POWER QUALITY ANALYZER

QNA-P / QNA-PV

(Cód. Q20713 / Q20731 QNA-P)

(Cód. Q20830 / Q20831 QNA-PV)

USER MANUAL

(M98155801-03 / 05A)

QNA-P/PV MANUAL CONTENTS

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1.- BASIC INSTRUCTIONS

This manual is designed to familiarise the user with operating the power supply quality analyzer model ***QNA-P/PV*** in order to get the best from its features.

QNA-P/PV is an analyzer specifically developed for supervising electrical power supply quality, which has been built with the most advanced technology in microelectronic components offering bench mark features in measuring and recording of electrical magnitudes in industrial power supply networks.

Please **read this manual carefully before connecting and switching on the analyzer** in order to avoid irreversible damage caused by improper use.

1.1.- Checking the contents of your package

Please check the following points on receipt of the analyzer:

a) The equipment delivered matches your order specifications.

b) After unpacking, check that the instrument has not been damaged during delivery.

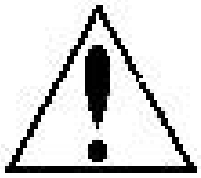
c) Standard equipment includes the following items:

1 RS-232 communication cable (female RJ-DB9).
1 ***QNA-P/PV*** User manual
1 CD containing PC program and user guide
1 GSM antenna (GPRS model only).

1.2.- QNA-P/PV Models

Code	Model
Q20711	Kit 1 QNA – P RS
Q20731	Kit 1 QNA – P GPRS. (SIM not included)
Q20712	Kit 2 QNA – P RS
Q20732	Kit 2 QNA – P GPRS. (SIM not included)
Q20830	QNA-PV RS (only voltage measurement)
Q20831	QNA-PV GPRS (only voltage measurement)

1.3.- Safety warnings



This manual contains information and warnings about the ***QNA-P/PV*** analyzer which must be followed to guarantee the proper operation of all instrument functions and to maintain it in a safe condition.

If the instrument is not used in accordance with manufacturer's specifications, the instrument's protection may be damaged.

Where any protection failure is suspected to exist (for example, if there are signs of external damage), the instrument must be immediately switched OFF. In the event of this contact a qualified technician.

1.4.- Operating instructions

QNA-P/PV is a programmable instrument, with operating modes which may be selected from the available programming menus.

Before starting the ***QNA-P/PV***, carefully read the paragraphs on **INSTALLATION & STARTUP AND SETTING *QNA-P/PV***, to select the most suitable operating mode for your requirements.

Note that when the instrument is switched on, the terminals may be dangerous when touched and opening or removing parts may access dangerous areas. Therefore, the instrument must not be used until it is properly installed.

2.- MAIN FEATURES

The ***QNA-P/PV*** is an analyzer specifically designed to check electrical power supply quality in accordance with the IEC 61000-4-30 standard.

- Harmonic measurement in accordance with IEC 61000-4-7
- Flicker measurement in accordance with IEC 61000-4-15
- Measurement of main electrical parameters.
  - Voltage, current, power, PF....
  - Harmonic distortion in Voltage and Current....
  - Neutral current and Neutral-Earth voltage
- 4-quadrant measuring system (Energy consumption and generation)
- High protection level against severe electrical conditions:
  - Wide range of supply and measurement voltages.
  - High protection level against overvoltage and transient events.
- Connection to either 3 or 4-wire distribution systems.
- Wide voltage supply range: 100-240 V c.a (QNA-P) / 100-400V c.a. ±30% (QNA-PV).
- Internal battery allowing the instrument to continue recording in the event of voltage supply loss.
- 4 Mbytes internal memory for saving all parameters measured by the *QNA-P/PV* analyzer.
- Communication via GPRS / GSM / RS-232 (according to model).
- Mounted inside a self-extinguishing case. Dimensions and fixing points according to DIN 43857.

2.1.- Basic features

The ***QNA-P/PV*** is an analyzer specifically designed to check electrical power supply quality in accordance with the IEC 61000-4-30 standard.

In addition to the A.C. voltage inputs (insulated by transformers), the instrument is equipped with 4 inputs of 2V (clamps) . which allows the *QNA-P/PV* to also be used as a network analyzer.

Its design in suitcase of high robustness (IP67) that makes an equipment ideal to measure in severe environmental conditions.

Moreover, the great variety of available models makes the *QNA-P/PV* suitable for any situation and communication mode.

The instrument's internal battery ensures continuity of measurement by the *QNA-P/PV* analyzer in the event of any loss in voltage supply (short or long-term line interruption).

QNA-P/PV is equipped with three A.C. voltage inputs which permit simultaneous **voltage** measurement in all three phases, together with **frequency** measurement in any power system.

To analyse electrical power supply quality in accordance with IEC 61000-4-30, the ***QNA-P/PV* uses a DSP** to analyse all cycles from all three voltage phases to detect the occurrence of any event (voltage dip, voltage swell, interruption). **Harmonic and flicker** is also **calculated** in accordance with **IEC61000-4-7 and 61000-4-15**, respectively,.

The *QNA-P/PV's* input 2V (2V / 5A) can analyse the main electrical parameters in 4 quadrants (Energy consumption and generation).

The QNA also has a Neutral current entry and another for Neutral-Earth voltage measurement. These parameters complete the information that the QNA is able to supply to study the electric network.

The ***QNA-P/PV*** analyzer is equipped with a **built in 4 Mbytes memory** to receive quality, events and electrical parameters.

The different information recorded in the ***QNA-P/PV***'s built in memory is distributed in four file types:

- *.STD files: This file contains all periodically recorded values (voltage, current, frequency, power, energy, flicker, harmonic distortion, harmonic content, unbalance).
- *.EVE files: File containing all incidents referred to the ***QNA-P/PV*** itself (file readout, setup modification, memory erasure, power supply on/off, battery on/off...).
- *.EVQ: This file contains all events observed in the electrical power supply (voltage dips, voltage swells, interruptions) together with supplementary information about these events (time of the event occurring, maximum/minimum voltage, average voltage, voltage prior to the event).
- *.H24: This file contains the data required to obtain a statistical analysis of the harmonic evolution in one day.
- *.STP: This file stores average values for voltage, frequency, flicker (pst and plt) and the THD over one week.

Measurable parameters by the *QNA-P/PV* analyzer are listed below:

Parameters	L1	L2	L3
Voltage	X	X	X
Current	X	X	X
Frequency	X		
Active power	X	X	X
Reactive power L	X	X	X
Reactive power C	X	X	X
Apparent power	X		
Active energy	X		
Inductive energy	X		
Capacitive energy	X		
Power Factor	X	X	X
Voltage THD	X	X	X
Current THD	X	X	X
Voltage harmonic content	X	X	X
Current harmonic content	X	X	X
Type of voltage wave	X	X	X
Type of current wave	X	X	X
Neutral current	X		
Neutral-Earth voltage	X		
Flicker (PST)	X	X	X
Dip	X	X	X
Interruptions	X	X	X
Swell	X	X	X
Unbalance	X		
Asymmetry	X		

The above parameters will be measured and recorded regardless of energy consumption or generation in the installation.

2.2.- Electrical features

Using the ***QNA-P/PV*** as a recording instrument for evaluating electrical power supply quality means that the analyzer must have a high degree of protection against severe electrical conditions:

- High-energy varistors absorbing surges to avoid any costly repairs.
- Noise filters in voltage and current inputs to ensure reliable measurements even under the most adverse operation conditions.
- Power supply: transformers with extra power dissipation and insulation.
- Built-in battery power supply to ensure voltage supply to the *QNA-P/PV* analyzer in the event of voltage loss.
- Insulation transformers guaranteeing the proper insulation of inputs.

3.- ANALYSIS MODES

QNA-P/PV series analyzers can be used in different operating modes according to their setting.

