



ELECTRICAL NETWORK ANALYZER

AR5

(Code 7 71 301)

Fast-Check Program

(Fast data logging)

(Code 7 71 328)

INSTRUCTION MANUAL

(M 981 506 / 00 B)

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1.- DESCRIPTION

This manual is aimed to familiarize de user with the operation of the portable analyzer model AR5 when working with the “Fast-Check program”.

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 “Fast-Check” program permits saving in memory the main electrical parameters with an integrating period multiple of 3 cycles (three-phase power systems) or multiple of 1 cycle (single-phase power systems). This operation mode allows to carry out analysis of motor starting processes or other transient events for which an integration period over 1 second is not fast enough.

All recorded data must be downloaded to a PC for their visualization and further analysis.

The file type generated by the “Fast-Check” program has always the A5T extension. By the “Type” option within the setup process, the user can select the parameters to be recorded in memory.

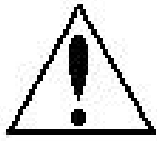
The analyzer is equipped with an intermediate buffer to store the acquired samples (TEMPORAR.TMP), so that, when the file is closed this is transferred to the previously defined A5T file.

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 software update.

3.- INSTALLATION AND STARTUP



The manual you hold in your hands contains information and warnings that the user should respect in order to guarantee a proper operation of all the instrument functions and keep its safety conditions.

Whether the instrument is not used according to manufacturer's specifications, the protection of the instrument can be damaged. Note that with the instrument powered on, cover opening or elements removal actions may allow accessing dangerous parts. Therefore, before any adjustment, replacement, maintenance or repairing operation is carried out, the instrument must be disconnected from any power supply source.

When any protection failure is suspected to exist, the instrument must be immediately put out of service. Contact then with a qualified service representative.

3.1.- Starting the AR5 analyzer up

Before connecting the instrument to the mains, please consider following points:

- 1) Supply voltage: 230 V a.c. +15 % / -15 %, 50... 60 Hz.

The instrument must be energized by a supply circuit with protection earth terminal.

- 2) Maximum input voltage at the voltage measuring circuit:
 - 500 V a.c. phase-neutral
 - 866 V a.c. between phases

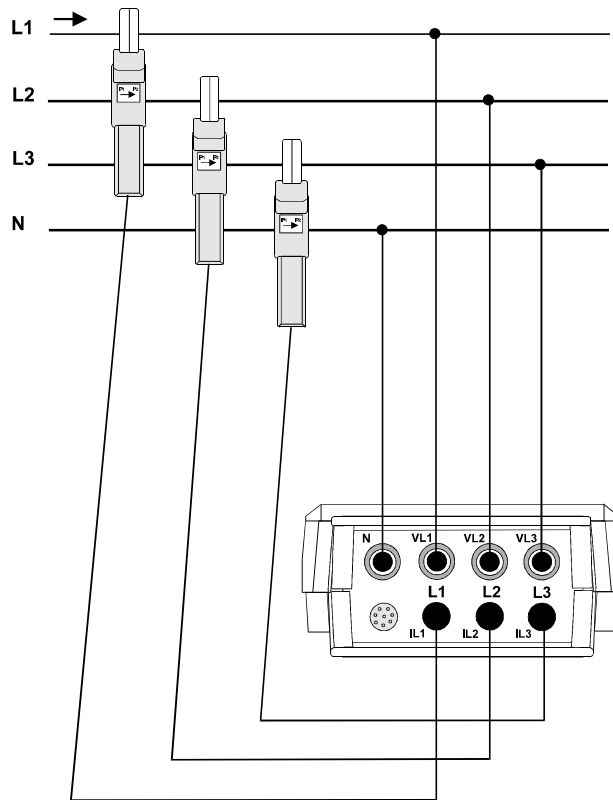
Use always the voltage leads factory-shipped with the instrument.

- 3) Burden: 8 VA.
- 4) Operation conditions:
 - Operation temperature: 0° to 50°C.
 - Operation humidity: 25 % to 75 % RH.
- 5) Safety : Designed to meet protection class II as per EN 61010.
- 6) Current measuring range: according to the ammeter clamp used

