



SUPPLY NETWORK ANALYZER

AR5

(Code 7 71 301)

(Harmonic Program - 50)

(Code 7 71 321)

INSTRUCTION MANUAL

(M 981 502 / 99 B)

(c) CIRCUTOR S.A.

CONTENTS	page
1.- DESCRIPTION.....	3
2.- Checking the contents of your package	3
3.- ANALYZER STARTUP	4
3.1.- Loading a new program.....	4
3.2.- Choice of the operation mode program	5
3.3.- Energy saving.....	5
4.- DATA VISUALIZATION ON DISPLAY	6
4.1.- Base screen	6
4.1.1.- Screen of instantaneous values	6
4.1.2.- Screen of maximum and minimum values.....	7
4.2.- Other visualization screens.....	8
4.2.1.- Visualization of 3 parameters in a big size mode	8
4.2.2.- Bar graphs.....	9
4.2.3.- Oscilloscope.....	10
4.2.3.1.- Three phase: Voltage - Current.....	10
4.2.3.2.- Zoom.....	11
4.2.3.3.- Harmonic factorization.....	12
4.2.4.- Setup visualization.....	13
4.3.- Warning messages.....	13
5.- PROGRAMMING THE AR5	14
5.1.- SETUP menu	15
5.1.1.- Measure	16
5.1.1.1.- CIRCUIT: Circuit type	16
5.1.1.2.- TR.REL : Transformer ratios.....	16
5.1.2.- RECORD menu	17
5.1.2.1.- PERIOD: recording period	17
5.1.2.2.- TRIGGER: Trigger conditions	17
5.1.2.3.- NAME: recording file name	20
5.1.2.4.- TYPE: recording file type.....	20
5.1.2.5.- PARAM: Choosing the parameters to be saved	22
5.1.3.- COMM: Communication parameters	23
5.1.4.- CLOCK: Internal clock.....	23
5.1.5.- RECALL: Read configuration.....	23
5.2.- DISPLAY menu	24
5.2.1.- OPTIONS: Screen options.....	24
5.2.2.- CONTRAST: Screen contrast.....	25
5.3.- RUN: data recording process status.....	25
5.4.- FILES Menu	25
5.4.1.- DIR: Directory	26
5.4.2.- DELETE: Deleting a file	26
5.4.3.- FORMAT: Formatting the AR5 internal memory	26
5.5.- CLEAR menu: Deleting data.....	27
6.- TECHNICAL SPECIFICATIONS	27
7.- SAFETY WARNINGS	28
8.- TECHNICAL SERVICE	28
A.- QUICK GUIDE (AR5 - HARMONICS).....	29

1.- DESCRIPTION

This manual is aimed to familiarize de user with the operation of the “Harmonic analyzer” program for the portable analyzer model AR5.

To get all necessary information about operation instructions and safety warnings of the portable analyzer AR5 consult its instruction manual (code M981501).

The AR5 analyzer loaded with the “Harmonic analyzer” program permits to save waves forms to be further managed with the PC software. This software is also required to download data form the AR5 to a PC.

Visualization actions in the analyzer are independent from the recording actions, that is, for instance, the harmonic content of a signal can be visualized while energy values are being recording.

According to the user’s choice, the analyzer stores in memory files with following extensions: ***.A5I “Harmonics” (Harm. 30 or Harm. 50)**, *.A5M “Standard” or *.A5T “Especial”.

Data recording action is performed at the end of the programmed recording period. Wave forms capture is done also at this moment.

It is possible to see harmonic factorization through a PC from an AR5 captured signal. Depending on the harmonic file type chosen (“Harm. 30” or “Harm. 50”) the factorization will be until harmonic 30 or 50.

Recording data process is done by means of an liner memory. That means that once memory is full, no new data is recorded anymore.

2.- Checking the contents of your package

After receiving the analyzer, please check the following points:

- a) The delivered material corresponds with your order specifications.
- b) After unpacking, check that the instrument has not been damaged in transit.
- c) The standard set includes the following items:
 - 1 cartridge for programming the AR5 containing the ordered operation mode program.
 - 1 Instruction Manual.
 - 3,5” diskettes containing the PC program update.

3.- ANALYZER STARTUP

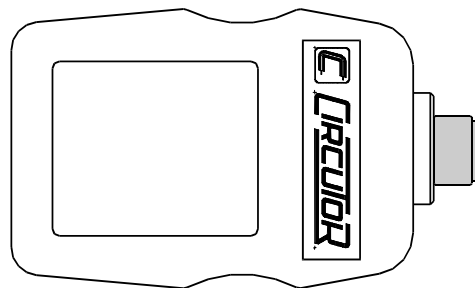
3.1.- Loading a new program

The AR5 has an internal memory to save diverse operation mode programs to be used by the user.

Before initiating this procedure, check that the AR5 battery is charged. Loading program action cannot be done whether the power supplier set is connected to the AR5, since the cartridge is to be connected to the input also used to connect the power supplier set.

To load any program, follow these instructions precisely:

- Turn the meter off.
- Connect the cartridge to the *AUX* input of the meter.
- Turn the meter on.
- Select with the keys [**▲**] & [**▼**] that you want to perform a program loading action (LOAD PROGRAM). Press [**ENTER**] or wait for a while to confirm this operation.
- Select the position to save the program into.
- The AR5 will perform a test to check that the cartridge has been properly connected.
- If an inserted cartridge is detected, then the program will be loaded.
- Once the loading is completed, reset the meter.
- If no cartridge was found or a loading mistake occurred, reset the meter and redo the above steps.