The most striking features of the analysers are:

- Measurement and storage in memory of main power quality parameters (voltage values, flicker, harmonics and unbalance).
- Measurement and storage in memory of main electrical parameters (voltages, currents, frequency, power, PF...).
- Neutral current and Neutral-Earth voltage measurement.
- Setting a voltage threshold to define different events (voltage sags, voltage swells and interruptions). Also an optional setting of an hysteresis value for each individual threshold.
- ***QNA-P/PV*** can carry out **quality analyses** in 3-wire or 4-wire distribution systems. All quality measurements will be referred the line-to-neutral or line-to-line voltage according to selection.
- ***QNA-P/PV*** can also be used to measure through **voltage and current measuring transformers**.

4.- DATA STORAGE IN MEMORY (AUTOMATIC MODE)

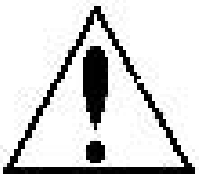
QNA-P/PV is equipped with an internal date and time clock to store automatic data recordings and quality events in the memory at regular time intervals..

The *QNA-P/PV* storage memory is divided into four independent blocks. Each discrete block is allocated to every file type to be saved. Every file type contains the following information:

- *.STD files: This file contains all values which are periodically recorded (voltage, current, energy, frequency, voltage harmonic distortion, harmonic content and unbalance…).
- *.EVE files: File containing all incidents referred to the ***QNA-P/PV*** itself (file readout, setup modification, memory erasure, power supply on/off, battery on/off...).
- *.EVQ: This file contains all events observed in the electrical power supply (voltage dips, voltage swells, interruptions) together with supplementary information about these events (time of the event occurring, maximum/minimum voltage, average voltage, voltage prior to the event).
- *.H24: This file contains the data required to obtain a statistical analysis of the harmonic evolution in one day.
- *.STP: This file stores average values for voltage, frequency, flicker (pst and plt) and the THD over one week.

QNA-P/PV is equipped with a built in **rotating memory** for data collection; this means that once this memory is full, new values overwrite the oldest ones. Therefore, if no data is to be lost, data must be retrieved from the memory before the oldest values are overwritten.

5.- INSTALLATION & START-UP



This manual contains information and warnings about the ***QNA-P/PV*** analyzer which must be followed to guarantee the proper operation of all instrument functions and to maintain it in a safe condition.

If the instrument is not used according to the manufacturer's specifications, the instrument's protection may be damaged Note that when the instrument is switched on, the terminals may be dangerous when touched and opening or removing parts may access dangerous areas. Therefore, the instrument must not be used until it is properly installed

Where any protection failure is suspected to exist (for example, if there are signs of external damage), the instrument must be immediately switched OFF. In the event of this contact a qualified technician.

5.1.- Connection terminal

The ***QNA-P/PV*** analyzer may be installed in any three-phase distribution line with neutral conductor (4 wires) or without neutral conductor (3 wires). Measurements solely depend on the connection mode and the analyzer configuration

The connection of an earth terminal is essential to ensure the efficiency of *QNA-P/PV* protection elements.

5.1.1.- Communication cables for RJ connectors

The most usual configurations for ***QNA-P/PV*** communication cables are as follows:

- RS-232 connection to PC or to external modem:

QNA-P/PV	PC
1–DSR	5–GND
2–Rx	3–Tx
3–TX	2–Rx
4–CTS	7–RTS
5–RTS	8–CTS
6–GND	5–GND

The RS-232 communication cables must always be disconnected to establish communication with a QNA-P/PV-GPRS/GSM via a mobile phone. If the RS-232 is connected, then modem operation is completely disabled.

5.2.- Starting the *QNA-P/PV* analyzer

Please check following points before switching on the analyzer:

1) Mains supply voltage:
   Voltage: 100-240 V AC (QNA-P)
   Voltage: 100-400 ± 30% V c.a (QNA-PV).
   Frequency: 50... 60 Hz.
2) Ground terminal: The ground terminal of the analyzer must be connected to earth. If it is not connected some of the protective parts may not work properly.
3) Maximum voltage in the voltage measurement circuit: 500 V C between phase and common:
   - ☑ 4-wire: 500 V AC line-to-neutral. / 866 V AC line-to-line.
   - ☑ 3-wire: 500 V AC line-to-line.
4) Maximum voltage in the Earth measurement circuit: 500 V AC between Neutral Earth.
5) Maximum permissible current : **Depends of the clamp In / 2 V c.a.**
6) Consumption: 16 VA – 8 W
7) Operating conditions:
   - Operating temperature range: 0ºC to 50ºC.
   - Storage temperature: -20ºC to 70ºC
   - Operating humidity: 0% to 90 % RH.
8) Safety: Designed to meet protection class III according to EN 61010.

Points to check during the installation process:

9) Check that the ground terminal of ***QNA-P/PV*** is connected to earth to avoid any possible interferences to the analyzer. If this ground terminal is not connected, then the effectiveness of the ***QNA-P/PV*** protection elements may be reduced.
10) Check power readouts and their sign (check current measurement transformer polarity).
10) Verify the ***QNA-P/PV*** setup.

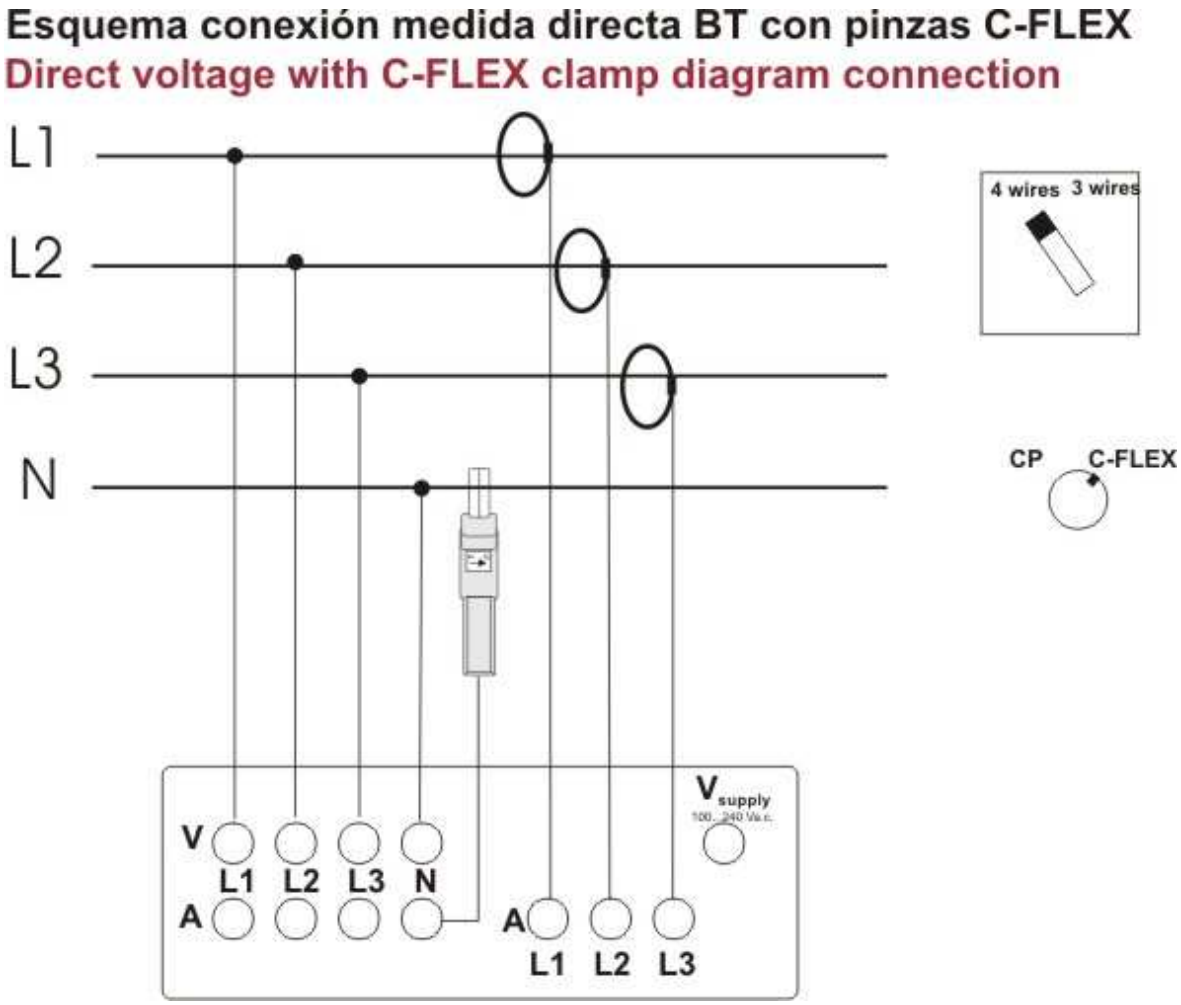
Points to consider:

Voltage values flashing on the display is a sign that the analyzer is incorrectly installed or configured. Possible causes might be:

- The analyzer detects an event: This can mean a real event in the network, or a wrong rated voltage setting where the set value does not match the actual network voltage.