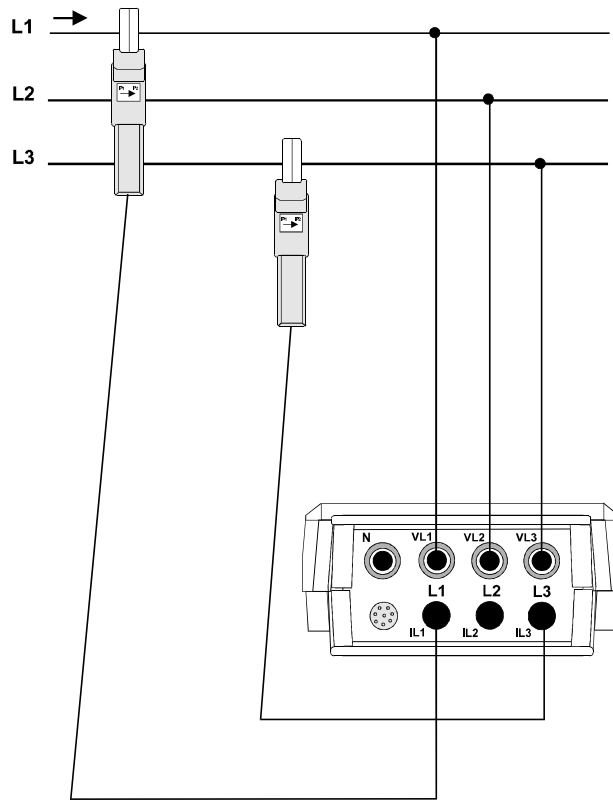
To start measurement works with the analyzer:

- 7) Connect the voltage leads at each phase of the monitored system, as well as the neutral whether it exists.
- 8) Connect the ammeter clamps at each phase conductor. Each current phase must coincide with its voltage phase.
- 9) Respect the connection modes shown at each diagram to correctly achieve energy readouts.

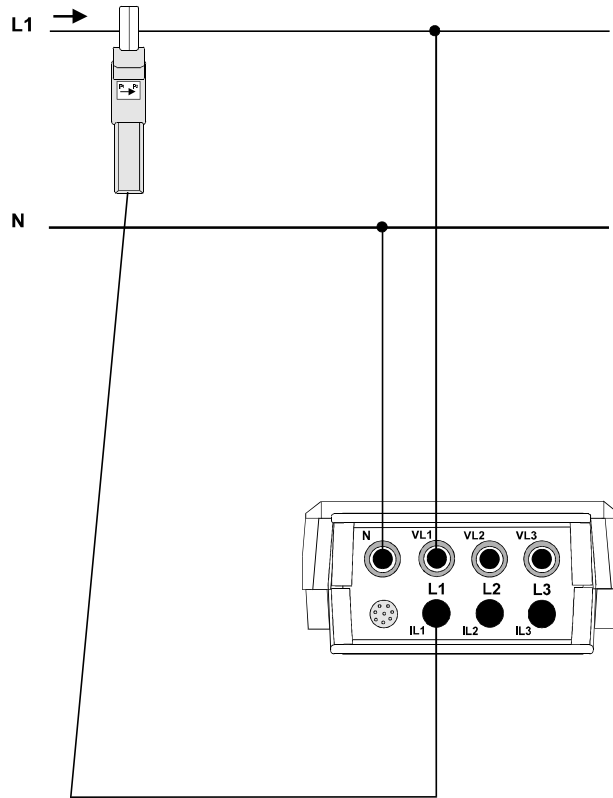
3.2.- Connection Modes



Three-Phase mode connection diagram



Aron mode connection diagram



Single-Phase mode connection diagram

3.3.- Loading a new program

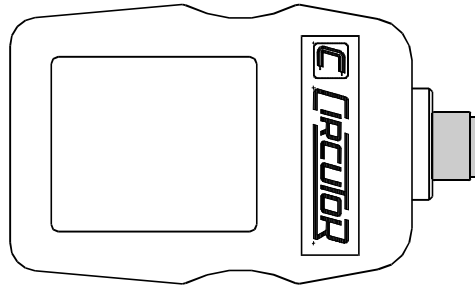
The AR5 has an internal memory to save diverse operation mode programs to be used by the user.

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.**

3.4.- 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 SET-UP UP !!!!

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

For instance, whether the set-up is modified at the "ANALYZER" program, these modification will not be valid for the "FAST-CHECK" program, and so for any program.

4.- DATA VISUALIZATION ON DISPLAY.

All measured instantaneous values or the screen for energy meter check can be read on a 160 x 160 pixel, liquid, crystal display or the “Fast-Check” screen.

Use the key **[ESC]** to switch the visualization screen.

4.1.- Screen of instantaneous values

This screen is only for the verification of a correct connection of the analyzer. So, you can verify the correct positioning of the ammeter clamps, the transformation ratio setting, concordance of voltage and current phases

Take into account that readouts shown in this screen by display a average values over 1 seconds. Besides, energy counters will be automatically set to zero every time this screen is reached since the “Fast-Check” program does not record energy values.

