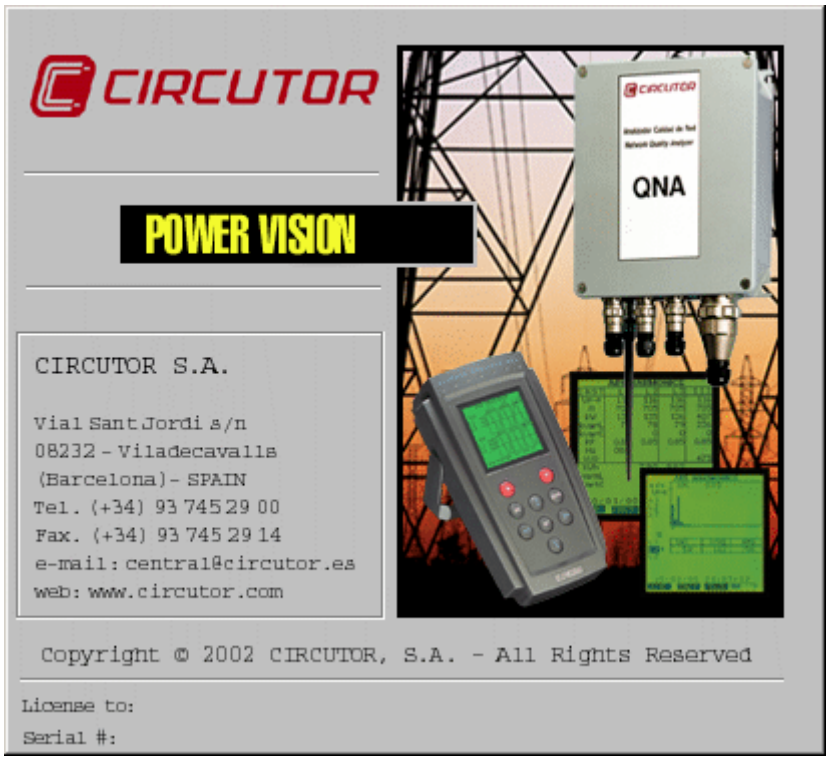


ELECTRICAL NETWORK ANALYSIS SOFTWARE

# Power Vision 1.7

(Cod. 775 353)

## USER'S MANUAL

(Cod. M 981 358 / 05B)

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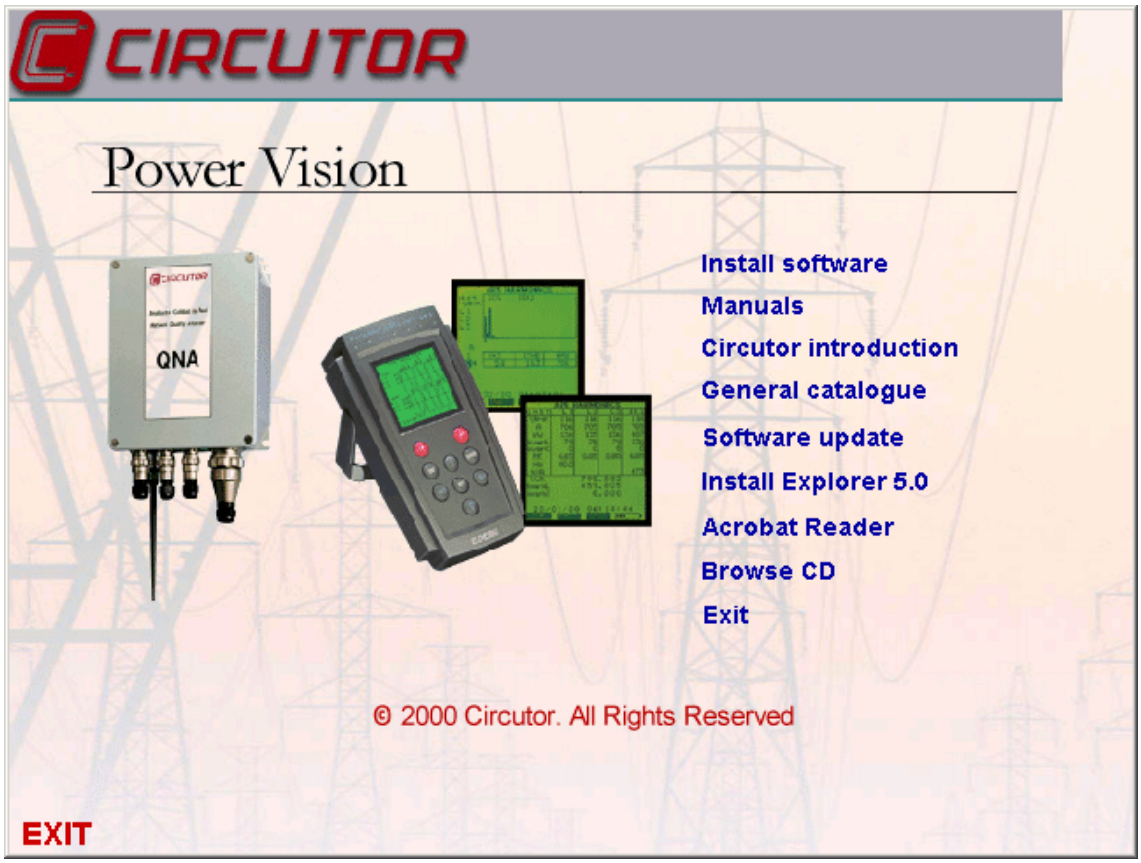
## 1.- POWER VISION SOFTWARE INSTALLATION

Firstly, you need these minimum requirements to a correct execution:

***Windows 95, 98, Me, XP, NT (4.0 or higher) or 2000***
***800x600 screen resolution***
***32 Mbytes of RAM***
***Pentium 133 MHz***
***Free 30 Mbytes on your hard disk***

Once you have proved your PC settings you'll be able to introduce de CD. An initial window will appear automatically when you introduce it in the CD-ROM reader:



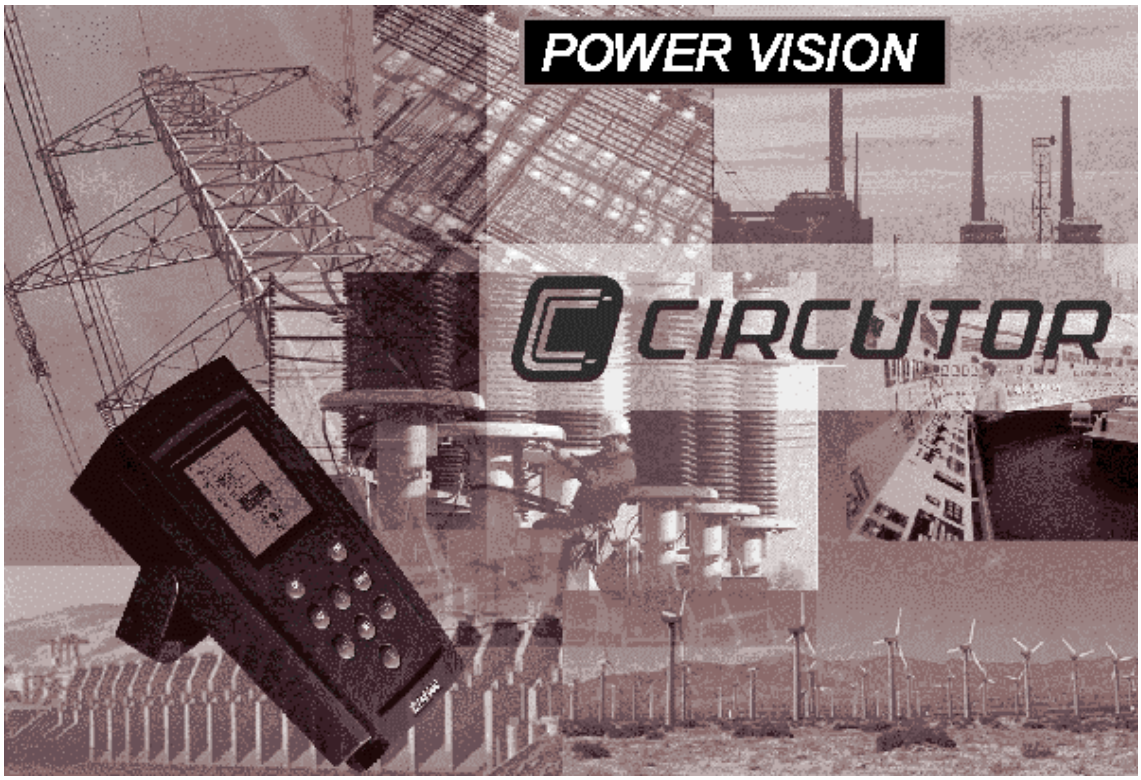

***Initial screen of installation***

If this screen doesn't appear automatically when you introduce the CD in the CD-ROM reader you must execute manually (from the Windows Explorer or the "***Run***" option from start menu) the program "***AUTORUN.EXE***". You can find it in the root of CD.

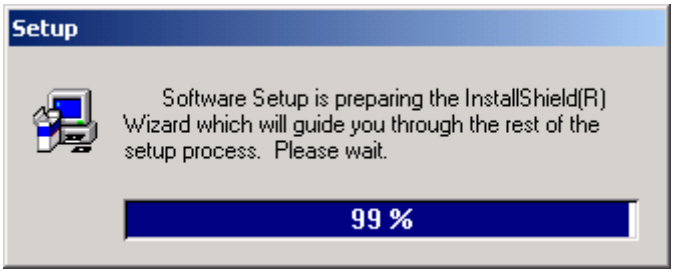
***Note:*** *Internet Explorer 5.0 installation or greater is not obligatory because Power Vision functions run correctly without the installation of this application. Nevertheless, if you have some doubt, we recommend installing this application in order to avoid possible subsequent problems. Internet Explorer 5.0 is included in the CD and you can install it clicking "**Install Explorer 5.0**".*

Finally, if you want to install the Power Vision software you must choose the "***Install software***" option in the main menu.

When Power Vision software contained in this CD is starting to be installed, it will appear a presentation screen while the installation is being prepared (it will appear a dialog box to inform the user).

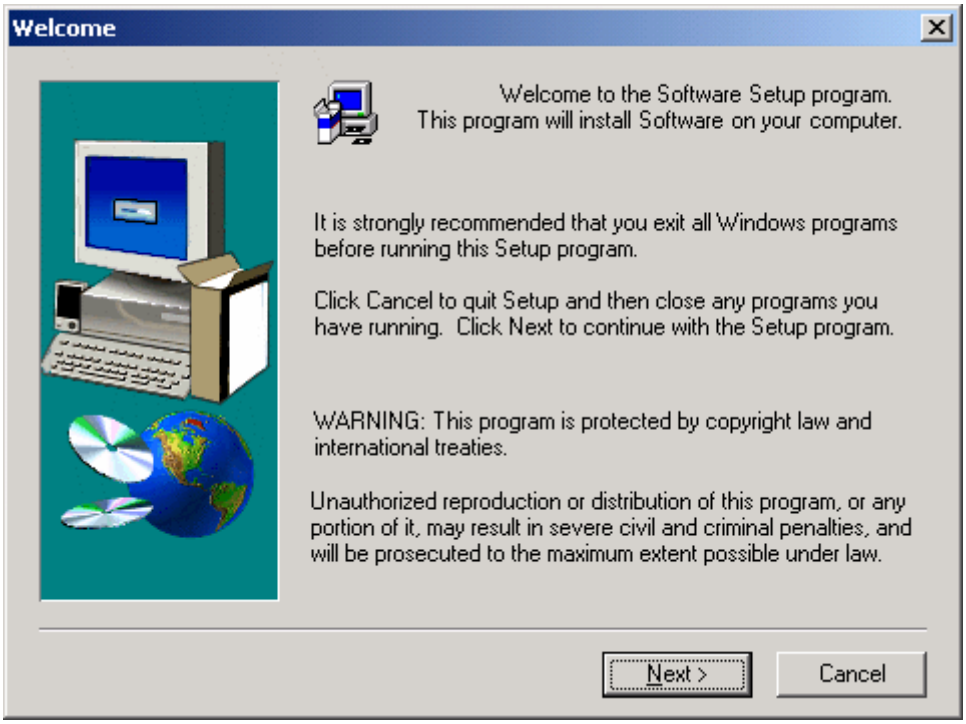



***Presentation image***



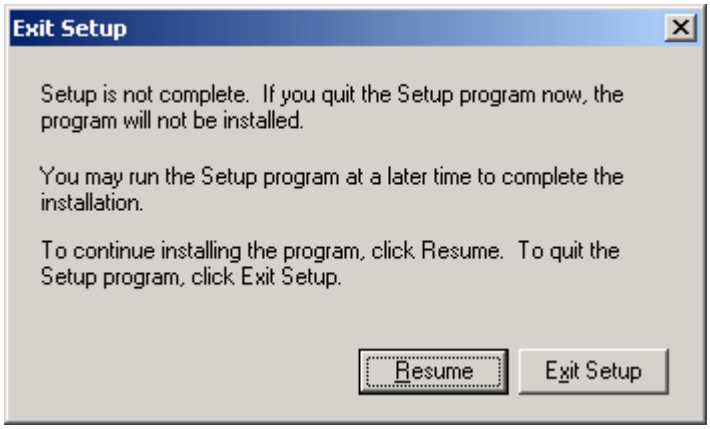

***Information about installation preparation process***

When the preparation process is finished, it will appear a welcome dialog box, to inform user about various legal and procedure aspects of the installation.




***Welcome dialog box***

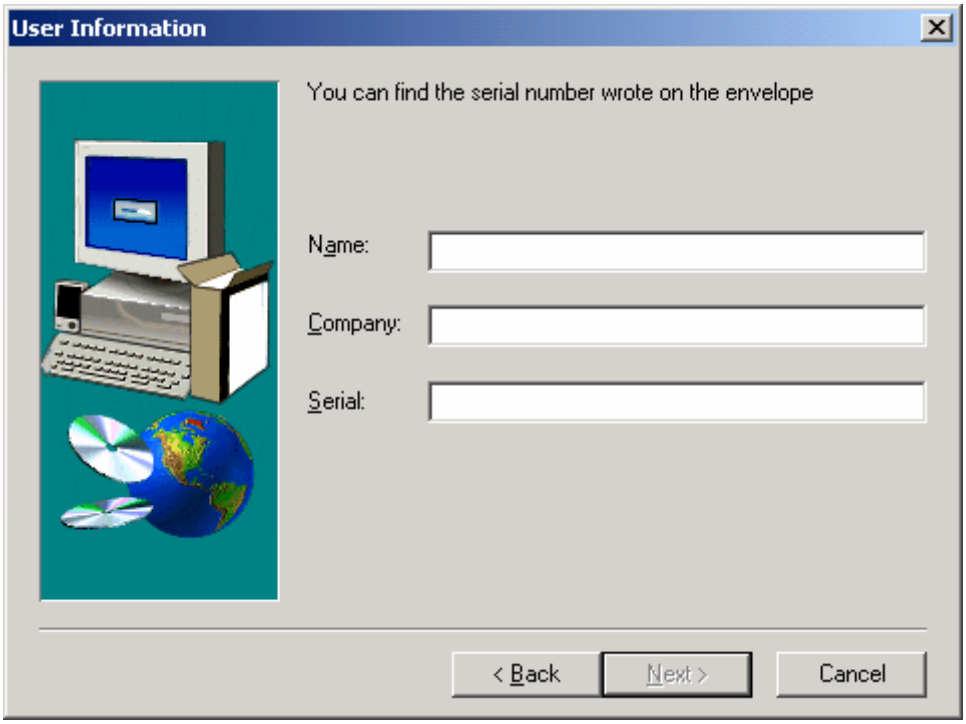
After reading all provided information, user will be able to follow with installation process, pressing "***Next***" button. Note that you can leave installation process at any moment clicking "***Cancel***" button, in those screens that allow it. If installation is cancelled, then it will appear a confirmation message as the following:




***Installation abort confirmation message***

If you choose "***Resume***" installation will continue at the same point that was stopped. If you want to leave installation process choose "***Exit setup***", program will exit and no data will be saved.

Well, if you have chosen "***Next***" into welcome dialog box, it will appear a screen asking for program registration data which is user name, company name, and program serial number. You will find program serial number in the cover that contents Power Vision application. This number has 10 digits, and its 6 first digits will always be 775353.



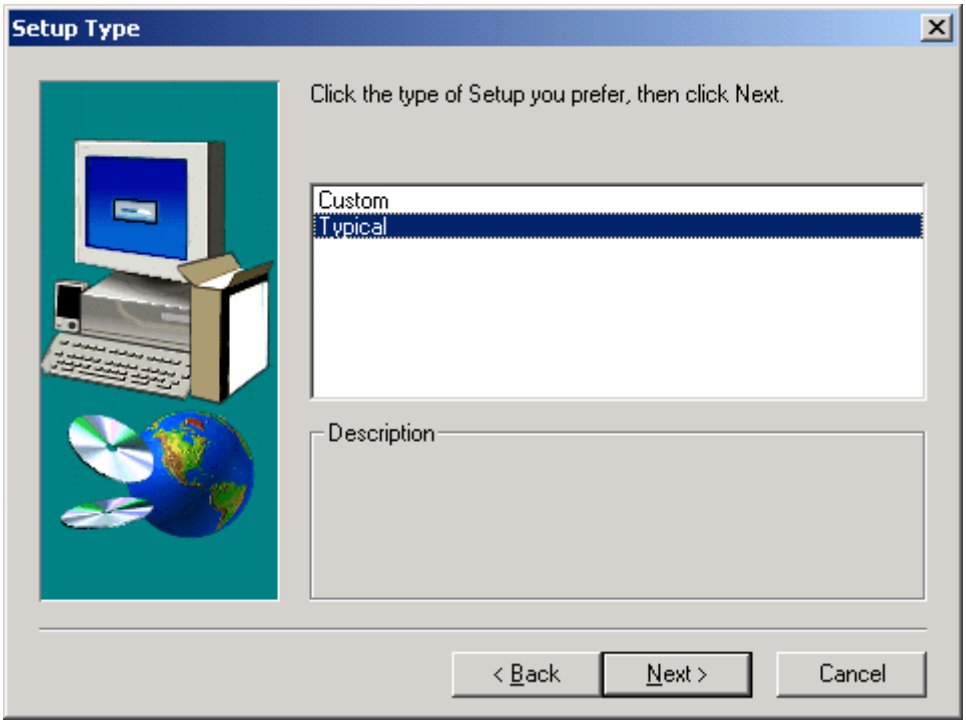

***Application registry screen***

Note that "***Next***" option is not enabled until serial number is introduced. If serial number is not correctly typed, it will appear an error message as the following:

***Serial number introduction error message***

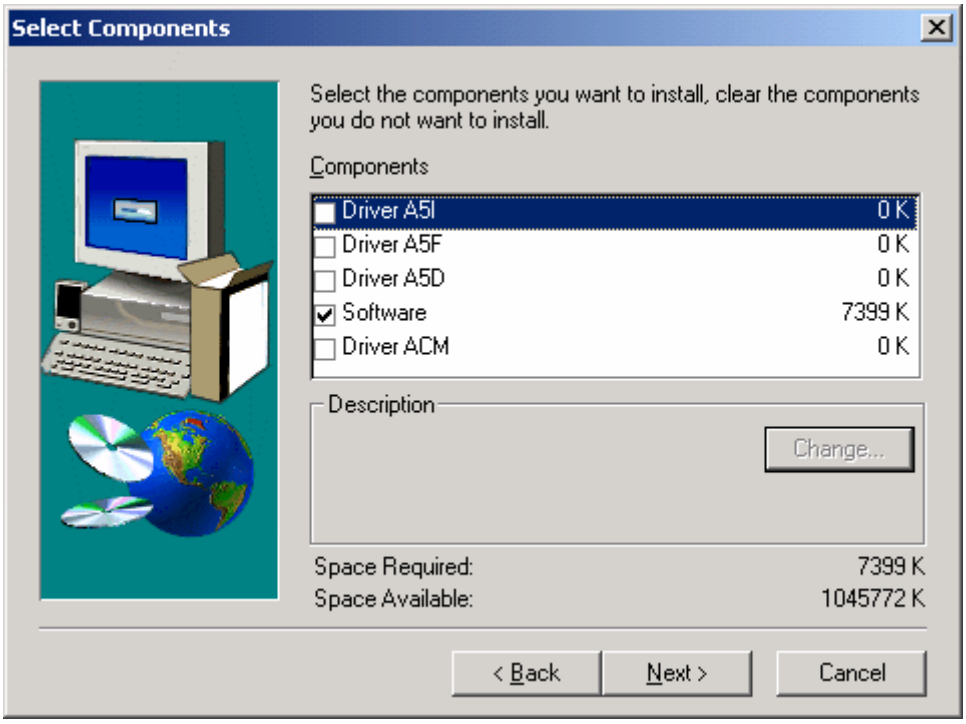
Note that with "***Back***" button you will always be able to return to the last screen (only if the screen provides this button). In any case, when the serial number is introduced correctly, you will be able to pass to the next screen using "***Next***" button.

The next screen will allow you to choose between two installation types: typical or custom. Typical installation will install all Power Vision available components. Custom installation allows you to choose the components that you want to install.



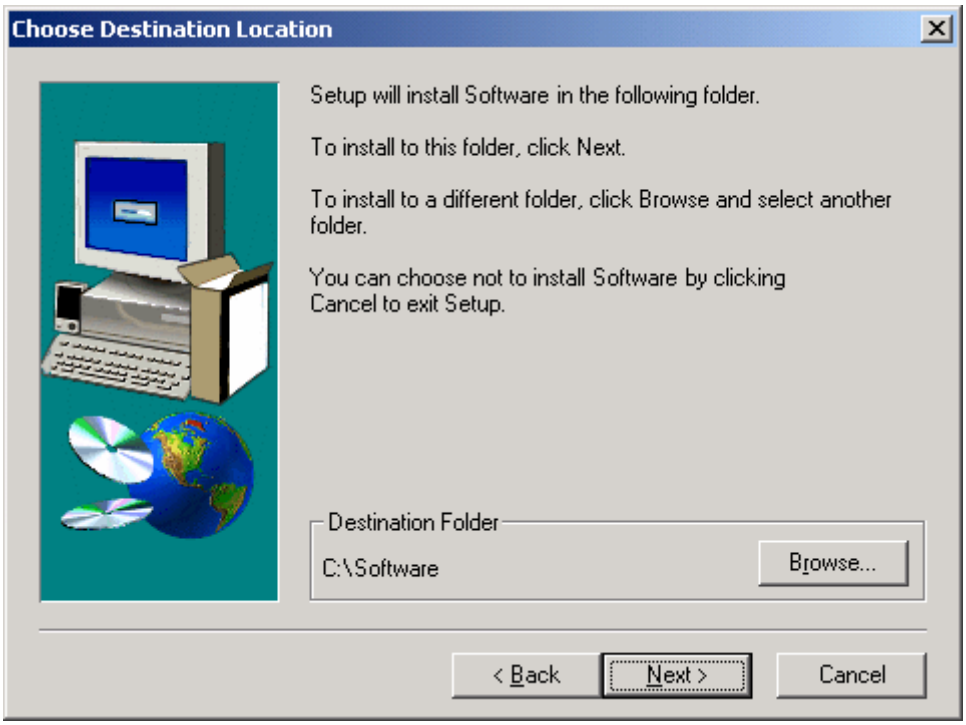

***Installation choose screen***

If you choose custom installation, you will be able to select all the components you want to be installed.



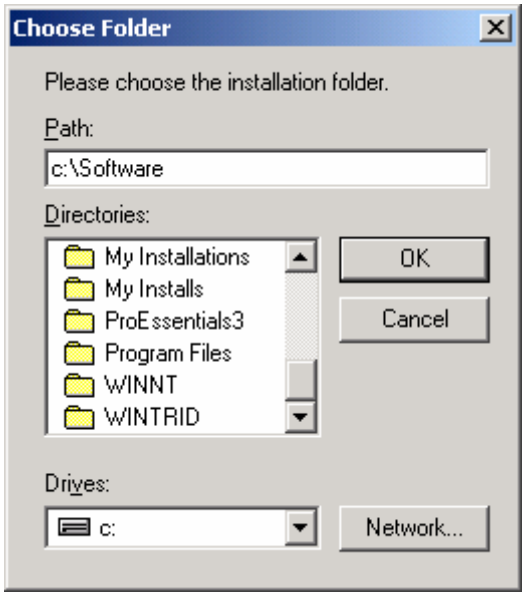

***Personalized component selection screen***

When you have marked all the components to be installed, push "***Next***" button and a dialog box will ask you the folder where Power Vision will be installed. (This dialog box will appear after choosing complete installation too)



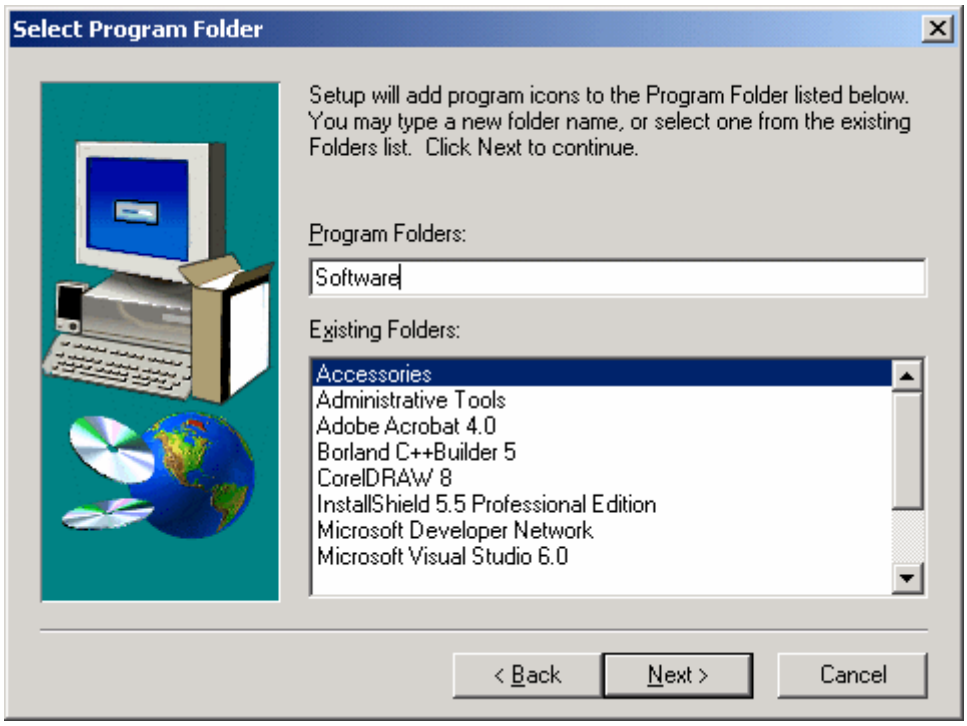

***Installation folder selection dialog screen***

The installation program chooses a default directory to install the application. To change installation folder, press "***Browse***" button, and you will be able to choose a new folder where the application will be installed.



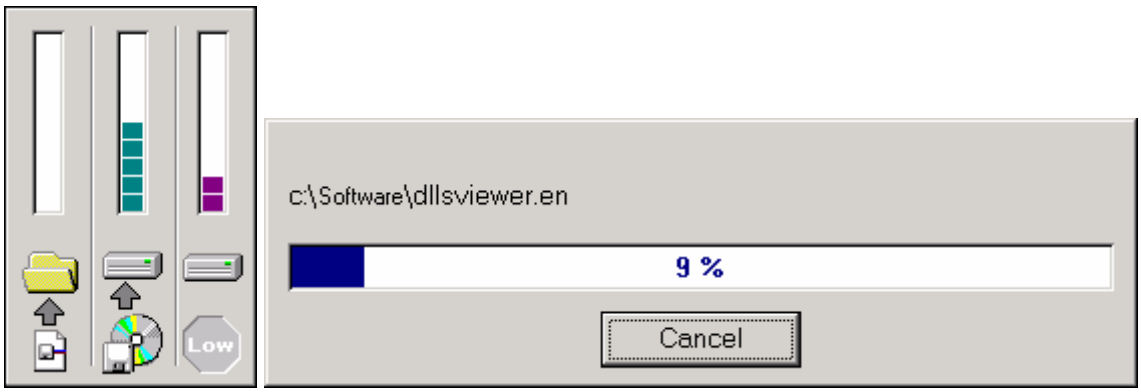

***Installation folder dialog box***

When the folder where the program will be installed is chosen, you may press "***Next***" button. Then the installation wizard will ask you the folder of the Windows START menu from where you want to run Power Vision.




***Program group selection window***

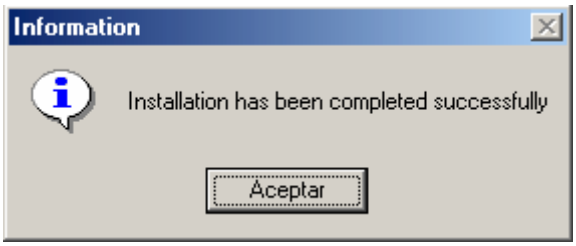
As it's shown, the program proposes a default path, but the user has the freedom to change it. In any case, when you have filled the dialog box, press "*Next*" button to continue with the installation. After all this steps, the program will start to copy program files to your computer. You will know the installation progress using two progress bars.



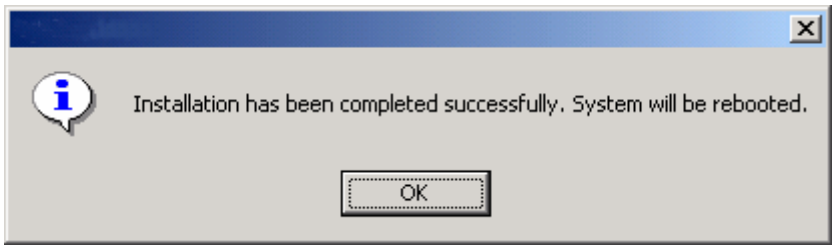

***Installation progress bars indicators***

As you can see, you are still able to cancel installation process pressing Cancel button, while files are being copied, but it's strongly recommended wait until application is completely installed and then uninstall it.

Finally, it will appear a message box to inform that the installation is finished.




***Note 1:*** *It's possible that installation program need to reboot the computer to be sure that all changes have been made. In this case, it will appear this message box explaining you must reboot your system:*




Power Vision installation process is now finished. You can execute Power Vision in your **Start** menu.

## 2.- INTRODUCTION TO POWER VISION

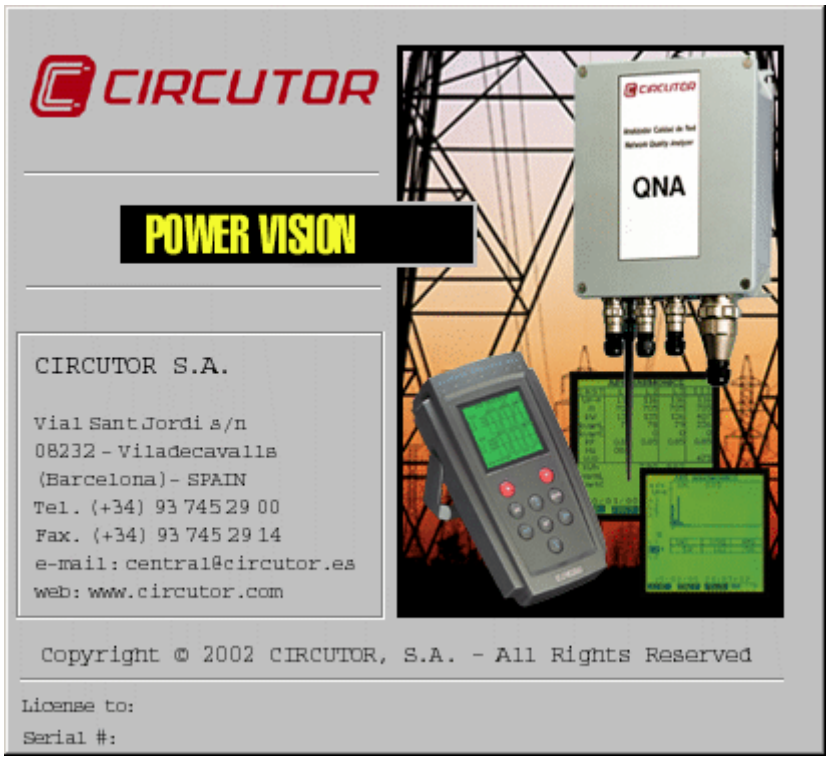
Power Vision is a program specially designed to operate with AR.5, QNA, CVM-COM, CVM-BDM-1M and CPL network analyzers and measure devices, and for that reason we can affirm that it is an ideal and indispensable complement of them. The software will allow you to capture data from the analyzer and then treat it in your PC.

Power Vision disposes of three groups of functions:

- First, there are functions to allow user extract data files from AR.5 or CPL and then save them to the PC's hard disk.
- Next, there are the functions to allow communications and configurations with the QNA, CVM-BDM-1M and CVM-COM, as much for they connected via RS-232 as those connected via GSM. In this chapter we are also able to discharge data files in a manual or an automatic way.
- Last, there are functions for data files analysis. These functions will allow us to work in an intuitive and a deep way, to analyze network's behavior and efficiency.

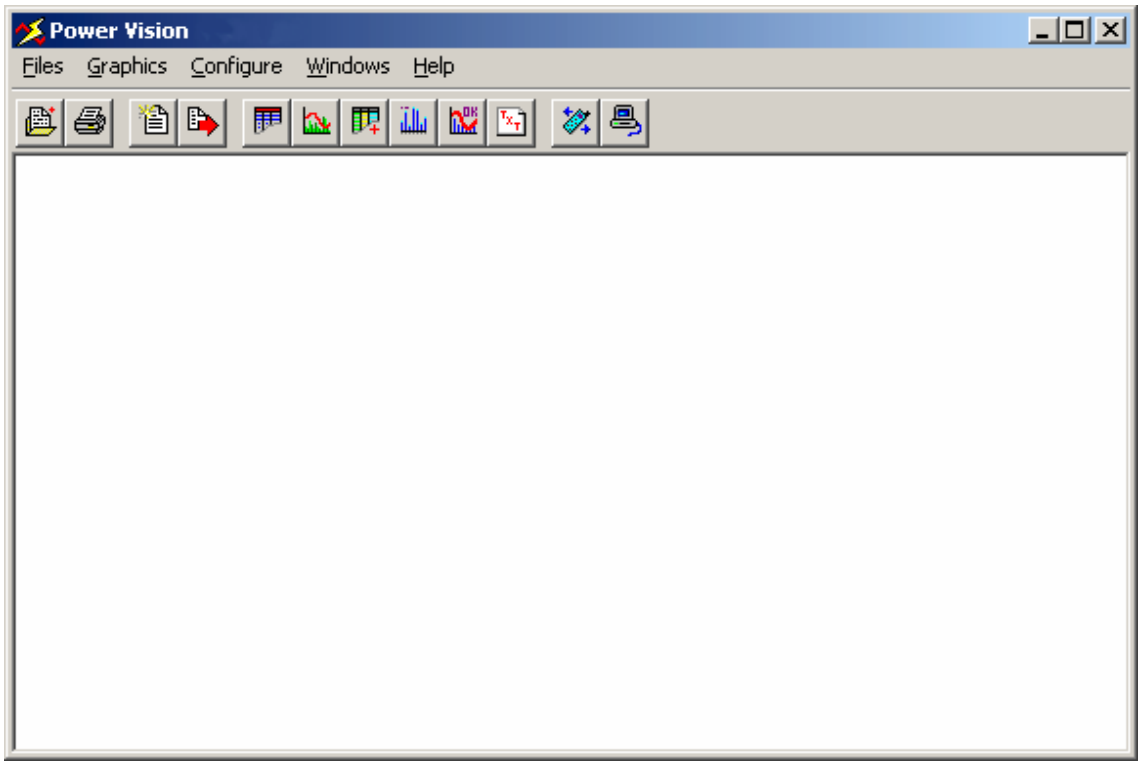
Power Vision will also give user a large group of functions to configure the application. That will allow user to operate the program in an easier and an agreeable way.