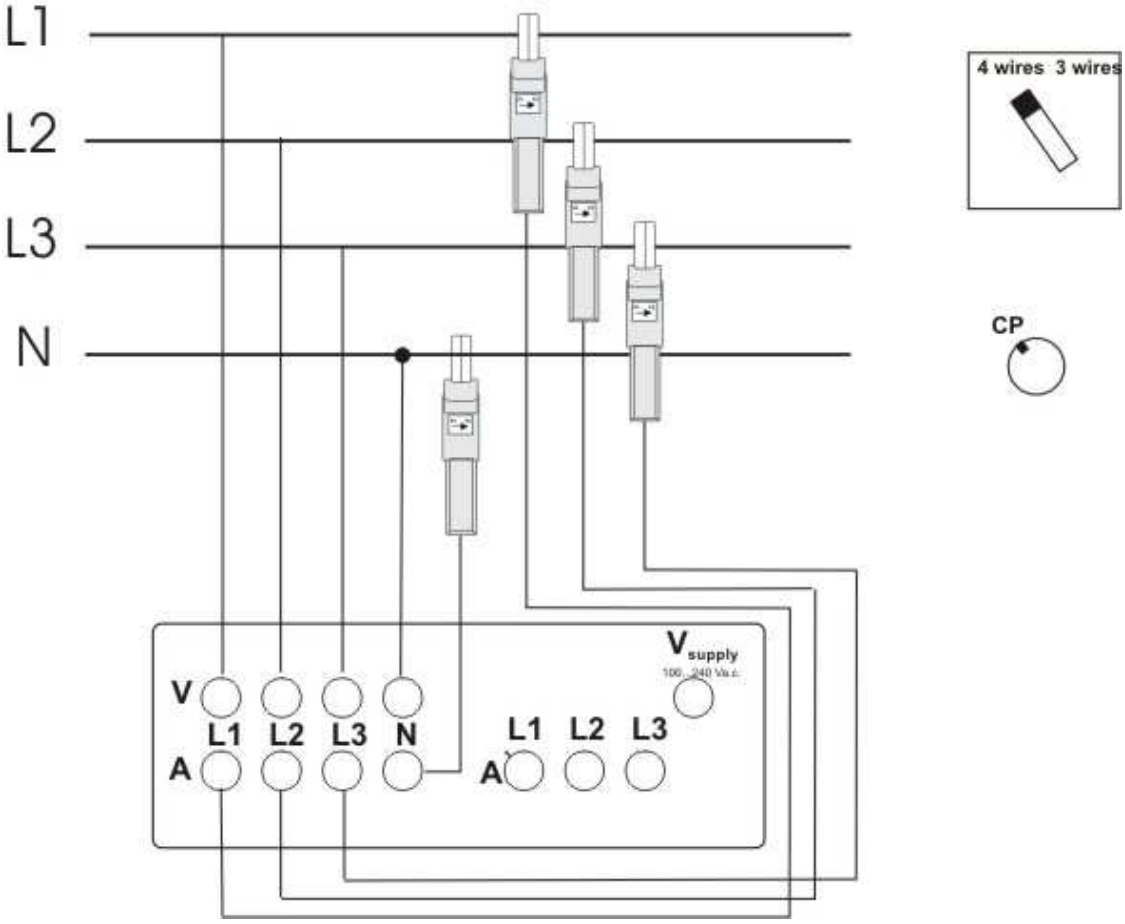
- If **the unbalance screen displays dashes**, there is an incorrect phase sequence.

5.3.- Connection drawing for the QNA-P/PV.

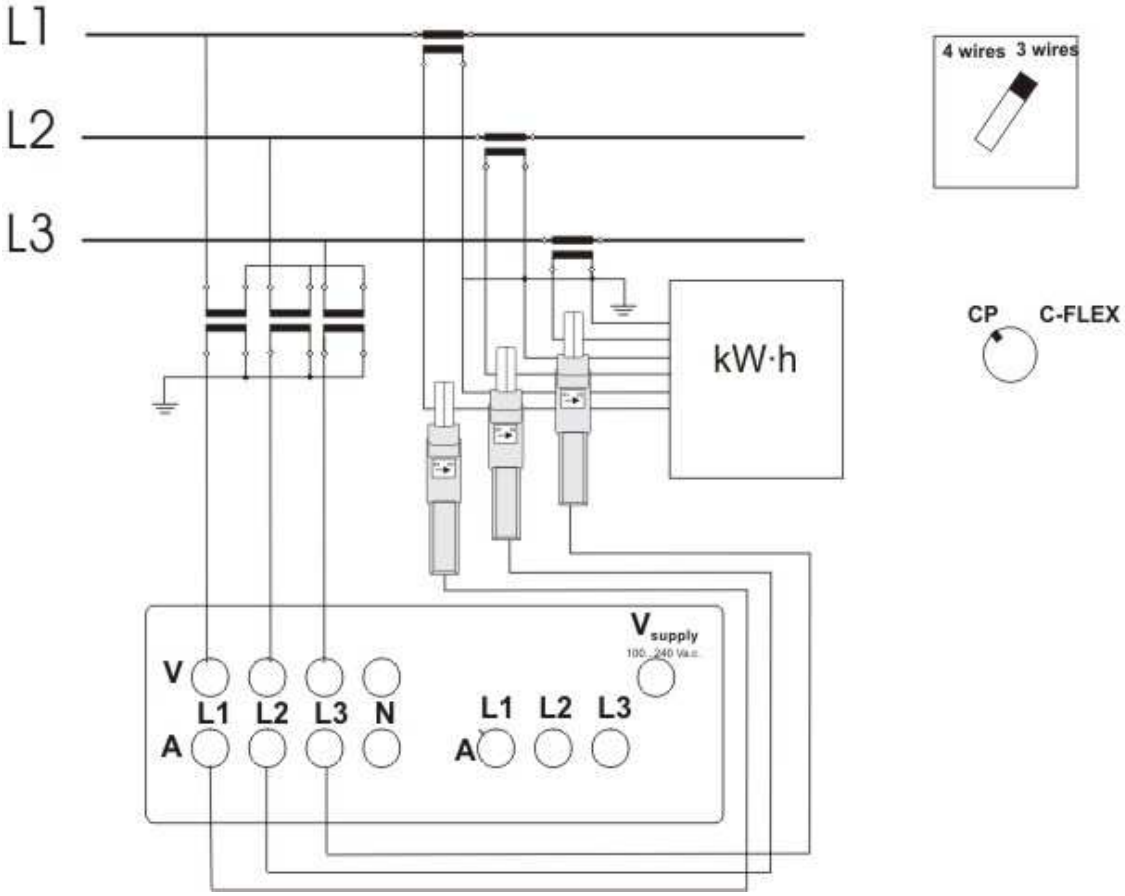


Esquema conexión medida directa B.T., con pinzas CP

Direct voltage with CP clamp diagram connection



Esquema conexión a través de transformadores de tensión (M.T.)
Voltage transformer diagram connection (H.V.)



