Portable power analyzers

CIRCUTOR offers a wide range of portable analyzers designed to measure, display and/or record the most important parameters of an electrical network. With the analysis of the electrical parameters, the user can find out the power consumption of the installation or detect problems within it

M.8

Definition

Portable power analyzers are units designed for easy transportation, and temporary and simple installation; they are also capable of measuring electrical parameters whether or not the data is recorded in the memory.

The majority of **CIRCUTOR** power analyzers have internal memory available where measured and calculated parameters are recorded. Because they are units that must perform measurements in a number of installations with very different features, they have setup menus for the most common installations (single-phase, two-phase, 3-wire or 4-wire three-phase).

The current measurement is performed by clamps for easy installation, as there is a wide variety of models and ways of measuring them.

Advantages

There are many diverse advantages of a portable analyzer for the user. The most important is information.

With a portable analyzer, information can be obtained from our installation simply by installing it (if you have screen) or with a single entry (analyzing data using PLUS PowerVision; for more information see M9).

With the information from a single entry, we can find out:

- Habits of use to ensure that the contracted tariffs are the most suitable.
- Response of an installation's load to see how it affects the rest of the installation, startup, shutdown or normal operation of the various charges.
- Angles of each of the loads for the analysis of reactive power, therefore avoiding penalties.
- Analysis of defects in the supply or quality events (if the analyzer permits) to determine the causes of unwanted tripping of protection, restarting electronic equipment, or PLCs
- Measuring leakage currents that trigger unwanted tripping of the differential current protection relays.
- Measurement of the harmonics of the installation that cause conductor warming, high neutral currents, and resonances with reactive compensation equipment.
- Getting to know the demand for our installation to determine if the power

- that the user has contracted is suitable.
- Determine the consumption of each of the charges and detect deviations from lack of maintenance or deterioration of components (bearings, etc.)
- Locate the installation points where connections and deviations appear for uncontrolled loads (rigging)

To sum up, the use of portable analyzers allows us to:

- Save on electrical energy costs
- Control the installation
- Prevent shut-downs of the installation
- Schedule stops for maintenance of the installation

CIR-e3 and CIR-eQ

The **CIR-e** family are the lower-range **CIRCUTOR** analyzers, but offer as many benefits. They make up a family of counters which allow the technician to obtain the electrical parameters necessary to perform energy audits and power quality. They don't have a display screen. The measured parameters are recorded in 2 quadrants. They are accompanied by an executable configuration program and the records are stored on an SD card.

The records generated by these portable analyzers can be analyzed using the web tool found at http://cir-e3.circutor.com and/or with the Power Vision or Power Vision Plus software.

AR5L

The **AR5L** portable analyzer increases the benefits of the CIR-e family as it has a display screen and records the measured parameters in 2 or 4 quadrants. It has an internal memory that stores the electrical parameters for subsequent downloading onto a computer via the communications cable.

It allows for the selection of variables to be recorded, as well as the recording period and the starting conditions for recording the measured parameters.

It has several operating programs running in order to perform harmonic studies, quality reports, flicker measurements, checking leakage currents and earth leakage relays, among others.

The unit's recorded data is compatible with the programs **Power Vision** and **Power Vision Plus**.

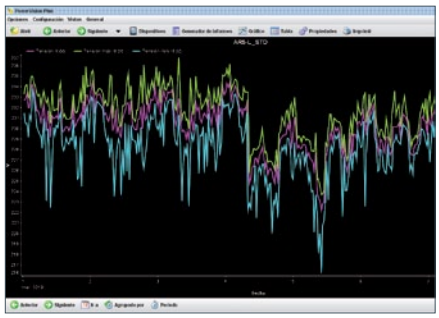
AR6

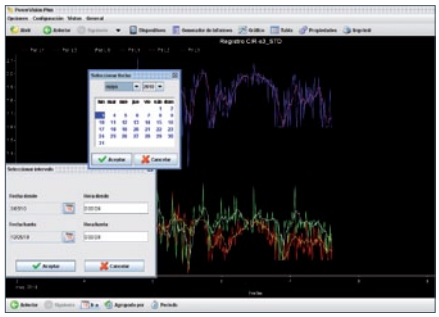
This analyzer is the most complete of the latest generation of portable analyzers. It has a colour graphic display screen with high resolution that allows you to see graphics in detail.
The **AR6** analyzer has 5 inputs for measuring voltage and 5 inputs for measuring currents for each phase and neutral. The other input allows for measurement of the leakage current simultaneously.