At least, Power Vision will allow users to operate with the analyzers at the maximum level, making work easier and giving them all the Power they need, all at the same time.




***Welcome window***

Once presentation window appears, you'll have to press left button of the mouse over it or some key of the keyboard to enter to the program (if you don't it, this window will disappear in few seconds). Program is ready to work.




***Power Vision main screen***

## 3.- COMMUNICATIONS

In this chapter you will find all information about how to communicate with network analyzer AR.5 and a QNA, a CVM-COM, CVM-BDM-1M or a CPL. that is, how to read data files stored in analyzers memory and save them to the PC's hard disk, and how to modify and/or consult their configuration.

### 3.1.- Connection of a portable device

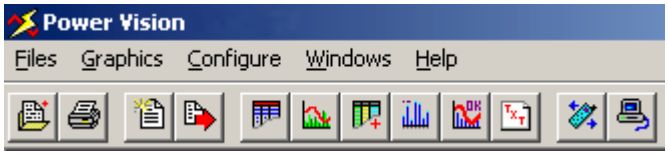
#### 3.1.1.- AR.5 network analyzer connection

First, and before any configuration, you must connect AR.5 network analyzer to a free PC COM serial port.

Once AR.5 is connected in serial port, you'll have to proceed to detect automatically its connection.

To auto detect the AR.5, you can use two different ways:

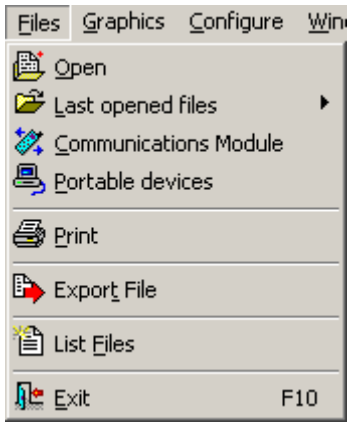
- Clicking on to icon on the tool bar with mouse left button. (Note that if you leave the mouse pointer over the icon it appears the message: "***Portable devices***")




***Toolbar***

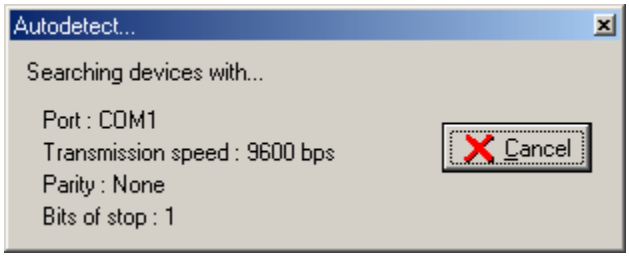
- Acceding to "***Files***" option of the menu bar, and in this menu selecting "***Portable devices***". To display "***Files***" menu you should click on this option with the left mouse button, or you should press ALT+'F' on the keyboard (Note that 'F letter appears underlined). Then, when the menu is displayed you should press 'P' key. (Note that 'P' letter appears underlined)

***Menu bar***




***Files Menu***

If you have followed all the steps, you'll see an auto detection screen.




***Portable device auto detection screen***

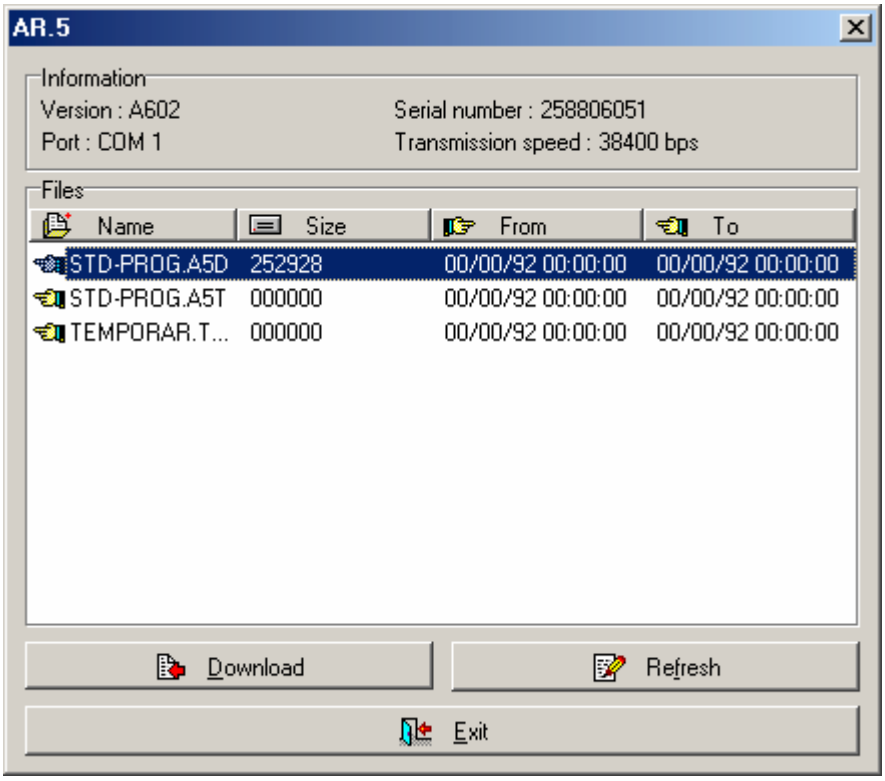
As you can observe, the program carries out an auto detection process to search some device as an AR.5 or a CPL (AR5, in this case).

If you press on "***Cancel***" button, auto detection process will finish and you'll return to Power Vision main screen.

It could happen that the device isn't connected correctly, it isn't turned on or it doesn't communicate because of something. If it happens, an error screen will appear and you must press on "***OK***" button to return to Power Vision main screen.

***Error screen about connected devices***

If the auto detection succeeds, this window will appear:

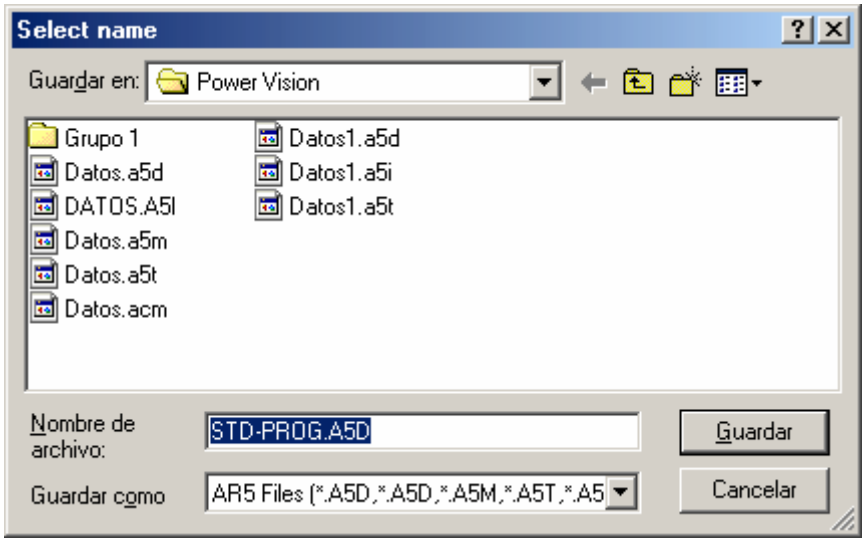



***Information window about AR.5 device***

This window contains the files that AR.5 has stored in its memory. They come from different data captures. Moreover, you can find information about the connection and device (serial number, the port where it is connected, version and transmission speed). These files will be able to be analyzed by Power Vision software, and you'll be able to make graphs, descriptive tables, quality studies, etc.

As you can observe, there are different available options in this window.

"***Download***" option appears firstly disabled because there isn't any selected file. To enable it, we must choose before one of AR.5 files. This option allows us to import this AR.5 file to our PC and then, we'll be able to do whatever Power Vision allows with it. If you press on this option, a Save dialog box will appear:




***Dialog box to save AR.5 file***

You must introduce a name to describe this file (default name is the same that there was in AR.5) and a path to save it. Next, you must press on "***Save***" button.

"***Refresh***" option allows us to update the data from AR.5. When you have finished to configure your settings, you must press on "***Exit***" button to return to the main screen.

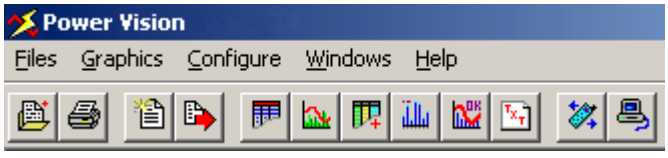
### 3.1.2.- CPL clamp logger connection

First, and before any configuration, you must connect CPL clamp logger to a free PC COM serial port.

Once CPL is connected in serial port, you'll have to proceed to detect automatically its connection.

To auto detect the CPL, you can use two different ways:

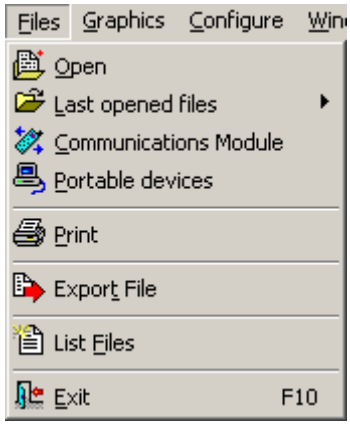
- Clicking on to icon on the tool bar with mouse left button. (Note that if you leave the mouse pointer over the icon it appears the message: "*Portable devices*").




***Toolbar***

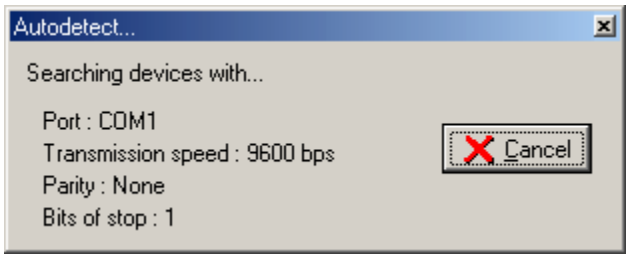
- Acceding to "***Files***" option of the menu bar, and in this menu selecting "***Portable devices***". To display "***Files***" menu you should click on this option with the left mouse button, or you should press ALT+'F' on the keyboard (Note that 'F letter appears underlined). Then, when the menu is displayed you should press 'P' key. (Note that 'P' letter appears underlined)

***Menu bar***




***Files Menu***

If you have followed all the steps, you'll see an auto detection screen.




***Portable device auto detection screen***

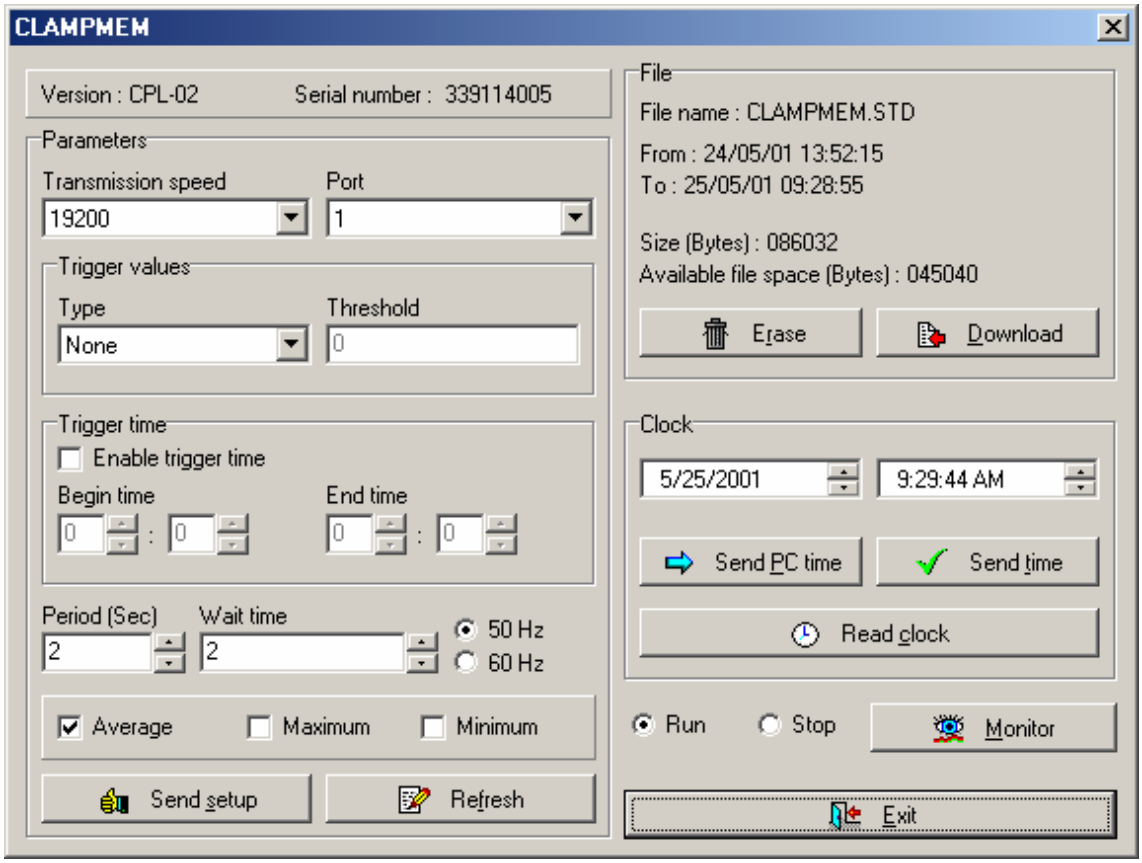
As you can observe, the program carries out an auto detection process to search some device as an AR.5 or a CPL (CPL, in this case).

If you press on "***Cancel***" button, auto detection process will finish and you'll return to Power Vision main screen.

It could happen that the device isn't connected correctly, it isn't turned on or it doesn't communicate because of something. If it happens, an error screen will appear and you must press on "***OK***" button to return to Power Vision main screen.

***Error screen about connected devices***

If the auto detection succeeds, this window will appear:




***Information screen about CPL device***

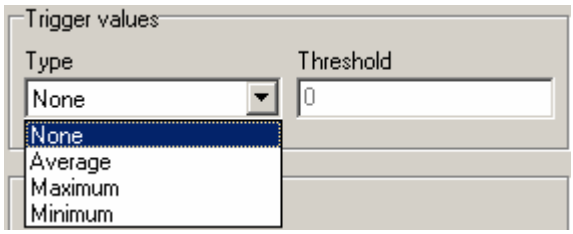
We can observe different information about CPL device in this window. In the upper side, we can observe CPL information, as serial number and its version.

Next, there are three clear sections: "***Parameters***" (CPL configuration), "***File***" (options to manage the file stored in CPL) and "***Clock***" (CPL clock configuration).

"***Parameters***" section: There, we can configure correct transmission speed of the port, (if it isn't correct) and we can change the port where CPL is connected, too. (For example, if we decide to change the port while it's running).

***Port configuration***

We can also define a trigger in CPL device in order that it filters by ***averages***, ***maximums*** or ***minimums*** and with a limit point (***threshold***). To do it we just have to go to "Trigger values" section and choose what trigger we want.

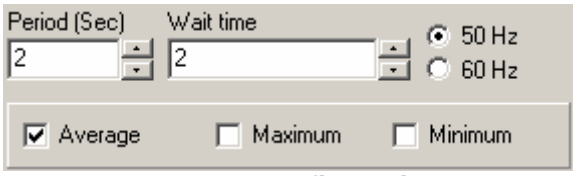



***Trigger values***

On the other hand, we can also define a trigger by time in "Trigger time" section. Then, we'll just register the data that is in the period of time defined. If we wish enable it, we just have to enable "***Enable trigger time***" option and then we'll be able to choose an initial time and a final time.

***Trigger time***

Finally, in "***Parameters***" section, we have to configure how much time CPL will register and what CPL will register.




***Capture configuration***

To define the period of time that CPL will be registering, we must change "***Period***" box. Near it, there is "***Wait time***" option and it is used to specify a delay to start the registering process.

Also, we can change the frequency of electrical network where we'll take the data (between 50Hz and 60Hz, 50Hz is default option) with the radio buttons near "***Wait time***" section.

Finally, there are a checkboxes to indicate what we want to register (average, maximum or minimum)

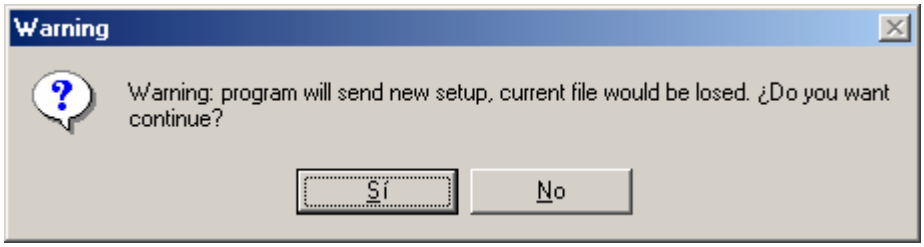
***Note:*** *See that we just choose maximum and minimum checkboxes if we choose a period higher than 1 second, because it is the time that CPL can save these values. (They haven't got a meaning with a low period)*

***Note:*** *If we choose 0 in the period, CPL will register cycle values (50 per second).*

Once you have configured CPL parameters, you'll have to press on "***Send setup***" button to establish new configuration.

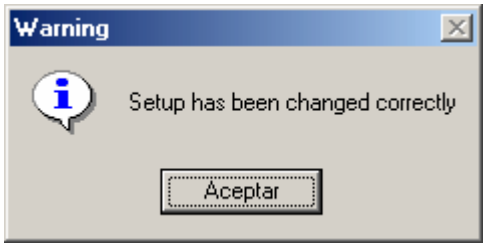
***Button to send a new configuration***

It'll appear next warning window:

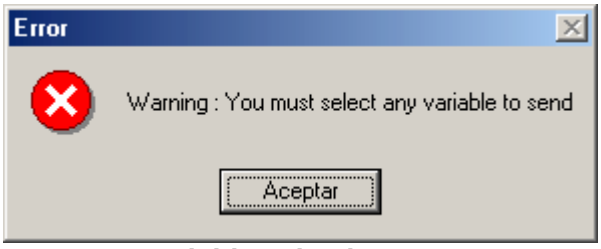



***Confirmation window of new configuration***

If you choose "***Yes***" configuration will be stored in the CPL. Elsewhere, if you choose "***No***", you'll return to CPL configuration screen and the configuration won't be stored in the CPL. If you choose to store the new configuration, an information message box will appear.




***Note:*** *If we don't choose any variable to store (averages, maximums or minimums) program will give us an error message trying to send the configuration. You'll have to press on "Accept" button and choose at least one variable.*

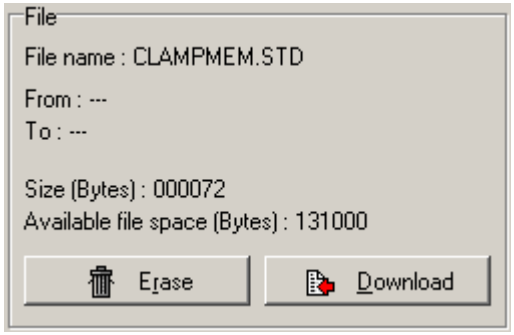



***Variable selection error***

However, there is "***Refresh***" button, too. It'll allow us to import CPL configuration whenever we want (for example, if we have done changes and we are disagree with them).

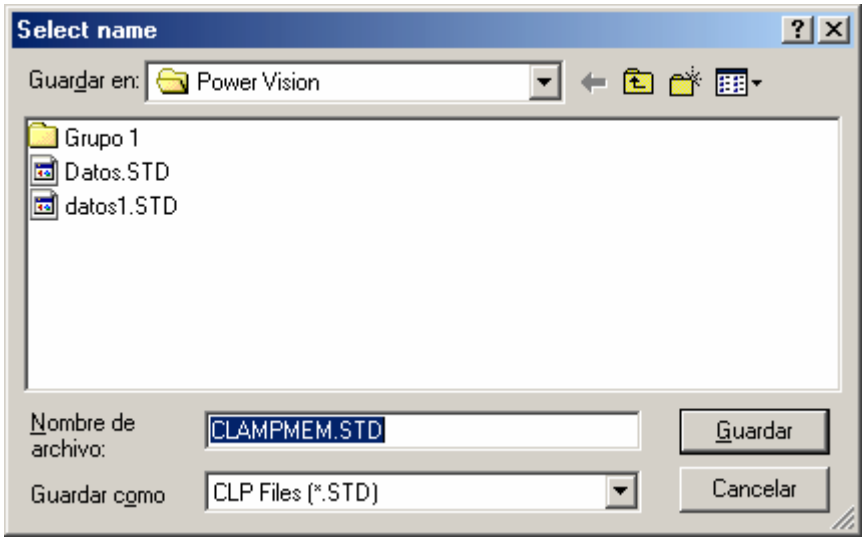
***Refresh button***

Next section is "***File***". There, we can see where CPL data is stored, creation date and ending date, its size and how much memory available space we have.



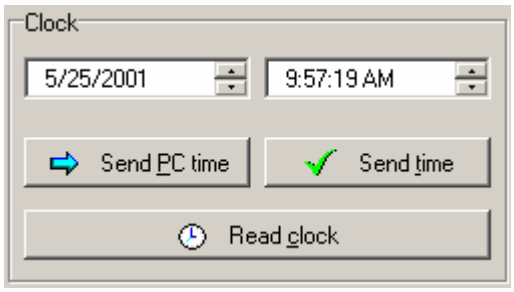

***CPL file information***

Also there are "***Erase***" and "***Download***" buttons. First one allows us to delete the CPL data, and other button allows us to export this data to our hard disk. It will be stored in an STD file (CPL file format) in order to analyze it with Power Vision options.




***CPL file location dialog box***

Last section is "***Clock***". There, we'll be able to change the time of the CPL and check what time there is in CPL device.




***CPL Clock setup***

Buttons description:

"***Send PC time***": This option will save PC time into CPL memory. We'll synchronize PC and CPL.

"***Send time***": We'll save the time manually established in upper boxes into CPL memory.

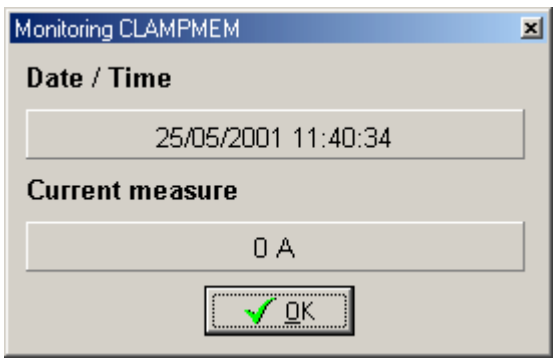
"***Read clock***": We'll import CPL time.

Moreover, there are other extra options in configuration CPL window.

***CPL extra options***

"***Run***" and "***Stop***": They allow us to modify CPL status and choose if CPL continues registering values in STD file (Run) or it stops registering (Stop).

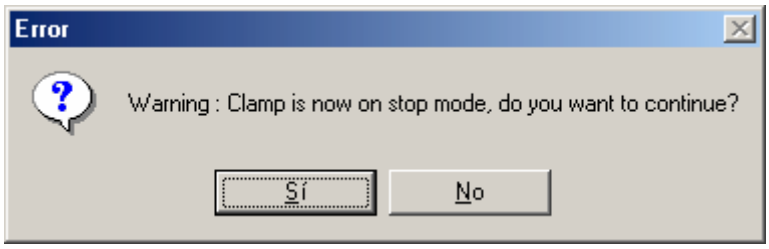
"***Monitor***": If we press this button, it'll appear a CPL status monitor, where we'll be able to see the CPL time and the current that it is measuring in real time. Pressing "***OK***", we'll return to CPL configuration window.




***CPL monitor***

If we disconnect the clamp while Power Vision is monitoring, an error messages will appear in Date/Time and Current measure fields. Finally, if we want to exit from CPL configuration we must click over "***Ok***".

***Note:*** *If we press "**Exit**" button and Stop radio button is enabled, a warning message will appear to advise that the clamp is in Stop mode and it won't register the current. If we choose "**Yes**", we'll ignore it, and if we choose "**No**", we'll return to CPL configuration screen.*




***Warning when clamp is in Stop mode***

## 3.2.- Communication module use

### 3.2.1.- Introduction

Communication module is the ideal and indispensable application to display analyzer data (QNA, CVM-BDM-1M and CVM-COM). This software will allow user to:

**1. –** *Maintain a list with habitual used devices:* This way, you can add new analyzers to the list remove them or modify existing ones.

**2. –** *Configure device analyzers:* In addition to allow to set up devices communication parameters (transmission speed, parity bits, phone number (if it is a GSM QNA, Modem CVM-BDM-1M or a CVM-COM), you will be able to change its internal configuration, indicating which variables must store, data capture period, and many other analyzer parameters. You will also be able to configure automatic file discharge, as well as the hour and the connection time period.

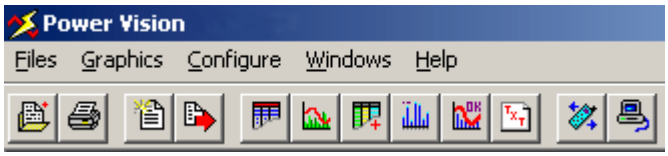
**3. –** *Display the Quality network analyzers*: You will always be able to display data that a device is measuring. By this way, you will be able to look after the status of the network that analyzer is studying.

**4. –** *Store data that devices have captured*: You will be able to save to the hard disk all saved files to analyze and study them later (for example using Power Vision software). The file discharge can be set in a manual or an automatic mode, only changing program configuration.

As you can observe, communications module will allow you to work with analyzers (QNA) and devices (CVM-COM and CVM-BDM-1M), making your task easier, quicker and trustworthier. The application gives to user a powerful managing and analyzing tool for these devices.

To accede to communications module you can use two ways:

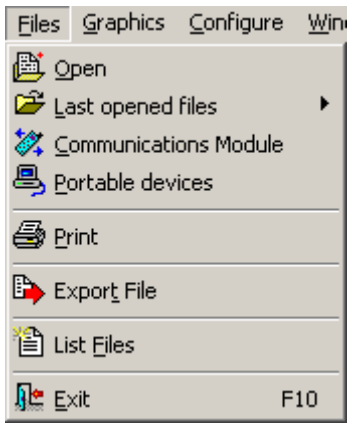
- Clicking on icon on the tool bar with mouse left button. (Note that if you leave the mouse pointer over the icon, next message will appear: "***Communications Module***").




***Toolbar***

- Acceding to "***Files***" option of the menu bar, and in this menu selecting "***Communications Module***". To display "***Files***" menu you should click on this option with the left mouse button, or you should press ALT+'F' on the keyboard (Note that 'F letter appears underlined). Then, when the menu is displayed you should press 'C' key or choose with the mouse cursor the option "***Communications Module***" (Note that 'C' letter appears underlined)

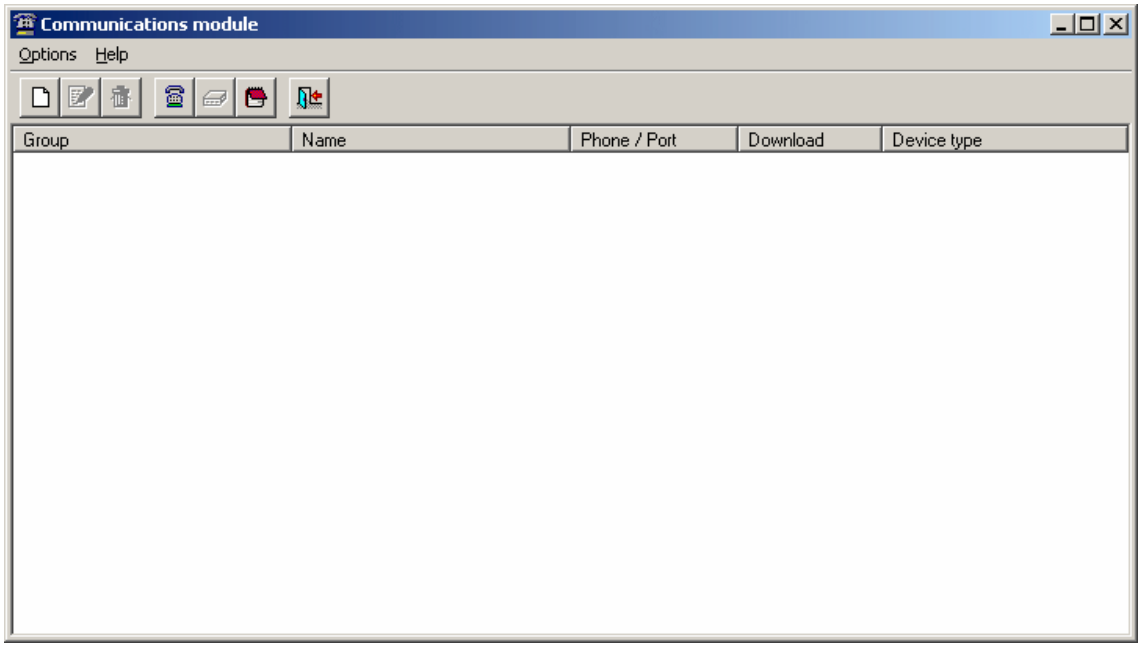
***Manu bar***




***Files Menu***

### 3.2.2.- Analyzers list management & maintenance

When the program is launched, first screen you will display is an analyzer list introduced to system.




***Communications module main screen***

You will be able to add to this list, those devices that you use more often, as well as remove or modify them, maintaining always an actualized list.

The information is given of each devcie is the group that it has assigned, the device name, telephone number or port where it's connected, information about the downloading, if it's automatic or manual and the type of device. All these parameters may be changed in the device configuration. Clicking over the columns of the list we'll be able to sort the devices.

We also have an icons bar that gives us seven actions. If we move the cursor over the wished icon, an information message will appear indicating the function of the icon. They are:

**1. -** *Add*: This button allows you to add a new device to the network quality analyzers list.

**2. -** *Modify*: Allows you to modify data of selected device. This action can also be performed with <ENTER> key on the keyboard. Note that if no device is selected, this option is not enabled.

**3. -** *Remove*: Allows you to remove selected device. This action can also be performed with <Del> key on the keyboard. Note that if no device is selected, this option is not enabled.

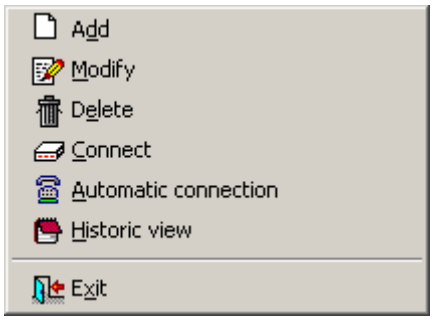
**4. –** *Connect automatically*: Allows you to do automatic downloads previously programmed. The program changes to the Start bar like an icon and it downloads the files of the programmed devices.

**5. -** *Connect*: Allows you to display real time data of the selected device. Moreover, with this button you will be able to save to your hard disk data stored in device's memory. Note that if no device is selected, this option is not enabled.

**6. -** *Historic*: If we have done an automatic download, will be generated a file with information about it. This informations will have the creation date, and the data (usually the data will be the downloaded file or the errors)

**7. -** *Exit*: Allows you to exit program. This action can also be performed clicking with your mouse on the top right window cross, choosing Exit option in menu that appears when you click with your mouse left button at the top right window icon, or pressing <ALT> + F4 keys.

You can also exit program with your mouse right button. This menu has the following options:




***Pop-up menu***

**1. -** *Add*: Allows adding a new device.

**2. -** *Modify:* Allows modifying selected device.

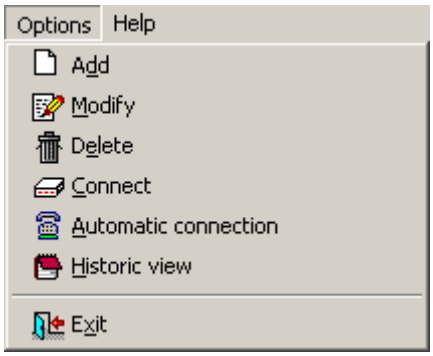
**3. -** *Remove*: Allows you to remove selected device.

**4. -** *Connect:* Allows visualization of real time data, as the last button shown

**5. -** *Automatic connection:* With this option you will be able to discharge files automatically from the device. When this option is selected, it appears a green icon on the Windows task bar (at the left side of the time). This icon will turn into red color when a file is being discharged.

**6. -** *Historic view:* If an automatic discharge has been made, this will generate a report file about its data. This information will consist in the date and all data captured (usually this data is from downloaded file or errors that have happened).