6.- THE *QNA-P/PV* ANALYZER'S INTERNAL BATTERY

The analyzer has an internal battery to ensure power supply to the analyzer when any event occurs. This battery keeps the analyzer continuously powered for 2-4 hours in the event of the mains power supply being cut. This operating period after voltage supply loss is user-programmable in order to save the battery and to ensure that any possible intermittent voltage interruptions are detected.

The guarantee of a 9999 second operating period is essential to ensure the proper detection and recording of multiple and long-term voltage interruptions.

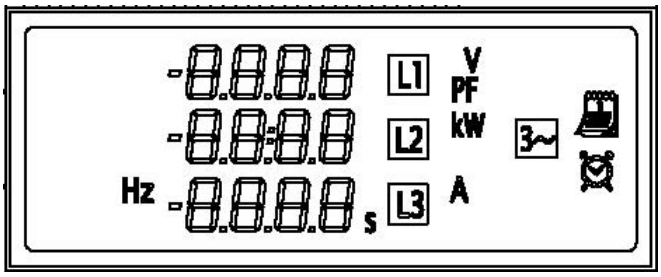
The battery is charging when the analyzer is connected to the mains.

The ***QNA-P/PV*** analyzer is equipped with an **intelligent energy charging system**. This means that the instrument continuously and automatically checks the status of the battery. This means that the charging process stops when the battery is on maximum charge level and, therefore, the life of the battery is increased.

7.- OPERATING MODE

7.1.- Display and buttons

QNA-P/PV is equipped with a display to show all information being measured by the analyzer using different buttons.



The function of each button on the ***QNA-P/PV*** analyzer is:

– ⬆ (Next screen): The next display screen is accessed.

– ⬇ (Previous screen): The previous display screen is accessed.

7.2.- Turning the analyzer on

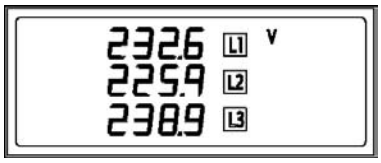
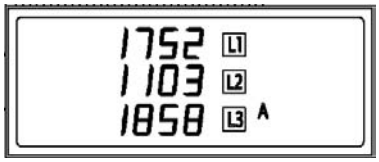
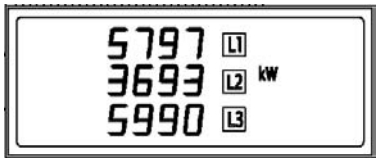
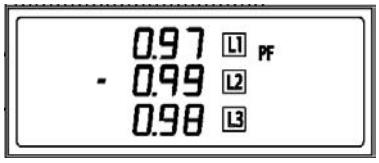
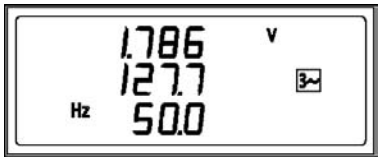
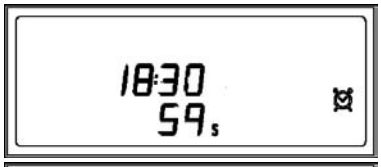
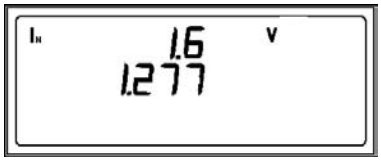
When the ***QNA-P/PV*** is turned on, the first screen appears with the analyzer's identification:

After some seconds, the display will show a screen displaying the three voltages measured by ***QNA-P/PV*** in each phase.

Use the ↑ and ↓ buttons to move through each available display screen.

7.3.- Display screens

The available display screens on the QNA-P/PV analyzer are as follows:

	☞ Voltage measured in the network
	☞ Current measured in the network
	☞ Active power kw without flicker = kW kw with flicker = MW
	☞ Power Factor
	☞ Unbalance rate ☞ Asymmetry rate ☞ Frequency
	**Date** ☞ Day / month ☞ Year
	**Clock** ☞ Hour / Minutes ☞ Seconds
	☞ **Neutral-Earth Voltage** ☞ **Neutral current**

Remarks

The QNA-P/PV analyzer may indicate that it is incorrectly installed or configured. Possible causes might be:

- **Voltage values flashing on the display**. Possible causes might be:
  - The analyzer detects an event: This can mean a real event in the network, or a wrong rated voltage setting where the set value does not match the actual network voltage..
  - If **the unbalance screen displays dashes**, there is an incorrect phase sequence.

- Power screens with a negative sign:
  - The installation is generating energy, or, the current transformer polarity is inverted.
  - PF values are wrong. Check the voltage and current phase wiring, the phase sequence is probably not correct.

8.- SETTING UP *THE QNA-P/PV*

Any setup action for the QNA-P/PV analyzer must be always done through a PC

The ***QNA-P/PV*** analyzer's performance will depend on the user-configuration of the instrument. There are two different setup procedures for configuring the analyzer:

- Operating Setup: To define the ***QNA-P/PV*** analyzer's operating mode.
- File Setup: To define the data collection procedure of the ***QNA-P/PV*** analyzer in the internal memory.

8.1.- Operating setup of the *QNA-P/PV* analyzer

The user defined procedures are listed below:

8.1.1.- Transformation ratios for voltage and current transformers

The ***QNA-P/PV*** analyzer can measure via transformers.

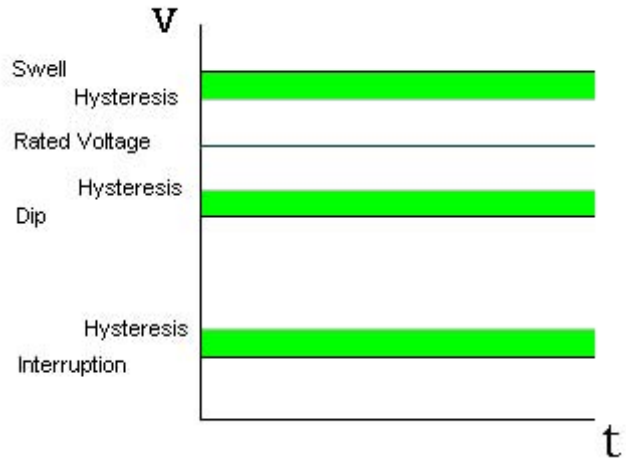
- **Voltage primary value / Voltage secondary value:** Setting the transformation ratio for voltage transformers used in measuring. Set 1/1 for direct voltage measurement (no voltage transformer used).
- **Current primary value:** Setting the primary value for the current transformers used in measuring.
- **Neutral current primary value:** Setting the primary value of the current transformer used in measuring Neutral current

8.1.2.- Features of the monitored electrical network

- **Rated voltage:** The rated voltage of the power system to be monitored by the ***QNA-P/PV*** analyzer. For a 3-wire configuration the line-to-line voltage must be set (ex. 400 V~), and for a 4-wire configuration the line-to-neutral voltage must be set (ex. 230 V~). If a voltage measurement transformer is used, then the rated voltage to be set must be referred to the secondary side (ex. 63.5 V~). The correct configuration of this is essential because the limits for the analysis of the quality of electrical power supply is to be analysed.
- **Rated frequency:** The rated frequency of the power system to be monitored by the ***QNA-P/PV*** analyzer. This parameter is necessary for the calculation of the RMS signal value in extreme quality networks.
- **4 Wire / 3 Wire:** The ***QNA-P/PV*** analyzer must be set according to the distribution system to be monitored, whether with neutral conductor (4 wires) or without neutral conductor (3 wires or Aron). The proper setting of this point is essential to ensure the correct detection of events. This choice must also match the external connection configuration.
- **Circuit type:** When measurement is via three current probes, then the analyzer must be set to operate with a three-phase circuit. For 3-wire networks, that is, networks without neutral conductor, the analyzer can be set to work in ARON system. Here only two current probes are required.