Pressing the key **[SET]** from this screen m the set-up menu is accessed. (See Section 5.1.-).

When powering the AR5 on, the display will show:

AR5 FAST-CHECK				
INST	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				

Verification 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.

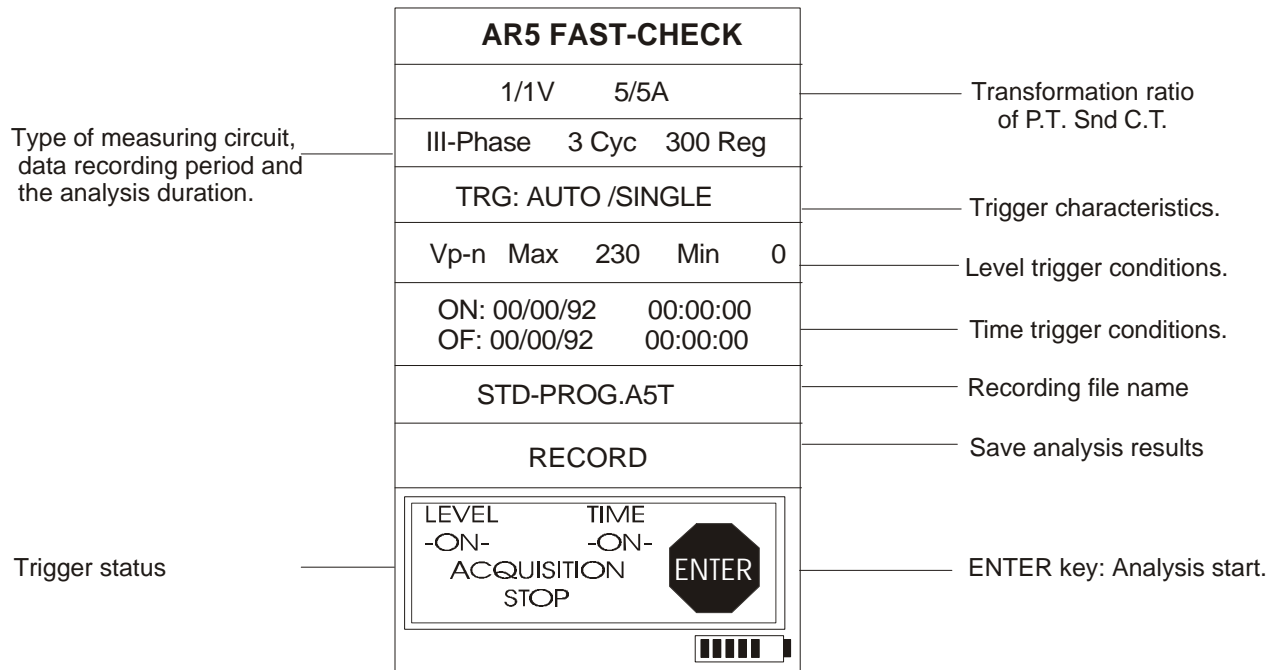
Frequency : Readout of the instantaneous value of the frequency (Hz).

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

Energies: Readout of the instantaneous value of the active, inductive reactive and capacitive inductive energy accumulated. These are always reset to zero when this screen is exited.

Time and Date. (time/date): Readout of present time and date. For any modification, see section 5.1.1.4.-.

4.2.- Screen for “Fast-Check”.



From this screen, the data logging process can be already started. By means of keys [^] & [v] the position of the screen to be modified is selected. This position is enabled to be modified when pressing the key [SET]. (See section 5.2.-).

By pressing the key [ENTER] the data logging process will be started (See Section 6.-).

4.3.- Warning messages

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

- **STOP**: This message is shown always that the screen of instantaneous values is on display; and indicates that the analyzer does not record any data from this screen.
- **M. Full**: Memory is full.
- **M.Error**: There is an error in the memory. The memory must be formatted.
- **Battery indicator**: Analyzer’s battery status. Notice that when only one bar is shown, the analyzer’s battery is very low and this can be powered 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.

The “FAST-CHECK” program has 2 different set-up menus:

- Setup accessible from the screen of instantaneous value (Section 5.1.-): By this Setup the basic functions of the AR5 analyzer together with the parameters for the “Fast-Check” program operation can be fully set.
- Setup accessible from the “Fast-Check” screen (Section 5.2.-): This Setup is exclusive for setting the “Fast-Check” program operation.

5.1.- Set-up of Instantaneous Values.