**A cartridge will be only valid for the analyzer which the program was for the first time loaded into.
Note on the cartridge the serial number of its related AR5.**

3.2.- Choice of the operation mode program

The AR5 can hold in memory different operation mode programs. The choice of the program to be used is done when starting the meter up.

- Turn the AR5 on.
- A list of available programs will be shown on display.
- Use keys [▲] & [▼] for the choice of the desired program.
- Press [ENTER] or wait for a while to confirm this operation.

CHECK THE SETUP UP !!!!

All programs have an independent setup, therefore, the setup must be always check to ensure a proper operation.

For instance, whether the setup is modified at the “ANALYZER” program, these modification will not be valid for the “HARMONIC” program, and so for any program.

3.3.- Energy saving

The AR5 analyzer is equipped with a saving energy system in order to enlarge its operation autonomy. That way, if no key is pressed for at least 5 minutes, the display is automatically off. The analyzer continues the recording data process but nothing appears on display.

The display will be automatically on when any key¹ is pressed.

¹ Keys that light the display on are: [◀],[▶],[▲],[▼],[SET],[ENTER] & [ESC].
The key [ON] has no effect
The key [OFF] turns the meter off without lighting the display

4.- DATA VISUALIZATION ON DISPLAY

All measured instantaneous values, as well as maximum and minimum, can be read on a 160 x 160 pixel, liquid, crystal display.

An indication of the type of data being displayed is shown at the upper right corner.

Data visualization screens of AR5 analyzer working with the harmonic program are the same ones that ones described in the AR5 manual.

4.1.- Base screen

4.1.1.- Screen of instantaneous values

When powering the AR5 on, the display will show:

AR5 HARMONICS				
INST	L1	L2	L3	III
Vp-n	220	221	223	221
A				
kW				
kvarL				
kvar				
C				
P.F.				
Hz				
kVA				
kWh			0.000	
kvarhL			0.000	
kvarhC			0.000	
25 / 10 / 97 17 : 31 : 29				

Instantaneous value screen

Voltage : Readout of the instantaneous RMS value measured at each phase (L1, L2 & L3) and the average value of the instantaneous values of the three phases (III).

Current : Readout of the instantaneous RMS value measured at each phase (L1, L2 & L3) and the average value of the instantaneous values of the three phases (III).

Active power: The active power is calculated from instantaneous voltage and current data. The readout gives the instantaneous values of the active power of each phase and also the three phase total instantaneous active power, which is the addition of each phase value.

Inductive reactive power: The inductive reactive power is calculated from instantaneous voltage and current data. The readout gives the instantaneous values of the inductive reactive power of each phase and also the three phase total instantaneous inductive reactive power, which is the addition of each phase value.

Capacitive reactive power: The capacitive reactive power is calculated from instantaneous voltage and current data. The readout gives the instantaneous values of the capacitive reactive power of each phase and also the three phase total instantaneous capacitive reactive power, which is the addition of each phase value.

Power factor : Readout of the power factor of each phase and the three phase average value.

Frequency : Readout of the instantaneous value of the frequency (Hz).

Apparent power : Readout of the three phase total instantaneous apparent, which is the addition of each phase value.

Energies: Readout of active, inductive reactive, and capacitive energy counters from the moment that the energy counters were reset to zero (see section 5.5.-)

Time and Date. (time/date): Readout of present time and date. For any modification, see section 5.1.4.- *CLOCK: Internal clock.*

4.1.2.- Screen of maximum and minimum values

AR5 HARMONICS				
MAX	L1	L2	L3	III
Vp-n	220	221	223	221
A				
kW				
kvarL				
kvarC				
P.F.				
Hz				
kVA				
kWh		-0.000		
kvarhL		-0.000		
kvarhC		-0.000		
25 / 10 / 97 17 : 31 : 29				

Screen of maximum values

An indication of the type of data being displayed is shown at the upper right corner: INST (Instantaneous), MAX (Maximum) or MIN (Minimum).

Maximum and minimum values displayed correspond to the maximum and minimum values obtained from the instantaneous values.

The negative energy counters are then displayed in place of positive energies.

4.2.- Other visualization screens

Through the key **[ESC]** other additional screens can be displayed.

4.2.1.- Visualization of 3 parameters in a big size mode

Three instantaneous parameters of your choice can be bigger-size displayed for a clearer reading.

INST	AR5 HARMONICS
Vp-n	220
L1	
Vp-n	221
L2	
Vp-n	224
L3	
25 / 06 / 95 17 : 31 : 29	

NOTE : The 3 parameters to be displayed can be selected as follows:

a.- Pressing: **SET --> DISPLAY --> OPTIONS ---> MEASURE ---> EXPAND.V**

b.- Directly pressing **[ENTER]**:

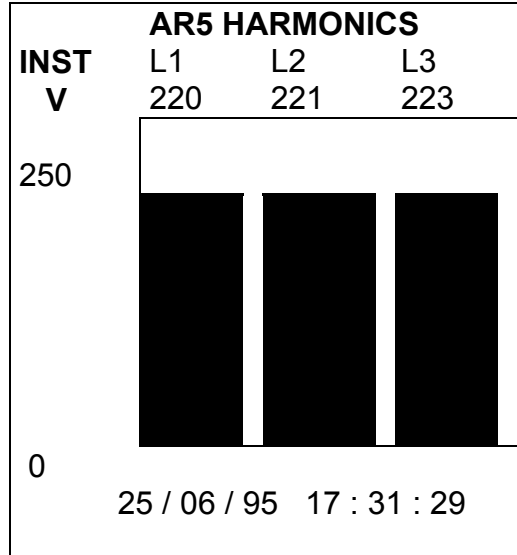
To modify:

- Select with the keys **[▼]**, **[^]**, **[▶]** or **[◀]** the desired parameter and press **[SET]** to validate the choice.
- Select "CLEAR ALL " on display + **[SET]** to clear all parameters.
- **[ENTER]** to validate the choice or **[ESC]** to exit with no modification.

