485
Baud rate	300-76800 bauds

AUXILIARY VOLTAGE	
- A.C. Vaux.	110 or 220 V
Burden	
IFR1	3 VA
IFRA, IFR4	6 VA
- Vaux D.C. (IFRA only)	24, 48 or 110 V DC.
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 diameter	2,5 mm^2
Weight	
IFR1-IFRA3	0,30 kg
IFRA	0,45 kg
IFR4	0,65 kg
Mounting	DIN rail

CONNECTIONS







NETWORK QUALITY ANALYZER - TMCQ

Instrument with programmable microprocessor, with four line LCD display and built-in keypad.

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

The TMCQ network quality analyzer detects and records power supply voltage faults in a system as overvoltages or undervoltages, dips and microcuts, which have exceeded the preset limits.

MODEL

- **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 and once finished, data is saved in a memory powered by a rechargeable battery.

Events contain 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 (RS232 optional)
- 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.

NETWORK ANALYZERS

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 text dBase file format.

TECHNICAL SPECIFICATIONS

INPUT

Rated voltage (Un)	100,110, 230 or 400 V A.C.
Burden	1 mA 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 < 3VA

Frequency 50 or 60 Hz

GENERAL FEATURES

Case material	Metal+ABS, UL94 V0
Dimensions	DIN 144 x 144 mm
Depth	88 mm.
Terminals	Pluggable
Max. wire diameter	2,5 mm^2
Weight	0,72 kg
Operating temperature	0-40º C
Protection	IP54 (front) IP20 (terminals)
Electrical safety (EN 61010)	Class 2 Category III

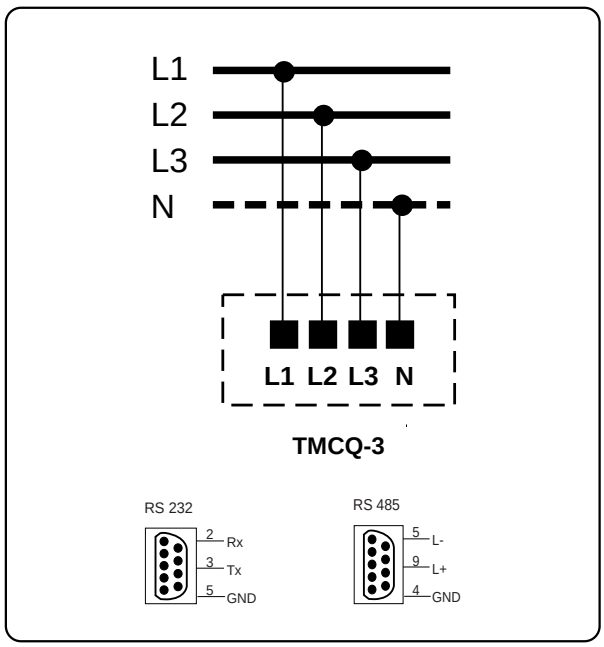
ACCESSORIES

RS232 / RS485 converters
RS485 amplifiers

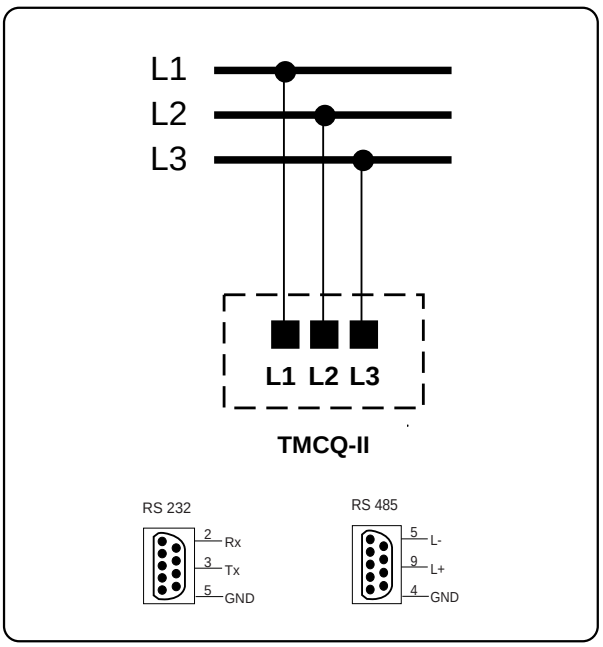
OPTIONAL

Management software, SACIgest.

CONNECTIONS



CONNECTIONS



MANAGEMENT SOFTWARE - SACIGEST

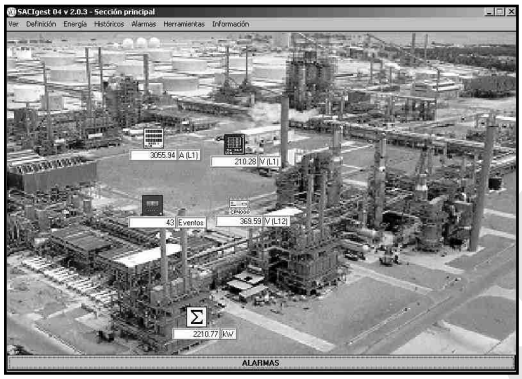
The SACIgest program is a system allowing the SACI terminals installed on the net to be easily managed as graphs. The electrical installation is grouped by sections, each of which is displayed differently, in the way they are inserted in their corresponding terminals.

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, LCAM, LDA, LDA-M, LAB
TCEM, MFR
CP2000, CP3000, CP4000
TMCQ
TCID, TCI, TCIV (*)
TMC-C
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.