To access AR5 set-up 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 the password is pressed, the analyzer will inquire for a confirmation before stopping the disturbance capture process and permitting the modification of set-up parameters.

Configuration parameters are independent for each program, that is, a modification over a certain program will not be applied over other programs.

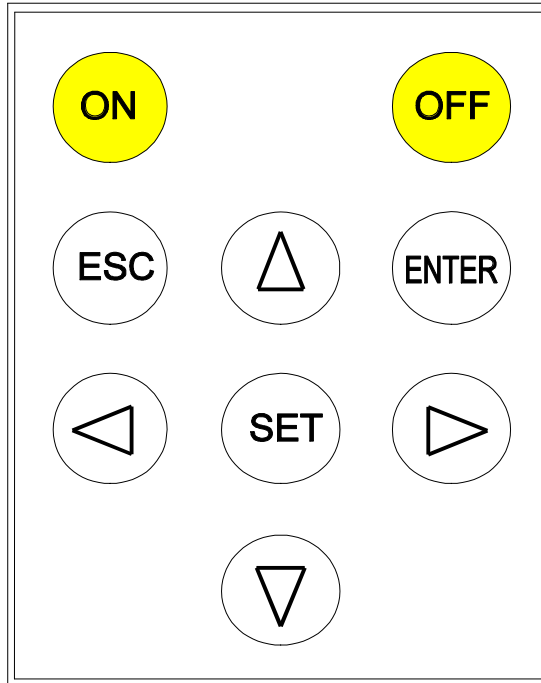
When the Setup mode is exited and any modification have been done, the analyzer will inquire for a confirmation to save the new Setup..

Setup Changed Sure ¿: <Yes> <No>
--

- Whether <Yes> is selected: The new Setup is saved to establish the new operation mode.
- Whether <No> is selected: The Setup mode is exited by no modification is saved..

Use the following keys to move along diverse available configuration menus:

- Select one option with keys [▼] & [▲].
- To access any menu option use [▶] or [ENTER].
- To close the menu press [◀] or [ESC].



Diverse setting MENUS are available:



➔ INITIAL MENU

5.1.1.- 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	
➔	MEASURE
	RECORD
	COMM
	CLOCK
	RECALL

➔ SET-UP menu.

MEASURE	
➔	CIRCUIT
	TR.REL

Three-phase, single-phase, ARON.
Transformation ratio for V & A.

RECORD	
➔	PERIOD
	LENGTH
	TRIGGER
	NAME
	TYPE
	PARAM

Three-phase (3,6,9...cycles) - Single-phase (1,2,3...cycles)
No. of readouts to be recorded
Level, Time.
File name (8 characters).
File type: Standard, Special.
Parameters of the special file.

COMM

Baud / Parity / Bits / Stop bits.

CLOCK

DD/MM/AA hh:mm:ss.

RECALL

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

5.1.1.1.- MEASURE Menu .

Measuring conditions are set at this option: **Setting the connection type and P.T. and C.T. transformation ratios.**

MEASURE :	
➔	CIRCUIT TR.REL A

Three-phase, Single-phase or, ARON
Prim. V, Secon. V, Prim. A

5.1.1.1.1. CIRCUIT: Circuit type.

The AR5 loaded with the “Fast-Check” program can analyze three-phase or single-phase power systems. Besides, the Aron measuring method can also be used (2 ammeter clamps).

5.1.1.1.2. TR.REL : Transformation ratios

Set here transformation ratios for voltage and current inputs.

TR.REL :	
➔	REL. V REL. A

Primary and secondary voltage values
Primary current value

- REL. V: transformation ratio of P.T.. When the voltage is directly measured (no P.T. used) you must set PRIM.V = 1/ SECV.V = 1; on the contrary, the transformation ratio must be set.
- REL. I: primary value of the ammeter clamp used for the measurement. The secondary value is always 2 V a.c. (this value must not be set). In case of taken the current signal from the secondary of .../5A current transformers, CP5 clamps will be then required and the C.T. primary must be set at the primary value of the C.T. used for measuring purposes.

5.1.1.2.- RECORD Menu.

The recording conditions are here user-programmed: Period, duration of the data logging process, parameters to be recorded...

RECORD	
➔ PERIOD	Three-phase (3,6,9...cycles) - Single-phase (1,2,3...cycles)
LENGTH	No. of readouts to be recorded
TRIGGER	Level, Time.
NAME	File name (8 characters).
TYPE	File type: Standard, Special.
PARAM	Parameters of the special file.

5.1.1.2.1. PERIOD: recording period.

The recording period for each phase is user-definable. The recording period will depend on the type of power system to be monitored. This period is set by cycle levels.