Only three parameters can be selected at once.

4.2.2.- Bar graphs

Simultaneous graphic representation on display of the three phases (L1, L2 & L3) of the selected parameter.



NOTE : Both the parameter to be displayed and the graphic scale can be selected as follows:

a.- Press: **SET --> DISPLAY -->OPTIONS ---> MEASURE ---> BAR.GR.V**

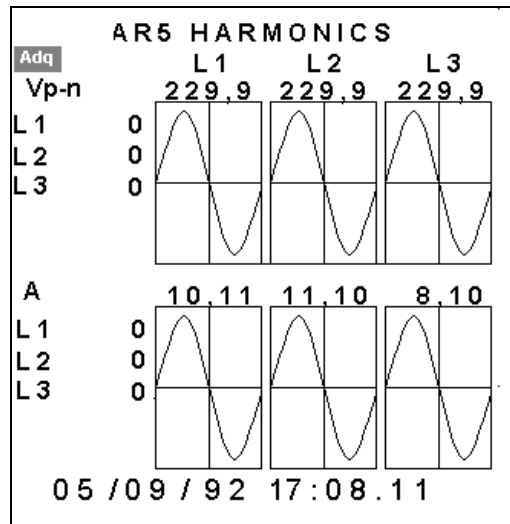
b.- Directly pressing **[ENTER]**:

- Select with keys **[▼]** or **[▲]** the desired parameter: *Vp-n, Vp-p, kVA, Hz, PF, kvarC, kvarL, kW & A*. Press **[ENTER]** to validate the choice.
- Set the scale offset (ZERO SCALE) with keys **[▼], [▲], [▶], [◀], [SET]** & press **[ENTER]** to validate the operation.
- Set the full-scale value (FULL SCALE) with keys **[▼], [▲], [▶], [◀], [SET]** & press **[ENTER]** to validate the operation.

4.2.3.- Oscilloscope

The display concurrently shows the wave forms of voltage and current of each phase (L1, L2 & L3).

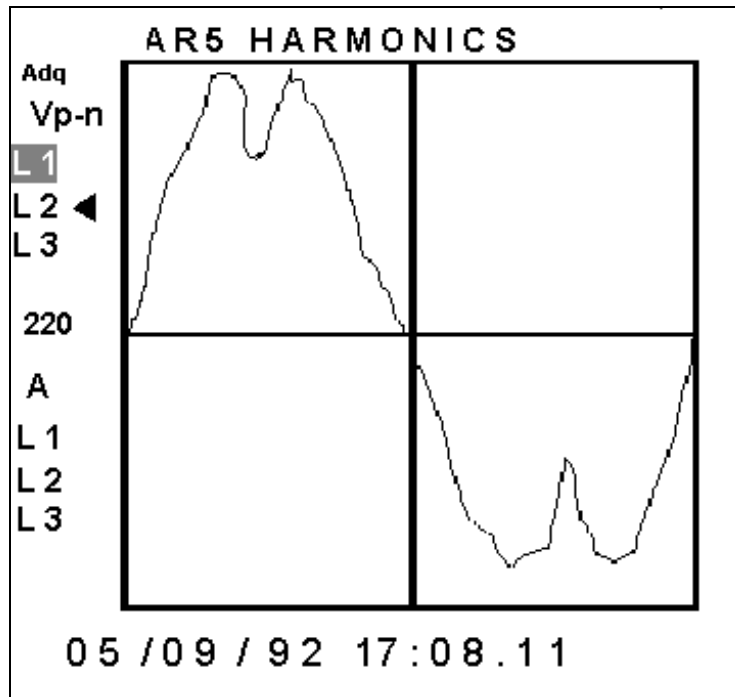
4.2.3.1.- Three phase: Voltage - Current.



- Both the voltage and the current waveforms of the captured cycle are shown on the screen together with their respective effective values.
- With **[^]** & **[v]** keys select the operation to be carried out. After pressing the **[ENTER]** key the reverse video mode text indicates that one of the following operation will be carried out:
 - "Adq" : a new waveform is acquired.
 - "L1", "L2" o "L3" : zoom on the waveform of the selected phase.
- With the **[>]** & **[<]** keys you can move along the ordinate axis, and see the instantaneous voltage and current.
- With the **[ESC]** key the Setup menu is shown.

4.2.3.2.- Zoom.