8.1.3.- Quality parameters

In order to determine electrical power supply quality, the voltage levels defining the event must be set beforehand.



Therefore, following points must be user-defined:

- **% of voltage swell threshold:** The detection of a voltage swell depends on the value set for this point (% of the rated voltage). Every semi-cycle with a RMS value over the defined limit value is said to be a voltage swell. A record will be kept in the events file (EVQ) every time this limit is exceeded, with the indication of the phase, the maximum voltage value detected, the voltage average value, voltage value previous to the event and the duration of the voltage swell event.

- **Voltage swell hysteresis:** A voltage swell hysteresis value can be defined at a different value for the voltage swell event starting and finishing. Therefore, a voltage swell event starts when the voltage swell threshold is exceeded and ends when the voltage value is below the value defined by subtracting the voltage swell hysteresis value from the voltage swell threshold.
- **% of voltage dip threshold:** The detection of a voltage dip depends on the value set for this point (% of the rated voltage). Every semi-cycle where the RMS value is below the defined limit is said to be a voltage dip. A record will be saved in the events file (EVQ) every time this limit is exceeded indicating the minimum voltage value detected, the average voltage value and the duration of the voltage dip event.
- **Voltage dip hysteresis:** A voltage dip hysteresis value can be defined at a different value for the voltage dip event starting and finishing. Therefore, a voltage dip event starts when the voltage dip threshold is not reached and ends when the voltage value is over the value defined by adding the voltage dip hysteresis value to the voltage dip threshold.
- **% of interruption threshold:** The detection of an interruption depends on the value set for this point (% of the rated voltage). Every semi-cycle where the RMS value is below the defined limit is said to be an interruption. A record will be saved in the events file (EVQ) every time this limit value is exceeded indicating the minimum voltage value detected, the average voltage value and the duration of the interruption event.
- **Interruption hysteresis:** An interruption hysteresis value can be defined at a different value for the interruption event starting and finishing. Therefore, an interruption event starts when the interruption threshold is not reached and ends when the voltage value is over the value defined by adding the interruption hysteresis value to the interruption threshold.
- **STD file recording period.** Part of the memory allocated for this file, expressed in days. This is a not modifiable value, it will depend on the recording period and the memory allotted for other files.
- **Number of recordings in the EVE file.** Part of the memory allocated for the incidents file, expressed as the number of incidents.
- **Number of recordings in the EVQ file.** Part of the memory allocated for the events file, expressed as the number of events.
- **H24 file size (in weeks):** Indication of the H24 file size.

		Default
STD file recording period.(*)		(Calculated value – Not programmed)
		74 days 23 hours
Number of recordings	**EVE file**	4655
	EVQ file	12330
H24 file size (days):		32
STP file size (weeks):		16

(*) The STD file has been calculated assuming a 10-minute recording period, and the default parameters of the STD file.

8.1.4.- Data to take into account for the periodical data recording process

Some points to allow the user to precisely define the information to be used for the recording calculation procedure .

Therefore, the user can define:

- **Description of the measurement site:** An identifying field to be filled in by the user.
- **Remark:** An information field to be filled by the user.
- **Recording period:** (affecting the .STD file only). The recording period of the integrated values. The recording period is, by default, set at 10 minutes, but this value is user-settable from 1 minute to 2 hours.
- **Integration of 10-cycle blocks with events (all except for voltage):** (affecting the .STD file only). An event might occur (voltage swell, dip, …) while the analyzer is calculating the voltage, flicker, harmonic averages. The ***QNA-P/PV*** allows the 10-cycle block where the event occurred to be added to the integration. If this option is disabled (“No”), then the 10-cycle block would be only added to the voltage average.
- **Integration of 10-cycle blocks with events (voltage):** (affecting the .STD file only). An event (voltage swell, dip, …) may occur while the analyzer is calculating the average voltage. The ***QNA-P/PV*** allows the 10-cycle block where the event occurred to be added to the integration (this may be for one or more event, depending on the duration of the event). If this option is disabled (“No”), then the 10-cycle block would be ignored, and, therefore, it would not be added to the integration for this periodical recording. This option does not affect the other parameters.
- **Date type:** (affecting the .STD file only). Permits the user to select date/time to be saved together with each recording. This date can be the initial or final recording.
- **Battery auto-power off timer:** The user can set the time for the ***QNA-P/PV*** battery auto-power to switch off in the event of supply voltage loss, in order to save the battery and to ensure the detection of possible intermittent voltage interruptions. The usual time is about 15-30 min.

8.2.- Selecting the parameters to be recorded

The ***QNA-P/PV*** saves all quality parameter recordings in its internal memory. The different information recorded by the ***QNA-P/PV*** is distributed in three file types:

8.2.1.- Standard file (STD)

The standard file (STD) is used to store all periodically recorded parameters.

The following electrical parameters will be saved in the memory during the user-defined recording period:

Parameter	L1	L2	L3	File
Voltage(Line-to-Neutral or Line-to-Line)	X	X	X	STD
Current	X	X	X	STD
Frequency	X			STD
Apparent power	X			STD
Energy Consumption				
Active power	X	X	X	STD
Reactive power L	X	X	X	STD
Reactive power C	X	X	X	STD
Power Factor	X	X	X	STD
Active energy	X			STD
Reactive energy L	X			STD
Reactive energy C	X			STD
Energy Generation				
Active power	X	X	X	STD
Reactive power L	X	X	X	STD
Reactive power C	X	X	X	STD
Power Factor	X	X	X	STD
Active energy	X			STD
Reactive energy L	X			STD
Reactive energy C	X			STD
Neutral current	X			STD
Neutral-Earth voltage	X			STD
Harmonics				
Voltage THD	X	X	X	STD
Current THD	X	X	X	STD
Voltage harmonic content (Selection of any harmonic between 2-50)	X	X	X	STD
Current harmonic content (Selection of any harmonic between 2-50)	X	X	X	STD
Wave types (V,I)	X			STD
Flicker (PST)	X	X	X	STD
Quality				
Dip	X	X	X	EVQ
Interruptions	X	X	X	EVQ
Swell	X	X	X	EVQ
Unbalance				
Unbalance	X			STD
Asymmetry	X			STD

*** The STD file will record the average values of the electrical parameters**

- **Flicker:**
  - **Pst:** The ***QNA-P/PV*** saves the Flicker value (Pst) obtained over the recording period. The Plt value will be calculated by the data analysis software in the PC.
- **Harmonics:**
  - **Harmonic distortion:** The ***QNA-P/PV*** will calculate and record in the memory the value of the average voltage harmonic distortion detected in the monitored power system.
  - **Harmonic content:** The ***QNA-P/PV*** will calculate and record in the memory the average value of the individual harmonic distortion rate for each voltage harmonic in the monitored power system (up to the 40th harmonic) (harmonic content of each 10-cycle blocks which have been integrated over a recording period).
  - **Direction of the harmonics:** The ***QNA-P/PV*** allows the direction of the individual harmonics to be displayed, indicating if a specific harmonic is being generated by the user or is being generated outside the installation.
- **Wave types:**
  - **Voltage:** Records one cycle of the voltage signal wave type on finishing the recording.
  - **Current:** Records one cycle of the current signal wave type on finishing the recording.
- **Unbalance:**
  - **Asymmetry rate:** ratio of homo-polar voltage to direct voltage.
  - **Unbalance rate:** ratio of inverse voltage to direct voltage.

8.2.2.- Events file (EVQ)

The analyzer also records an events file containing information on any event detected in the monitored power system. The following data is saved about each event:

Event date: Indication of the time of the event. This value is obtained with an accuracy of one cycle.

Type of event: Indication of the event type, i.e. a voltage dip, a voltage swell or an interruption. These events are defined in accordance with the ***QNA-P/PV*** setup. The type of event also identifies the phase where this event ocurred.

Duration of the event: Period of time in milliseconds that the event lasted.