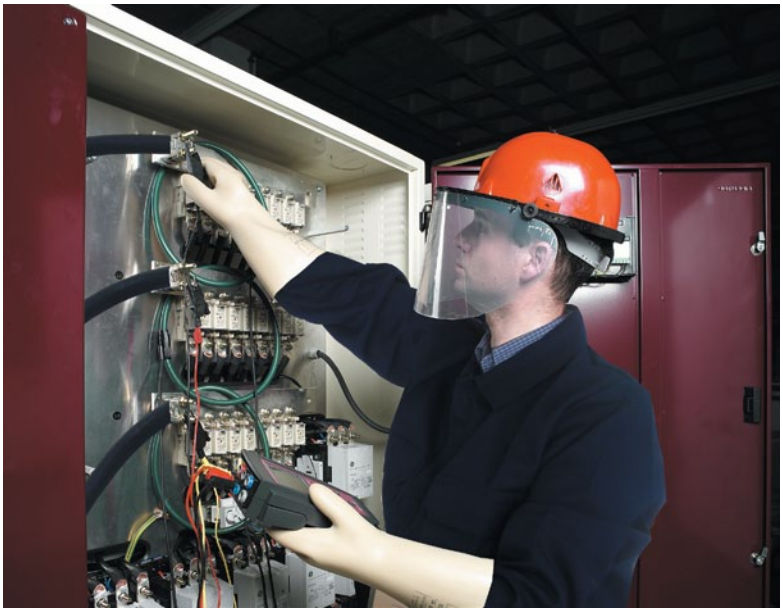
The power analyzer allows the user to measure and record power quality parameters (overvoltage, cuts and gaps) that are configured in a particular menu, in addition to recording wave shapes, flicker, energy and all measured parameters therein.

It has quadrant display per phase that lets you know how it is working in each measured line, detects imbalances, and sees lags between voltages and currents. All of this with its powerful graphics processor, along with its high resolution screen, makes this analyzer a very visual tool.

The **AR6** analyzer simultaneously records all network parameters and includes powerful analysis tools, combined with **PowerVision PLUS**, making it the perfect interface between installations in need of optimisation and their energy audits.







AR5-L

Portable single and three-phase power analyzer

Description

- Measures all of the main electrical parameters of an electricity network
- Measurement in true root mean square
- Built-in energy meter
- With 4 voltage channels and 4 current channels (**AR5-L**)
- Configurable auto-trigger, depending on the parameters required
- Languages: Spanish and English
- Large backlit LCD display
- CAT III 600 V (**EN 61010**). **UL** Certificate
- Display of up to 30 electrical parameters on the screen
- Small size and reduced weight, only 800 g
- Independent files for each measurement
- Including the powerful analysis software: **POWER VISION PLUS**
- Configurable with menus
- Optional operation with no external power supply, with an autonomy of up to 8 hours
- RS-232 Communications with PC
- Clamp auto-detection
- Auto-selection of parameters stored
- Calculation of the time remaining until the memory is full
- Linear or rotating memory (depending on the configuration)

Features

	AR5-L	
Power supply circuit		
Through an external power supply unit	100...240 V ac / 12 V dc	
Frequency	50...60 Hz	
Consumption	15 V·A	
Operating temperature	0...+40 ºC	
Altitude	≤ 2 000 m	
Humidity of operation	80 % for temperatures under 31 ºC, with a linear decrease down to 50 % at 40 ºC	
Measurement circuit	Three-phase (3 wires)	Three-phase (3 / 4 wires)
Contamination level	2	
Voltage circuit		
Measurement range	In accordance with the clamp, 0.01 A...20 kA	
Voltage and current transformation ratios	Programmable	
Measurement units	Automatic change of scale	
Internal memory	1 Mb	
Accuracy class (*)		
Voltage	0.5 % ± 2 digits	
Current	0.5 % ± 2 digits	
Active power	1 % ± 2 digits	
Power factor	1 % ± 2 digits	
Build features		
Housing	Reinforced insulation	
Keyboard / Display	On the front panel	
Display	LCD 160 x 160 pixels (backlit)	
Current clamp connector	3	3 / 4
Dimensions	220 x 60 x 130 mm	
Weight	800 g	
RS-232 Outputs	Series output	

AR5-L

Portable single and three-phase power analyzer

Application

- Complete study of the installation where the analyzer is capable of gathering different types of records: harmonics, disturbances, meter verification, transients, flicker, etc.