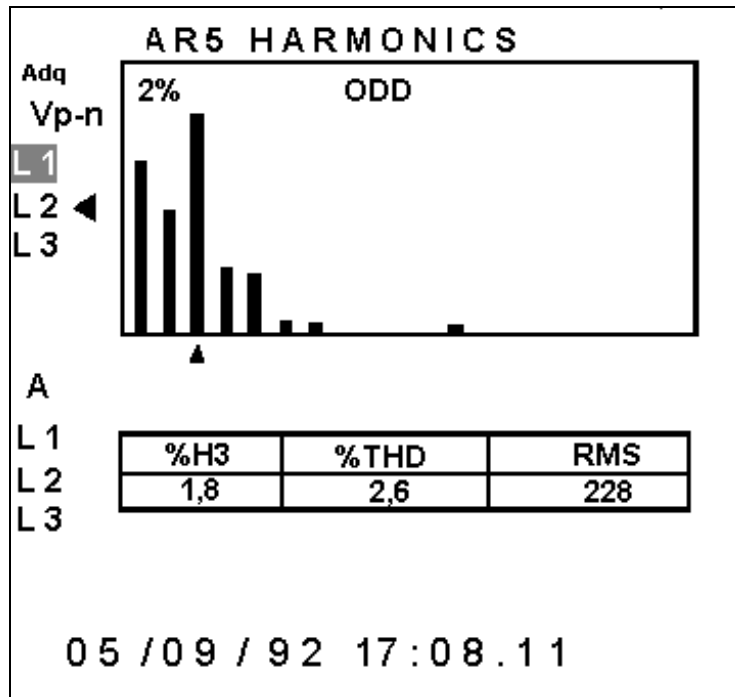
This window shows the captured signal in detail.



- The ◀ sign, indicates the kind of signal and the phase of the waveform that is being zoomed.
- Again, with the [▶] & [◀] keys you can move along the ordinate axis, and see the instantaneous voltage and current.
- With [^] & [v] keys select the operation to be carried out. After pressing the [ENTER] key the reverse video mode text indicates that one of the following operation will be carried out:
 - "Adq" : a new waveform is acquired.
 - "L1", "L2" o "L3" : zoom on the waveform of the selected phase.
 - If the selected phase is marked with the ◀ sign, you will next see the overall harmonic factorization of the selected signal
- With the [ESC] key the Setup menu is shown.

4.2.3.3.- Harmonic factorization.

The network analyzer has one screen where you can see the harmonic factorization of the signal that has been captured.



- The ◀ sign, indicates the kind of signal and the phase of the waveform that is being zoomed.
- With the [▶] & [◀] keys you can move the ▲ arrow along the ordinate axis and in the table below it the magnitude of the corresponding harmonic is shown.
- With [^] & [v] keys select the operation to be carried out. After pressing the [ENTER] key the reverse video mode text indicates that one of the following operation will be carried out:
 - “Adq” : a new waveform is acquired.
 - “ODD” or “EVEN” : it allows you for switching between even or odd harmonics.
 - “L1”, “L2” o “L3” : it carries out the harmonic factorization of the selected phase
 - If the selected phase is marked with the ◀ sign, the next screen to be shown is the initial one in which the voltage and current of the three phases are shown (see section 4.2.3.1.-).
- With the [ESC] key the Setup menu is shown.

4.2.4.- Setup visualization

This screen permits to check all Setup parameters in the analyzer.

The screen on the left is the one shown on the analyzer's display. The screen on the right explains the meaning of each term.


AR5 HARMONICS	
SETUP	
Measure: Triphasic	
1/1V	5A
File: Std-prog.A5M	
00:15:00	Harm. 50
Trigger: Auto	
0	0
00/00/92	00:00:00
00/00/92	00:00:00
Com: 9600/ NO /8/1	
25/10/97	7:31:29

AR5 HARMONICS	
SETUP	
Type of measuring circuit	
V.T. ratio	C.T. ratio
Name and type of file	
Recording period	Type A5I
Trigger parameter	
Max. Value	Min. Value
Trigger: date On	
Trigger: date Off	
Communication parameters	
Preset date	

“A5I Type” will only be shown when a harmonic type file (A5I) is programmed and says what kind of harmonic file is selected (“Harm. 30” or “Harm. 50”)

4.3.- Warning messages

Some warning messages can appear at the visualization screens. These messages inform about the AR5 performance:

- **STOP:** The analyzer is not recording data.
- **TRIG?:** Trigger conditions are not met. No data is being recorded.
- **M. Full:** Memory is full.
- **M.Error:** There is an error in the memory. The memory must be formatted.
-  Analyzer's battery status. When only one bar is displayed the battery should be recharged since the analyzer may be off at any moment.
- **WARNING MAX 500 V:** The maximum allowable phase to neutral voltage of 500 V has been exceeded during the measuring process. When measuring phase to phase voltages the limit is set at 866 V.

5.- PROGRAMMING THE AR5

To accessing AR5 setup options press the key **[SET]**. The analyzer will then inquiry for a password that consists of a key sequence to be pressed (the user has 15 seconds to press this sequence):

PASSWORD
[◀] [SET] [▲] [SET]

Once this password is entered, the analyzer will permit the user to modify any Setup parameters.

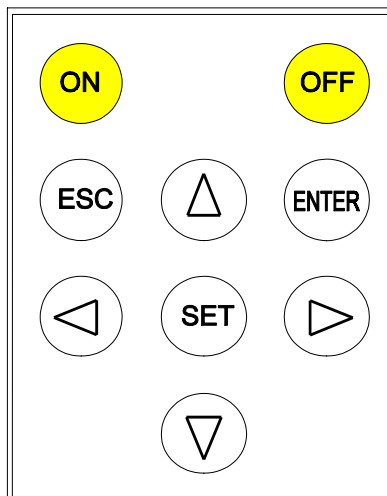
All programs have an independent setup, therefore, the setup must be always check to ensure a proper operation, since any modification will only affect the active operation program.