Maximum/minimum voltage for the event: In the event of an interruption or voltage dip, the minimum RMS½ (*) voltage value obtained during the event. In the event of a voltage swell, the maximum values will be recorded.

Average voltage for the event: The average RMS½ (*)voltage value during the event.

Voltage prior to the event: The RMS½ (*) voltage value before the event occurrence is recorded.

(*) RMS ½ value: RMS value of a complete cycle, refreshed every semi-cycle.

8.2.3.- Incidents file (EVE)

All incidents sent to the ***QNA-P/PV*** are automatically saved in this file, with an indication of the time and type of incident. The following incidents may be detected and recorded by the ***QNA-P/PV***:

Battery OFF: Indication of the time when ***QNA-P/PV*** stopped operating. This time depends on the value set by the user for the operating period after a voltage supply loss.

Auxiliary power supply ON: Indication of the time when the ***QNA-P/PV*** analyzer was connected to an external power supply.

Auxiliary power supply OFF: Indication of the time when the external power supply for the ***QNA-P/PV*** analyzer was interrupted. The analyzer is supplied from the internal battery from this time.

Setup modification: Record of the time when the instrument's setup was modified.

Memory formatting: Indication of the time when the user decided to format the ***QNA-P/PV's*** internal memory.

Forced memory formatting: The ***QNA-P/PV's*** internal memory will be automatically formatted if any error in this internal memory is detected.

File deletion: Indication of the time when the user deleted a file from the ***QNA-P/PV's*** internal memory. If the first data shown by the .EVE file indicates that a file has been deleted, then the deleted file was the events file.

Time change: Indication of any change to the date or time of the analyzer's internal clock. Recording this event type is quite important, because if the time intervals between two successive readouts are observed to be erroneous, this might be due to a change to the time of the internal clock.

Activated alarm: (only GSM devices) Indicates that the alarm condition has been activated, also indicates the alarm number.

Sended alarm: (anly GSM devices) Indicates that the alarm has been sended,condition is activated, also indicates which of the 8 telephone numbers has been activated.

8.2.4.- Harmonics statistics file (H24)

A series of values to be susbsequently used by the PC's software will be stored in this file. The software will calculate typical deviation, the statistical distribution curve and the effective values at 50%, 95% and 99% of each and every harmonic recorded by the QNA-P/PV .

8.2.5.- Weekly average values file (STP)

TYhis file will save the averaged weekly values for voltage variables (L1, L2 and L3), frequency, flicker (pst and plt) (L1, L2 y L3), harmonic distortion rate (L1, L2, L3 and three phase), unblanace and the total number of recordings used for calculations. The 0%, 5%, 95% and 100% values may also be obtained individually and as a whole taking into account all recordings, i.e. the whole week or just those recordings with no voltage events.

8.2.6.- Configuration and operation of the SMS alarms

The QNA-P/PV (GPRS / GSM model only) may configure up to 8 different alarms. A maximum and minimum limit and a time period may also be set for each alarm. They also may be sent to 8 different telephone numbers.

8.2.7.- Configuration and operation of the GPRS

The QNA-P/PV (GPRS model only) allows information to be sent to an FTP server via GPRS. This means that every X minutes the equipment automatically sends recorded information to an IP address defined by the user. The time period and the IP address are defined by the user. A user name and password supplied by the FTP server administrator to save the information must also be defined. This mode of communication avoids the user having to use a modem to download information, because it is the equipment itself which sends the information to the FTP server. This means that the user only requires an Internet connection to connect with the FTP server and to download the information.

9.- TECHNICAL SPECIFICATIONS

Power supply:

Supply voltage: Independent from the measuring circuit 100-240 V (QNA-P models)
100-400 V ±30% (QNA-PV models)
Frequency: 50...60 Hz.
Consumption: 16 VA – 8 W
Working temperature: 0ºC to 50ºC
Storage temperature: -20ºto 70ºC

Auxiliary power supply:

Battery: Ni-M-H
Autonomy: 9999 seconds continuous operation
(It is recommended that programming by software does not last for more than 1 hour to increase the life-time of the battery)

Voltage measurement:

Measuring system: 4 wire or 3 wire arrangement (choice by external connection)
Measuring range: 0 to 500 V AC. (phase-to-common).
4-wire network: 0 to 550 V AC. (line-to-neutral).
0 to 952 V AC. (line-to-line).
3-wire network: 0 to 550 V AC. (line-to-line).
Scale switch: Automatic.
Other voltages: Via voltage transformers.
Frequency : 42.5 – 69 Hz

Current measurement:

Measurement range : ... / 2V (according to current clamp).
Maximum current: 1.2 In
Scale switch : Automatic.

Accuracy:

Voltage: 0.1 % of nominal. (Class A according to IEC 61000-4-30)
Current: 0.1 % of nominal. (Class A according to IEC 61000-4-30)
Power: 0.2 % (according to EN 62053-22)
Unbalance: ± 0.15% (Class A according to IEC 1000-4-30)
Flicker: <5% according to IEC 61000-4-15
Harmonics: Class I according to IEC 61000-4-7

Measurement conditions to ensure accuracy class:

- Errors due to external voltage transformers not being included
- Temperature range : 5 ºC to 45 ºC
- Measurement range : between 5 % and 100 %

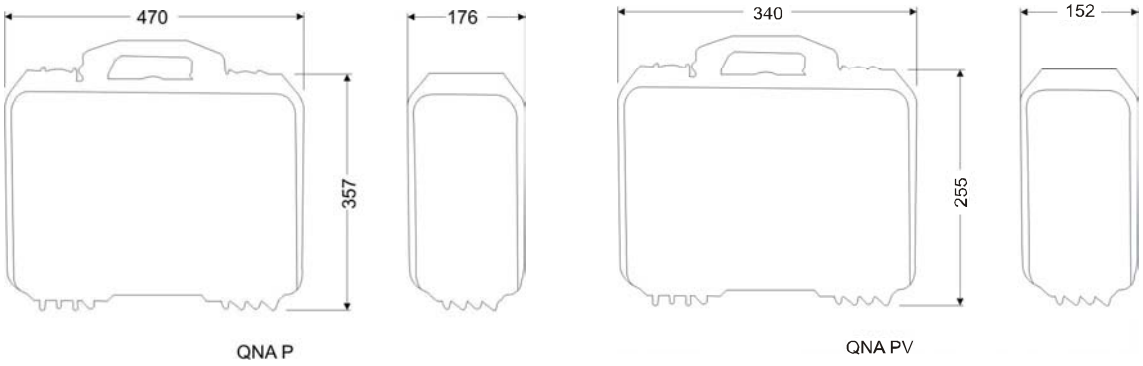
Internal memory:

Memory size: 4Mb

Mechanical characteristics:

Case: According to DIN 43859

Dimensions: According to DIN 43857



Weight: 6,7 Kg (QNA-P) / 5 Kg (QNA-PV)

STANDARDS

Quality : IEC 61000-4-30

Harmonics: IEC 61000-4-7

Flicker: IEC 61000-4-15

Other standards:

EN 60664, EN 61010, EN 61036, VDE 110, UL 94

EM EMISSION

- EN 61000-3-2 (1995), Harmonics.
- EN 61000-3-3 (1995), Voltage fluctuations.
- EN 50081-2 (1993), Industrial emission.
- EN 55011 (1994): Conducted (EN 55022 - Class B).
- EN 55011 (1994): Radiated (EN 55022 - Class A).

EM IMMUNITY

- EN 50082-2 (1995), industrial immunity.
- EN 61000-4-2 (1995), ESD.
- ENV 50140 (1993), EM Radiated field of RF.
- EN 61000-4-4 (1995), EFT burst.
- ENV 50141 (1993), RF common mode.
- EN 61000-4-8 (1995), 50 Hz H-field
- EN 50082-1 (1997), Residential immunity.
- EN 61000-4-5 (1995), Surges.
- EN 61000-4-11 (1994), Supply voltage interruptions.