- Three-phase power system: Available data recording periods are: 3, 6, 9, 12, ... 60 (multiples of 3 cycles). The recorded value is the average value over the analyzed cycles within the selected period.
- Three-phase power system: Available data recording periods are: 1, 2, 3... 60. The recorded value is the average value over the analyzed cycles within the selected period.

5.1.1.2.2. LENGTH: Duration of data logging process.

The duration of the analysis done by the "Fast-Check" program depends on the choice of the number of records to be taken. The maximum value to be set will depend on the available free memory in bytes. The minimum value is 15 records. The maximum number of available records is given by the following formula:

- Three-phase system: Each record corresponds to the analysis of cycle per each phase.

$$number\ of\ records = \frac{available\ memory - 360}{4 \times number\ of\ parameters + 94}$$

- Single-phase system: Each record corresponds to the analysis of 1 cycles over the single-phase network..

$$number\ of\ records = \frac{available\ memory - 360}{4 \times number\ of\ parameters + 52}$$

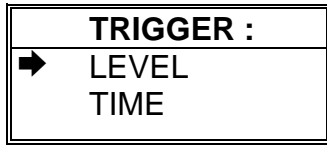
- Analysis duration (s) :

$$analysis\ duration(s) = \frac{number\ of\ records \times period}{Rated\ frequency}$$

Note:

For the "Standard" file the "number of parameters" selected equals 19

5.1.1.2.3. TRIGGER: Trigger conditions



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 conditions (TIME).
- 2) Conditions for a discrete parameter (LEVEL)

- **LEVEL:**

Set the parameter and the conditions to be met for this parameters so that the AR5 records in memory.

- **PARAM:** Selection of the trigger parameter between Vp-n (phase-to-neutral voltage) or A (current).
- **MAX / MIN:** Definition of the limits that determine the analysis range.

The trigger condition is met when the instantaneous vales of any of the three phases (L1, L2 or L3) or the three-phase average value of the selected parameter is higher than the maximum setpoint or lower than the minimum setpoint (the analyzer switches from STORE OFF to STORE ON position).



- Select with keys [▼] or [▲] the desired value and press [SET] to validate each figure
- Select “←“ on display + [SET] to delete a figure.
- [ENTER] to validate the total value or [ESC] to exit with no modification.

POINTS TO CONSIDER:

1) *When setting the maximum and minimum values take into account the units:*

Parameter	Units
Voltage	V. with decimals kV ex. 230. V 230.0 kV
Current	A.

• **TIME:**

To set the time trigger, that is, to define the period to perform the data recording process.

- TIME ON / OFF:

Set the beginning and ending time for the system analysis.

- 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.

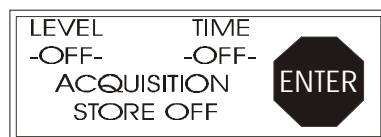
POINTS TO CONSIDER:

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:

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 into memory



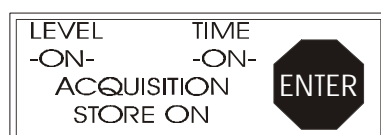
No data recorded since neither the level trigger as the time trigger conditions are met.



No data recorded since the time trigger condition is not met.



No data recorded since the level trigger condition is not met.



Data is being recorded in memory as all trigger conditions are met.

5.1.1.2.4. 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.

5.1.1.2.5. TYPE: recording file type

Select here the file type wanted for the data recording actions of the AR5. Use the keys **[▼]** or **[▲]** to choose the file type: Standard or Custom. **The extension is always A5T** when working with the Fast-Check program.

These two file types are distinguished by the parameters to be recorded:

- Standard file (pre-set parameters).

Parameter	A5T (Standard)			
	L1	L2	L3	III
Line-to-neutral V	X	X	X	
Current	X	X	X	
Active Power	X	X	X	
Inductive Power	X	X	X	
Capacitive Power	X	X	X	
Power Factor	X	X	X	
Frequency				X

- Custom file: User-selectable parameter (See Section: 5.1.1.2.6). Available parameters to be chosen are:

Parameter	A5T (Custom)			
	L1	L2	L3	III
Line-to-neutral V	X	X	X	X
Current	X	X	X	X
Active Power	X	X	X	X
Inductive Power	X	X	X	X
Capacitive Power	X	X	X	X
Power Factor	X	X	X	X
Frequency				X
Apparent power				X

Note: In case that when changing the file type this file 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.

5.1.1.2.6. 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.