Diverse setting MENUS are available:

SETUP
DISPLAY
RUN
FILES
CLEAR

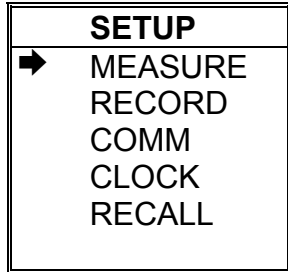
➡ INITIAL MENU

- Select one option with keys [▼] & [▲].
- To access any menu option use [▶] or [ENTER].
- To close the menu press [◀] or [ESC]. If this key is used when only the main menu is open, this is closed. Whether any modification over any setup parameter was done, before closing a confirmation of setup change is requested on display.

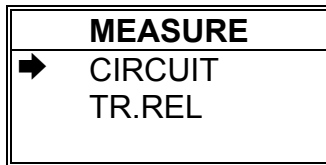


5.1.- SETUP menu

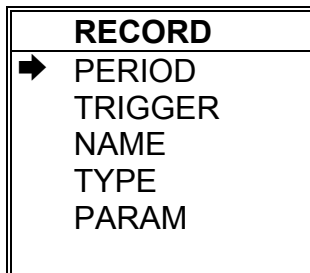
The **AR5 meter** can be user-configured to different performances involving its data analysis and recording modes, as it is followed shown:



➔ SETUP menu.



Three phase, ARON.
C.T and V.T ratios.



hh:mm:ss (1 s to 4 h or 5 s to 4 h) acc. file type
Level, Time.
File name (8 characters).
File type: Standard or Special.
Special file parameters.



Baud / Parity / Bits / Stop bits.



DD/MM/YY hh:mm:ss.



Standard.
Recall Stand.. sure <yes > <no>.

5.1.1.- Measure

Measuring conditions are set at this option: **PROGRAMMING THE CONNECTION TYPE (THREE PHASE or ARON) and C.T. and V.T. RATIOS**

MEASURE :	
➔	CIRCUIT
	TR.REL

Three phase, ARON.
Prim. V, Secn. V, Prim. I

5.1.1.1.- CIRCUIT: Circuit type

Choice among a THREE PHASE or ARON system (rotary input).

5.1.1.2.- TR.REL : Transformer ratios

V.T. and C.T. are here programmed:

TR.REL :	
➔	REL. V
	REL. A

Primary and secondary voltage values
Primary current value

- REL. V: Voltage transformer ratio. The primary voltage is firstly asked, and then the secondary voltage.
- REL. I: Ammeter clamp primary.

NOTE 1 : *If voltage is directly measured (no voltage transformer is used), you must set PRIM.V = 1/SECV.V = 1.*

NOTE 2 : *REL. I --> This option permits to program:*

- a) *The ratio of the ammeter clamp to be used.*
- b) *In case of a high voltage system, the measurement will be carried out through the secondary of current transformers. A shunt ATS-III 5 A a.c./ 2 V a.c. or CP5 clamp will be then required to enter the measurement signal into the AR5 analyzer (Never directly connect the 5 A signal to the AR5.). For this case, the C.T. primary must be set at the primary value of the C.T. used for measuring purposes.*

Ratio set must be modified for each ammeter or transformer type change to avoid measurement mistakes. Standard clamps give a voltage output (generally 2 a.c. at full-scale).

5.1.2.- RECORD menu

The recording conditions are here user-programmed:

RECORD	
➔ PERIOD	hh:mm:ss (1 s to 4 h).
TRIGGER	LEVEL, TIME.
NAME	File name (8 characters).
TYPE	File type: standard or special.
PARAM	Parameters stored by the AR5 when selecting an special File

5.1.2.1.- PERIOD: recording period

All values measured by the AR5 can be periodically saved in memory. The recording period (time period between each record) is user-definable.

Each record consists of the average values measured during the pre-defined period. This recording period can be from 1 s to 4 h for the standard and special type files (files **.A5M** & **.A5T**). For harmonic type files (files **.A5I**) this available period is from 5 s to 4 h.

5.1.2.2.- TRIGGER: Trigger conditions

TRIGGER
LEVEL
TIME

You can program here certain conditions (Trigger) so that values are saved in memory only when these conditions are met.

Two types of trigger conditions are available:

- 1) Time trigger (TIME): DATE/TIME of ON (starting measurement process), &/or OFF (ending measurement process).
- 2) Parameter trigger (LEVEL): you can set a **maximum** threshold (measured values must be higher) &/or a **minimum** (measured values must be lower) that define the value range within the recording actions are performed (thus, for instance, the voltage to be higher than a certain level, or the current lower than another one, etc.).

Whether the defined trigger conditions are met, the **AR5** stores data to its internal memory (STORE ON); and, on the contrary, no information is stored to memory (STORE OFF) and the display will show the message *TRIG?*.

Lets to set the time trigger, that is, to define the period to perform the data storage.

- TIME ON:

When selecting this option the present ON conditions are shown on display:

TIME .ON 00 /00 /00 00 :00 : 00

day/month/year hour:minute:second

- Pressing **[ENTER]**: ON values on display are directly validated.
- **To modify:** (rotary input).
- Select with keys **[▶]** or **[◀]** the position to modify.
- Though keys **[▼]**, **[▲]** the value of the selected position is increased or decreased.
- **[ENTER]** to validate the total value or **[ESC]** to exit with no modification.

- TIME OFF:

When selecting this option the present OFF conditions are shown on display; and the procedure is equal to the above one.