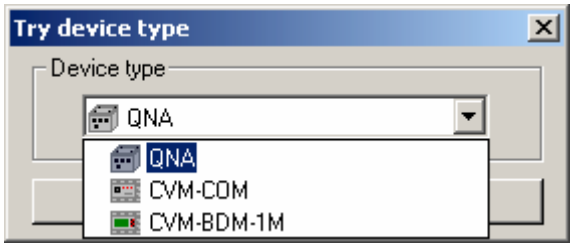
You can also make the same program options pressing with your mouse left button on the "***Options***" menu. This menu has the same options than the popup menu:




***Options Menu***

### 3.2.3.- Add a new device to work environment

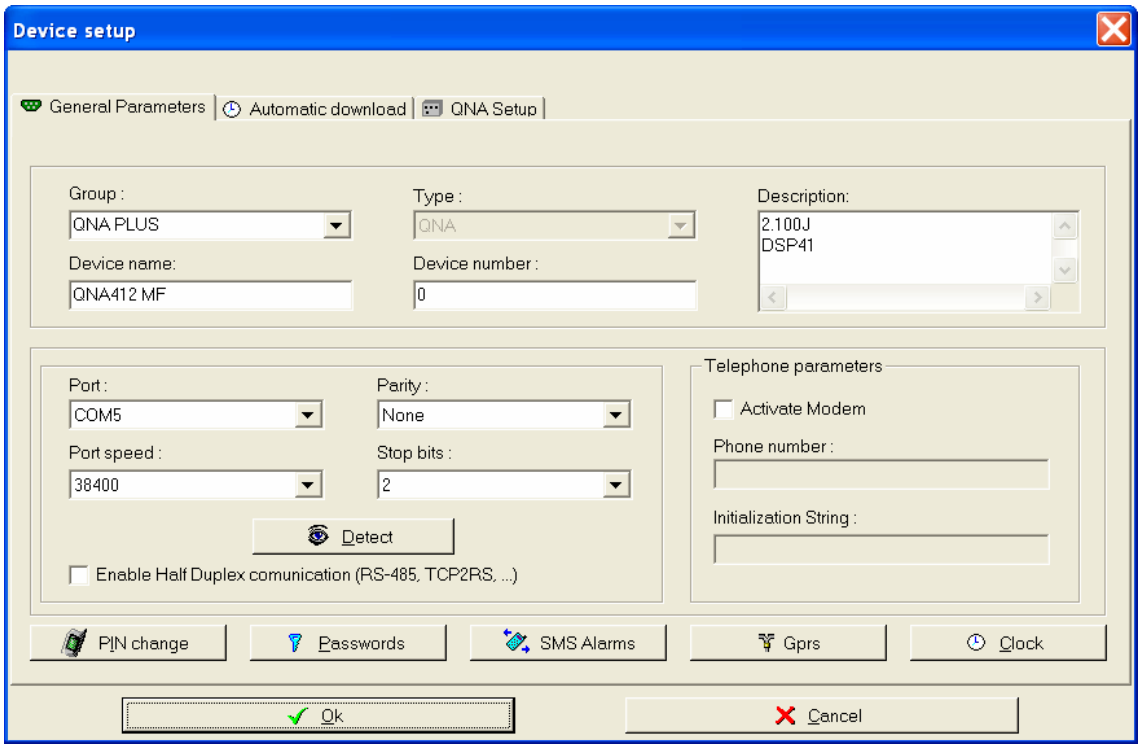
When “Add” in device module is selected it will appear a new dialog with different devices to try.




***Try device dialog***

#### 3.2.3.1.- Add a new QNA

When “Add” in QNA module is selected it will appear the new analyzer configuration dialog box. As you will see, it has three folders (**General parameters**, **Automatic download** and **QNA configuration**).




***General parameter configuration folder***

When the dialog box appears, selected folder is **General parameters**, where you will be able to configure all new QNA parameters. These are:

**1. -** *Port*: You will be able to select between all available PC communication ports, where QNA is connected. The QNA communications module will search for all free and existing ports in your computer. Is case we have the configuration file (AutoCall Plus.cfg file) from another computer, it may happen that the communication

port is not the same as the other one, or that it is not available in the new computer, so we must change it.

**2. -** *Address*: It must coincide with QNA direction. If the analyzers are connected via RS-232 or via GSM its value must be 0 (It's highly recommended not changing this value if it's not necessary).

**3. –** *Baud rate:* You will be able to select speed between 4800, 9600, 19200 or 38400 BPS. This speed will be used to configure the computer's port as well as QNA connected to that port. When we change this value, program tries to communicate with QNA and change its configuration, and if there was no success it will warn us. It will give the possibility of auto-detect the configuration. This will happen with any communication parameter.

**4. -** *Stop bits*: You will be able to choose between one or two stop bits. When this property is modified, selected port as well as QNA will be configured with the new selected value.

**5. -** *Parity*: You may choose between **no parity, odd** or **even**. When this property is modified, selected port as well as QNA will be configured with the new selected value.

**6. –** *Enable Half Duplex communication*. Allows to enable Half Duplex communication. It's necessary in all devices width RS-485, TCP2RS or GSM modem communications (devices without Full Duplex communication)

**7. -** *Device Name*: You must give a different name to each new device, because the program identifies each device with a single different name (The system will warn you if you try to assign a used name)

**8. -** *Group*: In order to organize analyzer's list, you will be able to assign each one to a group. Using this field you will choose an existing group or create a new one.

**Note**: The program creates a new folder with the name of the group and, inside, a new subfolder with the name of the device.

**9. -** *Description:* This field is allows you to add a short equipment description, but it's not obligatory to fill it.

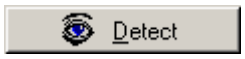
**10. –** *Activate Modem:* With this option, user informs to program that communication will be made via modem. Note that when this option is selected, **port speed, stop bits** and **parity** options are disabled and **Phone number and initialization string** is enabled. This occurs because all GSM communications will be made at 9600 BPS.

**11. –** *Phone number:* If QNA analyzer disposes of GSM communications, its phone number must be set here.

**12. –** *Initialization string*: This is a MODEM value and its default configuration should be maintained at (X1 V1 S0=0).

***Note:*** *Device type default set is QNA and could not be modified.*

In this folder you also can read the configuration of the QNA connected to the selected port, clicking with your mouse on the button named "*Detect*", at the right bottom part of the dialog box.



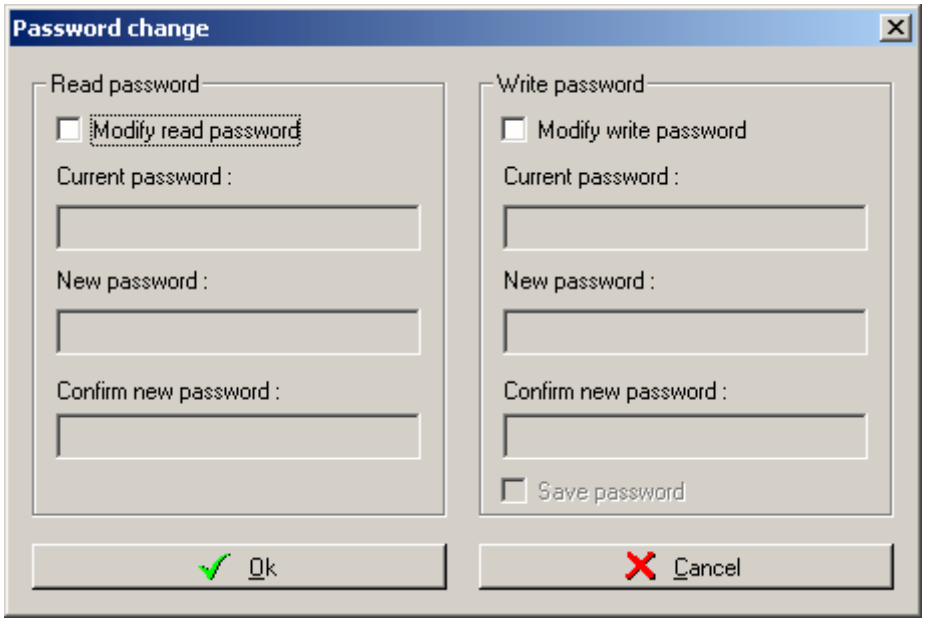

***Detect button***

When this button is pressed selected QNA parameters will be updated. If no QNA is connected to this port program will return an error message, warning user about the problem.

In case of we have a QNA with password setting capability (QNA 413 and 412) we'll be able to change the password using the password button

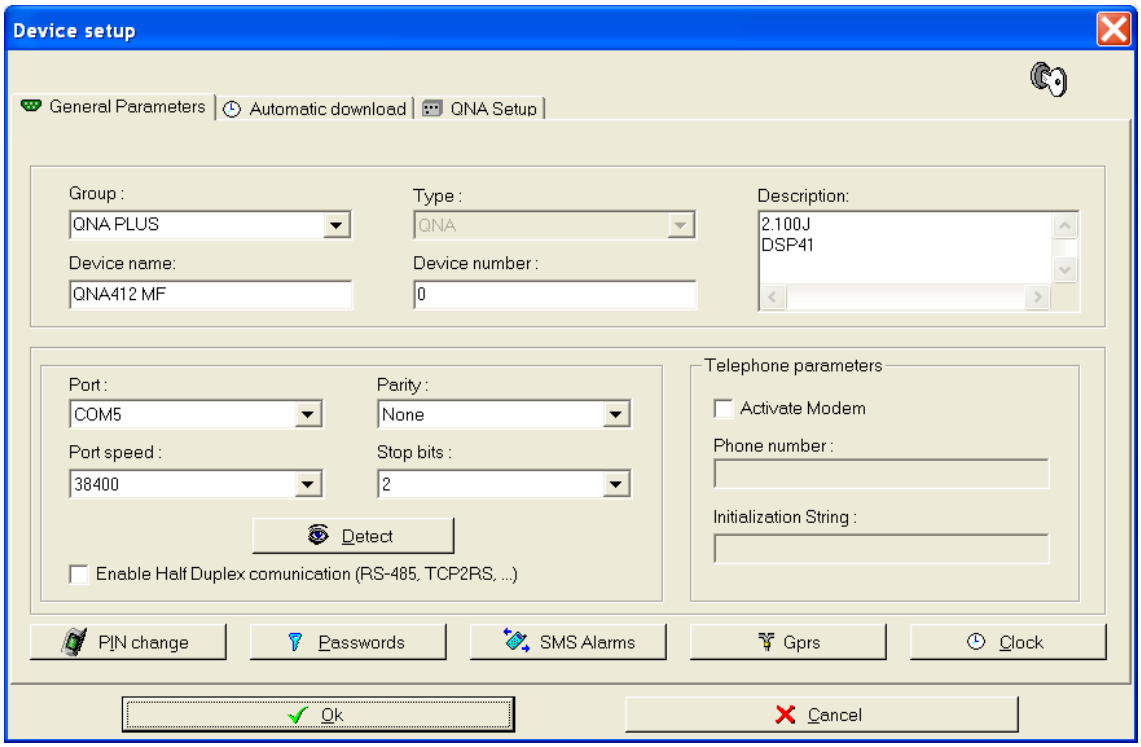
***Password button***

Once we have clicked this button, we'll have to see a message indicating that the QNA doesn't admit password or a window where we'll be able to change the reading and/or writing passwords. This option is only available in QNA 412 and QNA 413.



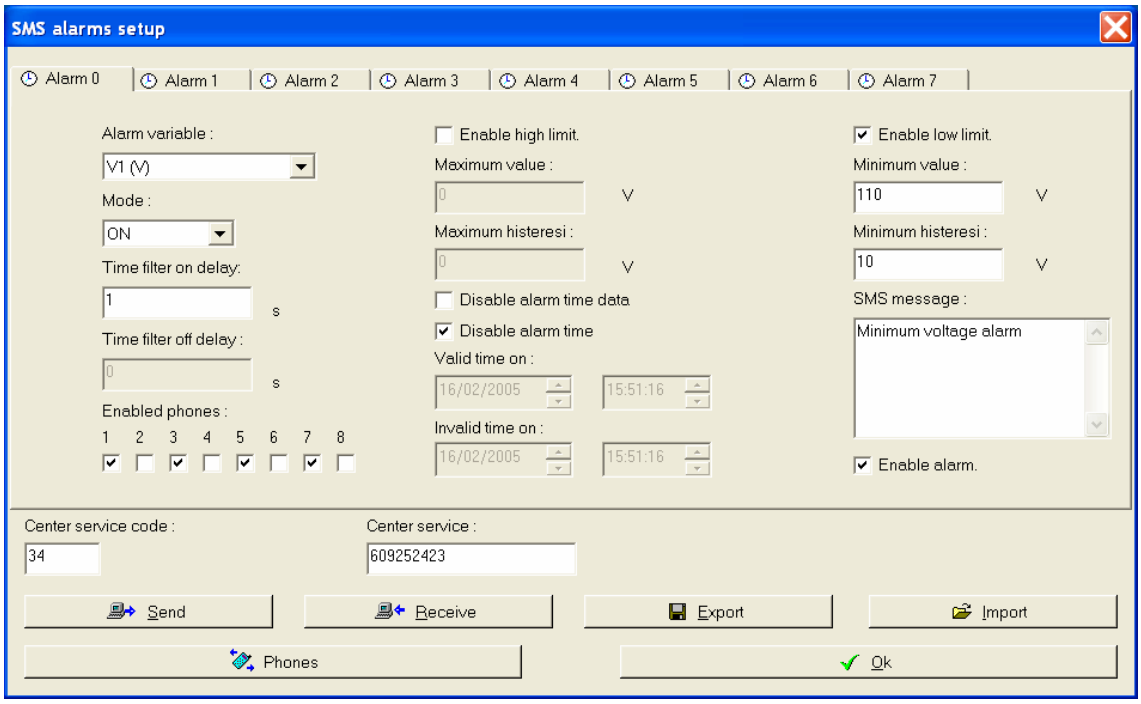

***Modify reading and/or writing passwords.***

We can view on this window that we have a check "*Save password*" and this check appear onto every read or write password window. This check will be able to enable write password store (read password always been stored), if we select this option window password will not appear anymore, it will be stored. Program only inquire this password if we make connection from another computer, other user or other device. If we have a password protected QNA we can see upper window a key.



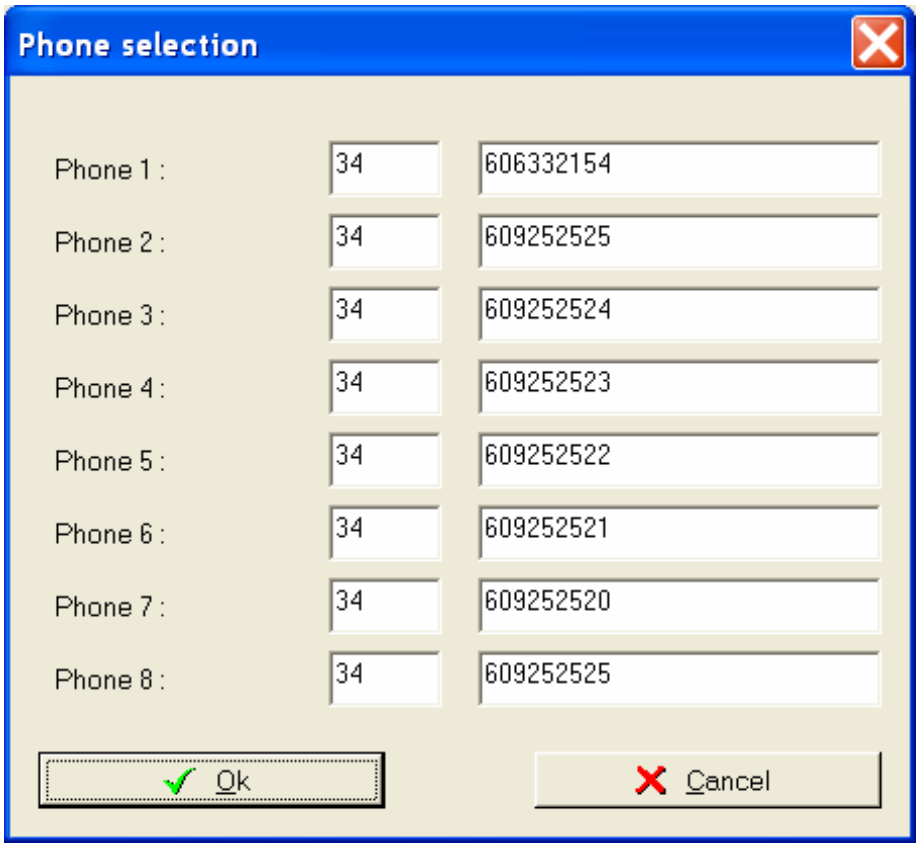

***Lock QNA with password.***

If you choose SMS Alarms option a SMS alarms setup screen will appear (412, 413 or 423 GSM with this option). This screen will show you the last configuration downloaded from a device, not the actual device configuration. If you want to access to this information you should choose the download option and the screen will be actualized with actual device setup. Also we have the option to export and to import the data to files for its later use with other QNA's.



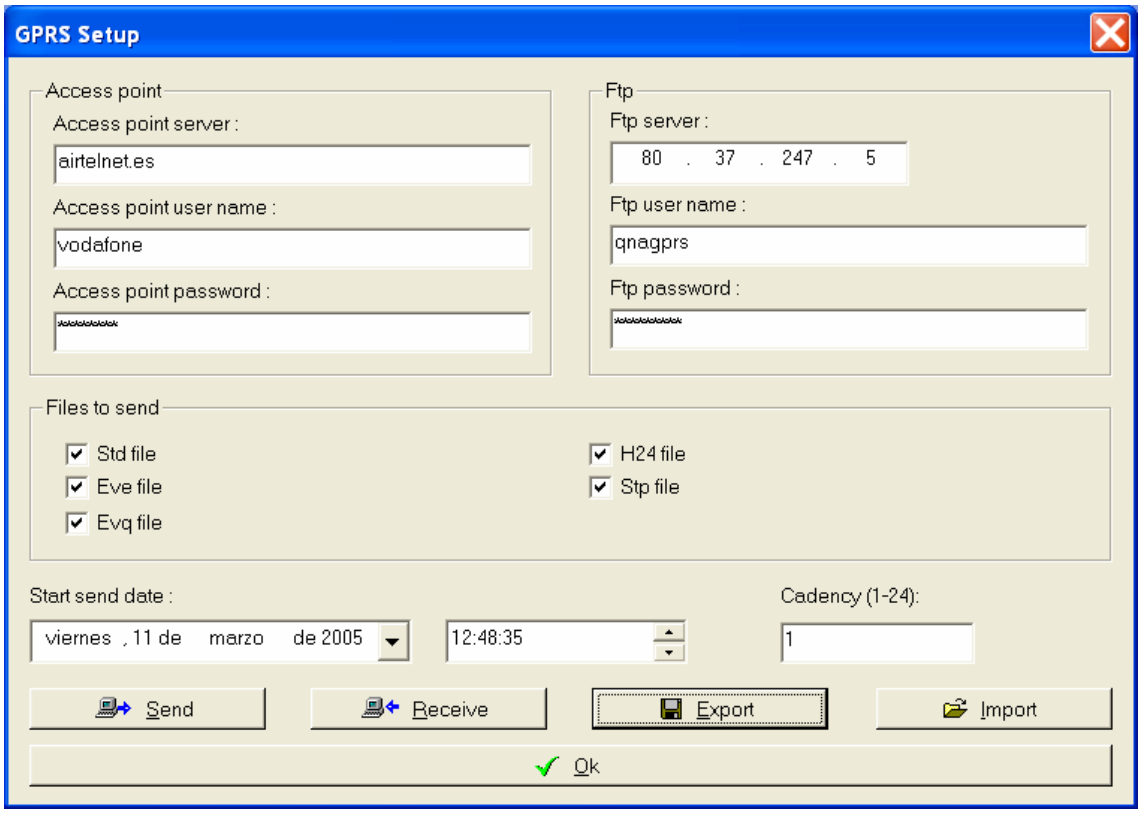

***SMS alarms setup.***

As we can see in this screen they will form the different parameters from alarms SMS. We have 8 possible alarms of which of a guided way we will setup the variable, delays, time of activation, maximum and minimum hours of activation, hysteresis, maximum and minimum values, and phones to which to send each alarm. At the bottom of the window we have buttons with the different options : send configuration to the device, receive setup of the device, export and import the configuration for its later use in other configurations and the configuration of the phones to which the alarms will be notified.




***SMS alarms phone setup.***

If you choose Gprs option a Gprs setup screen will appear (412, 413 or 423 GSM and GPRS with this option). This screen will show you the last configuration downloaded from a device, not the actual device configuration. If you want to access to this information you should choose the download option and the screen will be actualized with actual device setup. You will also export and import gprs setup files to use with other QNA's.



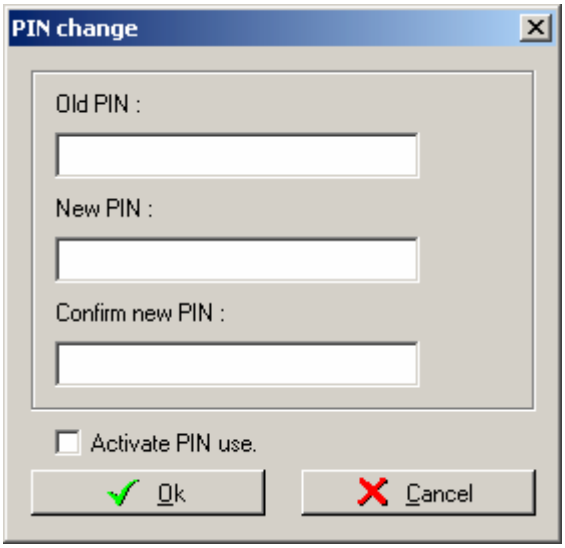

***GPRS setup.***

As we can see in this screen we will setup different parameters for the GPRS use: configuration of the access points and FTP, files to download, date and hour of beginning of shipment and cadence. At the bottom of the window we have buttons with the different options: send configuration to the equipment, receive configuration of the equipment, export and import the configuration for its later use in other GPRS configurations.

In case of we have a QNA GSM (412, 413 or 423 QNA's, if we have old QNA's it is not recommended to use this process) we'll be able to change the PIN of the GSM mobile phone. This change will be done clicking over the button Change Pin, located in the lower left side of the screen.

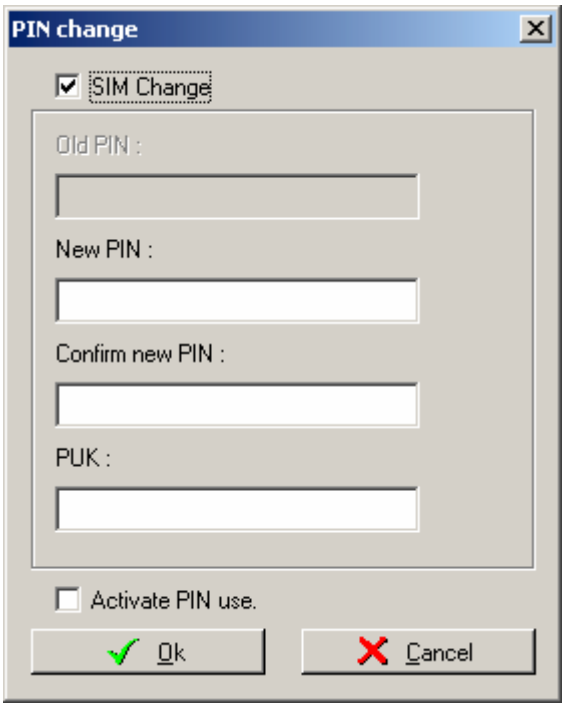
***Change PIN button***

Once we have clicked over the buton, we'll have to see a screen where we have the possibility to change the PIN or disable it. We have options depend on connection type that we use. If we use a modem connection we can make a PIN change. In this case program will inquire old PIN, new PIN and new PIN repeated. We will have also a use PIN check:



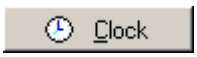

***Modify the PIN of the GSM mobile phone with modem.***

If we make a RS-232 connection (always a GSM QNA) we can do a PIN change (modem like before) or SIM change (selecting check). If we will do this program inquire new PIN, new PIN repeated and PUK.



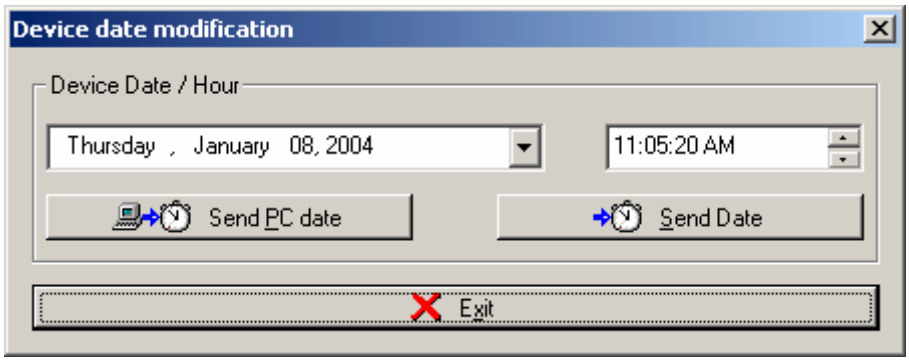

***Modify the PIN of the GSM mobile phone with RS-232.***

It's also possible to change selected equipment time and automatic time change values (only on new firmware versions of QNA's 412 and 413). To do this, we should first have configured well the equipment, and then click on "*Clock*" button. If the equipment is not well connected, program will return an error message.



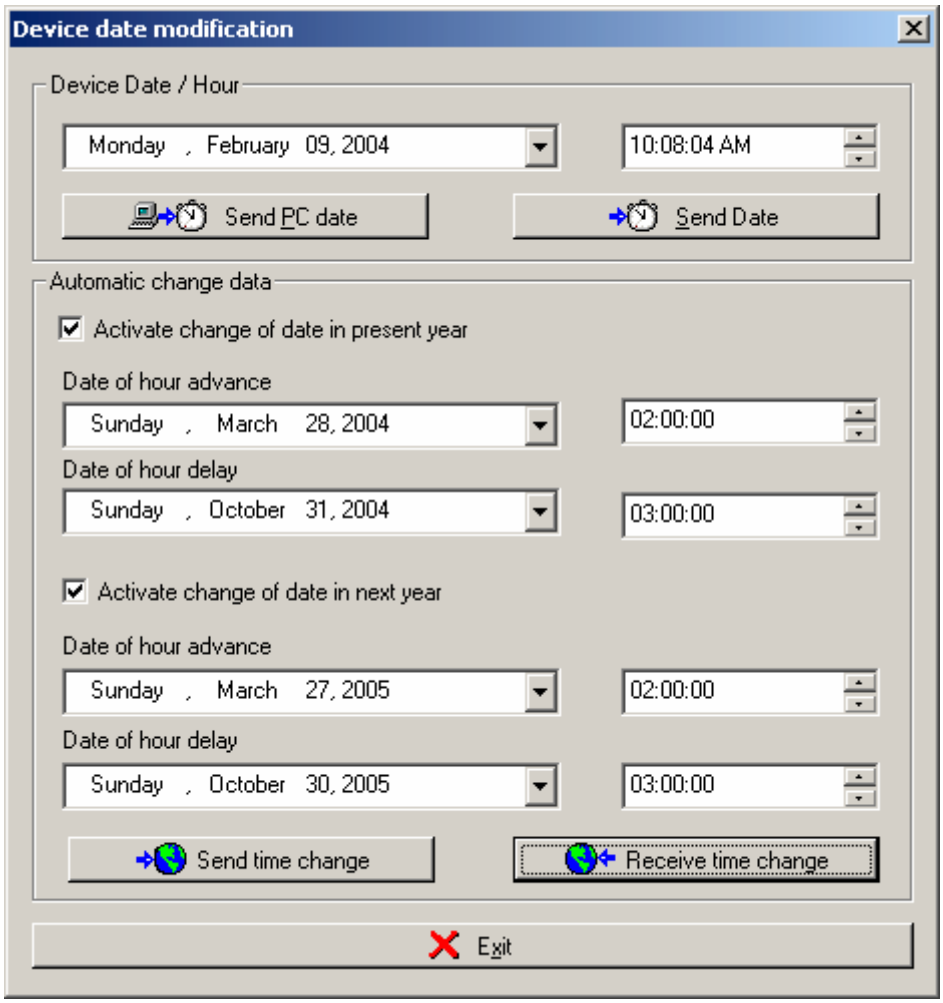

***Clock button***

Once this button is pressed, it should appear a dialog box like the one shown below. In this dialog box you will be able to change the date and time of the QNA, sending PC time or a manual introduced time.



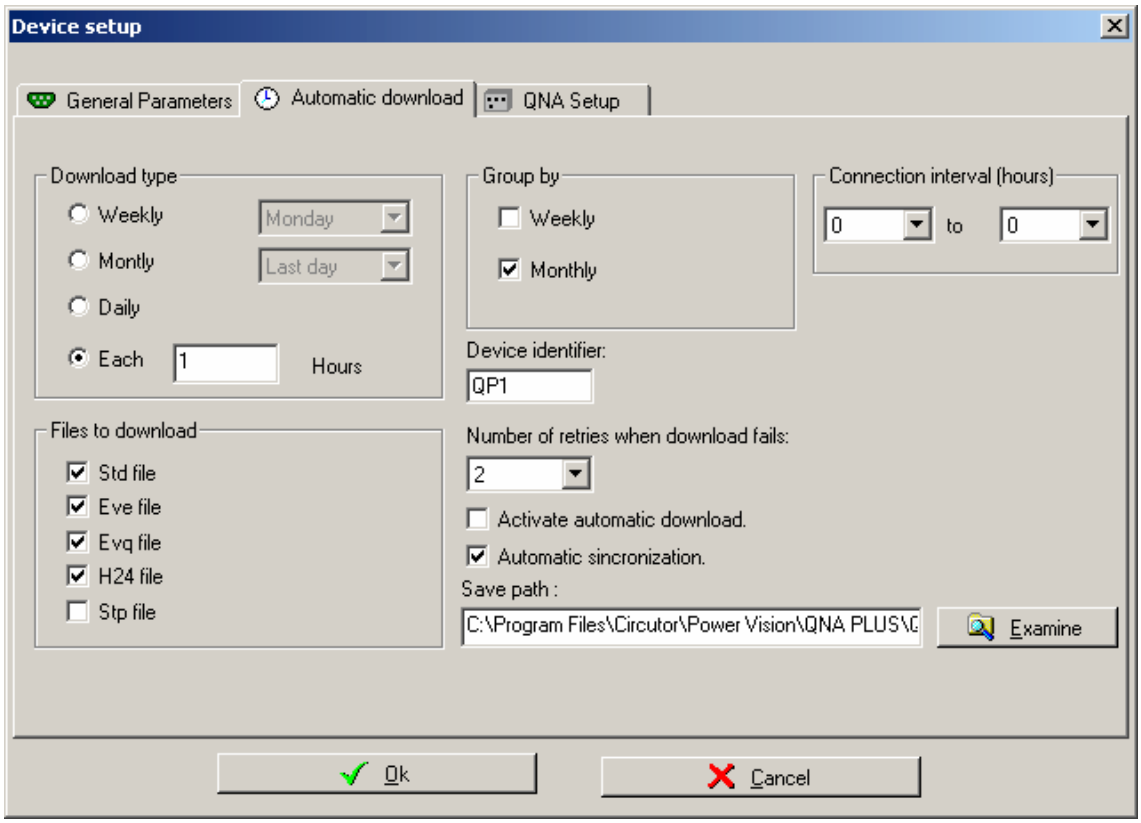

***Device time modification***

If an automatic time change is allowed (412 and 413 with new firmware versions) it should appear a dialog box like the one shown below. In this dialog box you will be able to change the date and time of the QNA and send automatic change time configuration. We have two time changes for current year and two for next year.




***Device time modification and automatic change time***

When all identification and communication parameters have been updated, you can now try to modify automatic download options:




***Automatic downloads dialog box***

Using this folder, you can modify automatic download propertied. Here goes a list of all updateable fields:

1. **-** *Group Data*: You can group all downloaded files in two different ways: **Weekly** and **Monthly**. Files can be grouped if they are downloaded in manual or automatic mode, and all data can be divided in many files.

2. **-** *Device identifier*: This number allows user to build the downloaded file name. The file will have the following format:

    ***a.*** *Weekly download:*
    Siiiwwyy.std
    Where:
    S: letter that means weekly grouping
    iii: QNA three digit identifier
    ww: week of the respective year
    yy: year with two digits

    ***b.*** *Monthly download:*
    Miiimmyy.std
    Where:
    M: letter that means weekly grouping
    iii: QNA three digit identifier
    mm: month of the respective year

yy: year with two digits

3. **-** *Automatic synchronization*: When this check box is selected, this software will change automatically QNA hour when they time configuration would not be the same.

4. **-** *Activate automatic download*: You can do automatic or manual downloads.

5. **-** *Download type*: With this option we choose the download periodicity. There are many options:

    a. Weekly: From Monday to Sunday, any day can be selected
    b. Monthly: From 1 to 30 of each month. In case day 30 is selected, on February program will download data on the 1st of March.
    c. Daily: Data is downloaded daily.
    d. Each x hours: Downloads data each x hours.

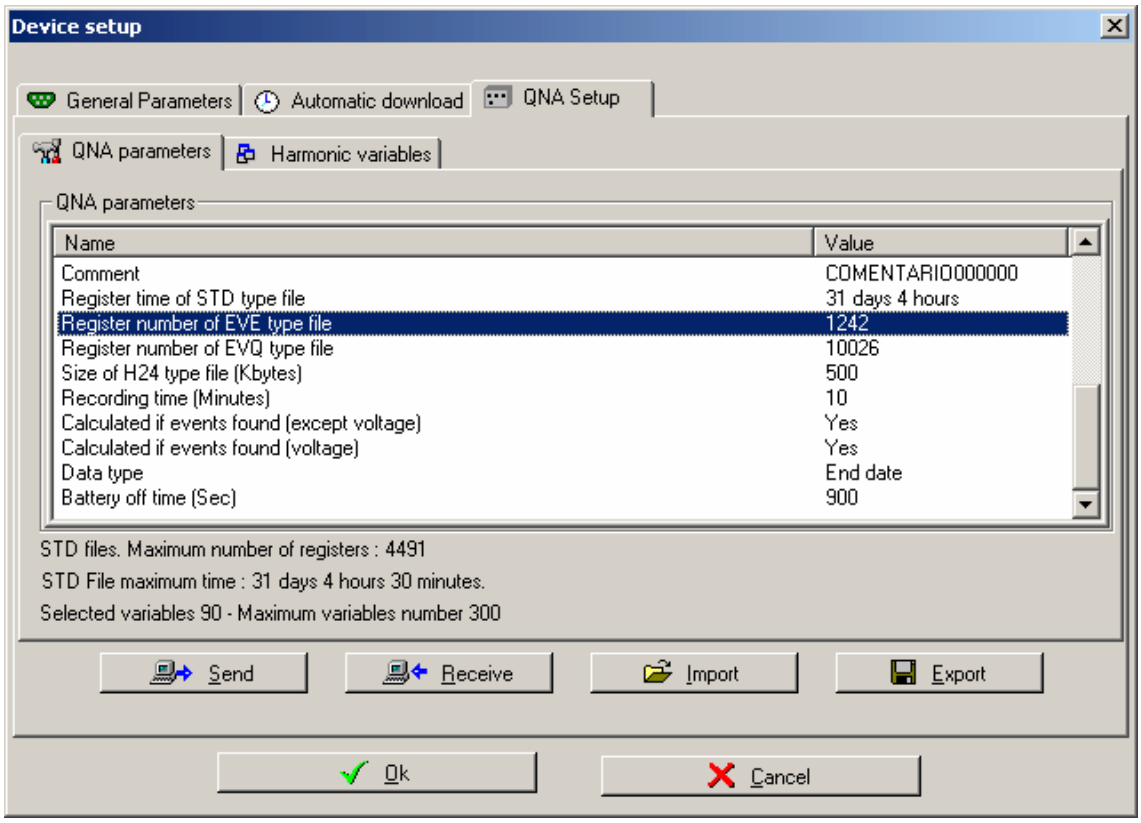
6. **-** *Connection interval:* Indicates all possible hours when automatic downloads are allowed. Download will only be done during this period of time. An advice is to user this property to connect with the QNA analyzer in these hours when a phone call is cheaper. You must take care that if interval is too short, it could happen that it does not have enough time to download all files.