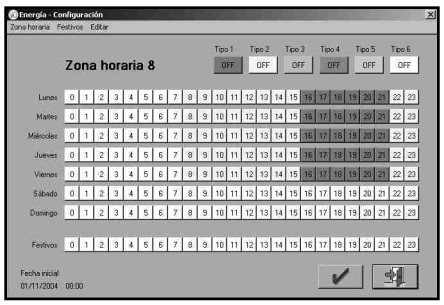
All definition and setting operations can be password protected.

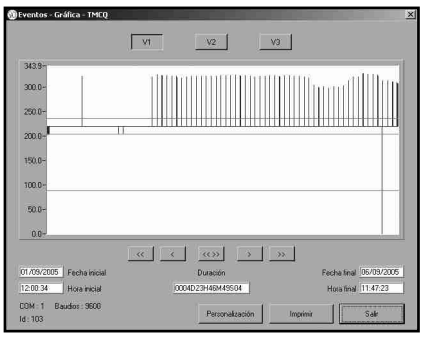
The software is capable of handling up to 4 communication ports (COM1 - COM4), as well as using a modem to communicate with the different terminals installed on the network. The communication speed with the terminals can also be configured (where possible).
The Client - Server operating mode via an Ethernet network can be selected.

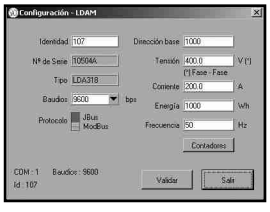
Minimum requirements:

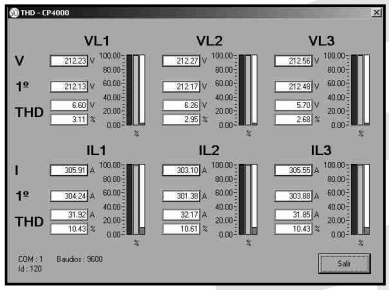
CPU:	Microprocessor: Pentium III
RAM:	128 Mb
Video card:	SVGA
Monitor:	Colour, 15" 800 x 600
Software:	MS Windows 98, ME, NT4, 2000 or XP, with Internet Explorer 4.01 or above.

It must also have a serial port for the RS-232 - RS485 converter connection (IFRxx Model) and a serial port for the mouse. It must also have a parallel port for connecting the anti-copying device and a printer.









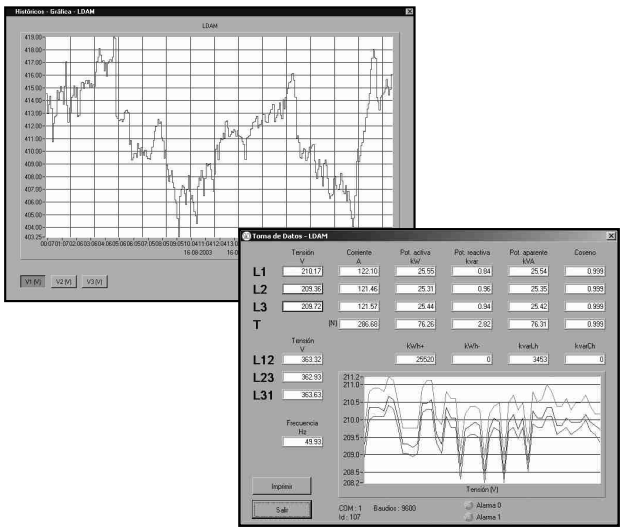
NETWORK ANALYZERS

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.

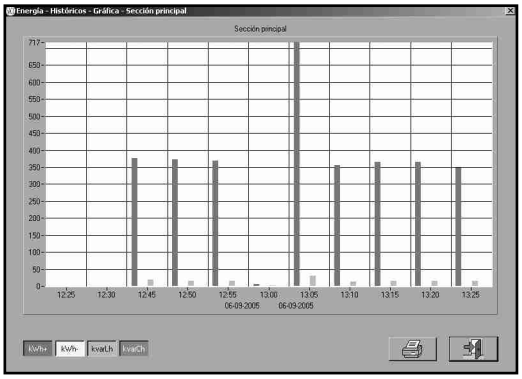
- SACIgest 04: Alarm option is added to 03. Different alarms on the system can be defined for each terminal allowing actions to be taken on the digital outputs of the terminal or on any other terminal. Pending alarm recordings and already registered alarms are shown. A button on the main screen will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

Sub-versions

Within each SACIgest version there are different sub-versions 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.

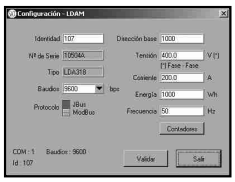
All versions, except for the DEMO and Client versions require hardware protection to operate. Each version has its specific protection and it cannot operate without its protection.

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

MANAGEMENT SOFTWARE

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.

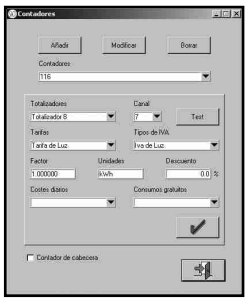


With this version, the two digital outputs of the instrument, maximums and minimums, harmonics and maximum required values (LDA) can be managed. It takes data for 30 electrical parameters and displays the variables as a graph.

This software version operates on a 32 bit platform, i.e. for Windows 9x, ME, NT4.0, 2000 and XP.

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.

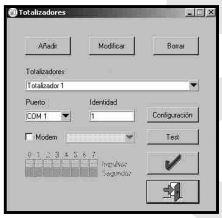
SOFTWARE - REMREADER

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 Windows 9x, ME, NT4.0, 2000 and XP.



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.