TIME .OFF 00 /00 /00 00 :00 : 00

day/month/year hour:minute:second

POINTS TO CONSIDER:

- a) *To void the time TRIGGER, all values must be zero.*
- b) *If only the ON & OFF TIME are programmed (two DATES set to zero), the defined time period will be cyclically repeated by the AR5.*

ADDITIONAL NOTES:

- a) The AR5 will save data in memory only when both TRIGGER conditions are met: Time (ON-OFF) and Parameter (maximum and minimum). If any condition is not met, no value is stored to memory (STORE OFF state). In case that trigger conditions are void (ON & OFF set to zero, and parameter set to AUTO), all values will be saved in memory according to the previously defined recording period.
- b) If trigger conditions are met at any moment within the defined recording period, the average values for the whole period will be saved in memory.

5.1.2.3.- NAME: recording file name

Type here the file name (8 characters, no extension).

NAME STD-PROG

- Pressing **[ENTER]**: Text on display is directly validated.
- **To modify:** (alphanumeric input).
- Select with keys **[▼]**, **[▲]**, **[▶]** or **[◀]** the character to modify and press **[SET]** to validate each character.
- Select **“◀”** on display + **[SET]** to delete a character.
- **[ENTER]** to validate the total text or **[ESC]** to exit with no modification.

NOTES!

If the typed name and extension already exists in memory, when exiting setting actions, the display will show:

“Overwrite file Sure? “ --> Do you really overwrite the file?

- If yes is answered, the previous file is deleted.
- If no is answered, setup menu is not exited, thus a new name can be typed for the file, or the setting actions can be cancelled.

POINTS TO CONSIDER:

Whether the name of the working file is change, previous file will not be deleted, since several files can be at the same time saved in the AR5 internal memory provided these are differently named. All data will be automatically saved in this file until a new one is opened.

5.1.2.4.- TYPE: recording file type.

Select here the file type wanted for the data recording actions of the AR5. With keys **[▼]** or **[▲]** choose the file type: Standard, Custom, Harm30 or Harm50.

These are distinguished in memory with its extension:

- A5M Standard file (preset parameters).
- A5T Custom file (user-selected parameters).
- A5I Harmonic file (preset parameters + wave forms).

Length of data saving records is different as per each file type. Memory autonomy for a 15 min recording period is listed below:

File type	Extension	Record length	AR5 256kb	AR5 1Mb
Standard	A5M	200 bytes	13.3 days	52 days
Custom	A5T	4*no.par+10 bytes	$\frac{256000 - 192}{(4 * n^{\circ} \text{var} + 10) * 96}$ days	$\frac{1000000 - 192}{(4 * n^{\circ} \text{var} + 10) * 96}$ days
Harm. 30	A5I	1000 bytes	2.6 days	10.4 days
Harm. 50	A5I	1800 bytes	1.4 days	5.9 days

When a harmonics file is selected, it is necessary to define which will be the later signal study: Harm. 30 file will allow to factorize only until harmonic 30, while Harm. 50 file will allow to factorize until harmonic 50.

Note: If the typed name and extension already exists in memory, when exiting setting actions, the display will show:

“Overwrite file Sure? “ --> Do you really overwrite the file?

- If yes is answered, the previous file is deleted.
- If no is answered, setup menu is not exited, thus a new name can be typed for the file, or the setting actions can be cancelled.

Saved parameters in files:

Parameters	A5M				A5I			
	L1	L2	L3	III	L1	L2	L3	III
Phase-Neutral Voltage	x	x	x	x	x	x	x	x
Max Phase-Neutral Voltage	x	x	x		x	x	x	
Min Phase-Neutral Voltage	x	x	x		x	x	x	
Current	x	x	x	x	x	x	x	x
Max Current	x	x	x		x	x	x	
Min Current	x	x	x		x	x	x	
Active Power	x	x	x	x	x	x	x	x
Inductive Power	x	x	x	x	x	x	x	x
Capacitive Power	x	x	x	x	x	x	x	x
Power Factor	x	x	x	x	x	x	x	x
Active Energy				x				x
Inductive Energy				x				x
Capacitive Energy				x				x
Frequency	x				x			
Wave form V					x	x	x	
Wave form I					x	x	x	

5.1.2.5.- PARAM: Choosing the parameters to be saved

As said before, parameters to be saved in memory are user-definable when working with Custom type files (extension .A5T - see section 5.1.2.4.-).

Note: This option does not vary the stored parameter if the selected file is a Standard type one (extension .A5M) or a Harmonic type one (extension .A5I); but would modify the parameters to be stored whether a Custom type file (extension .A5T) had been selected.

- Pressing **[ENTER]** previously user-defined parameters are automatically validated.

- **To modify:**

- Place over the desired parameter with keys [**▼**], [**▲**], [**▶**] or [**◀**].
 - Pressing **[SET]** the state of the parameter switches. Parameters to be saved are on a black background, and the ones to be not save are on a white background.
 - Placing over the text Inst (Instantaneous values) and pressing **[SET]**, you can now select the maximum values to be saved (MAX).
 - Placing over the text Max (Maximum values) and pressing **[SET]**, you can now select the minimum values to be saved (MIN).
 - Press **[ENTER]** to validate the choice or **[ESC]** to exit with no modification.
-

Note: If values are being saved in a file A5T and the parameters to be stored are changed, when exiting setting actions, the display will show:

“Error: New file should be created”

This message is shown since the change of parameters in an already existing file is not allowed. Follow these instructions to change the parameters of a file:

1. If you want to keep the file name.
 - Stop AR5 data recording process: SET -> RUN -> Stop.
 - Exit SETUP.
 - Delete the existing file: SET -> FILES -> DELETE.
 - Modify the parameters to be saved: SET -> RECORD -> PARAM
 - Enable the AR5 data recording process: SET -> RUN -> Run
 - Exit SETUP.
2. If you want to change the file name.
 - Change the file name: SET -> RECORD -> NAME.
 - Modify the parameters to be saved: SET -> RECORD -> PARAM
 - Exit SETUP.