7. **-** *Save path*: Indicates the folder where downloaded files will be saved. To change target folder, you must click on "***Examine***" button and then select the new folder to save files. If the name of the folder does not exist, program automatically creates it.

8. **–** *Number of retries when download fails:* Available values are from 0 (not retries) to 5. We also have a continuous value, application always try to retry the download (if it is in a not forbidden time).

9. **–** Files to download: We could select automatic download files to download. This option is useful if we are only interested in a few device files. We can choose betwen STD, EVE, EVQ, H24 and STP files if availables.

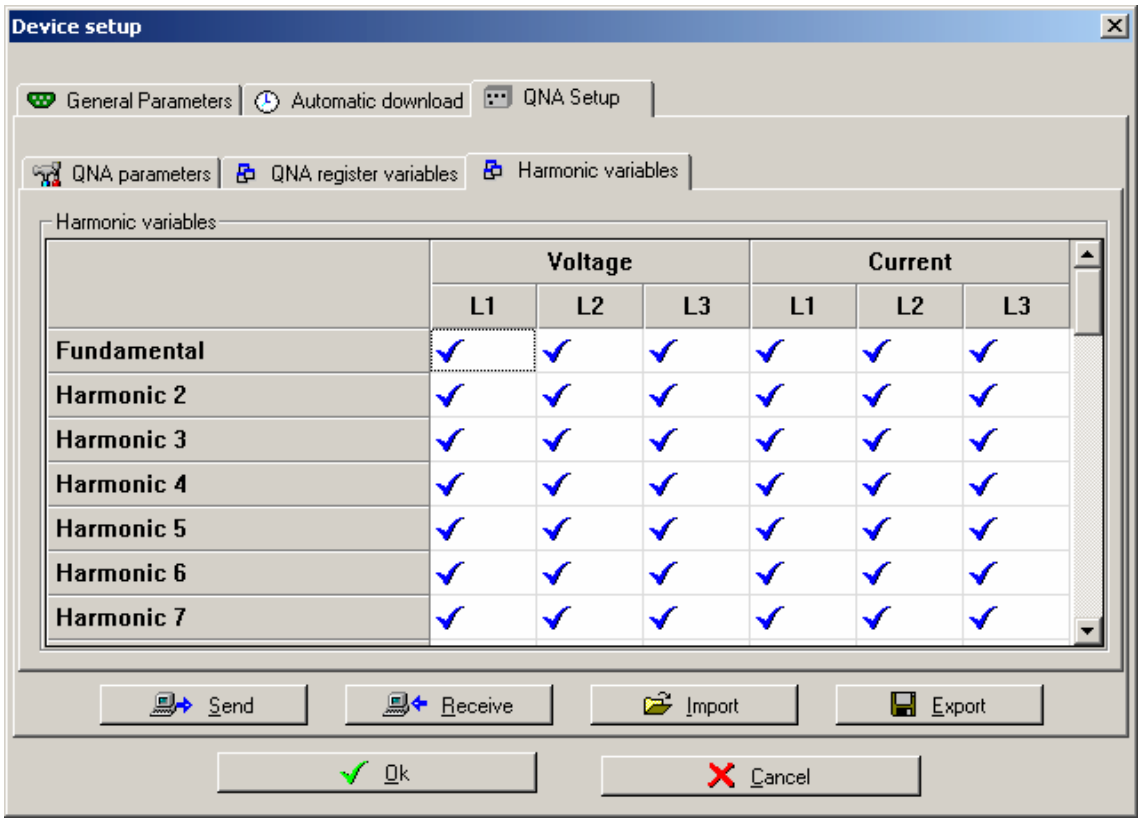
Once you have configured all communication and automatic download parameters, user must modify QNA internal configuration. This could be done using **QNA configuration** (third folder).




***QNA internal configuration screen (QNA parameters)***

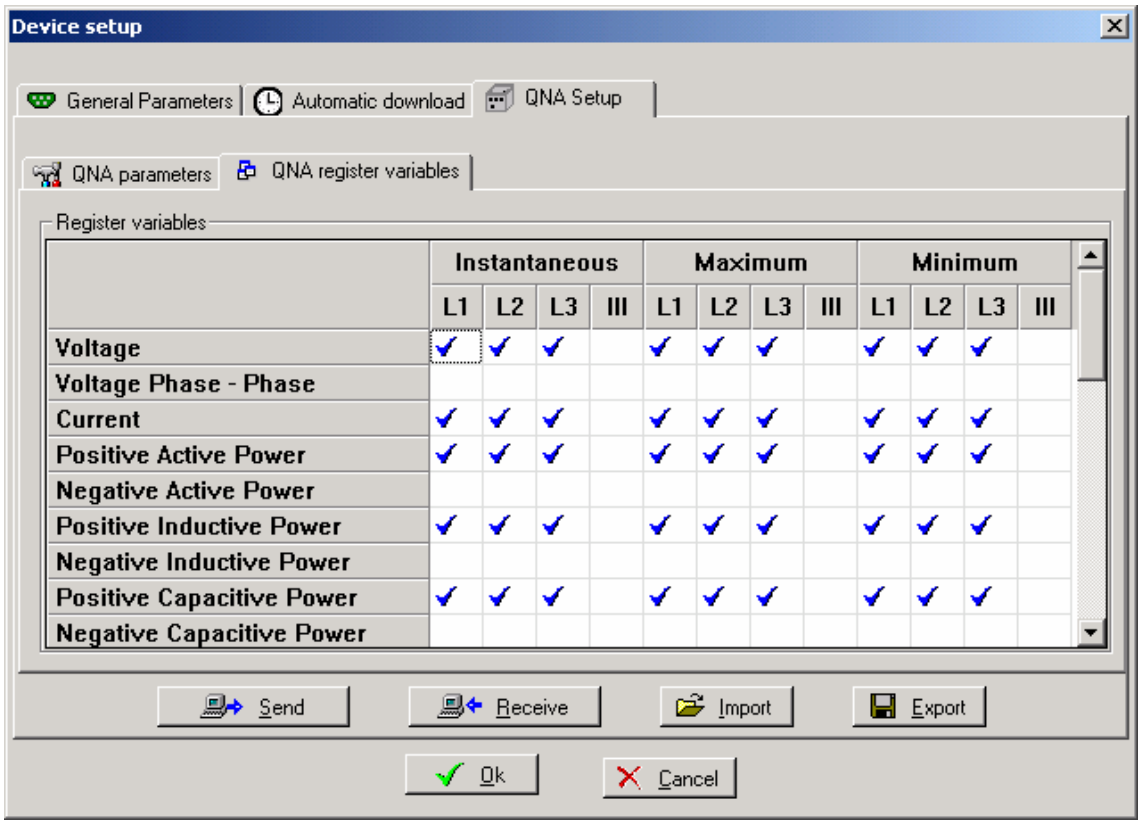
Inside QNA configuration you can find two other folders: **QNA Parameters** and **QNA register variables**. The first one shows QNA configuration parameters and the second one contains all variables that are going to be stored. The first time you configure equipment, both two folders will be empty, and there will not be the possibility to change any parameters or any analyzer variables. Once the configuration has been set, it will be saved automatically.

If we have a 412 QNA it will appear a new folder **Harmonic variables** and we can see voltage and current harmonic variables.




***QNA harmonic variable screen (QNA parameters)***

Clicking "***Receive***" button you can download the QNA configuration. When you press this button a list appears with all QNA parameters. Usually this is the first step to do and, after that, you can modify the predefined parameters.




***QNA internal configuration screen (QNA register variables)***

In this dialog box you can also find four buttons to do different actions.

To change QNA parameters, you must double-click on the device you want to modify, and then introduce a new value to the dialog box corresponding to that device. An important option to change is the **Recording time**, which indicates time period between each memory register saving. (The smaller the value is, a better precision is obtained, but more memory is used).

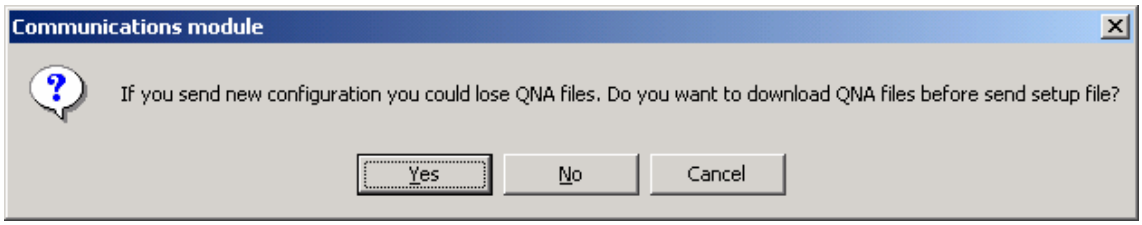
In the same folder we can find the maximum size that QNA .STD file can reach, the maximum saving time, the selected variables and the selected parameters.

If you want to add variables to the analyzer, you must click with the mouse on **QNA register variables** and then select on the table these variables you want to store. This value table will only be available if you have a 202 QNA because the 3 series do not allow modifying available variables.

This table contains some characteristics to make easier the analysis. When you select a variable, a blue thick will appear on its box, to indicate that it has been selected. If you click again on its box, variable returns to non-selected mode. In case you want to display all data for a variable (for example frequency) you only need to click on its column, and all its checkboxes will be selected. It is also important to remark than the black boxes are not allowed and you cannot select them.

Variable number that you can select is 99 (with QNA 2xx and QNA 3xx and 299 with QNA 4xx), but when you work with 202 QNA waveform series this number is 93 plus waveform (one variable) or 99 variables without waveform.

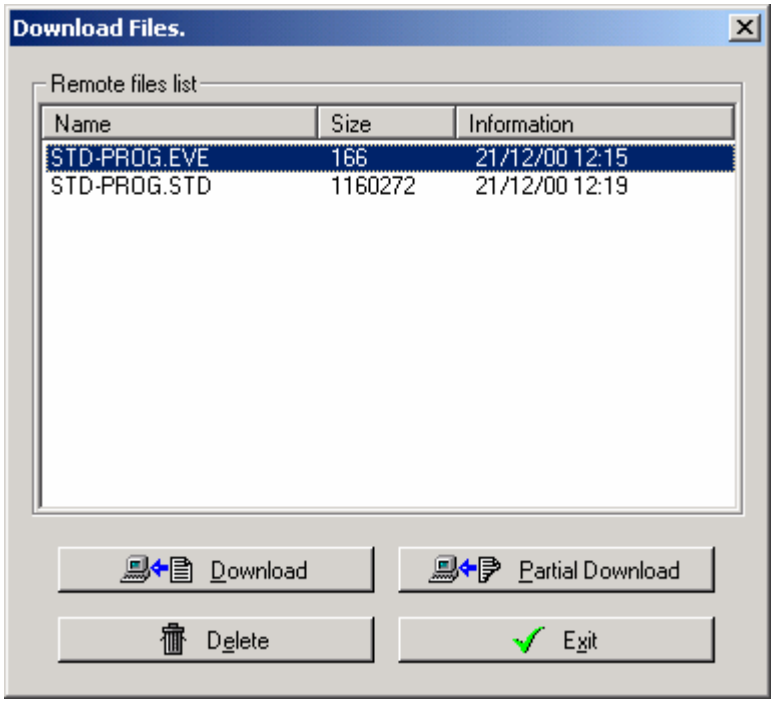
Once both lists are correctly configured, we can send, using "***Send***" button, the configuration to QNA (To allow data send you would have configured correctly the first folder). When you send a new configuration, device deletes stored files and reboot. Then we allow saving files stored on the QNA:




***Save confirm dialog***

When have three options: ***Yes***, we are allowed to download files before send new configuration. ***No***, send the new configuration. ***Cancel***, we return to the previous window without send the new configuration.

If we select the download file option we can see a new dialog explained in the "***device connect***" point.




***Download files dialog***

From this point, QNA will start to store data as you have established.

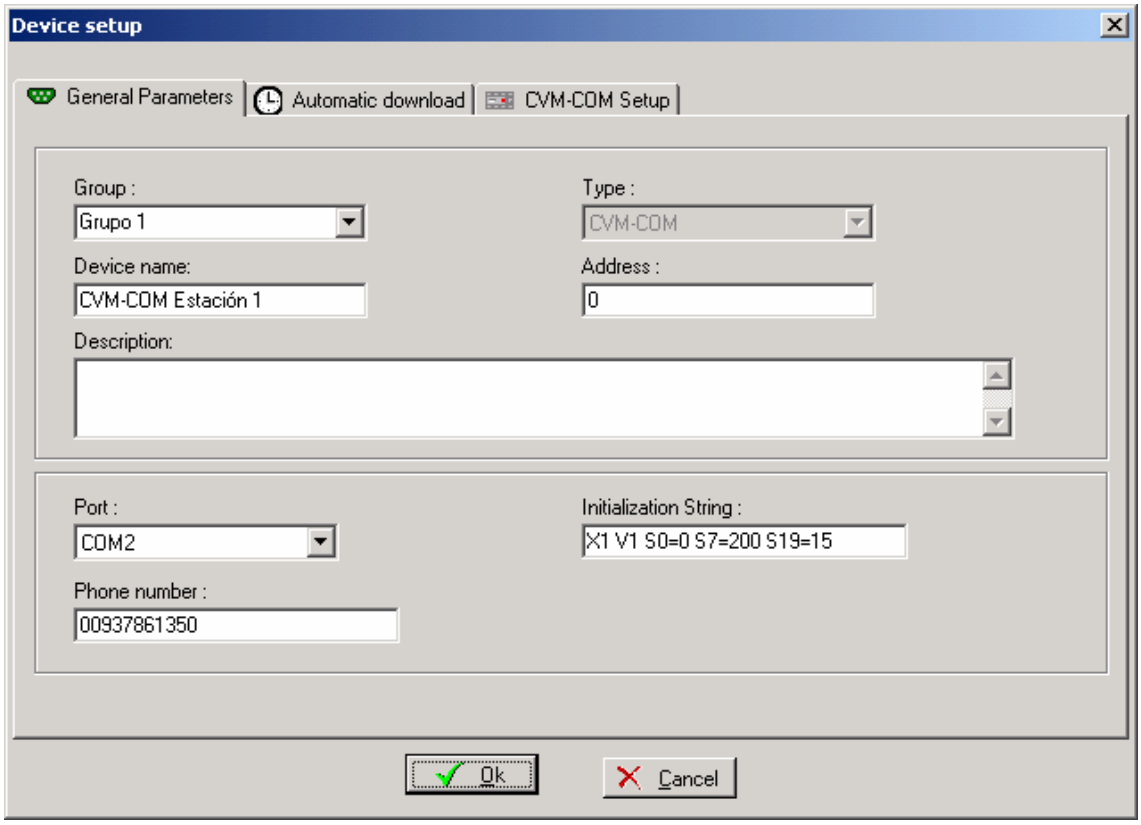
You also can, using "***Receive***" button, know which is the actual configuration of the analyzer (remember that communication parameters must be already set). After pressing this button, you will have both two folders with selected QNA configuration.

At least, program gives you the option to import or export configurations for the QNA (using "***Import***" and "***Export***" buttons), which is very useful to store in disk default equipment configurations, allowing its load at any time.

When all new QNA data has been entered, you should accept ("***Ok***" button or <ENTER> key) and the equipment will be added to QNA list. You can also cancel data entering using "***Cancel***" button or <ESC> key.

### 3.2.3.2.- Add a new CVM-COM

When "Add" in CVM-COM module is selected it will appear the new analyzer configuration dialog box. As you will see, it has three folders (**General parameters**, **Automatic download** and **CVM-COM Setup**).




***General parameter configuration folder***

When the dialog box appears, selected folder is **General parameters**, where you will be able to configure all new CVM-COM parameters. These are:

**1. -** *Port*: You will be able to select between all available PC communication ports, where CVM-COM modem is connected. The communications module will search for all free and existing ports in your computer. Is case we have the configuration file (AutoCall Plus.cfg file) from another computer, it may happen that the communication port is not the same as the other one, or that it is not available in the new computer, so we must change it.

**2. -** *Address*: It must coincide with CVM-COM direction. Default CVM-COM value is 99. (It's highly recommended not changing this value if it's not necessary).

**3. -** *Device Name*: You must give a different name to each new device, because the program identifies each device with a single different name (The system will warn you if you try to assign a used name)

**4. -** *Group*: In order to organize analyzer's list, you will be able to assign each one to a group. Using this field you will choose an existing group or create a new one.

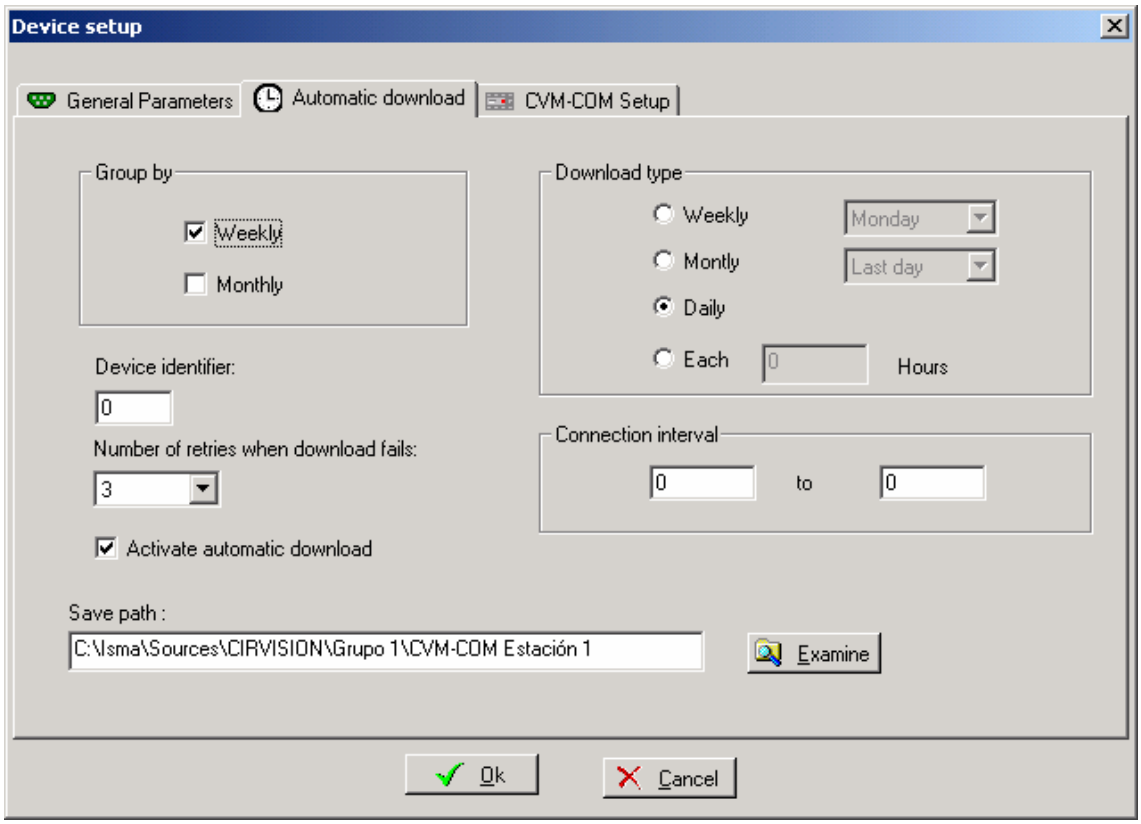
**5. -** *Description:* This field is allows you to add a short equipment description, but it's not obligatory to fill it.

**6. –** *Phone number:* The CVM-COM phone number must be set here.

**7. –** *Initialization string*: This is a MODEM value and its default configuration should be maintained at (X1 V1 S0=0 S7=200 S19=15).

***Note:*** *Device type default set is CVM-COM and could not be modified.*

When all identification and communication parameters have been updated, you can now try to modify automatic download options:




***Automatic downloads dialog box***

Using this folder, you can modify automatic download propertied. Here goes a list of all updateable fields:

1. **-** *Group Data*: You can group all downloaded files in two different ways: **Weekly** and **Monthly**. Files can be grouped if they are downloaded in manual or automatic mode, and all data can be divided in many files.

2. **-** *Device identifier*: This number allows user to build the downloaded file name. The file will have the following format:

   ***c.*** *Weekly download:*
   Siiiwwyy.std
   Where:
   S: letter that means weekly grouping
   iii: CVM-COM three digit identifier
   ww: week of the respective year
   yy: year with two digits

   ***d.*** *Monthly download:*
   Miiimmyy.std
   Where:
   M: letter that means weekly grouping
   iii: CVM-COM three digit identifier
   mm: month of the respective year
   yy: year with two digits

3. **-** *Activate automatic download*: You can do automatic or manual downloads.

4. **-** *Download type*: With this option we choose the download periodicity. There are many options:

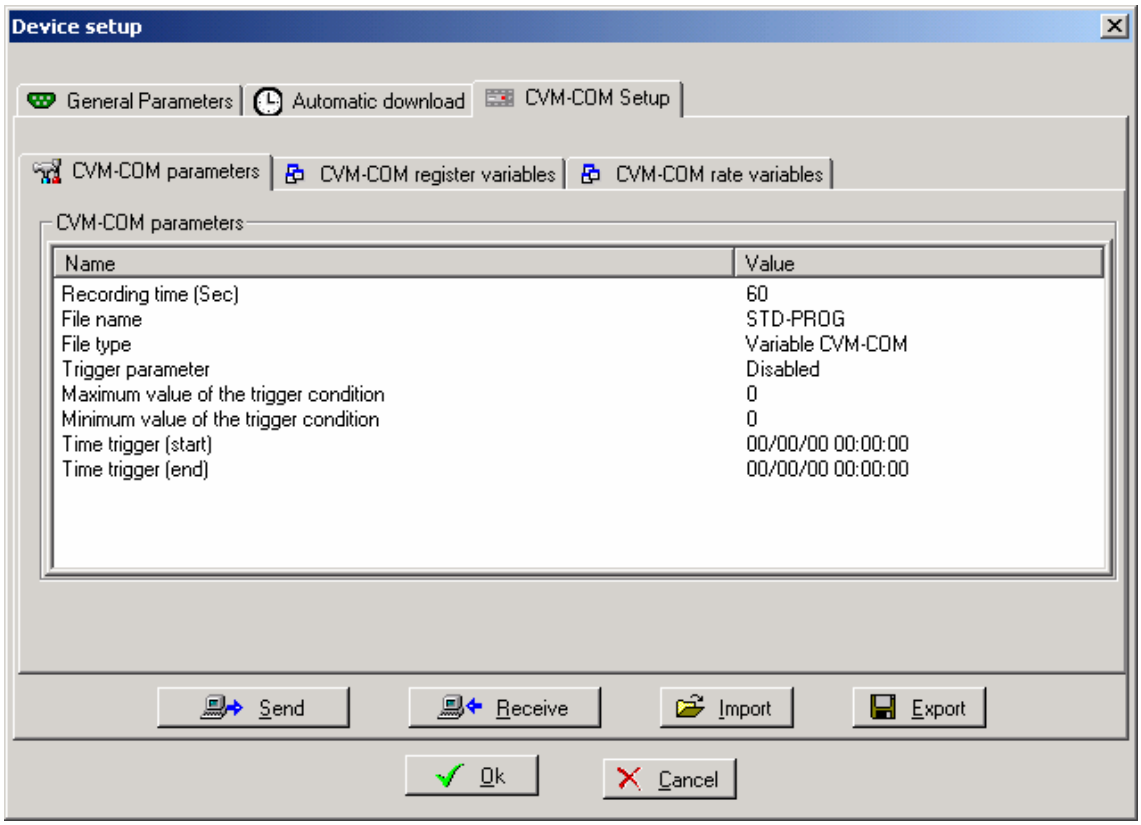
    e. *Weekly:* From Monday to Sunday, any day can be selected
    f. *Monthly:* From 1 to 30 of each month. In case day 30 is selected, on February program will download data on the 1st of March.
    g. *Daily:* Data is downloaded daily.
    h. *Each x hours:* Downloads data each x hours.

5. **-** *Connection interval:* Indicates all possible hours when automatic downloads are allowed. Download will only be done during this period of time. An advice is to user this property to connect with the analyzer in these hours when a phone call is cheaper. You must take care that if interval is too short, it could happen that it does not have enough time to download all files.

6. **-** *Save path*: Indicates the folder where downloaded files will be saved. To change target folder, you must click on "***Examine***" button and then select the new folder to save files. If the name of the folder does not exist, program automatically creates it.

7. **–** *Number of retries when download fails:* Available values are from 0 (not retries) to 5. We also have a continuous value, application always try to retry the download (if it is in a not forbidden time).

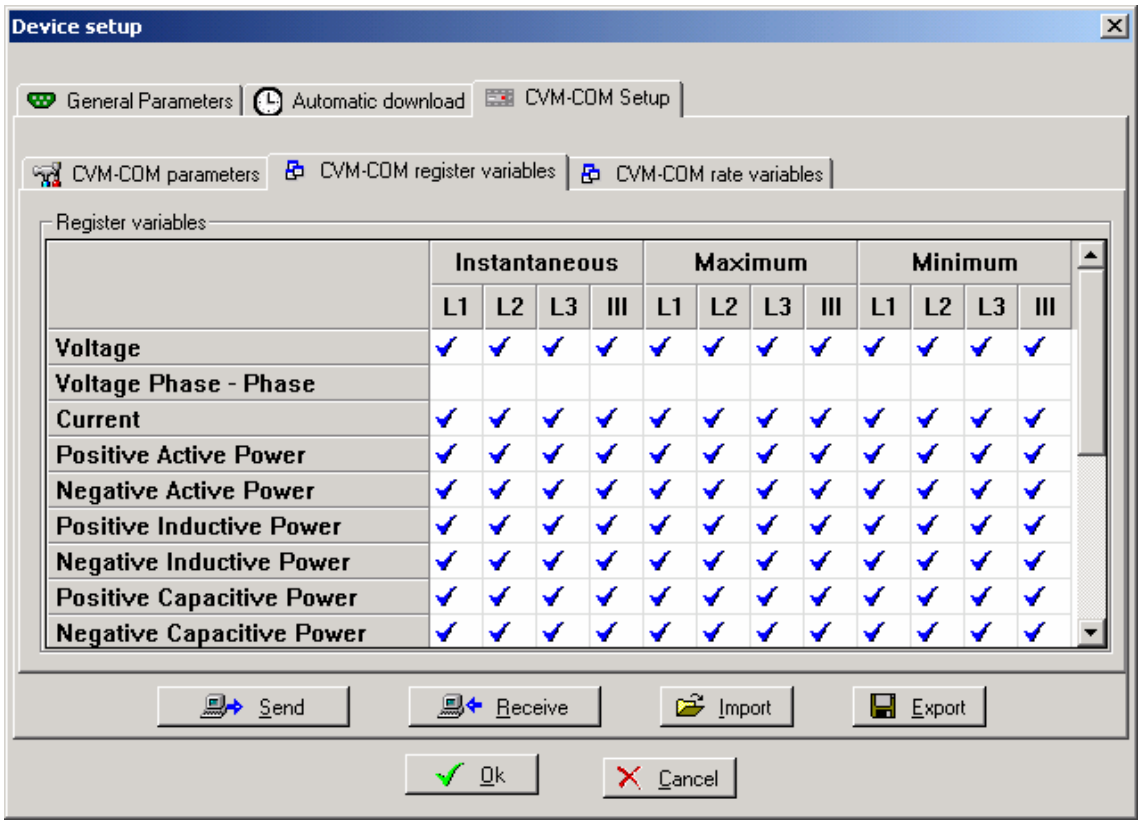
Once you have configured all communication and automatic download parameters, user must modify analyzer internal configuration. This could be done using **CVM-COM Setup** (third folder).




***CVM-COM internal configuration screen (CVM-COM parameters)***

Inside CVM-COM configuration you can find three other folders: **CVM-COM Parameters**, **CVM-COM register variables** and **CVM-COM rate variables**. The first one shows CVM-COM configuration parameters, the second one contains all variables that are going to be stored and the third one all rate variables. The first time you configure equipment, three folders will be empty, and there will not be the possibility to change any parameters or any analyzer variables. Once the configuration has been set, it will be saved automatically.

If we want to know the configuration of the CVM-COM we'll have to click over the button "***Recieve***", and then will appear in the parameters list all the information of its configuration. Usually, we may start doing this action to test the status of the device and do changes.

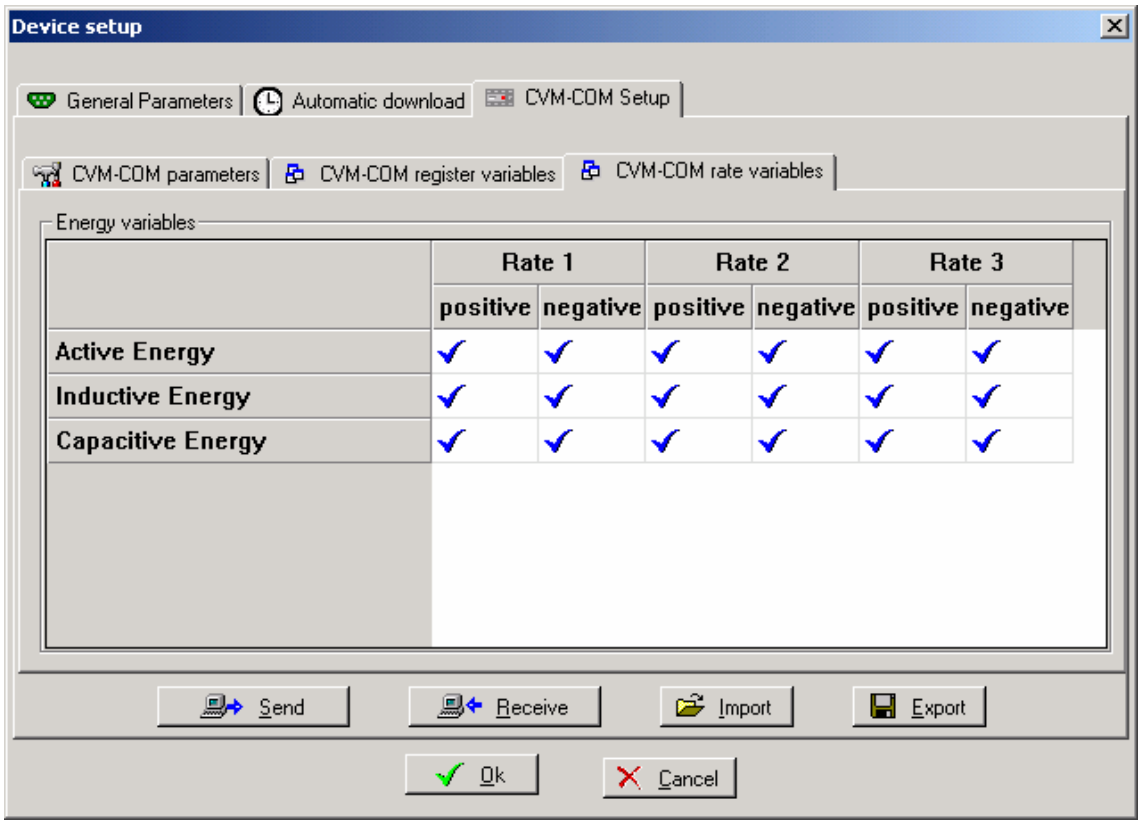



***CMV-COM internal configuration screen (CVM-COM register variables)***

In this dialog box you can also find four buttons to do different actions.

To change CVM-COM parameters, you must double-click on the device you want to modify, and then introduce a new value to the dialog box corresponding to that device. An important option to change is the **Recording time**, which indicates time period between each memory register saving. (The smaller the value is, a better precision is obtained, but more memory is used). Parameter **File Type** is also important because we can select two CVM-COM configuration types (if we select fixed type (CVM) we can not see variables).

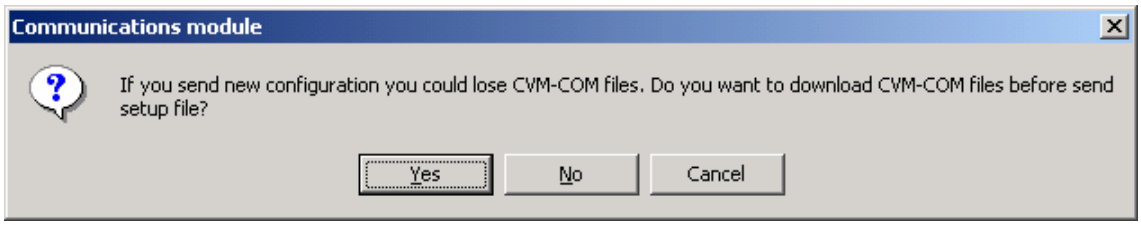
If you want to add variables to the analyzer, you must click with the mouse on **CVM-COM register variables** and then select on the table these variables you want to store. If you need to add energy variables you could use the **CVM-COM Rate variables**.




***CVM-COM internal configuration screen. CVM-COM rate variables screen.***

This table contains some characteristics to make easier the analysis. When you select a variable, a blue thick will appear on its box, to indicate that it has been selected. If you click again on its box, variable returns to non-selected mode. In case you want to display all data for a variable (for example frequency) you only need to click on its column, and all its checkboxes will be selected. It is also important to remark than the black boxes are not allowed and you cannot select them.

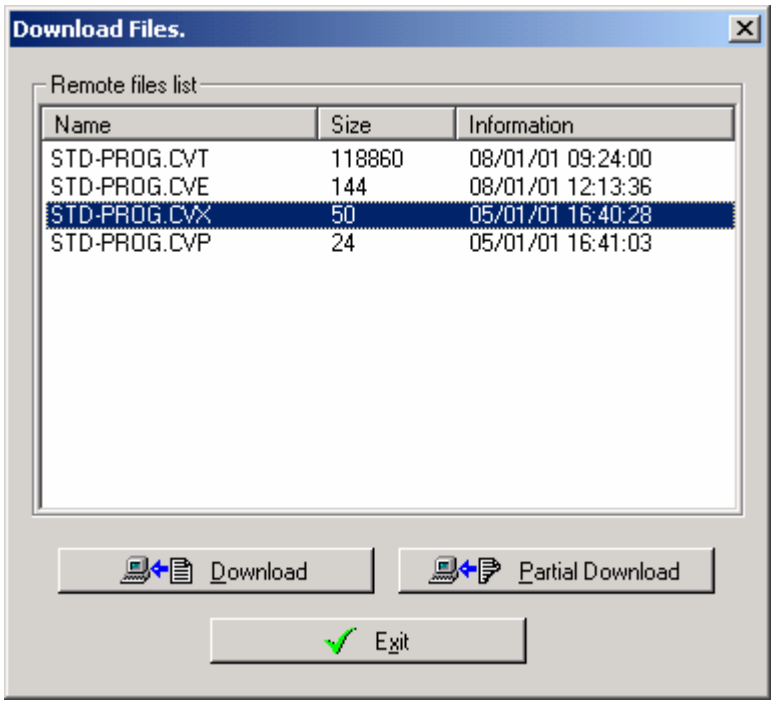
Once both lists are correctly configured, we can send, using "***Send***" button, the configuration to CVM-COM (To allow data send you would have configured correctly the first folder). When you send a new configuration, device deletes stored files and reboot. Then we allow saving files stored on the CVM-COM:




***Save confirm dialog***

When have three options: ***Yes***, we are allowed to download files before send new configuration. ***No***, send the new configuration. ***Cancel***, we return to the previous window without send the new configuration.