Available parameters are shown in the following table:

Parameter	A5T (Custom)			
	L1	L2	L3	III
Line-to-neutral V	X	X	X	X
Current	X	X	X	X
Active Power	X	X	X	X
Inductive Power	X	X	X	X
Capacitive Power	X	X	X	X
Power Factor	X	X	X	X
Frequency				X
Apparent power				X

Note: When a Standard type file is selected, this option does not modify the parameters to be recorded, but would modify the recorded parameter if a Custom type file is selected.

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

- **To modify:**

- Place over the desired parameter with keys [**▼**], [**▲**], [**▶**] or [**◀**].
 - Pressing [**SET**] the status 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.
 - Press [**ENTER**] to validate the choice or [**ESC**] to exit with no modification.
-

Note: When data is being recorded into a file and the parameters to be recorded are changed, 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.

5.1.1.3.- 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.
- 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.

5.1.1.4.- 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.

5.1.1.5.- RECALL: Read Configuration

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

```
RECALL STAND..
sure? <yes > <no>
```

- 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
- Circuit type : Three phase (III - Phase)
- File name (FILE Name) : STD-PROG
- FILE type : .A5T (Standard)
- Communication parameters : 9600,No,8,1

5.1.2.- DISPLAY Menu

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:

```
CONTRAST
██████████
```

LOW ← → HIGH %

5.1.3.- FILES menu.

The 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**".

```
FILES
▶ DIR
  DELETE
  FORMAT
```

☞ FILES MENU

5.1.3.1.- DIR: Directory.

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

AR5 - DIR

```
CK_METER. ACM   xxxxx bytes  ↗ File name / File size
  dd / mm / yy  hh : mm : ss      Day / Time
TEMPORAR.TMP   xxxxx bytes  ↗ Temporary file
  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.

5.1.3.2.- DELETE: Deleting a file

You can here delete any file from the internal memory.

AR5 - DELETE

```
STD-PROG. ACM   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.

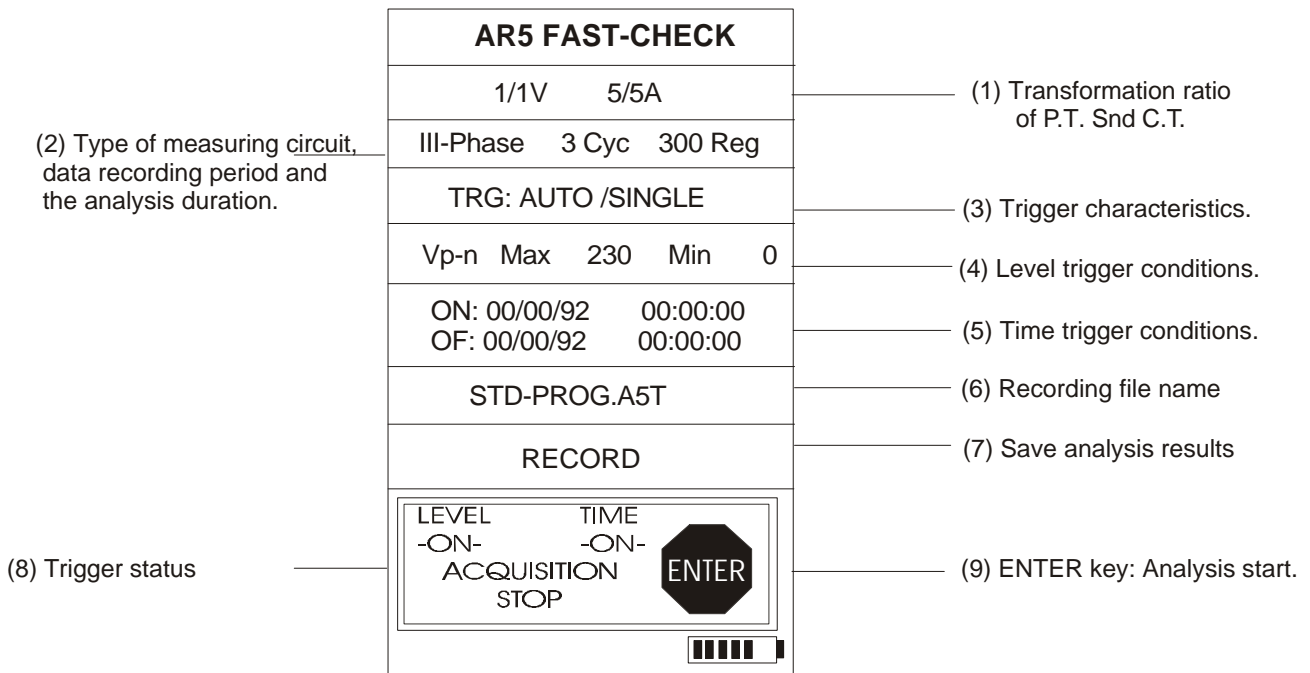
5.1.3.3.- FORMAT: Formatting the AR5 internal memory

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.