5.1.3.- COMM: Communication parameters

Program here the parameters of the built-in RS-232 serial output. When selecting this option the present parameters are shown on display:

COMM
9600 NO 8 1

Baud / Parity / Length / Stop bits

- Pressing **[ENTER]**: values on display are directly validated.
- **To modify:** (rotary input).
- Select with keys **[▶]** or **[◀]** the position to modify.
- Through keys **[▼]**, **[▲]** the value of the selected position is modified.
- **[ENTER]** to validate the total value or **[ESC]** to exit with no modification.

5.1.4.- CLOCK: Internal clock

Set here the AR5 internal clock: date / time. When selecting this option the present values are shown on display:

CLOCK
00 /00 /00 00 :00 : 00

day/month/year hour/minute/second

Proceed as for the previous section.

5.1.5.- RECALL: Read configuration

You can here recall a **standard** configuration.

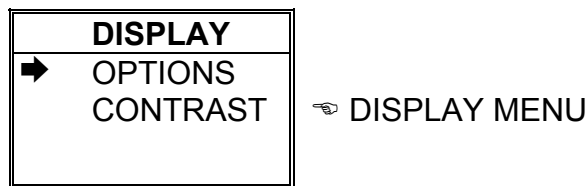
RECALL
Reg x

- A confirmation is requested: "Recall Setup sure <yes> or <no>". With keys **[▶]** & **[◀]** select yes or no, and then press **[ENTER]**.

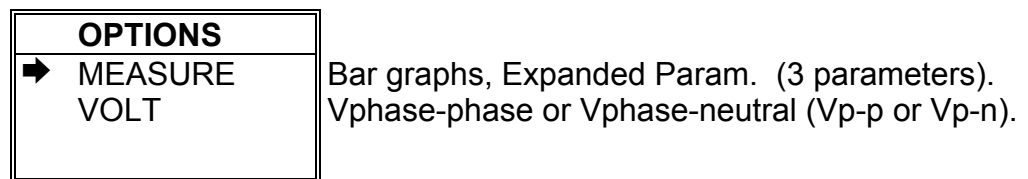
A "**Standard**" operation program for the AR5 is available to be user-recalled. Its features are:

- C.T. Ratio (SET + A) : 5
- V.T. Ratio (SET + V) : 1 / 1
- TRI/ ARON : Three phase (TRIPH).
- Period (SET + PERIOD) : 15 minutes
- TRIGGERS (Time and parameter) : All set to zero
- File name (FILE Name) : STD-PROG
- FILE type : .A5M
- Communication parameters : 9600,No,8,1
- RUN : RUN

5.2.- DISPLAY menu



5.2.1.- OPTIONS: Screen options



You can at this point define the options about the parameters to be visualized on display, the graphic mode performance, ...

MEASURE --> BAR.GR.V

To determine the parameter to be graphically displayed, in addition with its scaling. Both maximum and minimum values of the graph are inquired for auto-scaling performance.

- Choice with keys [**▼**] or [**▲**].
- [**ENTER**] to validate selection or [**ESC**] to exit with no modification.

MEASURE -->EXPAND.V

To choose three instantaneous parameters to be bigger-size displayed for a clearer reading.

- Select with keys [**▼**], [**▲**], [**▶**] or [**◀**] the desired parameter, and enable or disable each one with the key [**SET**].
- Select "CLEAR ALL " on display + [**SET**] to clear all parameters.
- [**ENTER**] to validate the choice or [**ESC**] to exit with no modification.

VOLT

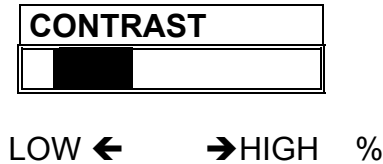
This option permits the user to choice whether the voltage readout in the main visualization screen corresponds to the voltage between phases (Vp-p) or between phase and neutral (Vp-n).

- Select with keys [**▼**] or [**▲**].
- [**ENTER**] to validate the choice or [**ESC**] to exit with no modification.

5.2.2.- CONTRAST: Screen contrast

The user can here vary the contrast of the AR5 display:

- With the [▶] you can intensify the display contrast and with the key [◀] this can be lowered:



5.3.- RUN: data recording process status

You can here enable or disable the data collection and logging action in the AR5.



- With keys [▼], [▲] RUN or STOP are selected.
- [ENTER] to validate or [ESC] to exit with no modification.

5.4.- FILES Menu

Non-volatile AR5 internal memory is storing data up to its maximum capacity. Once full, neither new data will not be saved in, nor stored data will be lost (provided no incorrect operation is done).

When memory is full, the display will show: **"MEMORY FULL"**.



5.4.1.- DIR: Directory

This option shows on display a directory of all files saved in memory.

```

AR5 - DIR
STD-PROG. A5M      xxxxx bytes  ↗ File name / File size
  dd / mm / yy   hh : mm : ss           Day / Time
TEST1. A5T        xxxxx bytes
  dd / mm / yy   hh : mm : ss
STD-PROG. A5X      xxxxx bytes
  dd / mm / yy   hh : mm : ss

..... / .....
    
```

Free bytes: xxxxxxxxxx ↗ *Number of free bytes in memory*

- Keys [▼] or [▲] allows reading more files in case that all files stored by the AR5 cannot be shown in only one screen.
- Keys [ENTER] or [ESC] to exit.