If we select the download file option we can see a new dialog explained in the "device connect" point.




***Download files dialog***

From this point, CVM-COM will start to store data as you have established.

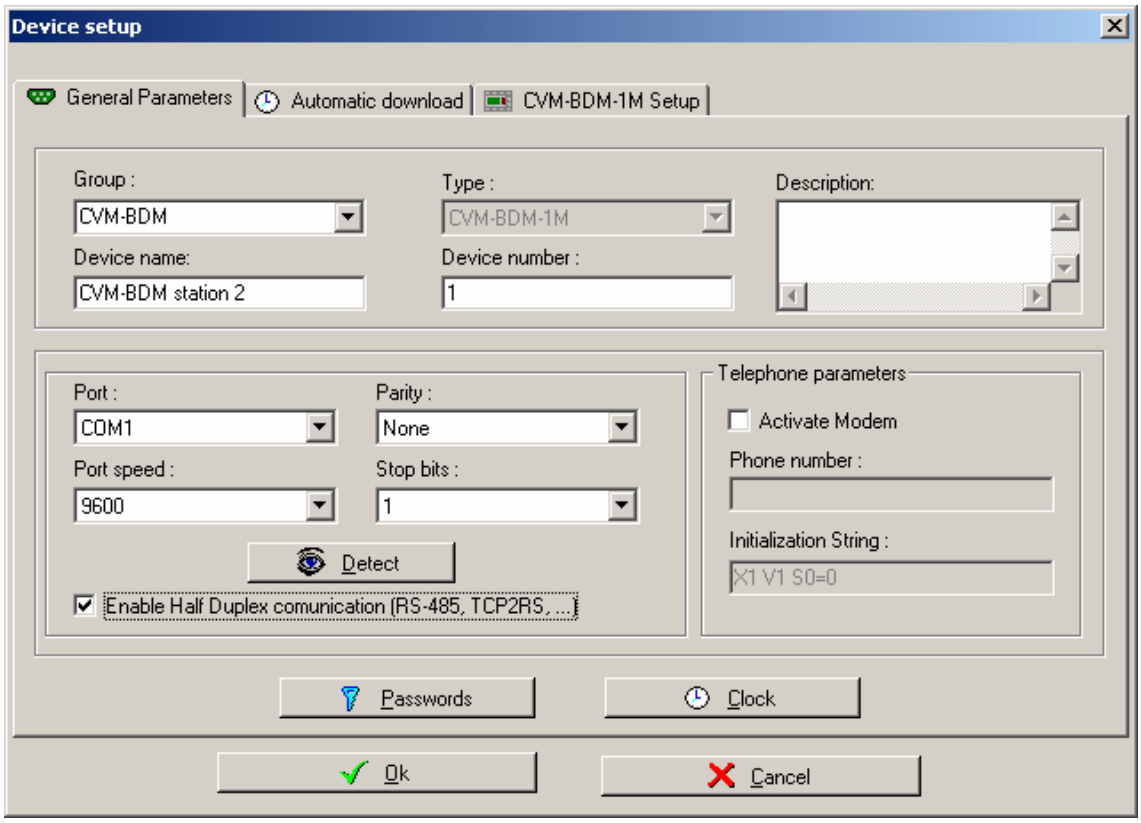
You also can, using "***Receive***" button, know which is the actual configuration of the analyzer (remember that communication parameters must be already set). After pressing this button, you will have both two folders with selected CVM-COM configuration.

At least, program gives you the option to import or export configurations for the CVM-COM (using "***Import***" and "***Export***" buttons), which is very useful to store in disk default equipment configurations, allowing its load at any time

When all new CVM-COM data has been entered, you should accept ("*Ok*" button or <ENTER> key) and the equipment will be added to device list. You can also cancel data entering using "***Cancel***" button or <ESC> key.

### 3.2.3.3.- Add a new CVM-BDM-1M

When “Add” in CVM-BDM-1M module is selected it will appear the new configuration dialog box. As you will see, it has three folders (**General parameters**, **Automatic download** and **CVM-BDM-1M Setup**).




***General parameter configuration folder***

When the dialog box appears, selected folder is **General parameters**, where you will be able to configure all new CVM-BDM.1M parameters. These are:

**1. -** *Port*: You will be able to select between all available PC communication ports, where CVM-BDM-1M modem is connected. The communications module will search for all free and existing ports in your computer. Is case we have the configuration file (AutoCall Plus.cfg file) from another computer, it may happen that the communication port is not the same as the other one, or that it is not available in the new computer, so we must change it.

**2. -** *Address*: It must coincide with CVM-BDM-1M direction. (It’s highly recommended not changing this value if it’s not necessary)

**3. –** *Baud rate:* You will be able to select speed between the values 4800, 9600 and 19200 BPS. This speed will be used to configure the computer’s port as well as CVM-BDM-1M connected to that port. When we change this value, program tries to communicate with CVM-BDM-1M and change its configuration, and if there was no success it will warn us. It will give the possibility of auto-detect the configuration. This will happen with any communication parameter.

**4. -** *Stop bits*: You will be able to choose between one or two stop bits. When this property is modified, selected port as well as CVM-BDM-1M will be configured with the new selected value.

**5. -** *Parity*: You may choose between **no parity, odd** or **even**. When this property is modified, selected port as well as QNA will be configured with the new selected value.

**6. –** *Enable Half Duplex communication*. Allows to enable Half Duplex communication. It's necessary in all devices width RS-485, TCP2RS or GSM modem communications (devices without Full Duplex communication)

**7. -** *Device Name*: You must give a different name to each new device, because the program identifies each device with a single different name (The system will warn you if you try to assign a used name)

**8. -** *Group*: In order to organize analyzer's list, you will be able to assign each one to a group. Using this field you will choose an existing group or create a new one.

**Note**: The program creates a new folder with the name of the group and, inside, a new subfolder with the name of the device.

**9. -** *Description:* This field is allows you to add a short equipment description, but it's not obligatory to fill it.

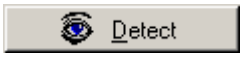
**10. –** *Activate Modem:* With this option, user informs to program that communication will be made via modem. Note that when this option is selected, **port speed, stop bits** and **parity** options are disabled and **Phone number and initialization string** is enabled. This occurs because all GSM communications will be made at 9600 BPS.

**11. –** *Phone number:* If CVM-BDM-1M analyzer disposes of modem communications, its phone number must be set here.

**12. –** *Initialization string*: This is a MODEM value and its default configuration should be maintained at (X1 V1 S0=0).

***Note:*** *Device type default set is CVM-BDM-1M and could not be modified.*

In this folder you also can read the configuration of the CVM-BDM-1M connected to the selected port, clicking with your mouse on the button named "***Detect***", at the right bottom part of the dialog box.




***Detect button***

When this button is pressed selected CVM-BDM-1M parameters will be updated. If no CVM-BDM-1M is connected to this port program will return an error message, warning user about the problem.

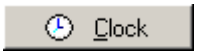
CVM-BDM-1M has password setting capability and, for this reason, we'll be able to change the password using the password button

***Passwords button***

Once we have clicked this button, we'll have to see a window where we'll be able to change the reading or writing passwords. This password locks the keyboard setup and disables the option of send configuration.

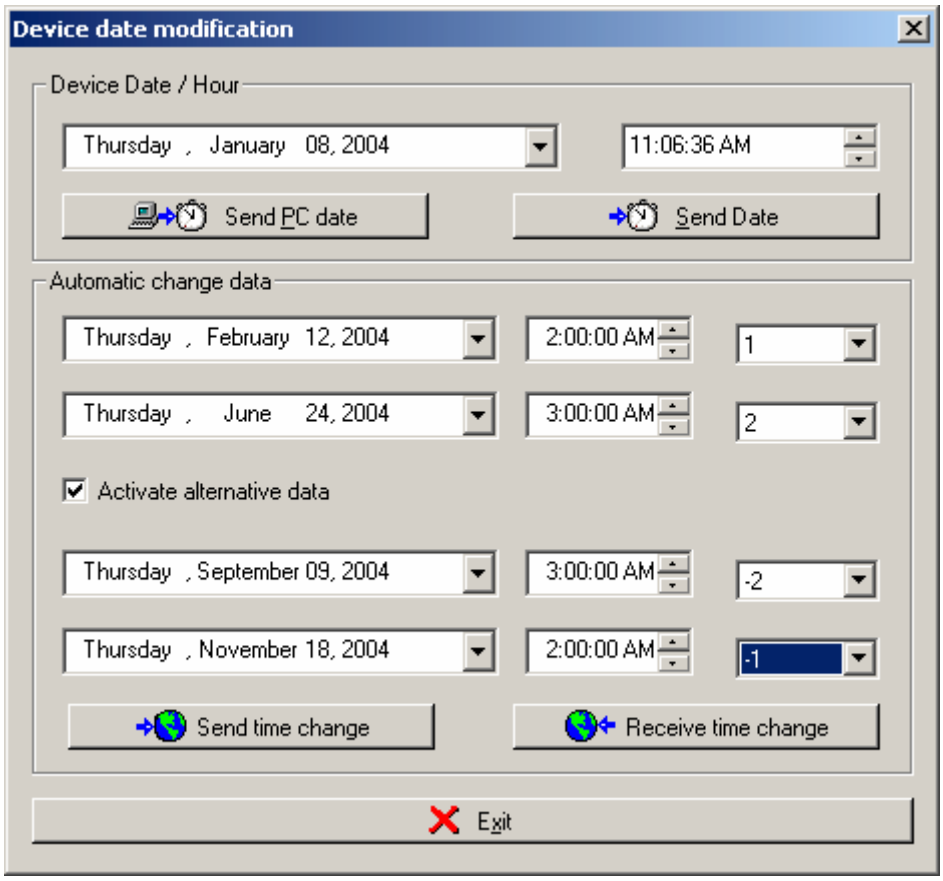
***Changing the CVM-BDM-1M password***

It's also possible to change selected equipment time. To do this, we should first have configured well the equipment, and then click on "*Clock*" button. If the equipment is not well connected, program will return an error message.



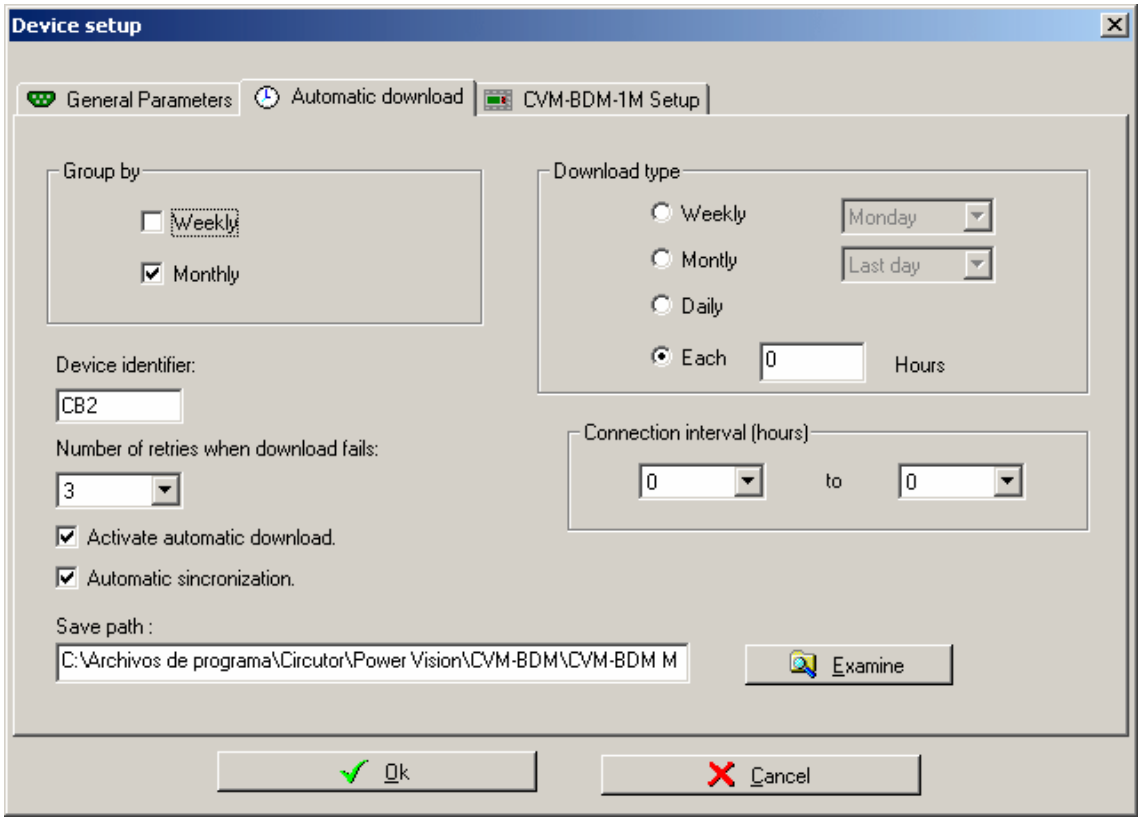

***Clock button***

Once this button is pressed, it should appear a dialog box like the one shown below. In this dialog box you will be able to change the date and time of the QNA, sending PC time or a manual introduced time.




***Change CVM-BDM-1M Date/Time***

You can now try to modify automatic download options:




***Automatic download for CVM-BDM-1M***

Using this folder, you can modify automatic download propertied. Here goes a list of all updateable fields:

1. **-** *Group Data*: You can group all downloaded files in two different ways: **Weekly** and **Monthly**. Files can be grouped if they are downloaded in manual or automatic mode, and all data can be divided in many files.

2. **-** *Device identifier*: This number allows user to build the downloaded file name. The file will have the following format:

   - *Weekly download:*
     Siiiwwyy.std
     Where:
     S: letter that means weekly grouping
     iii: QNA three digit identifier
     ww: week of the respective year
     yy: year with two digits

   - *Monthly download:*
     Miiimmyy.std
     Where:
     M: letter that means weekly grouping
     iii: QNA three digit identifier
     mm: month of the respective year
     yy: year with two digits

3. **-** *Automatic synchronization*: When this check box is selected, this software will change automatically CVM-BDM-1M they time configuration would not be the same.

4. **-** *Activate automatic download*: You can do automatic or manual downloads.

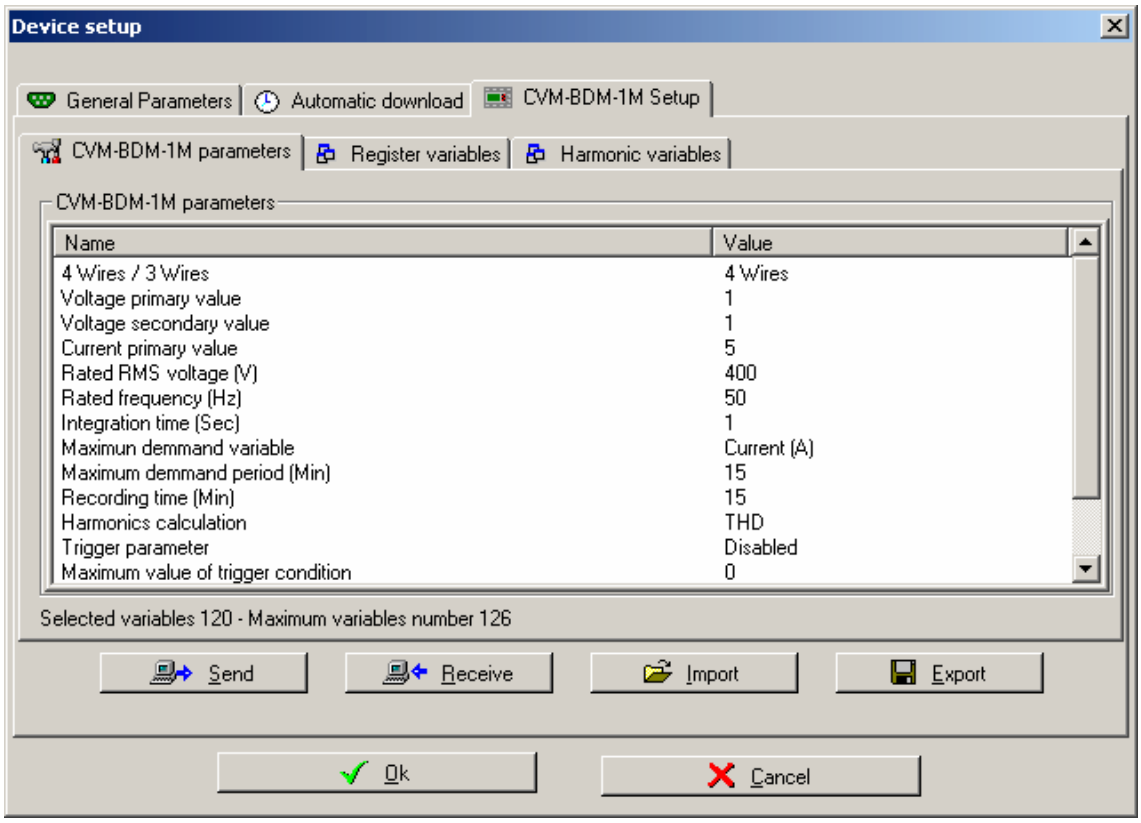
5. **-** *Download type*: With this option we choose the download periodicity. There are many options:

   - Weekly: From Monday to Sunday, any day can be selected
   - Monthly: From 1 to 30 of each month. In case day 30 is selected, on February program will download data on the 1st of March.
   - Daily: Data is downloaded daily.
   - Each x hours: Downloads data each x hours.

6. **-** *Save path*: Indicates the folder where downloaded files will be saved. To change target folder, you must click on "***Examine***" button and then select the new folder to save files. If the name of the folder does not exist, program automatically creates it.

7. **–** *Number of retries when download fails:* Available values are from 0 (not retries) to 5. We also have a continuous value, application always try to retry the download (if it is in a not forbidden time).

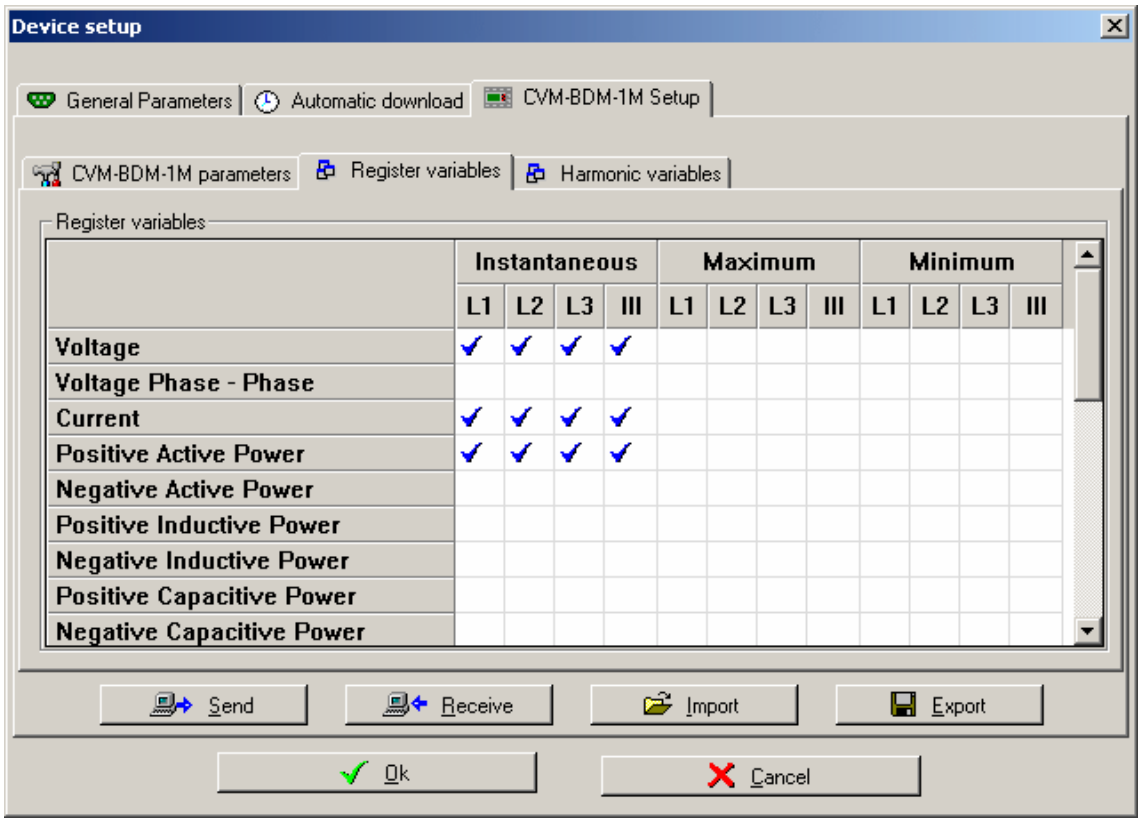
Once you have configured all communication and automatic download parameters, user must modify CVM-BDM-1M internal configuration. This could be done using **CVM-BDM-1M configuration** (third folder)




***CVM-BDM-1M internal configuration screen (CVM-BDM-1M parameters)***

Inside CVM-BDM-1M configuration you can find three other folders: **CVM-BDM-1M Parameters**, **CVM-BDM-1M register variables** and **CVM-BDM-1M harmonic variables**. The first one shows CVM-BDM-1M configuration parameters, the second one contains all variables that are going to be stored and the third one all harmonic variables. The first time you configure equipment, three folders will be empty, and there will not be the possibility to change any parameters or any analyzer variables. Once the configuration has been set, it will be saved automatically.

If we want to know the configuration of the CVM-BDM-1M we'll have to click over the button "***Recieve***", and then will appear in the parameters list all the information of its configuration. Usually, we may start doing this action to test the status of the device and do changes.



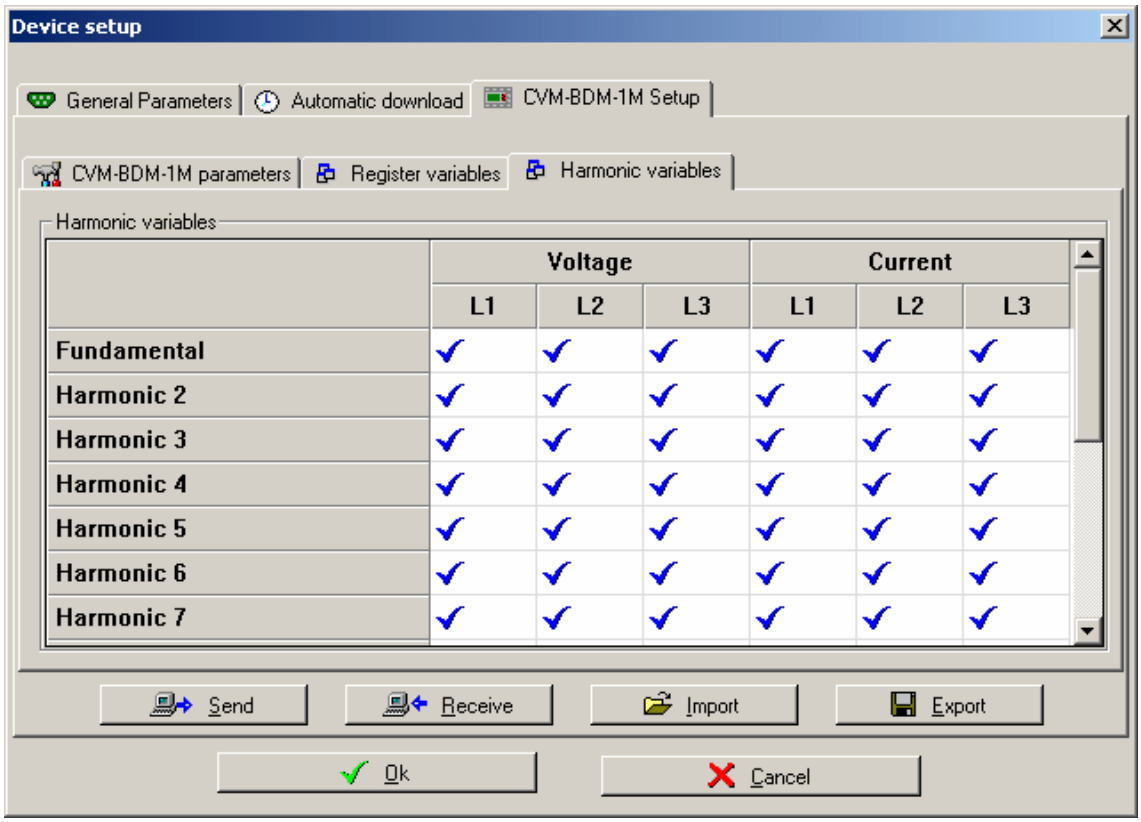

***CMV-BDM-1M internal configuration screen (CVM-BDM-1M register variables)***

In this dialog box you can also find four buttons to do different actions.

To change CVM-BDM-1M parameters, you must double-click on the device you want to modify, and then introduce a new value to the dialog box corresponding to that device. An important option to change is the **Recording time**, which indicates time period between each memory register saving. (The smaller the value is, a better precision is obtained, but more memory is used).

You can also see the alarms configuration and analogic outputs configuration, it depends on CVM-BDM-1M type. For example, if the device has only relays we can configure alarms and we cannot configure analogic outputs.

If you want to add variables to the analyzer, you must click with the mouse on **CVM-BDM-1M register variables** and then select on the table these variables you want to store. If you need to add harmonics variables you could use the **CVM-BDM-1M harmonic variables**.

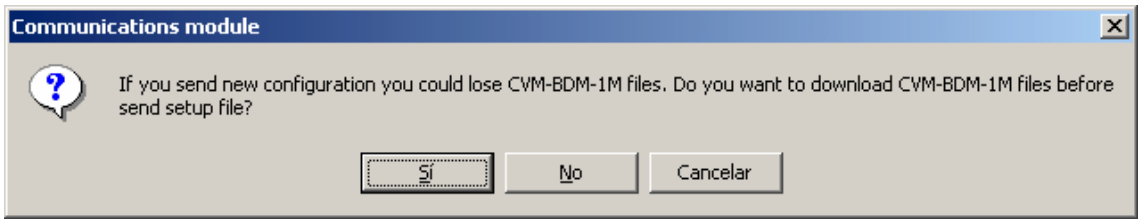



***CVM-BDM-1M internal configuration screen (CVM-BDM-1M harmonic variables)***

This table contains some characteristics to make easier the analysis. When you select a variable, a blue thick will appear on its box, to indicate that it has been selected. If you click again on its box, variable returns to non-selected mode. In case you want to display all data for a variable (for example frequency) you only need to click on its column, and all its checkboxes will be selected. It is also important to remark than the black boxes are not allowed and you cannot select them.

You can select 126 variables (every energy spend two variables)

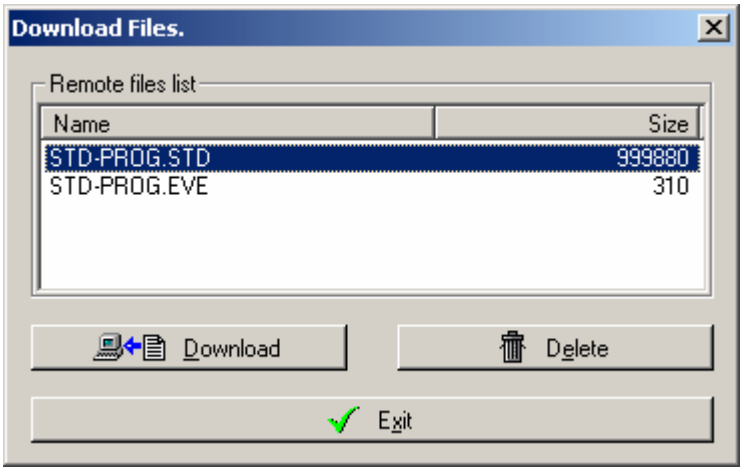
Once both lists are correctly configured, we can send, using "***Send***" button, the configuration to CVM-BDM-1M (To allow data send you would have configured correctly the first folder). When you send a new configuration, device deletes stored files and reboot. Then we allow saving files stored on the CVM-BDM-1M:




***Save confirm dialog***

When have three options: ***Yes***, we are allowed to download files before send new configuration. ***No***, send the new configuration. ***Cancel***, we return to the previous window without send the new configuration.

If we select the download file option we can see a new dialog explained in the "device connect" point.




***Download files dialog***

From this point, CVM-BDM-1M will start to store data as you have established.

You also can, using "***Receive***" button, know which is the actual configuration of the analyzer (remember that communication parameters must be already set). After pressing this button, you will have both two folders with selected CVM-BDM-1M configuration.

At least, program gives you the option to import or export configurations for the CVM-BDM-1M (using "***Import***" and "***Export***" buttons), which is very useful to store in disk default equipment configurations, allowing its load at any time.

When all new CVM-BDM-1M data has been entered, you should accept ("*Ok*" button or <ENTER> key) and the equipment will be added to device list. You can also cancel data entering using "***Cancel***" button or <ESC> key.

### 3.2.4.- Modify a device in work environment

To modify one analyzer of equipment list, you must select it and then click with mouse left button on "***Modify***" button (you can also double-click on the QNA that is going to be modified or select it and then press <ENTER> key)

***Modify button***

Then, it will appear device selected configuration screen again (QNA, CVM-BDM-1M or CVM-COM), with its three folders, where you will be able to change all the parameters.

When we do our first connection to configure the device (clock reading, receiving or sending the SETUP file) the connection will remain opened during 60 seconds.

For more details on how to change configuration parameters, see the section named **Add a new device to work environment**.

### 3.2.5.- Remove a device from work environment

If you want to remove a device from device list you must first select the equipment and then click with your mouse left button on "***Remove***" button. You also can do it pressing <Del> key when the analyzer is selected.

***Remove button***

Then, the selected device will disappear of the list.

### 3.2.6.- Connect with a device

Once the device is configured, you can communicate with it using "***Connect***" button.

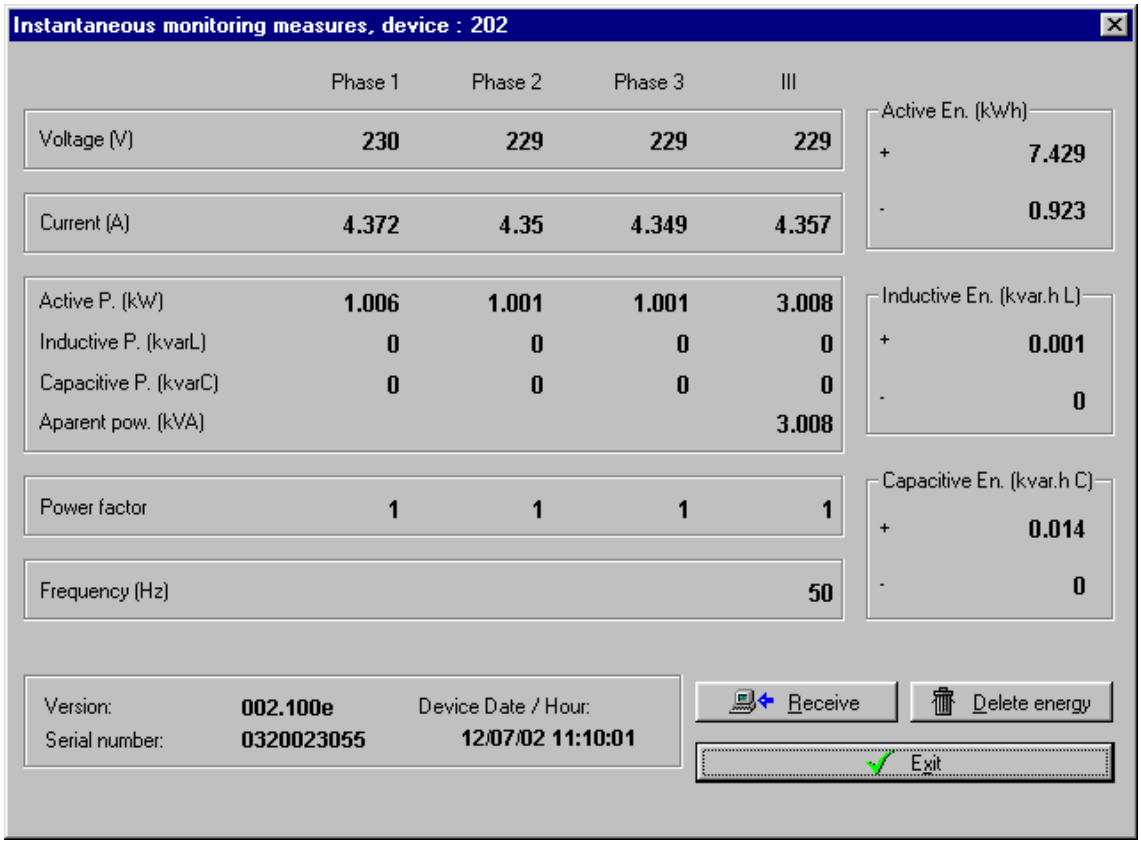
***Connect button***

Display window will be different depending on the selected device.

### 3.2.6.1.- Connect with a QNA.

#### 3.2.6.1.1. QNA 202

This button accedes to selected QNA-202 display window.




***Instantaneous values display window QNA 202***

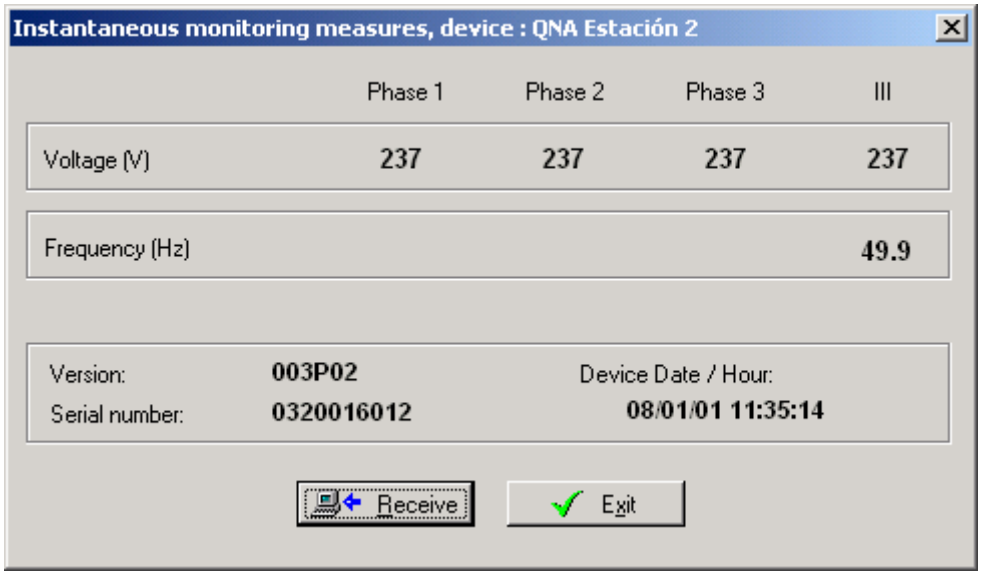
In this window you can display at real time, all parameters that analyzer is measuring this moment. Thus, you will know voltage values, current, Power, energy, etc. Measured by analyzer immediately. You will also display date and time, QNA version and QNA serial number. In the title bar you can also display equipment name.