5.2.- Setup: Fast-Check screen.

- Use the keys [▼] and [▲] to select the option to be modified.
- By pressing the key [SET], modification of the selected option is enabled.
- By pressing the key [ENTER] at any moment the analysis is started.



1. This option permits to set the transformation ratios for voltage and current inputs.

- When the voltage is directly measured (no P.T. used) you must set PRIM.V = 1/ SECV.V = 1; on the contrary, the transformation ratio must be set.
- primary value of the ammeter clamp used for the measurement. The secondary value is always 2 V a.c. (this value must not be set). In case of taken the current signal from the secondary of .../5A current transformers, CP5 clamps will be then required and the C.T. primary must be set at the primary value of the C.T. used for measuring purposes.

2. Analysis characteristics:

- Type of measuring circuit: Definition of connection mode: single-phase, three-phase or Aron.
- Data recording period: Data recording period setting. This period for a three-phase system must be set at 3..60, and 1..60 for a single-phase system (see Section 5.1.1.2.1). The recorded value is the average value of all cycles analyzed within this period.
- The duration of the analysis done by the “Fast-Check” program depends on the choice of the number of records to be taken. The maximum value to be set will depend on the available free memory in bytes. The minimum value is 15 records. (Ver Section 5.1.1.2.2)

- Definition of the trigger type to be executed together with the data recording specifications. First of all, the starting mode for the data recording process: Manual (Activation by the user) or automatic (Activation by trigger conditions). Besides, data recording specifications must be also established:

Automatic Trigger <Auto>:

The data recording process is started when trigger conditions are met (date and level). For this case, the analyzer will behave according to the data recording specification setting:

- **<Recurrent >**: Data is not recorded in memory when trigger conditions are not met or when the key <ENTER> is pressed (Rotary memory).
- **< Single >**: Data is not recorded in memory anymore when the buffer is full or the key <ENTER> is pressed (Linear memory).

Manual Trigger <Manual>:

The data recording process is started when the key <ENTER> is pressed. No condition trigger is considered. For this case, the analyzer will behave according to the data recording specification setting:

- **<Recurrent >**: Data is not recorded in memory when the key <ENTER> is pressed (Rotary memory).
- **< Single >**: Data is not recorded in memory anymore when the buffer is full or the key <ENTER> is pressed (Linear memory).

3. Level trigger conditions: Definition of maximum and minimum values of voltage (V_{L-N}) or current (A) to set the data recording range of the analysis. (See Section 5.1.1.2.3)
4. Time trigger conditions: Definition of the period to perform the data recording process. (See Section 5.1.1.2.3)
5. Recording file name. When any analysis is performed, this is firstly saved in a temporary file; and when this analysis is confirmed to be recorded into the internal memory, then all data is transferred to a file with the set name in this option. (See Section 0)

6. By pressing the key "**SET**" at this point, data save into the temporary file is transferred to the user-defined file.

This action can last for some seconds, and, in the meantime, the number of remaining records to be transferred into the A5T file can be read in display.

In case that a previous analysis has been already performed with this file name, this transference action will suppose all previous data to be deleted and replaced by new measured values.

If no analysis have been performed and this option is selected, the analysis will show in display the following error message:

Memory Empty.
Perform an
Analysis.
Press ESC

7. These texts indicate the analyzer status. Below words "LEVEL" and "TIME" the linked trigger status is indicated (if trigger conditions are being met or not). Besides, the analyzer status can be also noticed:

- Acquisition Stop: No data analysis is being performed by the analyzer.
- Acquisition Store ON: A data analysis has been started and, since trigger conditions are met, the data recording process is active.
- Acquisition Store OFF: A data analysis has been started but, since trigger conditions are not met, the data recording process is not active.

8. If the key "**ENTER**" is pressed at any moment, the analysis will start. All data is saved in a temporary file (TEMPORAR.TMP), and, when the analysis is finished, the analyzer will automatically inquire the user for saving all recorded data. If data is not recorded at this moment, then this action will have to be done by means of the "Record" option.