5.4.2.- DELETE: Deleting a file

You can here delete any file from the internal memory.

```

AR5 - DELETE
STD-PROG. A5M      xxxxx bytes  ↗ File name / File size
TEST1. A5T        xxxxx bytes
STD-PROG. A5T      xxxxx bytes
.....
    
```

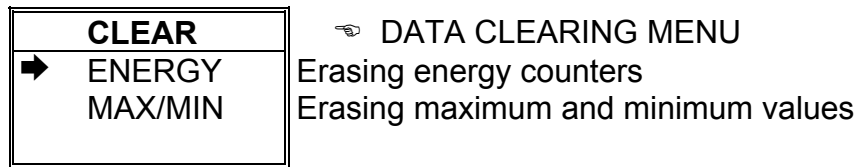
- With keys [▼] & [▲] select the file to be deleted.
- [ENTER] to confirm selected file erasing. Once press, a confirmation is required.
- Press key [ESC] to exit with no modification.

5.4.3.- FORMAT: Formatting the AR5 internal memory

This option lets the user to format the internal memory. A confirmation is required to perform this action. Take into account that this action will mean all stored data to be deleted.

Note: Do not turn the AR5 off during the memory format process, otherwise the display will show an error message and the process should be redone.

5.5.- CLEAR menu: Deleting data



AR5 energy counter values as well as maximum and minimum values are kept in memory even though the analyzer is powered off. Clear menu options let the user to reset these values to zero.:

ENERGY: Lets the user to reset energy counters to zero.

MAX/MIN: Lets the user to clear maximum and minimum values.

6.- TECHNICAL SPECIFICATIONS

Voltage measurement:

Measuring range : 20 to 866 V a.c. (between phases)
 20 to 500 V a.c. (phase-neutral)

Automatic scale adjustment

Other voltages : through suitable voltage transformers

Frequency : 45 to 65 Hz

Current measurement:

Measuring range: according to current clamps

Current transducer ratio : user-programmable

Measurement units : automatic scale adjustment

Harmonic measurement:

With AR5 Analyzer:

- Until harmonic 50.

With PC program:

- Harm. 30 file type -> Until harmonic 30
- Harm. 50 file type -> Until harmonic 50

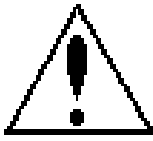
CONSTRUCTIVE CHARACTERISTICS OF THE CARTRIDGE

Case : Anti-chock plastic

Dimensions : 64 x 19 x 40 mm

Connection terminals : 1 input/output terminal

7.- SAFETY WARNINGS



The user should take into account all installation instructions referred in sections INSTALLATION AND STARTUP, CONNECTION INSTRUCTIONS and TECHNICAL SPECIFICATIONS of the analyzer.

Note that with the instrument powered on, the terminals could be dangerous to touching, and cover opening or elements removal actions may allow accessing dangerous parts. The analyzer has been designed and tested to meet IEC 348 standard and is factory-shipped in proper conditions.

8.- TECHNICAL SERVICE

For any inquiry about the instrument operation mode or in case of malfunction, you can contact CIRCUTOR S.A.'s technical service.

CIRCUTOR S.A. - Aftersales Service

Lepanto, 49

08223 - TERRASSA (SPAIN)

Tel: 34 - 93 - 745 29 00

Fax: 34 - 93 - 745 29 14

e-mail: ar5@circutor.es

A.- QUICK GUIDE (AR5 - HARMONICS)

Menu			Description	Options	Standard	
Setup	Measure	Circuit		Choice type of measuring circuit.	Three phase Aron	Three phase
		Tr. Rel	Rel. V	Voltage transformers ratio		Primary=1 Secondary=1
			Rel. A	Current transformers ratio		Primary =5
	Record	Period		For Standard (A5M) and Custom (A5T) files For Harm. 30 and Harm50 (A5I) files	1 s to 4 h 5 s to 4 h	15 minute
		Trigger	Level	Parameter trigger and threshold setting	Auto Vp-p Vp-n A kW kvarL kvarC PF Hz kVA	Auto
			Time	Time trigger setting	No Date On Date Off	No
		Name		Working file name		STD-PROG
		Type		File type (Standard, Custom or harmonic)	Standard Custom Harm. 30 Harm. 50	Standard
		Param		Parameters to be stored to a custom type file	All	
		Comm		Communication parameters setting		9600,n,8,1
	Clock		Analyzer's date and time setting			
	Recall		Recalling a Standard configuration			
	Display	Options	Measure	Bar Gr.	Choice a parameter to be graphical displayed	Vp-n Vp-p kVA Hz PF kvarC kvarL kW A
Expand				Choice three parameters to be displayed in a big size mode	Instantaneous	Vp-n kW A
Volt			Choice the voltage readout in the main screen to be Vp-p or Vp-n	Vp-n Vp-p	Vp-n	
Contrast		Contrast				
Run			Enabling / Disabling data recording process	Stop Run	Run.	
Files	Dir		Directory of stored files			
	Delete		Deleting a file			
	Format		Clearing all memory content			
Clear	Energy		Clearing energy counters			
	Max/Min		Clearing maximum and minimum values			