As you can observe, these values are refreshed each few seconds (depending on analyzer connection), showing all-instant values. You will display data until you press "***Exit***" button or you choose "***Receive***" option.

Use "***Receive***" button to download one or various files stored in QNA memory.

### 3.2.6.1.2. QNA 303

This button accedes to selected QNA-303 display window.




***Instantaneous values display window QNA 303***

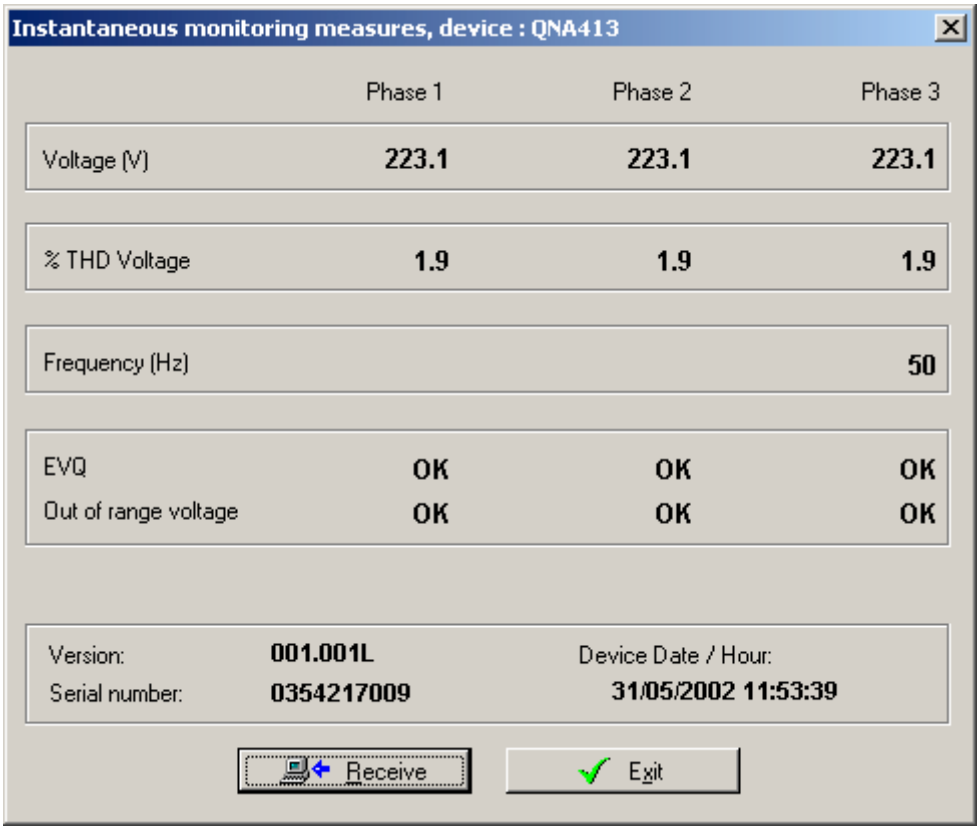
In this window you can display at real time, all parameters that analyzer is measuring this moment. Thus, you will know voltage values and frequency values measured by analyzer immediately. You will also display date and time, QNA version and QNA serial number. In the title bar you can also display equipment name.

As you can observe, these values are refreshed each few seconds (depending on analyzer connection), showing all-instant values. You will display data until you press "***Exit***" button or you choose "***Receive***" option.

Use "***Receive***" button to download one or various files stored in QNA memory.

### 3.2.6.1.3. QNA 413

This button accedes to selected QNA-413 display window.




***Instantaneous values display window QNA 413***

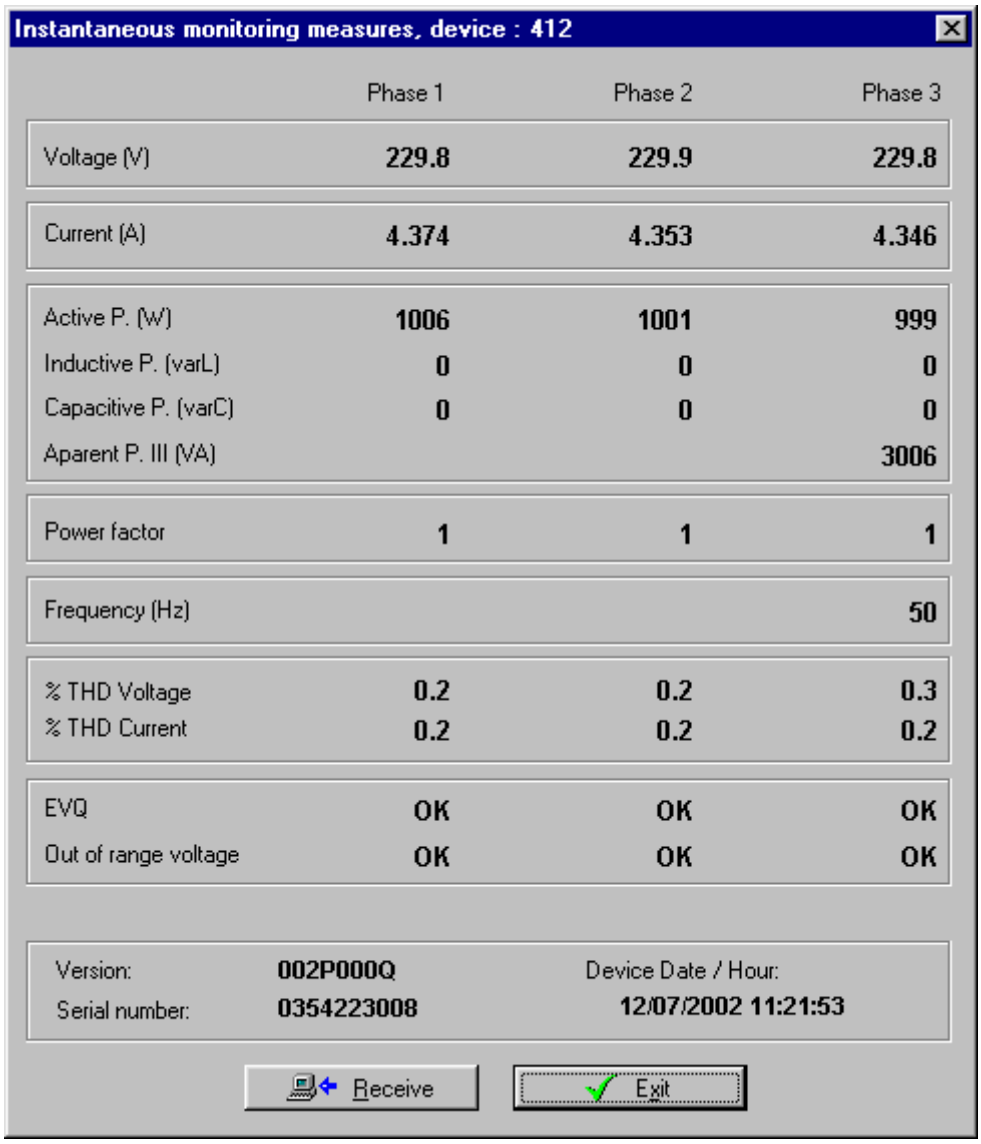
In this window you can display at real time, all parameters that analyzer is measuring this moment. This, you will know voltage values and frequency values measured by analyzer immediately. You will also display date and time, QNA version and QNA serial number. In the title bar you can also display equipment name.

As you can observe, these values are refreshed each few seconds (depending on analyzer connection), showing all-instant values. You will display data until you press "***Exit***" button or you choose "***Receive***" option.

Use "***Receive***" button to download one or various files stored in QNA memory.

### 3.2.6.1.4. QNA 412

This button accedes to selected QNA-413 display window.



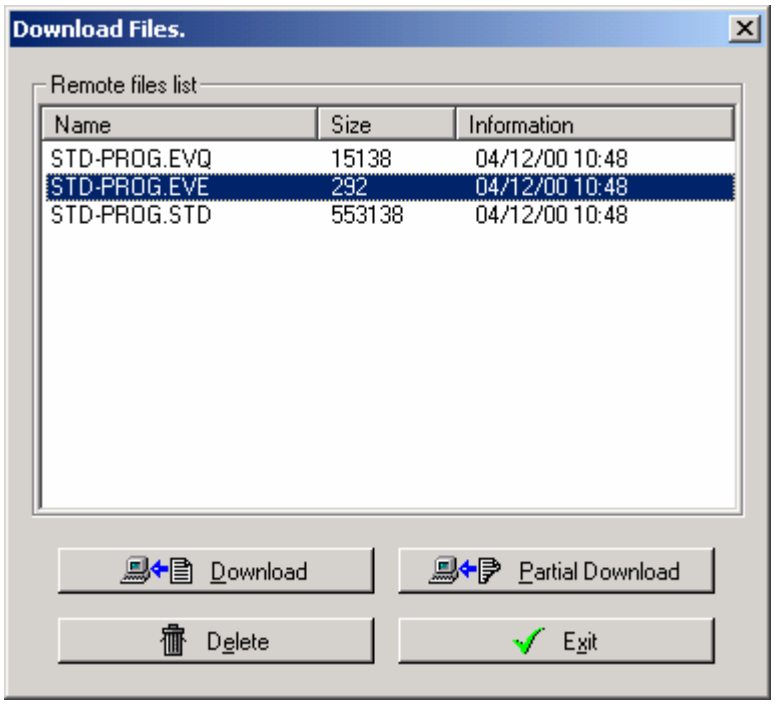

***Instantaneous values display window QNA 412***

In this window you can display at real time, all parameters that analyzer is measuring this moment. This, you will know voltage, current, active and reactive power, aparent power, voltage and current THD and frequency values measured by analyzer immediately. You will also display date and time, QNA version and QNA serial number. In the title bar you can also display equipment name.

As you can observe, these values are refreshed each few seconds (depending on analyzer connection), showing all-instant values. You will display data until you press "***Exit***" button or you choose "***Receive***" option.

Use "***Receive***" button to download one or various files stored in QNA memory.

### 3.2.6.1.5. Downloading files

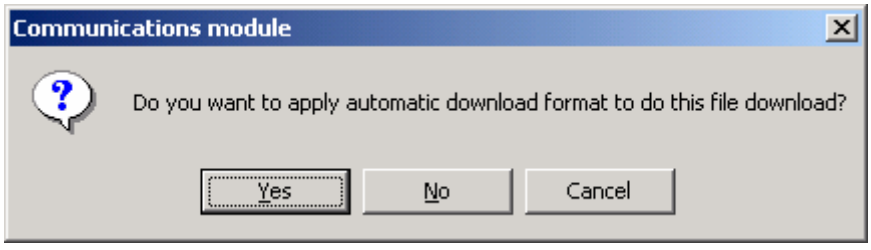



***Download files dialog box***

This window will show you the stored file list in QNA, as well as download file option (**"*Download*"** button), partial file download (**"*Partial Download*"** button) and delete selected files (**"*Delete*"** button).

If you press **"*Delete*"** button all data contained in these files will be erased, so these files will now be empty and ready to start to capture new data (and they will start immediately).

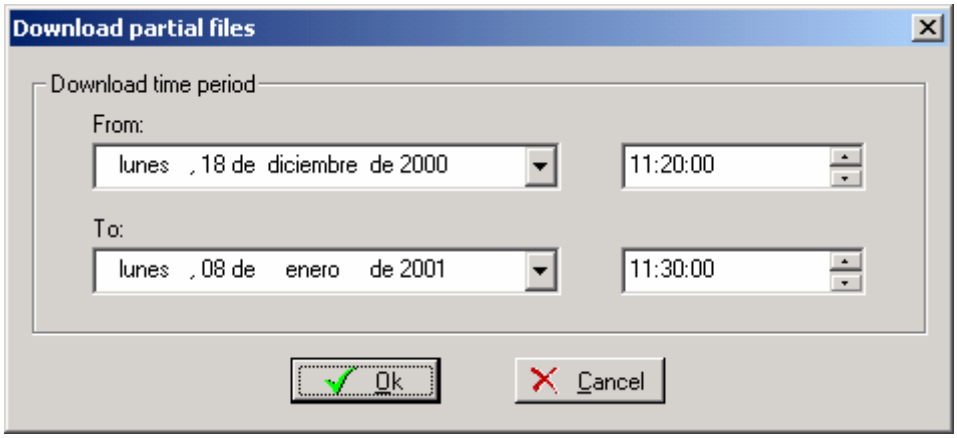
If you press **"*Download*"** button, program will ask you if you want to use automatic reading configuration to download selected files. If you chose you want use its configuration, program will download missing files in last downloading process and save them with previous files.




***Using automatic reading dialog box***

In case your answer is negative, it will ask you the name that you want to use to save them for each selected file.

If you press **"*Partial download*"** button, program will allow you to download a part of each selected file.

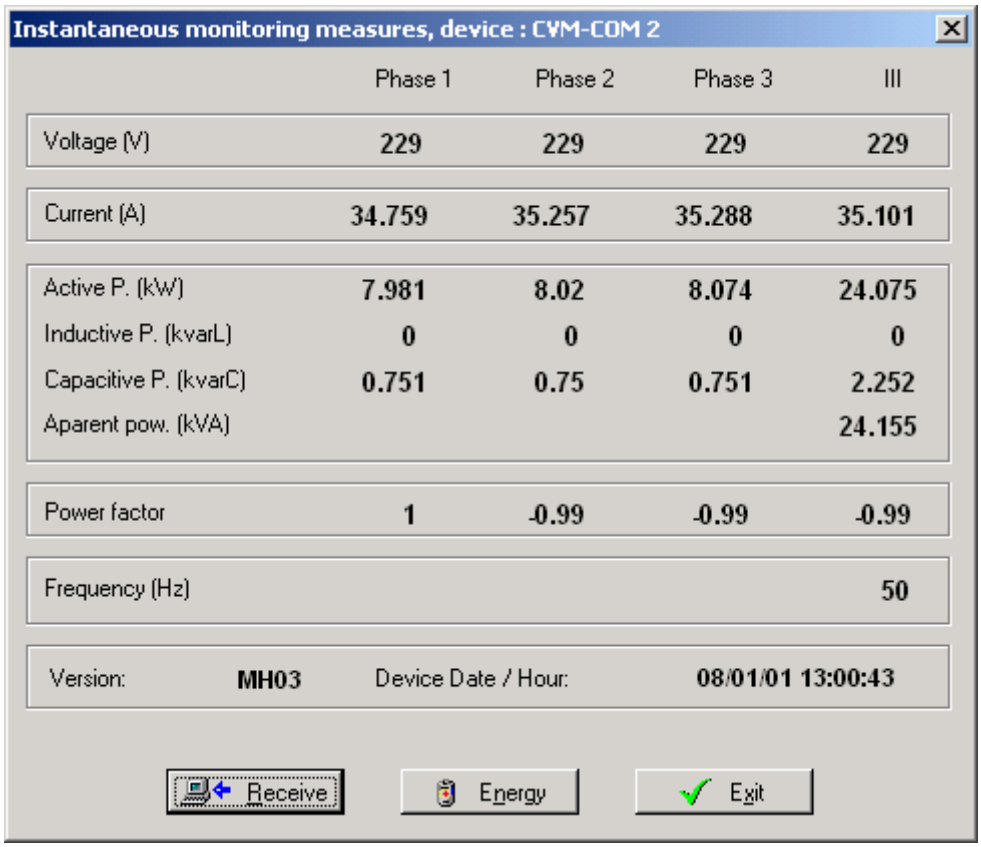



***Partial file downloads window***

This way, for each file it will appear its data store interval (from the date it started to save to the date it has finished), and user will be able to choose the period to download. For example: it's possible to download only a day of a file that contains data of two or three months.

### 3.2.6.2.- Connect with a CVM-COM

This button accedes to selected CVM-COM display window.

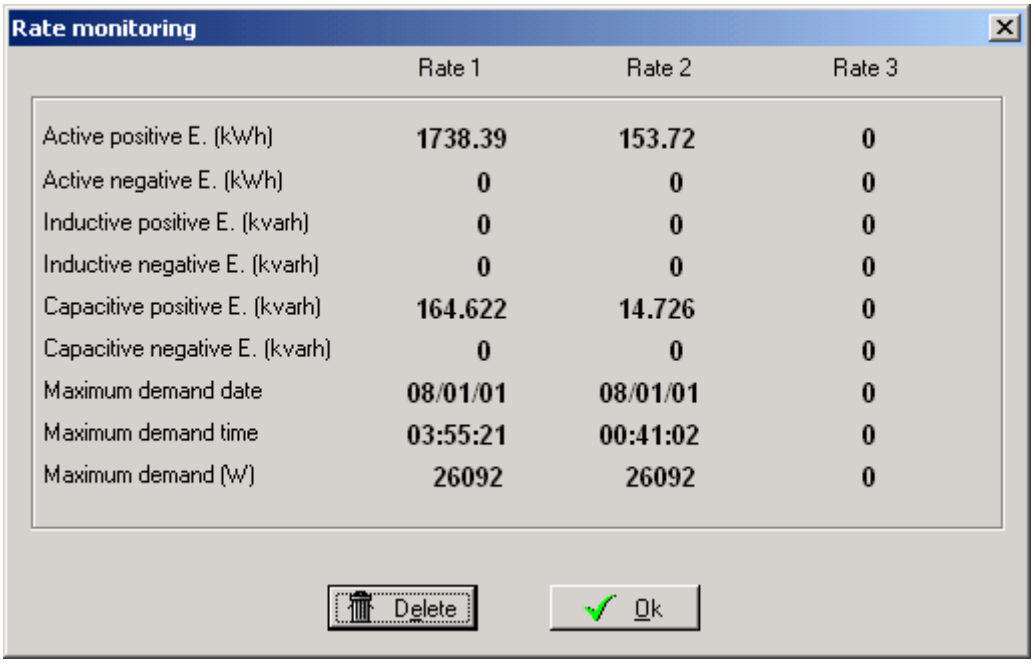



***Instantaneous values display window***

In this window you can display at real time, all parameters that analyzer is measuring this moment. Thus, you will know voltage values, current, Power, energy,

etc. Measured by analyzer immediately. You will also display date and time, and CVM-COM version. In the title bar you can also display equipment name.

As you can observe, these values are refreshed each few seconds (depending on analyzer connection), showing all-instant values. You will display data until you press **"*Exit*"** button, you choose **"*Receive*"** option or you access to rate window (**"*Energy*"** button).



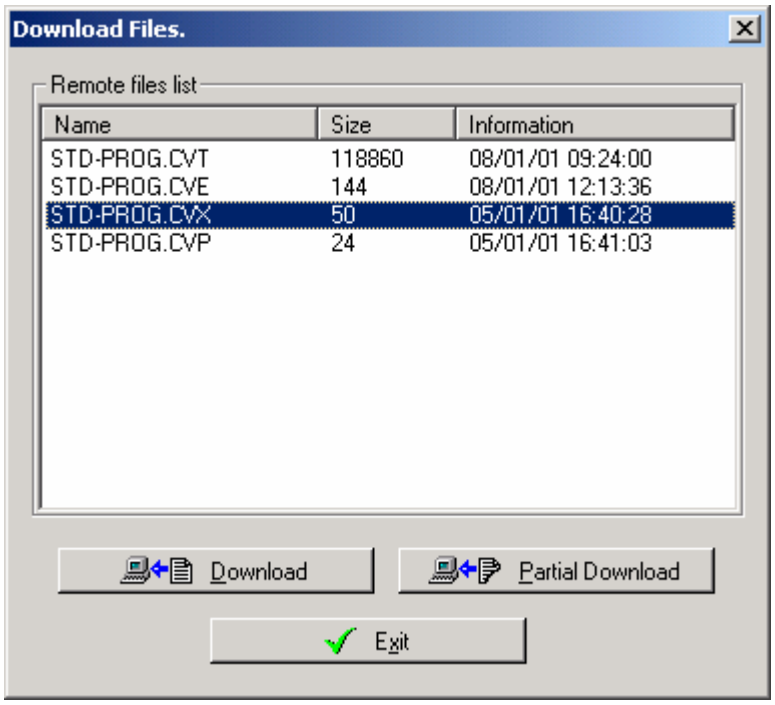

***Energy and Maximum demand values display window***

In this window you can display at real time, all energy and maximum demand parameters that analyzer is measuring this moment (if rate is available).

As you can observe, these values are refreshed each few seconds (depending on analyzer connection), showing all-instant values. You will display data until you press **"*Exit*"** button and return to monitoring window. You will also delete maximum demand rate with the "Delete" button.

Use **"*Receive*"** button to download one or various files stored in CVM-COM memory.

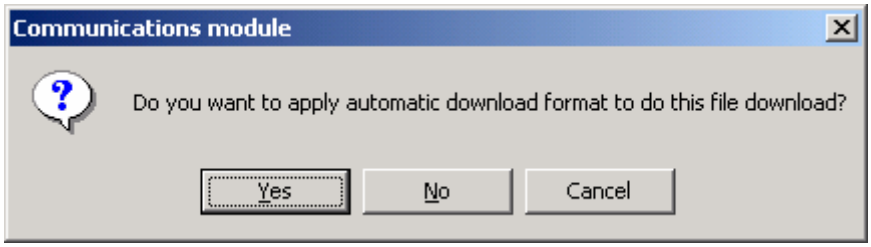
### 3.2.6.2.1. Manual downloads file




***Download files dialog box***

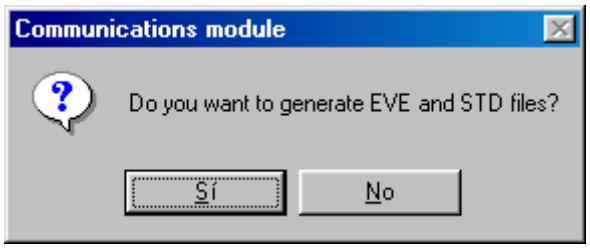
This window will show you the stored file list in CVM-COM, as well as download file option ("***Download***" button) and partial file download ("***Partial Download***" button).

If you press "***Download***" button, program will ask you if you want to keep actual automatic reading configuration to save selected files. If your answer is affirmative, missing STD and EVE files will be downloaded.



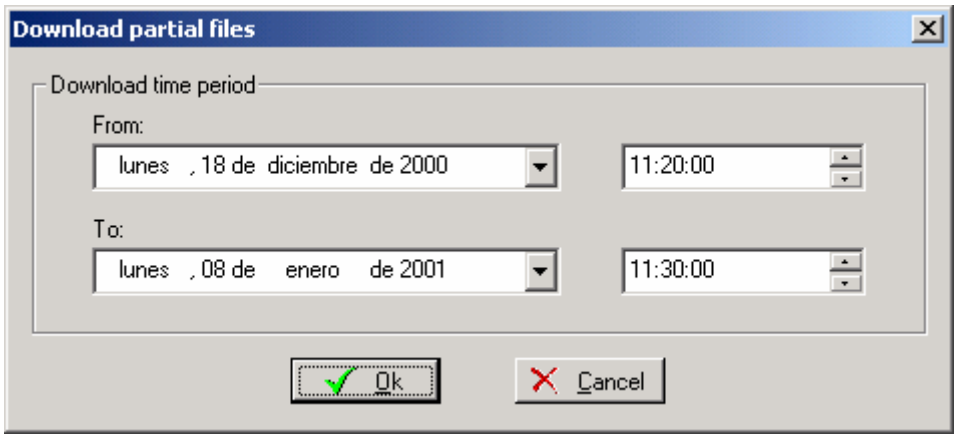

***Dialog box to keep automatic reading configuration***

If your answer is negative, program will ask you if you want generate STD and EVE files. If you push "yes", whole selected files will be downloaded and changed to STD and EVE files. It will also answer you the name that you want to use to save in disk. If you push "no", it will do same process, but selected files won't be changed to STD and EVE files.




***STD and EVE transformation dialog***

If you press "***Partial download***" button, program will allow you to download a part of each selected file.



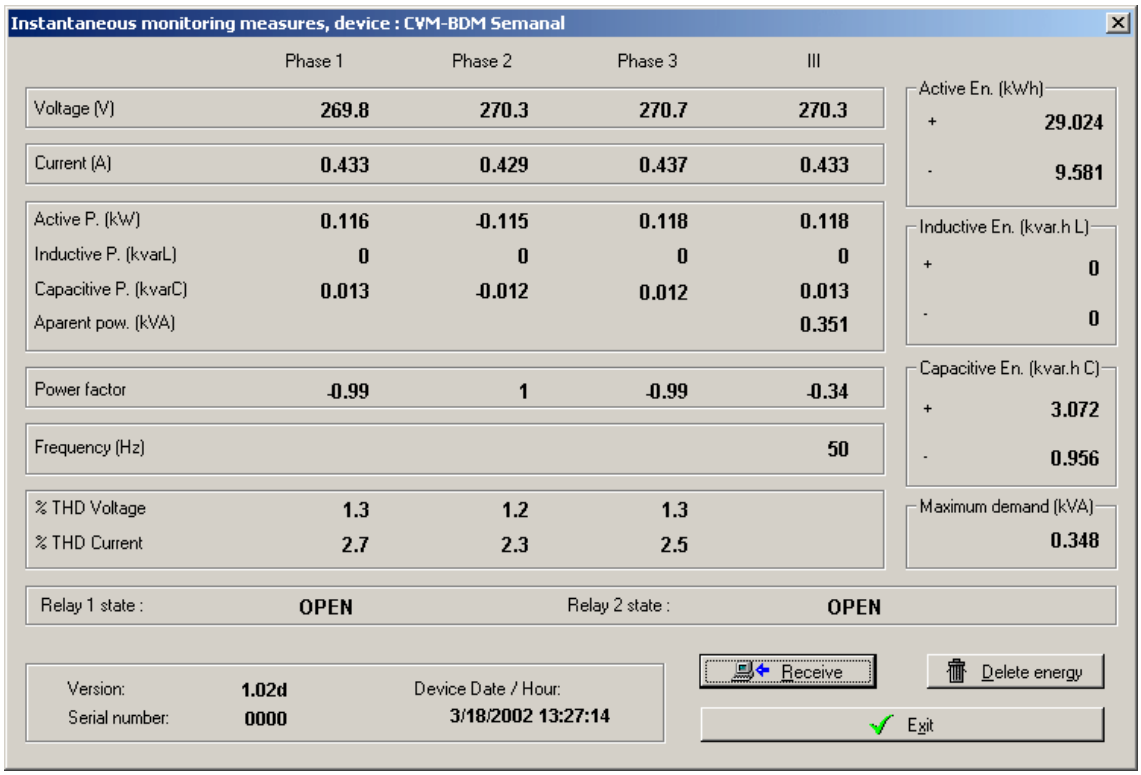

***Partial file downloads window***

This way, for each file it will appear its data store interval (from the date it started to save to the date it has finished), and user will be able to choose the period to download. For example: it's possible to download only a day of a file that contains data of two or three months.

***Note:*** *These downloaded files with these options will be saved with the name that appears in list and in the folder selected in* ***automatic download*** *options. When applications saves the file to the hard disk, it will ask if you want to group information depending on its date in a STD file (CVM, CVT and CVX files) or EVE (CVP and CV files), or you want to save it with a file name. If you select a CVM or CVT file it automatically download CVX file (maximum demand) and group it.*

### 3.2.6.3.- Connect with a CVM-BDM-1M

This button accedes to selected CVM-BDM-1M display window.

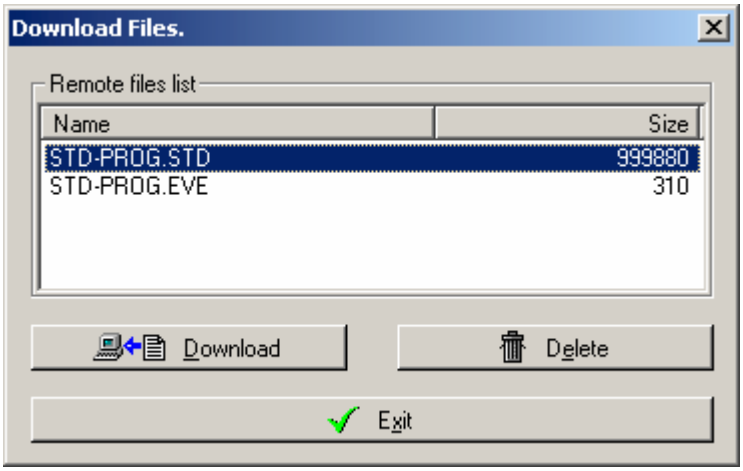



***CVM-BDM-1M values display monitor***

In this window you can display at real time, all parameters that analyzer is measuring this moment. Thus, you will know voltage values, current, Power, energy, etc. Measured by analyzer immediately. You will also display date and time, CVM-BDM-1M version and serial number. In the title bar you can also display equipment name.

As you can observe, these values are refreshed each few seconds (depending on analyzer connection), showing all-instant values. You will display data until you press **"*Exit*"** button or you choose **"*Receive*"** option. You can also initialize energy counters clicking **"*Delete Energy*"** button.

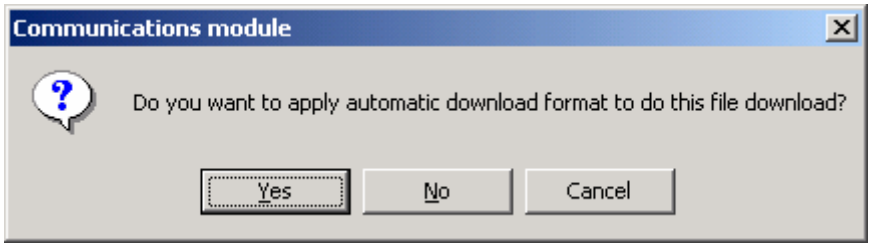
### 3.2.6.3.1. Manual downloads file




***Download files dialog box***

This window will show you the stored file list in CVM-BDM-1M, as well as download file option ("***Download***" button) and partial file download ("***Partial Download***" button).

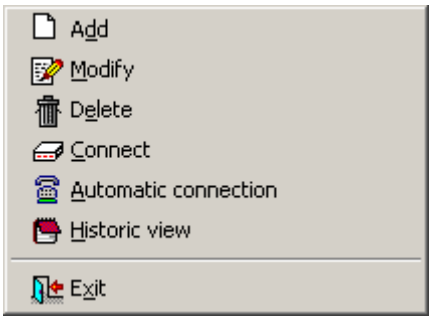
If you press "***Download***" button, program will ask you if you want to keep actual automatic reading configuration to save selected files. If your answer is affirmative, missing STD and EVE files will be downloaded.



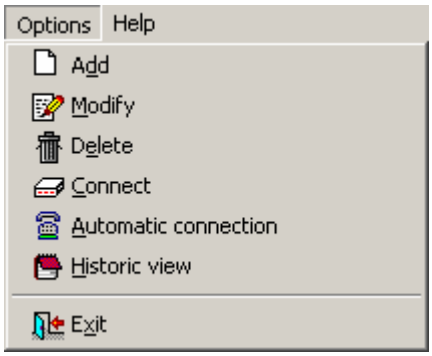

***Dialog box to keep automatic reading configuration***

### 3.2.7.- Automatic downloading

Once you have set up device configurations, you must press the mouse right button and the following menu will appear:




***Pop-up menu***




***Main menu***

Then, you must select "***Automatic connection***" option. After this, program will hide himself, and an icon (a phone with green support) will appear in Windows task bar. It indicates that program has started automatic download.

***Task Bar***

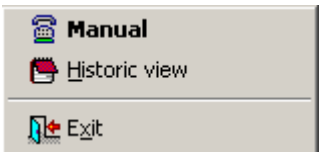
This icon has two views: one with a green support and the other one with a red support. When icon is green it means that program is waiting to any device file download. When support is red it means that program is actually downloading a file.

***Program waiting for downloads***

***Program downloading a file***

In both two cases if we put mouse pointer over the icon, system will show a short description. If phone support is green it will display program version, and if it's red it will display information about equipment that is being downloaded.

Program options are available if you click with mouse right button on the icon and are the following:




***Program options***

1. **-** *Manual*: With this option you will return to available equipment list window. This is the default option, so if you double-click on the icon the list will appear too. If icon support is green (waiting for a download) you will be able to disable download and return to configuration dialog box, but if icon

support is red you won't be able to return to this page until downloading is finished.

2. **-** *Exit*: As you can imagine, this option allows program exit. This can be done during a download or not. If you exit program during a file download, the communication will be interrupted and the file will be added to the list of files waiting to be downloaded.

3. **–** Historic view : this option allow us to view download historic without turn to manual mode.

### 3.2.8.- Historic View

All download process will be registered in a historic file, in spite of it had succeeded or not.

```
27/12/2000 08:16:13  **Device downloads start: Centrality 22 (7)
27/12/2000 08:16:52  Standard file downloaded (. STD)
27/12/2000 08:17:00  Events file downloaded (. EVE)
27/12/2000 08:17:09  Quality events file downloaded (. EVQ)
27/12/2000 08:17:12  Device downloads finished.
27/12/2000 08:45:20  **Device downloads start: Centrality 24 (10)
27/12/2000 08:46:16  CVM standard file downloaded (. CVM)
27/12/2000 08:46:18  Maximum demand file downloaded (. CVX)
27/12/2000 08:46:18  STD file generated.
27/12/2000 08:46:21  input/output file downloaded (. CVE)
27/12/2000 08:46:22  Events file downloaded (. CVP)
27/12/2000 08:46:22  EVE file generated.
27/12/2000 08:46:26  Device downloads finished.
```

***Historical file (Message.log)***

You can access to this option selecting the option "***Historic view***" in the menu "***Options***" of main menu or selecting the same option in the toolbar ( )

## 4.- FILE ANALYSIS

Once you have downloaded data from analyzer, it's time now to analyze it. Power Vision gives you a large group of tools to analyze and interpret all captured data.