Features

	AR5-L
Safety	Category III - 600 V, in accordance with 61010
Standards	
EN 61000-3-2 (1995), Harmonics	
EN 61000-3-3 (1995), Voltage fluctuations	
EN 61000-6-4 (2002), Industrial emissions **EN 55011 (1994), Driven (EN 52022 – Class B)** **EN 55011 (1994), Radiated (EN 55022 – Class A)**	
EN 61000-6-2 (2022), Industrial immunity **EN 61000-4-2 (1995), Electrostatic discharge** **ENV 50140 (1993), Radiated electromagnetic field** **EN 61000-4-8 (1995), Rapid transient bursts** **ENV 50141 (1993), RF in common mode** **EN 61000-4-8 (1995), Magnetic field at 50 Hz**	
EN 61000-6-1 (2002), Domestic immunity **EN 61000-4-5 (1995), Shockwave** **EN 61000-4-11 (1994), Power supply interruptions**	
(*) Accuracy is given by the following measurement conditions: Exclusion of errors produced by the clamps and external voltage transformers, with a range of temperature of 5 ... 45 ºC and power factor of 0 ... 1	

References

Analyzer	Clamps	Program	Transport	Type	Code
			Units		
AR5-L	-	Energy / Harmonics	Carrying Bag	**AR5-L- Power analyzer with 4 current inputs**	**M80111**
			AR5-L Kits		
AR5-L	3 x CPR-1000 1 x CPR-500	Energy / Harmonics	Carrying Bag	**3 L AR5-L**	**M80811**
AR5-L	3 x CPR-2000/200 1 x CPR-1000	Energy / Harmonics	Carrying Bag	**4 L AR5-L**	**M80821**
AR5-L	3 x CPR-2000/200 1 x CPR-10003 x CP-5	Energy / Harmonics and Disturbances	Carrying Bag	**5 L AR5-L**	**M80832**
AR5-L	3 x C-FLEX–45 cm 1 x CF-5	Energy / Harmonics and Disturbances	Carrying Bag	**11 L AR5-L-RBT**	**M80843**
AR5-L	3 x C-FLEX-80 cm 1 x CF-5	Energy / Harmonics and Disturbances	Carrying Bag	**12 L AR5-L-RBT**	**M80853**
AR5-L	3 x C-FLEX-45 cm 1 x CF-5	Energy / Harmonics and Disturbances	Case	**11 LM AR5-L-RBT**	**M80643**
AR5-L	3 x C-FLEX-80 cm 1 x CF-5	Energy / Harmonics and Disturbances	Case	**12 LM AR5-L-RBT**	**M80653**
The two analyzers include: 3 voltage cables + power supply					
All kits include: 3 voltage cables + power supply + PowerVision software + energy / harmonics program + 3 clamps					

Accessories
See page M.8-40

AR5-L

Portable single and three-phase power analyzer

Parameters measured

Three-phase system, 4 wires

Parameter	Symbol (unit)	L1	L2	L3	Three-phase value
phase-neutral voltage	V	Yes	Yes	Yes	-
Current	A	Yes	Yes	Yes	Yes
Neutral current (only AR5-L)	I_N	Yes			
Frequency	Hz	Yes	-	-	-
Active power	kW	Yes	Yes	Yes	Yes
Power factor L	kvarL	Yes	Yes	Yes	Yes
Power factor C	kvarC	Yes	Yes	Yes	Yes
Apparent power	kVA	-	-	-	Yes
Power factor	PF	Yes	Yes	Yes	Yes
Active energy	kW·h	Yes	Yes	Yes	Yes
Power factor L	kvar·h L	Yes	Yes	Yes	Yes
Power factor C	kvar·h C	Yes	Yes	Yes	Yes
Voltage harmonics		Yes	Yes	Yes	-
Current harmonics		Yes	Yes	Yes	-
Current harmonics on neutral		Yes			