10.- SAFETY CONSIDERATIONS

The user should take into account all installation instructions indicated in the INSTALLATION & STARTUP and TECHNICAL SPECIFICATIONS sections in this manual.

Note that when the instrument is switched on, the terminals may be dangerous when touched and opening or removing parts may access dangerous areas. The analyzer has been designed and tested to meet IEC 348 standard and is factory-shipped in proper operating conditions.

11.- MAINTENANCE

The ***QNA-P/PV*** does not require any special maintenance. No adjustment, maintenance or repair should be carried out while the instrument is open and switched on. Qualified technicians must carry out these actions when they are necessary.

Before any adjustment, replacement, maintenance or repair, the instrument must be totally disconnected from any power supply source.

If any protection failure is suspected, the instrument must be immediately placed out of service. The instrument's design allows it to be quickly replaced in the event of any breakdown.

The design of the analyzer allows it to be easily replaced in the event of breakdown.

12.- TECHNICAL SERVICE

For any information on the instrument's performance or in the event of breakdown, please contact CIRCUTOR's technical service.

CIRCUTOR S.A. - After-sales service
Vial Sant Jordi, s/n
08232 - Viladecavalls (BARCELONA - SPAIN)
Tel - + 34 93 745 29 00
fax - + 34 93 745 29 14

E-mail : central@circutor.es

A. Appendix: Installation and start up of the QNA-GSM/GPRS.

Configure the QNA-P/PV analyzer before inserting the new SIM card

N.B: The GSM line used must be capable of data transmission

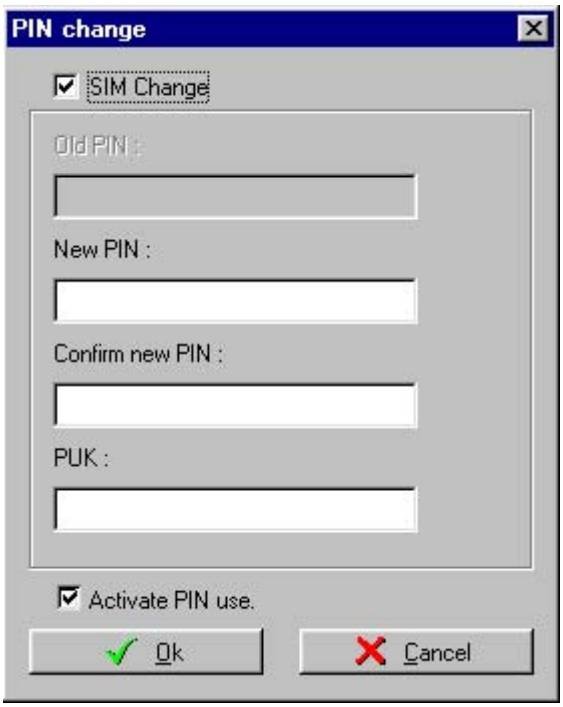
First the SIM on the phone line to be used must be configured to enable communication with the QNA-P/PV GSM/RS-232's GSM modem,.

This action will always be required when a new SIM card is inserted in the QNA GSM analyzer, regardless of whether it is the first installation or a replacement SIM.

Proceed as follows:

1. With no SIM card inserted:
   1) Turn on the QNA analyzer.
   2) Connect to the QNA analyzer via the RS-232 serial port using a communication cable.
   3) Use the PC software to add a QNA or, for a SIM change, modify the configuration on the existing QNA analyzer.
   4) Access the "general parameter" option in the software field, and select the option called "PIN change".

   The following screen will be then shown:

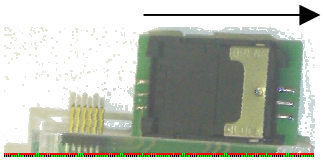


5) Select options “SIM change” and “Enable use of PIN”
6) Enter the PIN and PUK numbers for the SIM to be inserted.
7) Accept the action and follow the steps shown by the software:
   a. Insert the new SIM card and then remove the RS-232 communication cable from the analyzer.

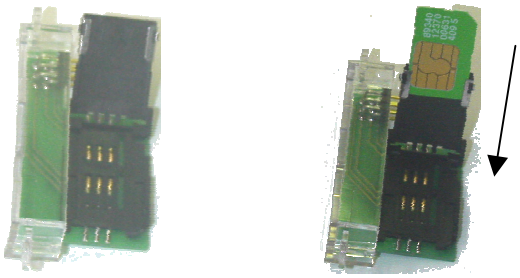
2. Inserting the SIM card

8) Loosen the screws on the SIM holder cover.

9) Carefully pull out the piece.
10) Release the SIM holding lock.



11) This position of the lock permits the user to open the holding piece and insert the SIM card.



12) Close the holding piece and place the lock back into its initial position.
13) Put the SIM holder cover back into the QNA analyzer.
14) Tighten the cover screws to avoid any possible malfunction of the SIM.

3. With the new card SIM inserted:
    15) Remove the RS-232 cable from the analyzer.
    16) Wait until the PC software issues a warning (About 60 s)
    17) Reconnect the RS-232 communication cable to the QNA analyzer.
    18) Check that the PC software notifies the results of the operation. The result may be:
        - Successful: The QNA modem is ready to operate.
        - Error: The SIM card has not been initialized. Check the configuration again, carefully following all steps.

Upon completion of the installation, ensure that the RS-232 cable is not still connected to the PC.
This connection will prevent the QNA communicating via the GSM modem

The local modem must not be connected via a telephone switchboard. It must be a direct line

B. Appendix: Installation and start up of the QNA-GPRS.

Steps to be followed when setting the QNA analyzer so that it sends recorded information via GPRS to an FTP server.

1- Apply power supply voltage to the QNA (it is important that when this is done, the RS-232 communications cable is not connected. If it is, then the modem will not start correctly).

2.-Wait for about 2 minutes so that the equipment starts the modem. Press the two keys at the same time until the screen display the message “SIGNAL XX”, XX being equal to the value of the existing cover (this may be between 0 and 30). When this message appears, it means that the modem start up process has been correctly carried out.

3.- Connect the RS-232 communications cable to the equipment.

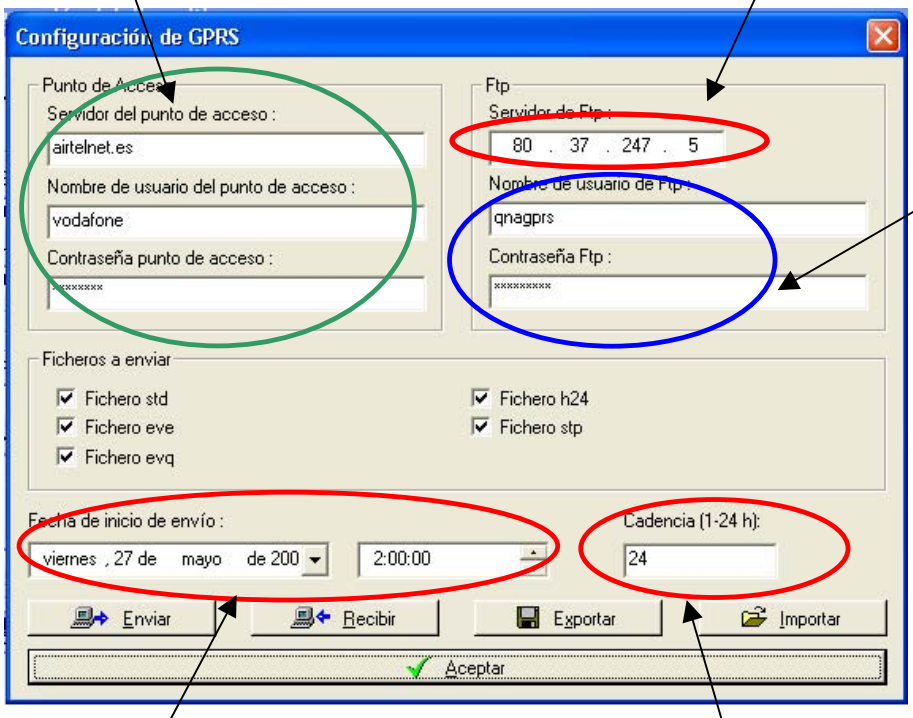
4.- Using the PowerVision software, enter the device’s general parameters and then press “GPRS”.