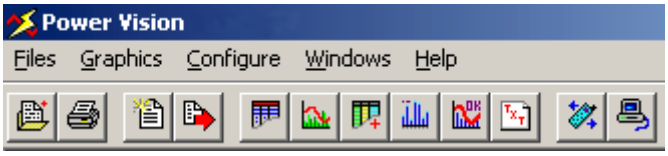
### 4.1.- Opening a file

The first step is to load data in memory. Power Vision allows opening 9-file extensions[1]:

**A5M**: Standard fixed file
**A5I**: Harmonics file
**A5D**: Disturbances file
**A5T**: Custom file & FastCheck
**A5F**: Flicker file
**STP**: Quality weekly file
**ACM**: Check-Meter file
**STD**: Standard file
**EVE**: Event file
**EVQ**: Quality event file
**H24**: Harmonics statistics daily file

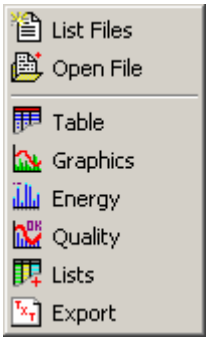
To open data files you must follow one of these three paths:

- Click with your mouse left button on icon in the top tool bar. (Note that if you leave the mouse-pointer over the icon it appears the message: "Open")




***Toolbar***

- Press mouse right button in any non-occupied work zone (white zone), and it will appear a context menu with these options:



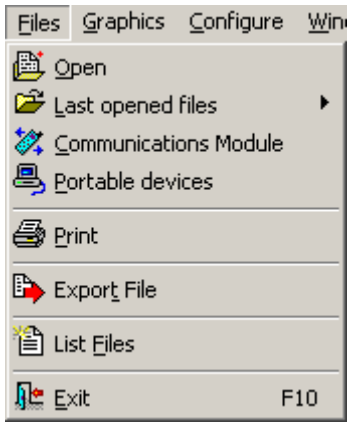

***Context menu***

When the menu has appeared, click with mouse left button on "***Open File***" option (you can also press 'O' key, note that it appears underlined).

- Click with your mouse left button on the "***Files***" menu or press ALT+'F' keys on the keyboard. (Look at menu bar).

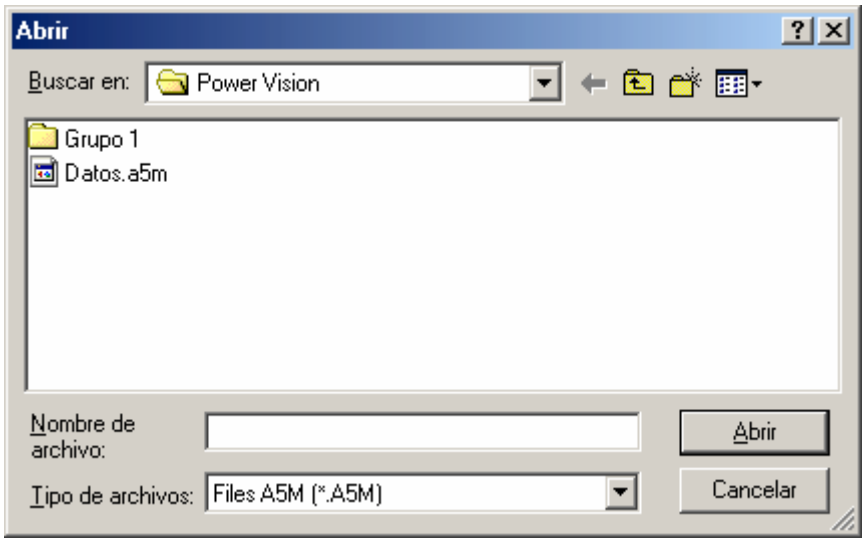
***Menu bar***

When files menu is deployed, you must select "***Open***" option, or press 'O' key on the keyboard (Note that 'O' key is underlined). You can also select the option "***Last opened files***" in order to analyze this files.




***Files Menu***

By now, you must be displaying the dialog box that allows you to open files.



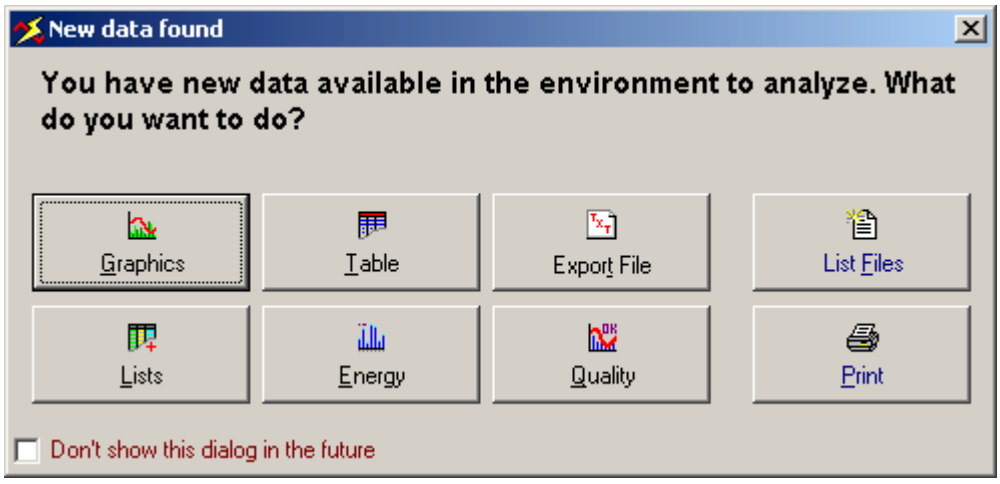

***"Open" dialog box***

Now, select the file you want to open, and then click on it. If you want to open more than one file you can select them and click on "***Open***" button (or pressing 'O' key). To select more than one file using the keyboard you can press CTRL plus arrow keys or mouse to move, and then click on "***Open***" key too. **If dialog box hides, means that you have the files opened already.**

It could happen that you have tried to open a file that does not belong to any compatible Power Vision files (with one of those 9 extensions), or that the file you want to open is corrupted. In that case it will appear a message warning you about problems.

***File open error message***

Every time you add new data in the environment (opening new files) a window appears allow us to choose one of the most usual actions to do with the new available data.




Most important actions are included in this window and it's a fast way to analyze data as soon as it is available in the environment.

Of course, you can repeat this process as any times as you require, so you can open as many files as you want. Power Vision will consider as the default active file the last file opened.

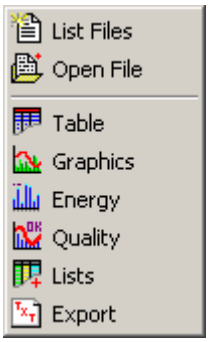
Now, you have your files opened, ready to be analyzed and treated.

## 4.2.- Managing all opened files

It could happen that you need to display and use the list of files you have opened, for example to open a new one, or to close a file you will not use anymore.

To manage all these files you will need to accede to file viewer. This can be done by two different ways:

- Press mouse right button in any non-occupied work zone (white zone), and it will appear a context menu with these options:



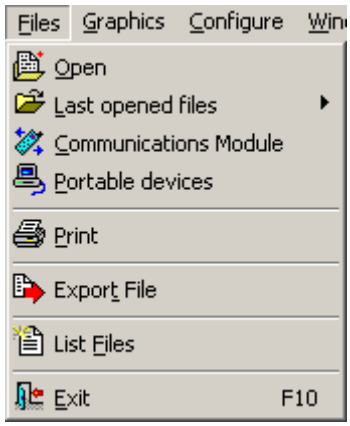

***Pop-up menu***

Then, click with mouse left button on the "***List Files***" option or press 'F' when the context menu is active (Note that 'F' letter appears underlined).

- Click with your mouse left button on "***Files***" option in menu bar or press ALT+'F' keys on the keyboard. It will appear the Files menu:

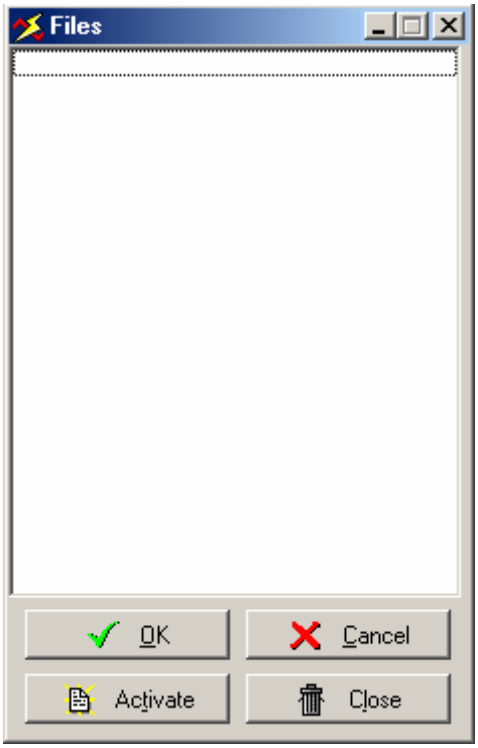
***Menu bar***

Then, click with the mouse left button on "***List Files***" option and the list will appear. You can also press F key on the keyboard (Note that 'F' key appears underlined).




***Files menu***

Doing one of these two steps, you must now display file list viewer. This viewer will show you all files opened until the moment; moreover, it will inform which is the active file (it will appear between symbols '<' and '>').




***File List viewer***

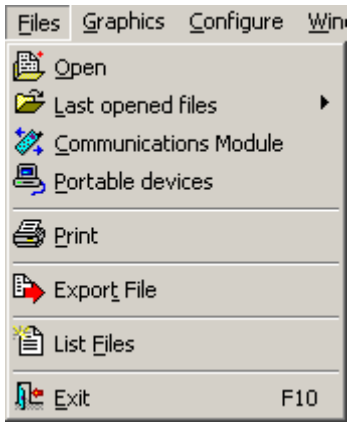
Opened file list viewer will allow you to do 2 fundamental operations:

- **Close an opened file:** Click with your mouse on the file you want to close (check that it turns into bounced mode), and then click on the "***Erase***" button. File has been closed. If you close the active file, Power Vision will not activate another file, so it will actuate with the first file it encounters. You can also erase many files at the same time selecting more than one file and then clicking on the "***Erase***" button.

  ***Note****: If you only want to close the active file you can follow this procedure: First deploy "**Files**" menu option (click with the mouse left button on it or press ALT + 'F'). It's one case when it's usefull the "active file", allowing us to remove a file, quickly.*

***Menu bar***

Then when "Files" menu is deployed, click on "Close" option or press 'C' key on the keyboard (Note that 'C' key appears underlined).




***Files menu***

Once the active file has been closed, it will not activate any other file. If there is not an active file when we select this option Power Vision will ignore the order, and will not return any error message.

- **Allows setting an active file:** Click with mouse left button on the file you want to activate, and it will turn onto bounced mode. Then, click on the "***Activate***" button at the bottom of the dialog box (or press 'T' key). You can also double-click on the file name and it will turn to active file.

### 4.3.- Representing graphically file data

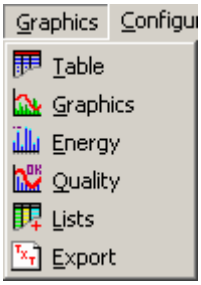
To analyze and study your data files, you will surely want to display information using practical graphs, and you would be really interested to display different variables, merge them, make zoom on the graphs, etc. Power Vision allows all this functions and many other ones.

To represent graphically analyzer's data you will need to accede to graph viewer. You can accede to that menu following two paths:

- Click the mouse left buttons on the "***Graphics***" option on the menu bar, or press ALT + 'G' keys on the keyboard.

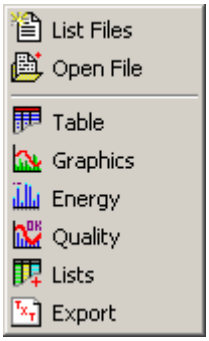
***Menu bar***

This action will deploy Graphs menu. When this menu is deployed, click on "***Graphics***" option or press 'G' (Note that it appears underlined).



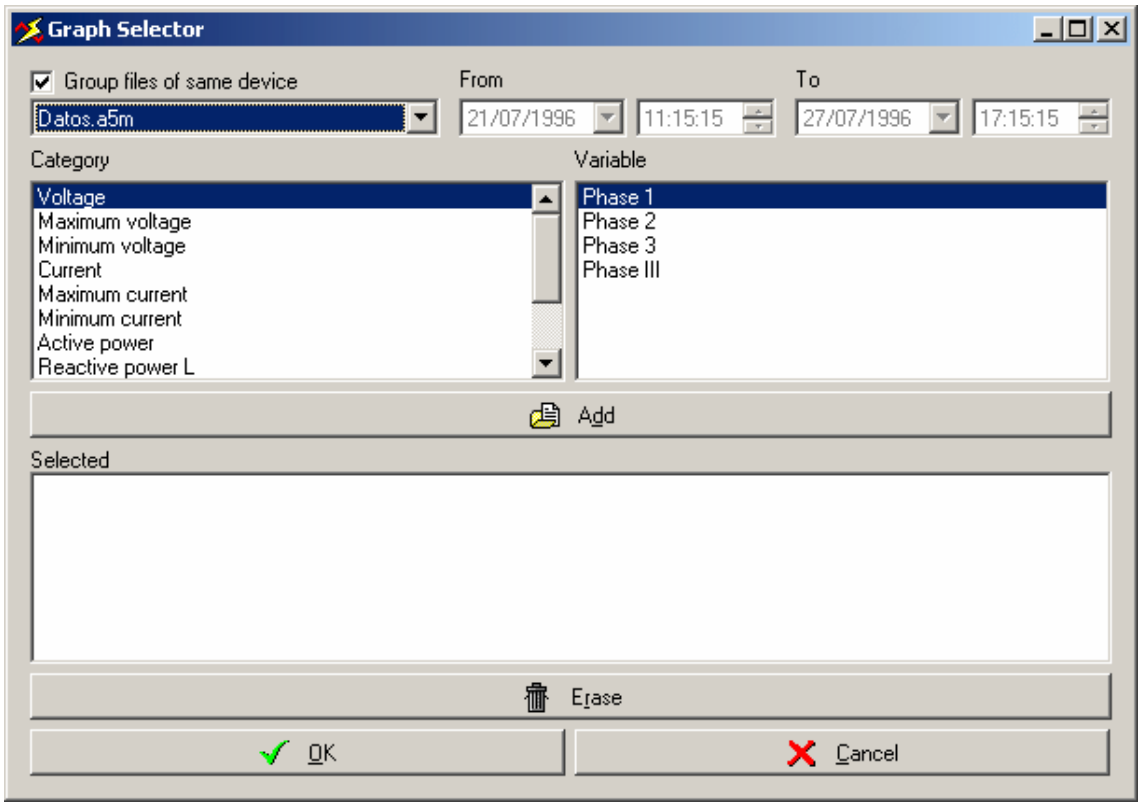

***Graphics menu***

- You can also accede to graph viewer clicking on icon or selecting "***Graphics***" option in main screen context menu (to display context menu just press right mouse button in a non-occupied work zone).




***Context menu***

If you have well done this, now you must be displaying graphics viewer.




***Graphics viewer***

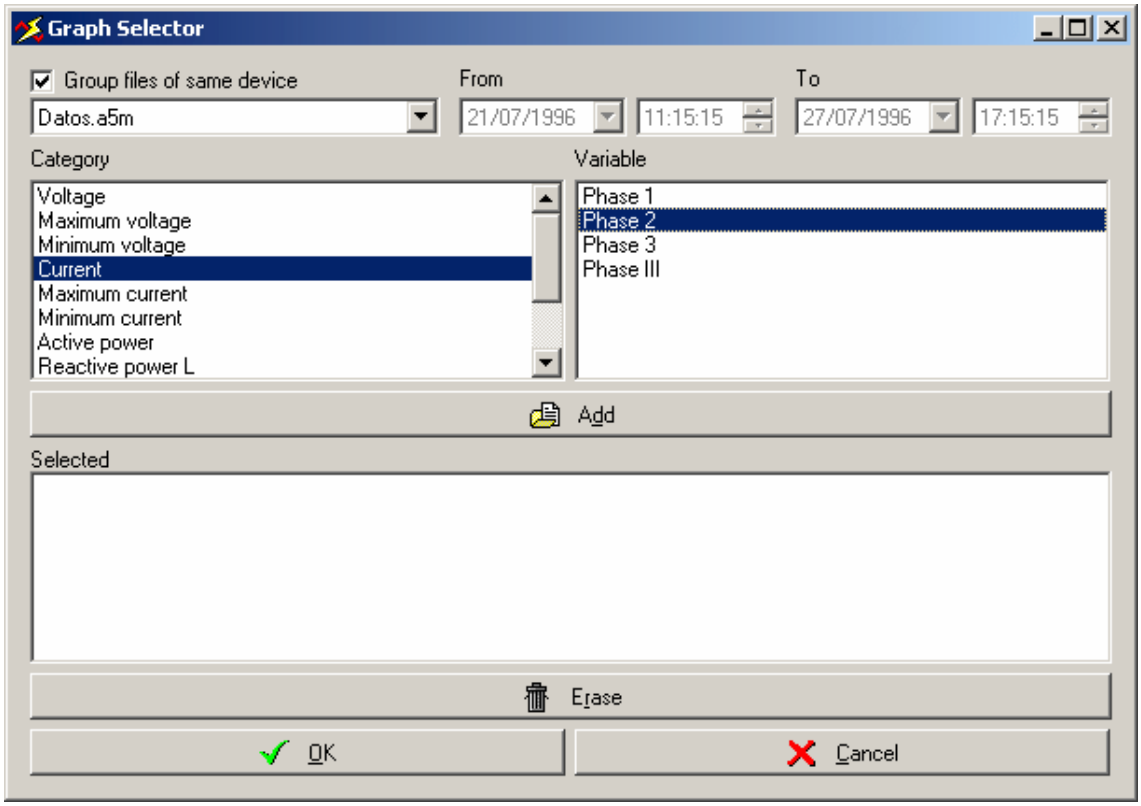
This viewer will allow you to choose different variables to be represented, from one or many files. Each file type and each single file allows representing different data variables (as voltage, current, etc.) You will be able to choose as many variables as you want to represent, without restriction of any type.

If you want to select the variable “Current phase 2” in the file “Datos.a5m” you must proceed as follow:

First of all you should select the file that contains the variable we would like to show. You can do that in the top-left combobox (under “***Group files of same device***” option) Once you have selected the file the category and variable panels will show all the information (variables grouped by category) stored in the selected file. And the fields “***From***” and “***To***” inform us about the dates range of selected file.

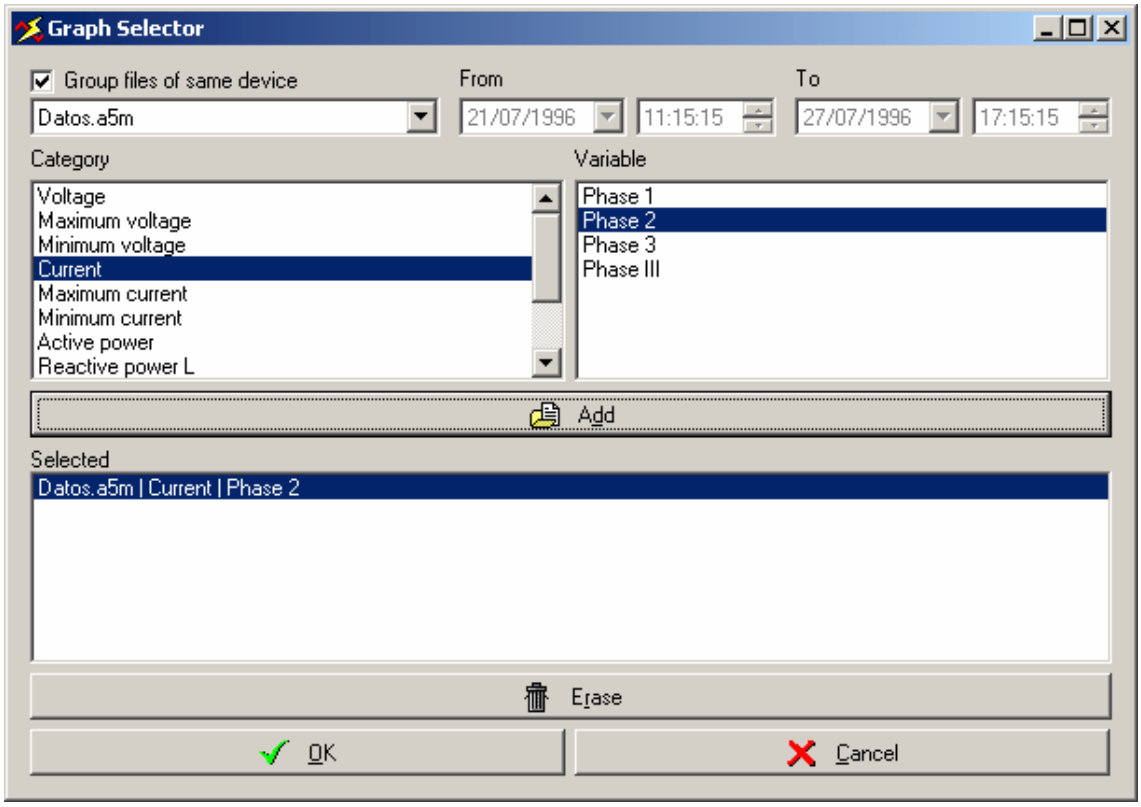
***Note****: You can also view all opened files grouped by device selecting the “**Group files of same device**” option. This option allows us to see under the same name all files grouped by weeks or months generated by communications module. For example, if you check this option, files with names M0030202.STD, M0030302.STD, M0030402.STD appear with the name 003.STD*

Then, in the left panel, you should select the category of the variable to choose (in this case the option “***Current***”) and in the right panel you should select the variable (in this case the variable “***Phase 2***”)




***Graphics viewer: selecting current phase 2***

Finally you can add this variable to the "***Selected***" panel clicking the "***Add***" button.




***Graphics viewer: Variable selection***

If you want to add more variables to be represented, you only need to repeat this procedure as many times as you need. It doesn't matter if variables are form different files, or different units. Power Vision graphic engine will know what can or cannot represent combined or fussed (About the graphic engine, and how does it work, you will be noticed later).

***Note:*** *If you do not add any variable to be represented (pressing "**Add**" button) program will represent the graph according to the options actually selected on the three top-box lists.*

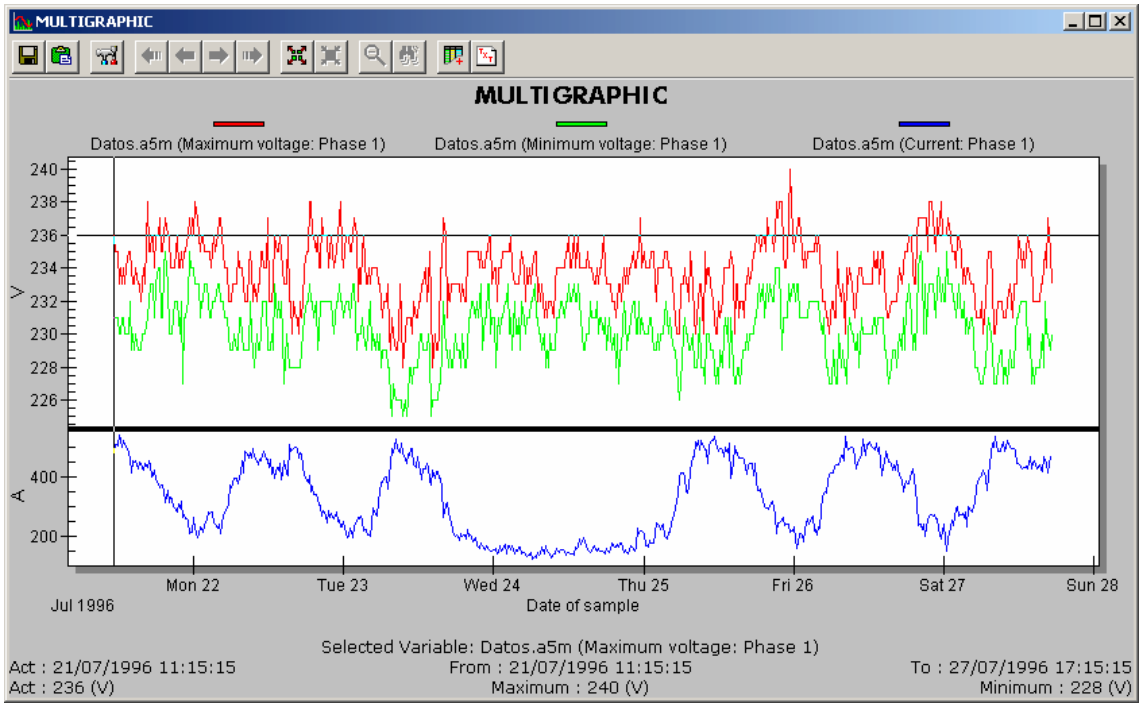
When you have added all desired variables, and you want to start to represent the graphs, press "***Ok***" button with mouse left button. After that you must be displaying the graph.

***Note:*** *Graph viewer allows removing any variable you had already selected. Click on the variable you want to remove in the Selected list (it will turn into bounced mode) and then click with your mouse left button on the "Erase" button (or press 'R' key when variable is selected). You have removed this selection.*

## 4.4.- Knowing which graphs I'm going to obtain

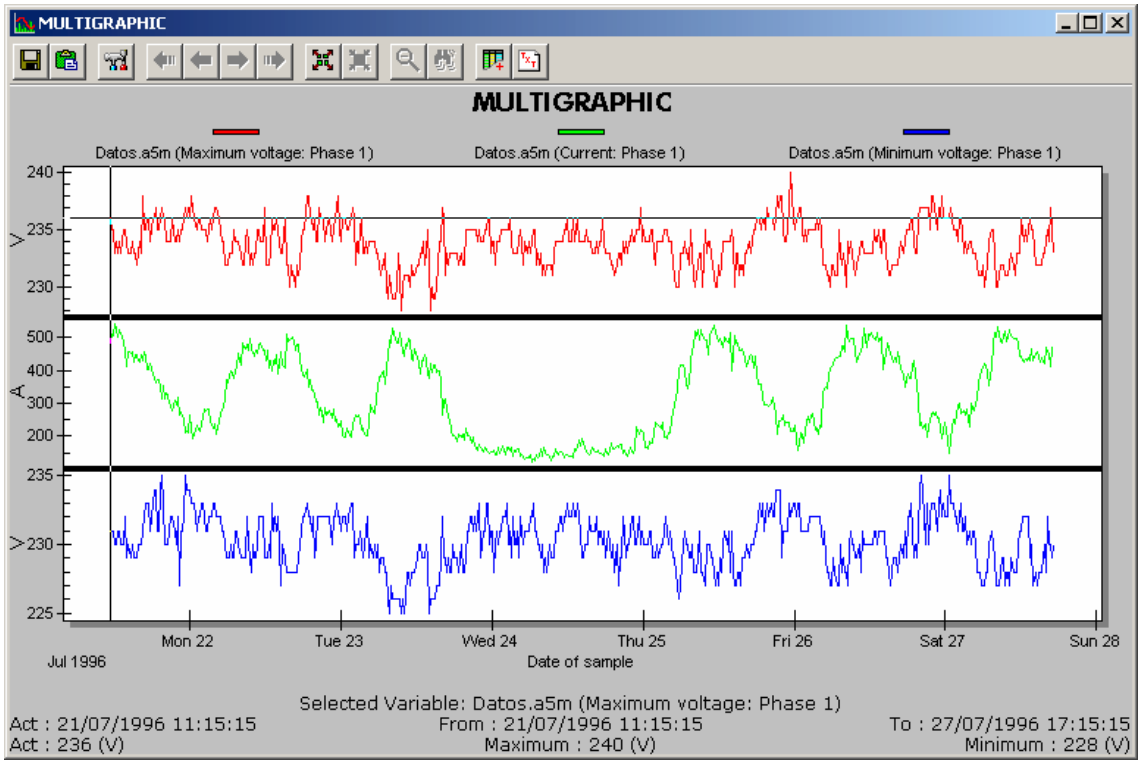
Power Vision tries to maintain at the same graph as many variables as it can, because it thinks that user wants to compare them quickly and comfortably. If you do not want to compare them, we recommend opening all variables in a single graph, and do not open all variables at the same time. This way, you will display data better, but it will be hard for you to compare different graph values, with different windows.

When Power Vision detects that user has selected more than one variable, if these variables have the same unit, represents them using one coordinate axis. If variables do not have the same measuring units, it will appear as many coordinate axes as different units you have selected. This way, you will have more precision to compare units with the same units or you will be able to display variables with different units.




The last example is the result of selecting a graph that had 2 voltages ("Maximum" and "Minimum") and the current, all from Phase 1. As you can observe, the graphic engine has drawn both voltages on the same vertical axes and the current in another one. This has happened because Power Vision has realized that both the first ones had the same measuring unit "V" and he has decided to represent them together

You can represent separately on the same graph each variable; in spite of they have the same unit. You only need to insert a variable with a different unit between the selection of the units that have the same unit. Using the last example, if you want to display each variable on its own axis, you only need to select variables in the following order: "*Maximum Voltage Phase 1*", "*Current Phase 1*", "*Minimum voltage Phase 1*", and you will obtain this graphic:

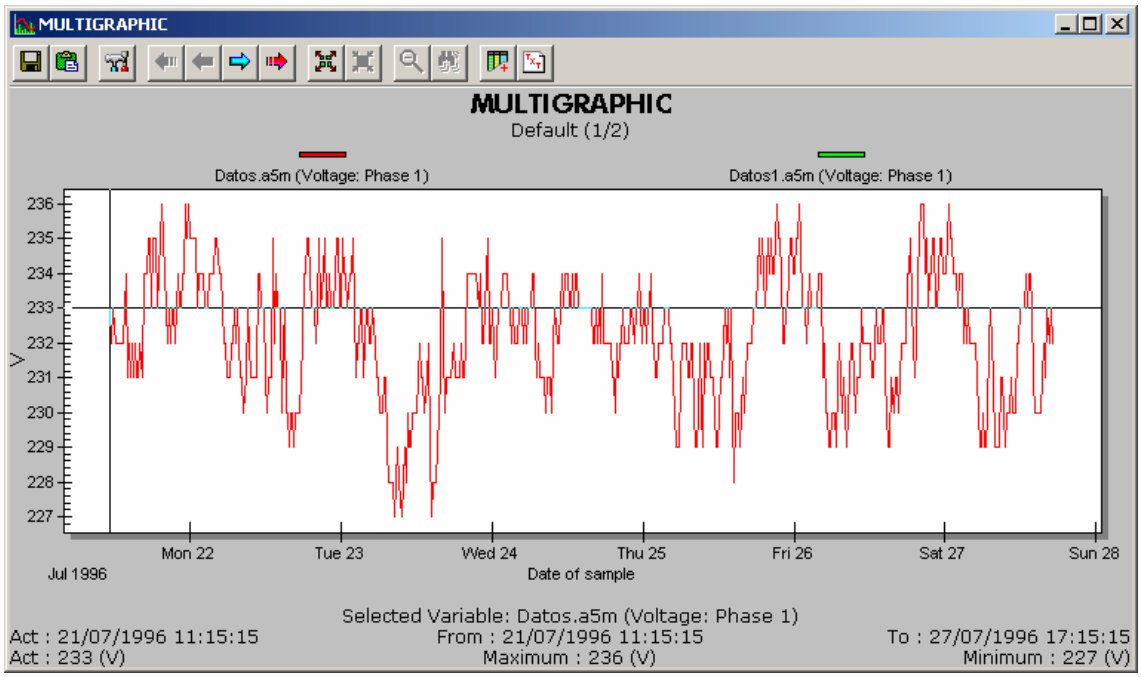



There are some special representations that the graph engine will always represent on its own window, due to its special character, so it will not try to mix them with other selected variables. These variables are:

- Power factor graphs
- Harmonic graphs, THD, RMS and wave form
- Disturbances graphs
- Events graphs
- Some daily harmonics statistics in H24 files

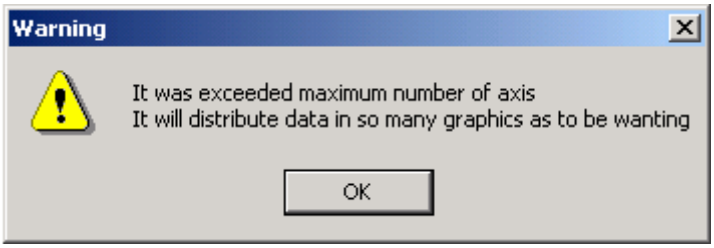
All graphs of these four groups will be represented in alone near window.

As you surely had imagined, you also can mix two or more variables from different data files. In this case, if you have selected one of the special mentioned variables (Power factor, harmonics or disturbances), the graphic engine will separate them in a single window for each one, avoiding mix problems. If you have selected a normal variable (like voltage) of two or more different files the graphics engine will group the graph by files:




Note that this graphic has been divided en two parts, in the first one we found the variable "***Phase 1 Voltage***" from "***DATOS.A5M***" and the second one has the same variable but from "***Datos1.a5m***". This happens because all data contained on the file "DATOS.A5M" are from year 1996 and all data from "DATOS1.A5M" are from 1998.

Another possibility is that when you select variables for a graph, you select more than 6 variables with different units. Power Vision accepts up to 6 axis on the same graph so your selection will not be represented. When this situation happens, it appears the following warning message:




With this message, program warns user that the graphic engine has detected more than 6 axis, so it will create as many windows as it need. Do not warn if you find more than one graphic when the result appears.

***Note**: A maximum number of 12 variables can be displayed in the same graph, for this reason, if you select more than 12 variables in graphics viewer the engine will create two or more windows to display all variables (the same process that if the graphics engine detects more than 6 axis)*

### 4.5.- Interaction with the graph: Moving through the values

Once the graph is open, you can explore it in so many ways. First, note that it disposes of a cursor to display active variable and its value. When the graph is started the cursor stays in the first variable you have selected.

You can move through all values and all variables using different available keys:

| Name | Symbol | Description |
|---|---|---|
| Right arrow | ► | Jumps to selected variable next value |
| Left arrow | ◄ | Jumps to selected variable previous value |
| Up arrow | ▲ | Jumps to the same value of the previous variable |
| Down arrow | ▼ | Jumps to the same value of the next variable |
| Home key | **Home** | Jumps to actual variable first value |
| End key | **End** | Jumps to actual variable last value |
| Page Up | **Pg. Up** | Jumps forward some values of the selected variable |
| Page Down | **Pg. Down** | Jumps back some values of the selected variable |

You can also go to a variable value using the mouse. To allow this, just pass through the graphic with the mouse-pointer and go over the value you want to select. Then the mouse-pointer will change from an arrow (default) to a hand.

⇐ **Mouse-pointer:** Then press mouse left button.

Note that at the left bottom part of the graph you can observe both coordinates actual values. (The one above is "**X**" axis that usually represents time and the one below is "**Y**" axis that represents variable value). You can also find information about the maximum value and the minimum of both (X, Y) axis at the bottom center or right side.

This information will be found in all graphs, in spite of being one of the three special values.

***Mouse-Pointer position information***

It could happen that more information is available in other graphs.