Three-phase system, 3 wires

Parameter	Symbol (unit)	L1-L2	L2-L3	L3-L1	Three-phase value
phase-phase voltage	V	Yes	Yes	Yes	-
Current	A	Yes	Yes	Yes	Yes
Frequency	Hz	Yes	-	-	-
Active power	kW	Yes	Yes	Yes	Yes
Power factor L	kvarL	Yes	Yes	Yes	Yes
Power factor C	kvarC	Yes	Yes	Yes	Yes
Apparent power	kVA	-	-	-	Yes
Power factor	PF	Yes	Yes	Yes	Yes
Active energy	kW·h	-	-	-	Yes
Power factor L	kvar·h L	-	-	-	Yes
Power factor C	kvar·h C	-	-	-	Yes
Voltage harmonics		Yes	Yes	Yes	-
Current harmonics		Yes	Yes	Yes	-

Two-phase System

Parameter	Symbol (unit)	L1-N	L2-N	Two-phase value L1-L2
phase-phase voltage	V	Yes	Yes	Yes
Current	A	Yes	Yes	Yes
Neutral current (only AR5-L)	I_N	-		
Frequency	Hz	Yes	-	-
Active power	kW	Yes	Yes	Yes
Power factor L	kvarL	Yes	Yes	Yes
Power factor C	kvarC	Yes	Yes	Yes
Apparent power	kVA	-	-	Yes
Power factor	PF	Yes	Yes	Yes
Active energy	kW·h	-	-	Yes
Power factor L	kvar·h L	-	-	Yes
Power factor C	kvar·h C	-	-	Yes
Voltage harmonics		Yes	Yes	-
Current harmonics		Yes	Yes	-
Current harmonics on neutral		Yes		

Single-phase system

Parameter	Symbol (unit)	L1-N
phase-phase voltage	V	Yes
Current	A	Yes
Frequency	Hz	Yes
Active power	kW	Yes
Power factor L	kvarL	Yes
Power factor C	kvarL / (-C)	Yes
Apparent power	kVA	Yes
Power factor	PF	Yes
Active energy	kW·h	Yes
Power factor L	kvar·h L	Yes
Power factor C	kvar·h C	Yes
Voltage harmonics		Yes
Current harmonics		Yes

Programs

AR5-L

Portable single and three-phase power analyzer

Programs

Description	Equipment	Type	Code
Updating harmonics	AR5-L	**Updating ARI**	**M80221**
Flicker (PST and PLT assessment)	AR5-L	**FL Program**	**M80223**
Detection of network disturbances	AR5-L	**PERTURB Program**	**M80224**
CHECK METER, meter verification system	AR5-L	**CM Program**	**M80225**
Optic fibre sensor, shunts and CHECK METER program included	AR5-L	**Optical check meter kit**	**M806B3**
FAST CHECK, motor start-up	AR5-L	**Fast Program**	**M80226**
LEAK METER, detection and analysis of leakages	AR5-L	**Leak Program**	**M80229**
FILE VISION, display of files in AR5-L	AR5-L	**Fil Vision Program**	**M8022A**

Memory capacity example: In the Energy program, if you record 30 network parameters, with a registration period of 15 minutes, you obtain an autonomy of 80 days of memory.

Harmonics

The harmonics program can be used for the following:

- Analysis of all electrical parameters: voltage, current, power, energy, etc.
- Analysis of overheating in transformers, capacitors, etc.
- Detection of neutral current
- Wave shapes shown on the display in real time
- Zoom on a wave shape
- Harmonic decomposition display (30 or 50 harmonics)
- Calculation of the THD % in voltage and current

Applications:

- Calculation of the diameter of cable required to support losses produced by harmonics
- Study of harmonic filtering applications
- Comparison of measurements taken, in accordance with the IEC standard
- Energy and billing study
- Study of installation consumption
- Analysis of the power factor compensation

Graphical representation of:

- Wave shapes and harmonic distortion
- Total harmonic distortion THD %
- Harmonic decomposition (up to order 50)
- True root mean square values for voltage and current
- It can be used to prepare tables and lists
- The direction of harmonics can be seen with software

Type	Code
Updating ARI	**M80221**