5.- The following message will then appear on the screen to allow the GPRS parameters to be changed:

This information is supplied by the telephone company. For example, Vodafone in Spain has the access point server: airtel.es . The user name and password is: vodafone in both cases.

IP of the FTP server from which the information is to be downloaded

User name and password for the FTP Server file to where the information is to be downloaded.



Indicates the date of the first piece of information sent. Every X hours from then on (as indicated in the frequency) a file is sent to the FTP server with the information.

Indicates the frequency in which the QNA is to send information to the server

C. Appendix: setting the SMS Alarms.

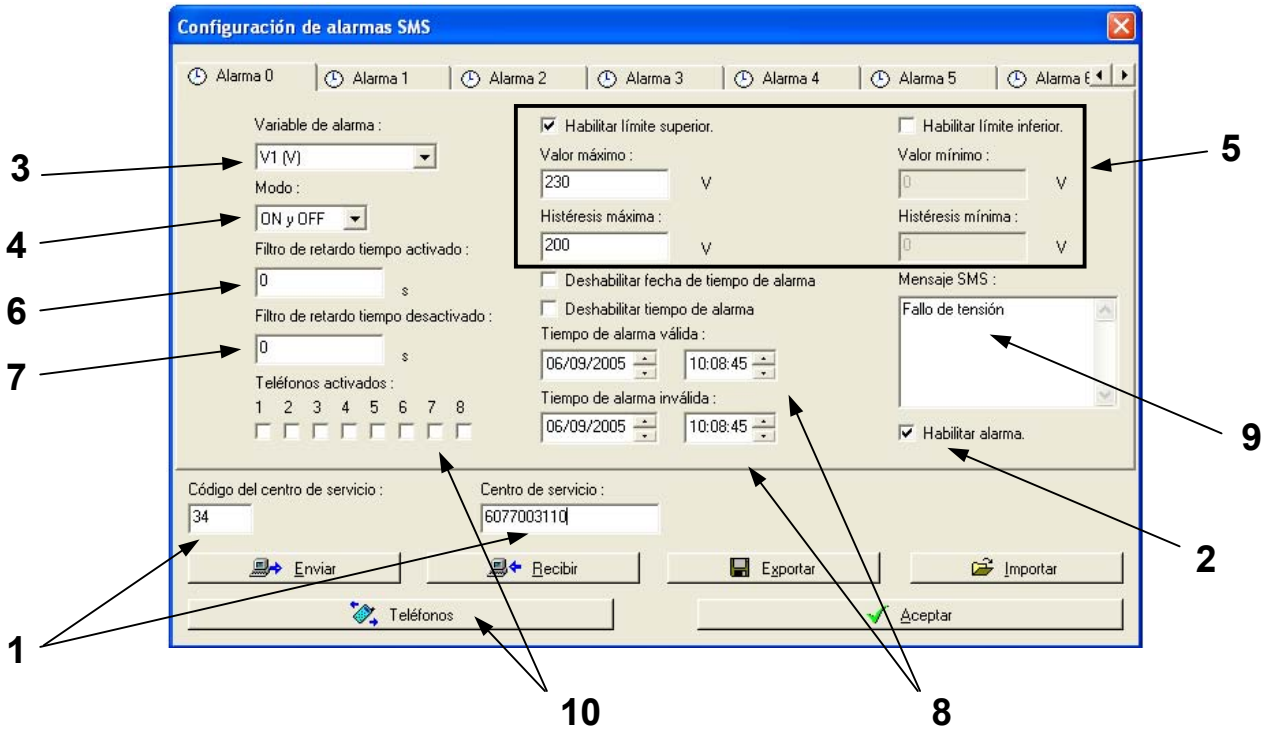
The equipment may be set so that it sends an SMS message when a preset condition is met.

Follow the steps below to activate and set the alarms:
1.- Connect the RS-232 communications cable to the equipment or set it to communicate via GSM

2.- Using the PowerVision software, enter the device's general parameters and then press "SMS Alarms"

4.- The following message will then appear on the screen to allow the SMS Alarms parameters to be changed

5.- Up to 8 alarms may be enabled at the same time. Once an alarm is enabled, it may be set



SMS alarms menu (Steps to be followed):

1. Service Centre Telephone:

   Country code for service centre (for example, 34 for Spain)
   Contracted company service centre (for example for Vodafone 607003110)

2. Enable Alarm

   The different parameters may be set once the alarm is enabled.

3. Select the type of alarm

Drop down menu with the available types of alarm:

Voltage	V1, V2, V3, VIII
Current	I1, I2, I3, IIII
Active power	W1, W2, W3, WIII
Capacitive power	vaC1, vaC2, vaC3, vaCIII
Inductive power	vaL1, vaL2, vaL3, vaLIII
PF	PF1, PF2, PF3, PFIII
Voltage THD	VTHD1, VTHD2, VTHD3, VTHDIII
Current THD	ITHD1, ITHD2, ITHD3, ITHDIII
Unbalance	
Asymmetry	
Frequency	
EVQ	IntV1, IntV2, IntV3, IntVIII, DipV1, DipV2, DipV3, DipVIII OverV1, OverV2, OverV3, OverVIII

4. Select the SMS send mode

Possible modes:

ON An SMS is sent when an alarm is activated.
OFF An SMS is sent when an alarm is deactivated.
ON and OFF An SMS is sent when an alarm is activated and deactivated.

5. Defining maximum, Minimum and Hysterisis limits

The maximum and/or minimum values to set off an alarm are now set. The hysterisis value is the margin value to fulfil the alarm condition.

6. Delay from reaching the alarm level to activating the alarm

Time in which the alarm condition is met. If the day/month/year fields are zero, the time is daily. If these variables are 0, the alarm is always on.

If the selected variable is EVQ, the unit for this variable must be stated in ms.

7. Delay in which the alarm goes back to OK and is deactivated

If the selected variable is EVQ, the unit for this variable will be 0.

8. Validity period for the alarm

The trip time may be set. The schedule when the alarm is to be active is indicated.

Alarm On time: Time when the alarm is to be active

Alarm Off time: Time when the alarm is to end

Note: If the alarm time date is disabled, the alarm shall be active every day during the preset time slot.
If the alarm time is disabled, the alarm will be active all the time.

9. Alarm message
   Received message text.

10. Telephone number(s) to which the SMS is to be sent and their activation.

Note: Time and level conditions (limits) have to be met if the alarm is to be activated

Note: A log is made in the eve file every time an alarm condition is met or SMS message sent

FOR EXAMPLE: Example of a voltage alarm setting and the different conditions which may be set

1. The following parameters are set:

Variable V1

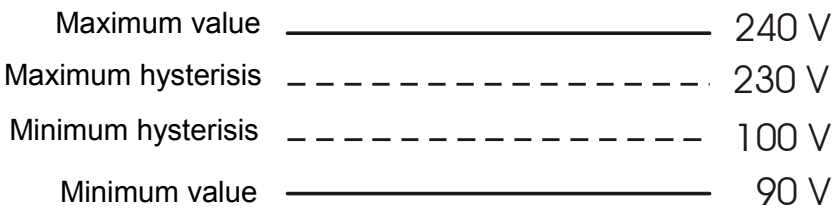
ON and OFF mode

Upper limit: Maximum value: 240, maximum hysterisis: 230

Lower limit: Minimum value: 90, minimum hysterisis: 100

Activated delay time: 5 seconds

Deactivated delay time: 5 seconds



The alarm will be activated under these conditions and an SMS will be sent when, for example, 240 V is exceeded for more than 5 seconds.

The alarm will be deactivated and an SMS sent when V1 is below 230 V for more than 5 seconds.