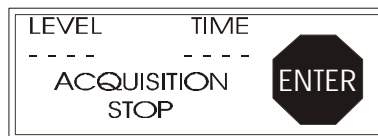
6.- OPERATION MODE

To use the AR5 as “Fast-Check” analyzer proceed as follows:

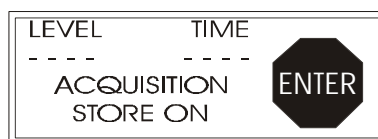
1. Turn the AR5 on and select the “Fast-Check” program.
2. The first screen is the instantaneous value screen where the user can check the proper connection of the analyzer to the monitored power system (ammeter clamp polarity, right voltage-current phase sequence, right transformation ratios)
3. Press the key **[ESC]** to pass to the “Fast-Check” screen.
4. Once in this screen, the specifications of our analysis can be defined (See Section: 5.2.-).
5. Once the Setup have been fully checked, the analysis can be started..

From this moment, and in case that a **manual trigger** has been set, the operation mode is as following described:

- The following message appears in the bottom of the screen:



- Press **[Enter]** to initiate the analysis.
- Confirm that the analysis is wanted to be started. Any possible trigger setting is not considered by the analyzer.
- The following message is shown in the screen:



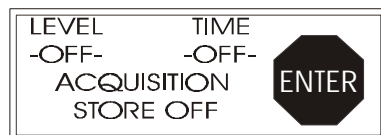
- Data recording process will be completed when the memory is full (SINGLE Trigger) or when the key **[ENTER]** is again pressed. At this moment, the initial message is again shown in the screen (ACQUISITION STOP).
- The analyzer will inquire the user for saving all recorded data. If the set file name already exists this could be modified.

In case that an **automatic trigger** has been set, the operation mode is as following described:

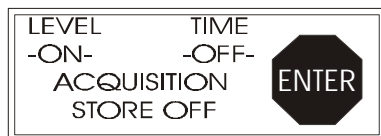
- The following message appears in the bottom of the screen:



- Press **[Enter]** to initiate the analysis.
- Confirm that the analysis is wanted to be started. Data recording process will depend on any possible trigger setting
- Following message might appear in the screen:



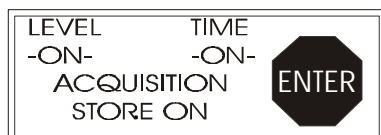
No data recorded since neither the level trigger as the time trigger conditions are met.



No data recorded since the time trigger condition is not met.



No data recorded since the level trigger condition is not met.



Data is being recorded in memory as all trigger conditions are met.

- Data recording process will be completed when the memory is full (SINGLE Trigger) or when the key **[ENTER]** is again pressed. At this moment, the initial message is again shown in the screen (ACQUISITION STOP).
- The analyzer will inquire the user for saving all recorded data. If the set file name already exists this could be modified.

Note:

Two discrete analysis cannot be saved into the same file. In case that when a file is demanded to be saved in memory this already exists, a confirmation to overwrite the previous file is inquired.

One analysis → One file

7.- TECHNICAL SPECIFICATIONS .

Voltage measurement:

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

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

Accuracy class:

- Current 0.5 % of readout \pm 2 digits
- Voltage 0.5 % of readout \pm 2 digits
- Active power 1.0 % of readout \pm 2 digits
- Reactive power..... 1.0 % of readout \pm 2 digits

Measuring conditions to assure accuracy class:

- Errors due to external voltage and current transformer not included
- Temperature range : 5 °C to 45 °C
- Power factor : 0.5 to 1.
- Measuring range : between 5 % and 100 %.

8.- 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.

9.- 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 - SETUP.

Menu		Description		Options	Standard	
Setup	Measure	Circuit		Choice type of measuring circuit.	Three-phase Single-phase ARON	Three-phase
		Tr. Rel	Rel. V	Voltage transformers ratio.		Primary=1 Secondary=1
			Rel. A	Current transformers ratio.		Primary=5
	Record	Period		Data recording period	Three-phase/Aron 3, 6, 9....60 Cycles Single-phase 1, 2, 3...60 Cycles	3 Cycles
		Length		Duration of data logging process		
		Trigger	Level	Level trigger	Vp-n A	A
			Time	Time trigger		
		Name		Recording file name		STD_PROG
		Type		File type	Standard Custom	Standard
		Param		Selection of parameters for "custom" type files		
		Comm		Communication parameters setting		9600,n,8,1
	Clock		Analyzer's date and time setting			
	Recall		Recalling standard configuration	Standard		
Display		Contrast.				
Files	Dir		Directory of stored files.			
	Delete		Deleting a file.			
	Format		Clearing all memory content.			

B. AR5 QUICK GUIDE: FAST-CHECK.