***Note**: If you press these keys and the cursor does not move (active value) then check that the graph has the focus set. To set focus to the graph take the mouse-pointer to a free zone of the graph (for example the title bar) and then press the left button. Try now to move the keys. If the problem persists, check if you have well configured the cursors (see, **How can I configure?** section). It's one of the cases that it's usefull the "active file", allowing us to remove a file, quickly.*

## 4.6.- Interaction with the graph: Making a zoom

It's possible that you want to zoom in an image to observe its details. Zoom consists on selecting a rectangular zone you want to display at the whole screen. To make a zoom in your graph you must follow these points:

- Take the mouse-pointer over the point you want to become the new corner of the screen.
- Press mouse left button and, without leaving it, move it until the box becomes as big as you want.
- Leave mouse button and the zoom will be done.

Note that the cursor that indicated the active value and the active variable can be lost. Don't worry because it's could happen that the cursor is left outside the screen. (To know how to display values see previous chapter).

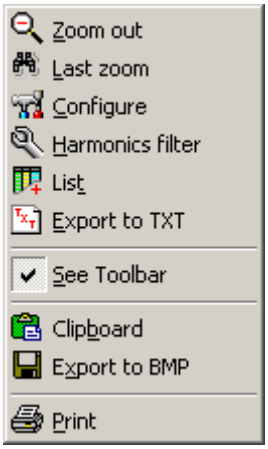
As you can observe, after making the zoom, it will appear a horizontal movement bar to move your self through the entire graph that is out of visible zone.

***Horizontal scroll bar***

After displaying various zoom views, it's possible that you want to display the whole graph again. In this case you must proceed as it follows:

**1-** Press button on tools bar (If you have done some zoom before). You will be able to see whole graphic.

**2-** Take the mouse-pointer to any graph zone and press mouse right button and this menu will appear:




***Context menu***

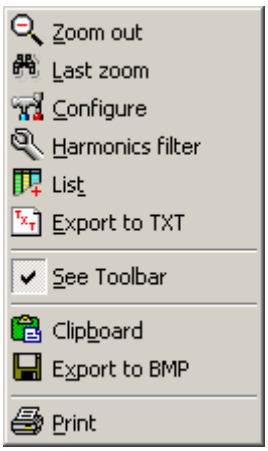
Click with mouse left button on the "***Zoom Out***" option or press 'Z' key (Note that 'Z' key appears underlined). After that, the whole graph will appear.

***Note:*** *If you have not made any zoom, zoom out option appears disabled.*

Sometimes, you can need to do some zooms and you want to return back step-by-step. In this case, you can do two things:

1. Press button on tools bar. Next, you will be able to see last zoom you have made. You can repeat it with same button.

2. Take the mouse-pointer to any graph zone and press mouse right button. The following context menu will appear:




***Context menu***

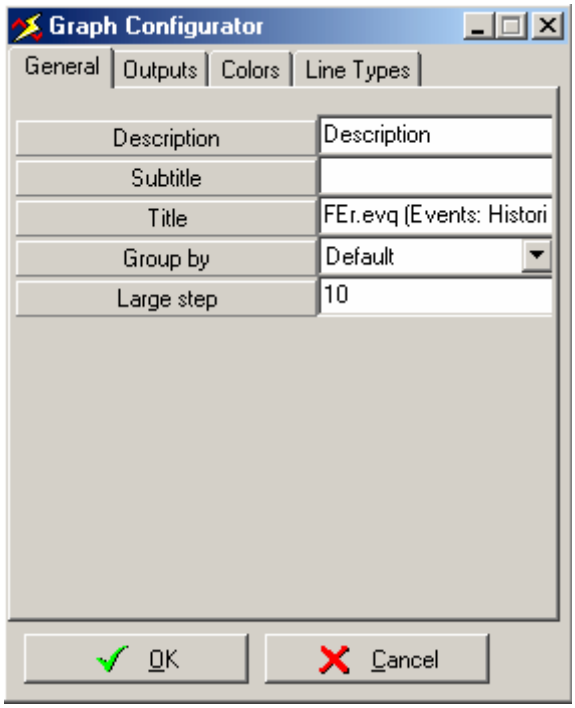
Click with mouse left button on the "***Last Zoom***" (You can also press 'L' key on keyboard, you can see it is underlined). If you haven't still done a zoom, this option will appear disabled.

***Note:*** *To be sure last zoom is correctly done, all zooms must do in same axis, so, it means we don't have to do zooms on two or more axis (however, sometimes it can go right).*

## 4.7.- Interaction with the graph: Configuring

Once you have your graph loaded perhaps you need to change some of its parameters. In Power Vision you can configure the following parameters: General (title and subtitle), Outputs (graph type, units), colors and line types.

To change all these properties, you must accede to configuration viewer that allows changing all these parameters. To accede to configuration viewer, you must accede to context menu with mouse right button and then choose "***Configure***" option. Then it will appear configuration dialog box:




***Configuration viewer, General folder***

We also can open configuration viewer with button on tools bar.

This viewer allows you to change graph configuration parameters. Description is the only parameter that has no incidence on the graph because it's only used to keep any user information that he wants to store. If you change any of the other properties, you will change your graph aspect.

***Note**: "Large step" parameter means the number of registers or periods that graphic will be moved when you press* *and* *buttons (so, it will only go right in graphics with register or period divisions)*

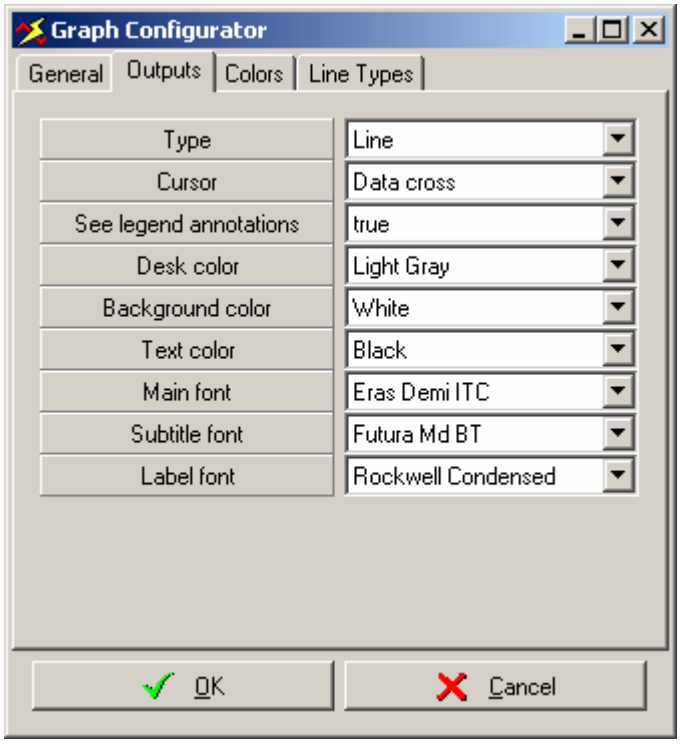
When all configuration changes are done, you will be able to accept the configuration (pressing "***Accept***" button on left-bottom side of the screen) or restore last configuration (pressing "***Cancel***" button near "***Accept***" button).

To change general properties, take the mouse-pointer on white panel and press left button. Now, you have to write the text you wish for this property. When you are ready, press any mouse button on other folder or label. Changes will display immediately in the graphic, so, if you have changed the "Title" property, when you accept this change you will be able to see how title has changed.

As you observe, "Title" property changes the graphic title, "Subtitle" property changes graphic subtitle (lower text under the title) and "Description" property changes graphic description (it's only an explaining text for users). "Group" property divides graphic in periods of different length, choosing between hours, days, weeks, months, default settings or not group.

As will observe, you have 4 groups of properties to configure: General parameters, Output characteristics, Colors and Line Types.

To accede to Output parameters press with the mouse left button on "Output" folder and you will display them:




***Configuration viewer, Output folder***

In this folder, you can configure the following properties:

- *Graph type:* This property allows you to choose graph aspect. There are many options, like line with points, area, bars, etc. To change this property you must deploy the list next to the "Type" caption. (To deploy a list box you must click on the down arrow at the right side of the list).

***Note:*** *It's possible to change global units that Power Vision works. See "**Units Management** " chapter.*

- *Cursor:* This option allows you to set graph cursor aspect. There are four possibilities: *"Data Cross"* (default cursor), *"Vertical"* (it's just a vertical line), *"Data Square"* (it's a little square) and *"No cursor"* (it removes graph cursor and you won't be able to move for the graphic points)

- *See legend annotations:* In this option you will be able to decide if you want to display the legend. This option is useful when the graph has more than one variable represented.

- *Desk color*: This option allows user to change graph box color.

- *Background color*: Allows changing color between axis.

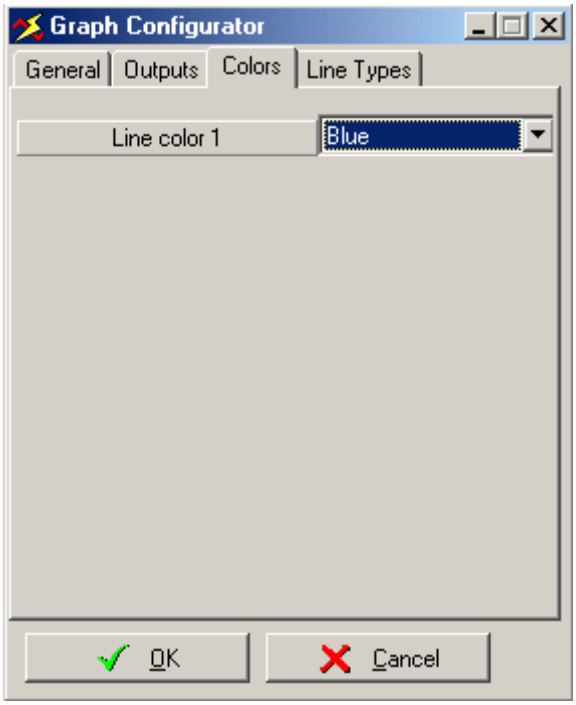
- *Text color*: Allows change text color.

- *Main font.* Allows to change main text font.

- *Subtitle font*. Allows to change subtitle text font.

- *Label font*. Allows to change label text font.

To change variable color go to folder "*Colors*", clicking with mouse left button to the folder labeled "*Colors*".

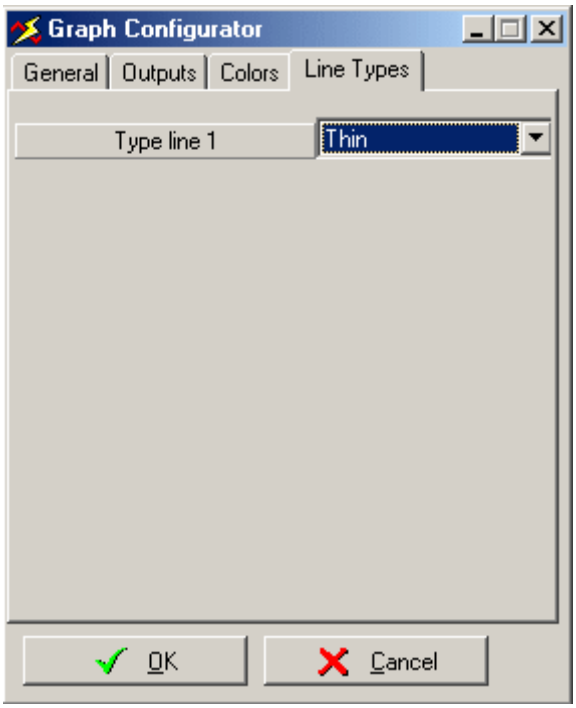



***Setup viewer. Color folder***

- *Line color x*: (where x is the number of a represented variable) allow you to change the color of the x variable.

***Note:*** *"Colors" folder and "Line types" folder are properties that modify graph variables, limitted to 12.*

At least in this configuration viewer you have "*Line Types"* folder, which has the following options:



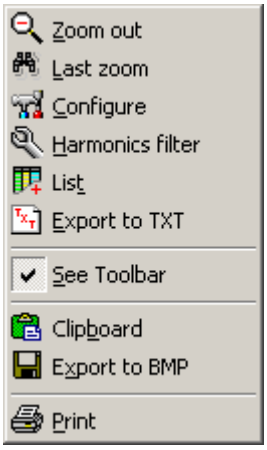

***Setup viewer. Line type folder***

- *Type line x*: (where x is the number of a represented variable). Allows user to change variable draw. There are different line types: Thin, Medium, Solid, Dashed, Dotted, Dash-Dot, Dash-Dot-Dot.

## 4.8.- Interaction with the graph: Printing

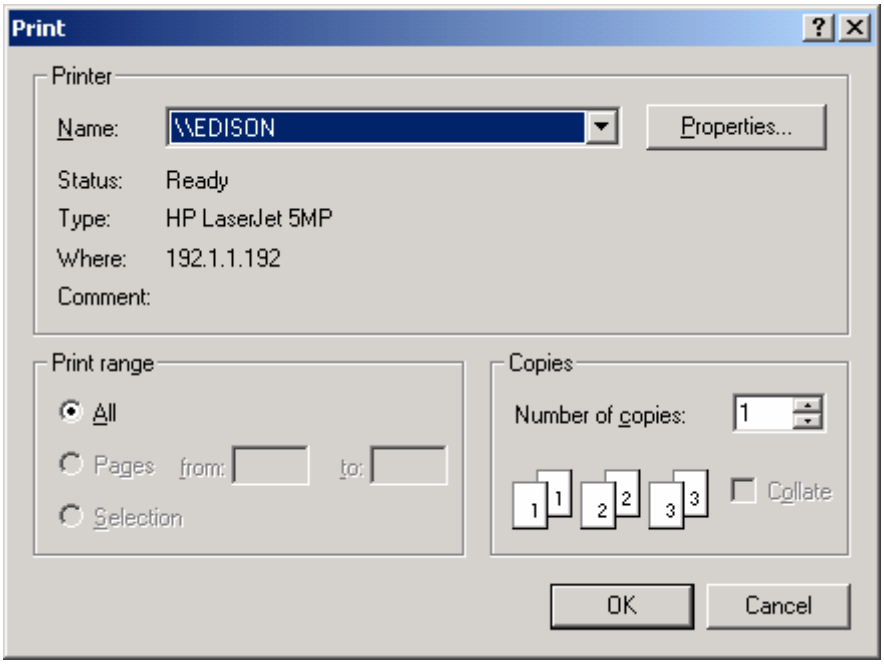
To print a graph, you can follow two different paths: The first one is from "***Files***" menu option, choosing "***Print***" option (or pressing 'P' key). The other one is using the context menu (remember that context menu appears pressing mouse right button) and then choosing "***Print***" option (the last one) or pressing correct button in buttons bar.

***Icon***



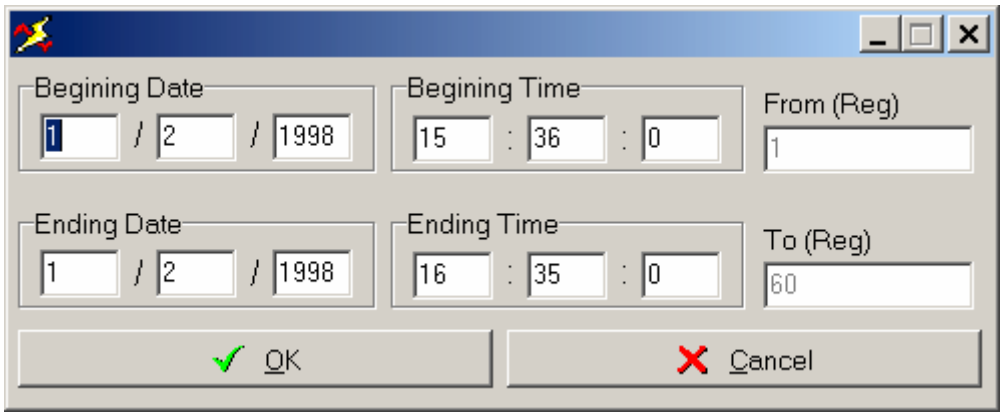

***Context menu***

Then, it will appear a printer configuration menu to configure different printer properties (sheet position, number of copies, etc.).




***Printer configuration menu***

After accepting all configuration options, if the graph has more than one register (see *"Graph formats"*), it may appear a menu like the following:




***Range selection menu***

This menu allows you to print registers range using its date or, some times, register index, so you will be able to select a starting and an end date, or a starting and and end register. Note that when the dialog box appears the program selects the range to print all available data (to print all the registers).
(See also "***Interaction with the graph: How can I configure it?***" to change box properties.)

This menu will warn you if the range you have selected has non-coherent data ranges, using a warning box like this:

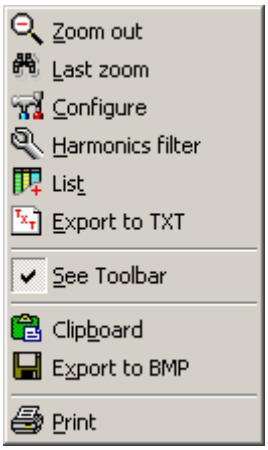
***Range error message***

For example the program can indicate to user that he has entered an erroneous initial date (bigger than the final date, so it produces the error)

## 4.9.- Interaction with the graph: Exporting

In order to allow to use the graph in another program (like Microsoft Word or Adobe Photoshop), Power Vision gives you two possibilities: to keep it into the Clipboard or to export it to a *.BMP file.

To do one of these two actions, you must click with the mouse right button on the graph, and the graph context menu will appear:



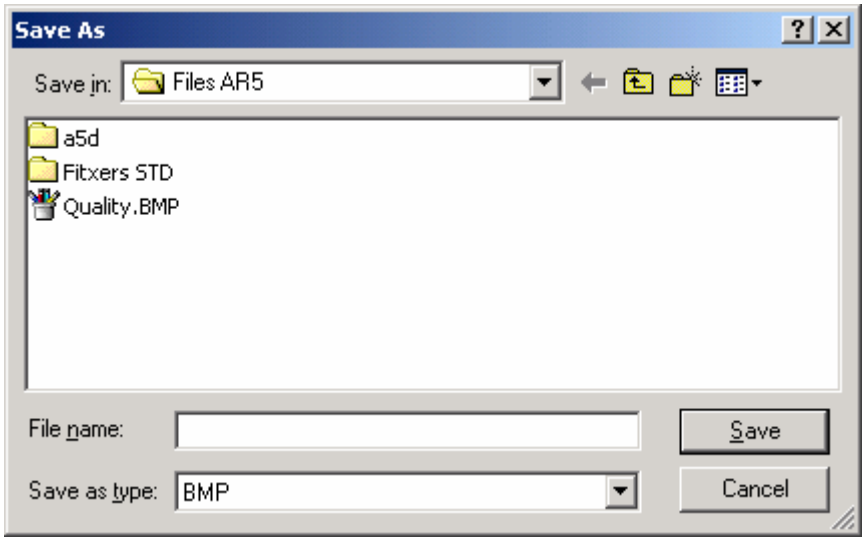

***Graph context menu***

As you can note, in this context menu it appears both options named "***Clipboard***" and "***Export to BMP***".

To copy the graph in the clipboard, you must click with the mouse left button on "***Clipboard***" menu option or with button in buttons bar, and the graph will be stored automatically in the clipboard.

When we copy the graph in the clipboard, we'll be able to paste it in any program with this option.

To save graph to disk in a BMP format, you must click with the mouse left button on the "***Export to BMP***" option or with button in buttons bar and the following dialog box will appear:




***Save dialog box***

Enter the file name and then click on the “OK” button to accept options. If there was a file on the disk with the same name as the one you have given, program will ask you to replace it or not:

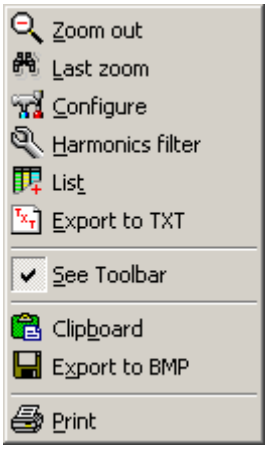
If you have decided tot replace the file, all old file data will be lost.

## 4.10.- Interaction with the graph: Toolbar

There is a Toolbar on the upper side of the graph that you can use to change different graph properties quickly and powerful.

***Toolbar***

Elsewhere, you can hide or show this bar whenever you want with "***See Toolbar***" option in context menu (Can be useful to hide toolbar to increase graph view).




***Context menu***

This bar displays all enable options about the graph and it keeps disable the options whose kind of configuration doesn't allow.

There are special graphs where you'll be able to find some extra button. This is because active graph has new extra options that you just can accede with this extra buttons (They are in context menu, too). For example, you'll be able to find an extra button like this . It's properties button that you can use to configure active graph.

This is some information about the graph buttons:

: Button to export active graph to BMP file. You can also do this action in context menu.

: Button to save the graph in Windows Clipboard (You will be able to Paste it in other applications). You can also do this action in context menu.

: Button to configure the graph. This button gives you the possibility of configure general properties of the graph like title, units, ... (See **"Interaction with the graph: Configuring"**).

: Button to return back quickly to old registers or periods. You can change the number of registers or periods that it will return back with standard graph configuration. (See **"Interaction with the graph: Configuring"**).

: Button to go to last register or period.

: Button to go to next register or period.

: Button to go to next registers or periods quickly. You can change the number of registers or periods that it will jump (See **"Interaction with the graph: Configuring"**).

: Button to group the information in shorter periods. For example, if the graph is grouped by weeks, you'll change to group by days. You can also do this action with standard graph configuration (See **"Interaction with the graph: Configuring").**

: Button to group the information in larger periods. For example, if the graph is grouped by hours, you'll change to group by days. You can also do this action with standard graph configuration (See **"Interaction with the graph: Configuring"**).

: Button to undo all zooms that you have made on graph. You can also do this action in the context menu.

: Button to undo last zoom you have made on graph. You can also do this action in the context menu.

: Button to accede to special graph configuration. This button gives you the possibility of configure typical and special properties about the active graph. You can also do this action in the context menu.

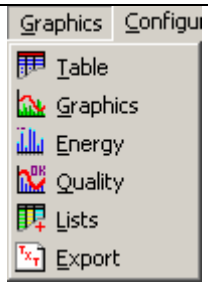
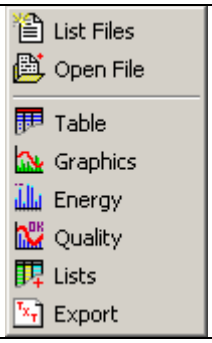
: You can display the values list from every graph. This is the faster option if you want to see the numerical values you are representing in the actual graph.

: You can export to a text file values represented in the graph. This is the faster option if you want to export to text values you are representing in the actual graph.

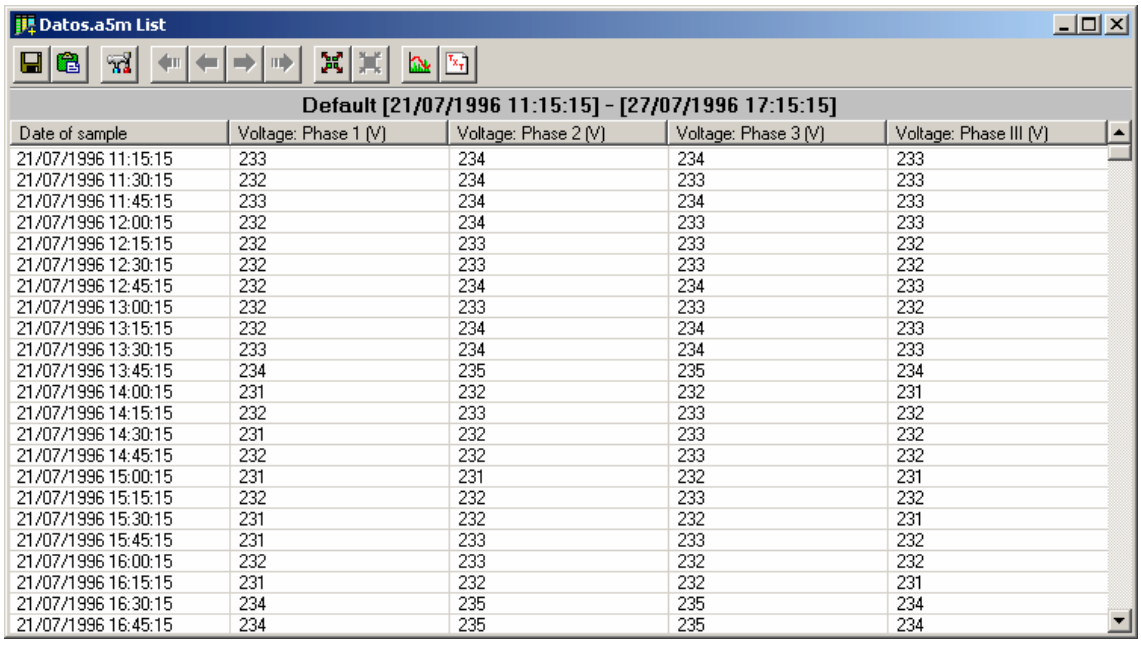
## 4.11.- Making a list using file data

You may also need to display data in a numerical list. To display this list, deploy "***Graphics***" menu on the menu bar (ALT + 'G' keys) and then click with your mouse left button on the "***Lists***" option (You can also press 'L' key on the keyboard)

You can also display this viewer clicking with the mouse left button on this icon on the toolbar, or selecting "Lists" on the main screen context menu.

<table>
<tr>
<td> 
</td>
<td> 
</td>
</tr>
<tr>
<td>Graph menu</td>
<td>Context menu of main screen</td>
</tr>
</table>

Once you have selected this option the list selector will appear. This selector is like the graphics viewer but the selection result is a list instead of a graph. You can also make a list directly from a graph.



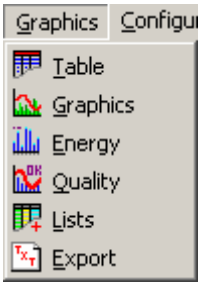

| Date of sample | Voltage: Phase 1 (V) | Voltage: Phase 2 (V) | Voltage: Phase 3 (V) | Voltage: Phase III (V) |
|---|---|---|---|---|
| 21/07/1996 11:15:15 | 233 | 234 | 234 | 233 |
| 21/07/1996 11:30:15 | 232 | 234 | 233 | 233 |
| 21/07/1996 11:45:15 | 233 | 234 | 234 | 233 |
| 21/07/1996 12:00:15 | 232 | 234 | 233 | 233 |
| 21/07/1996 12:15:15 | 232 | 233 | 233 | 232 |
| 21/07/1996 12:30:15 | 232 | 233 | 233 | 232 |
| 21/07/1996 12:45:15 | 232 | 234 | 234 | 233 |
| 21/07/1996 13:00:15 | 232 | 233 | 233 | 232 |
| 21/07/1996 13:15:15 | 232 | 234 | 234 | 233 |
| 21/07/1996 13:30:15 | 233 | 234 | 234 | 233 |
| 21/07/1996 13:45:15 | 234 | 235 | 235 | 234 |
| 21/07/1996 14:00:15 | 231 | 232 | 232 | 231 |
| 21/07/1996 14:15:15 | 232 | 233 | 233 | 232 |
| 21/07/1996 14:30:15 | 231 | 232 | 233 | 232 |
| 21/07/1996 14:45:15 | 232 | 232 | 233 | 232 |
| 21/07/1996 15:00:15 | 231 | 231 | 232 | 231 |
| 21/07/1996 15:15:15 | 232 | 232 | 233 | 232 |
| 21/07/1996 15:30:15 | 231 | 232 | 232 | 231 |
| 21/07/1996 15:45:15 | 231 | 233 | 233 | 232 |
| 21/07/1996 16:00:15 | 232 | 233 | 232 | 232 |
| 21/07/1996 16:15:15 | 231 | 232 | 232 | 231 |
| 21/07/1996 16:30:15 | 234 | 235 | 235 | 234 |
| 21/07/1996 16:45:15 | 234 | 235 | 235 | 234 |

The list Toolbar (top) is like the graphic toolbar but here you cannot make zooms. Note that you can make the equivalent graph clicking the last button in the toolbar.

Like graphs, you can configure some visualization parameters, export to clipboard, to BMP, group by months, weeks, etc. All this options are like in a graph.

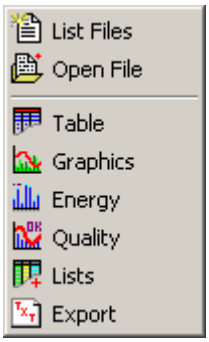
## 4.12.- Exporting to text some data

It's possible you want to export to text all or part of data contained in one or more opened files in order to process them with any other extern program like Excel from Microsoft. To do that you have to expand "***Graphics***" menu in the toolbar and choose "***Export***" option with left mouse button.




***Graphics menu***

You can also select this option clicking button in the main toolbar or selecting "***Export***" option in context menu.




***Context menu in main window***

Once these steps are completed the export selector will appear. This selector is equal to graphs selector and, of course, they have the same options, so, in order to learn more about this selector please read the chapter about making graphs. Graphs, lists and exports modules are fully complementaries.

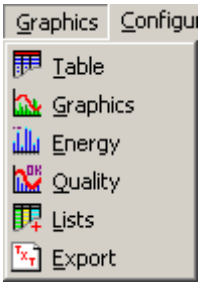
***Note:*** *It's possible to make text exports directly from any graph or list and also clicking the right option in the top toolbar. This is a shorter way to do data export if you want to export precisely the data you are representing in actual graph or list.*

Once variables to export have been selected a new dialog will appear. In this one we will be able to select the name and folder for destination file containing selected data.

And finally, another window will appear that allow us to choose field and decimal point separator. If you want to learn more about this window, please read the section "***file export***".

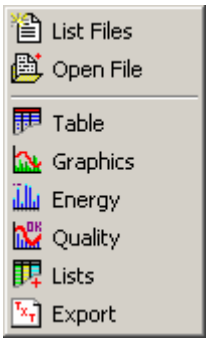
## 4.13.- Making a table using file data

You may also need to display all data in a numerical data table. To display this table, deploy "***Graphics***" menu on the menu bar (ALT + 'G' keys) and then click with your mouse left button on the "***Table***" option. (You can also press 'T' key on the keyboard)



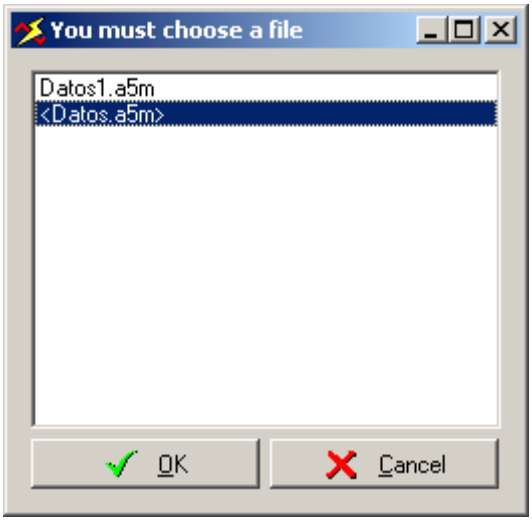

***Graph menu***

You can also display this viewer clicking with the mouse left button on this icon on the toolbar, or selecting "Table" on the main screen context menu.




***Context menu of main screen***

Then it will appear a file viewer to choose any opened file.




***File viewer***

Select the file you want to display a table (clicking with the mouse left button on its name) and then click on the "***Ok***" button.

In the next dialog box, you will be able to select all the variables you want to display on the table. Note that each file type will have different available data. For example in an "A5I" file, you will find the following options:

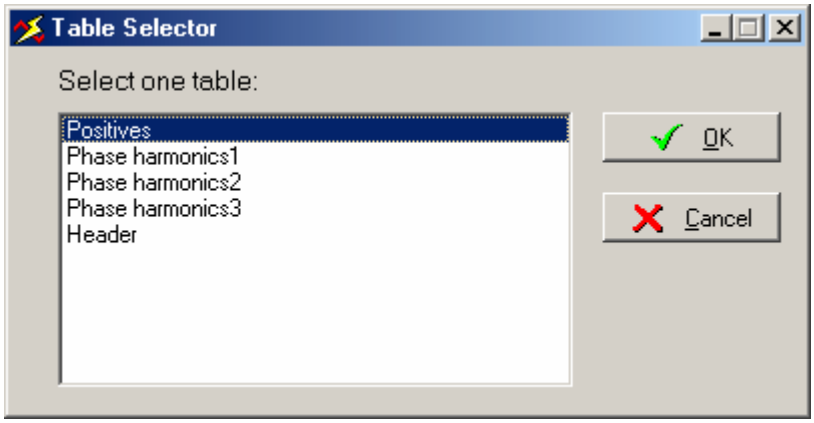
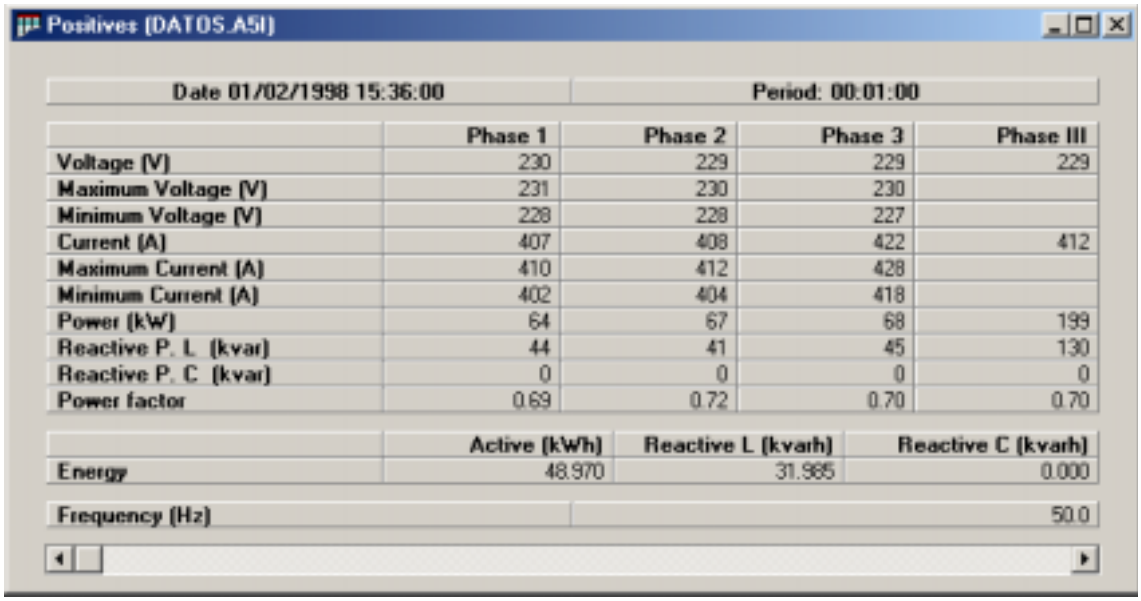



***Table selection viewer***

Usually, all the files give us standard tables with the most usual variables (voltage, current, power, etc.) In the other side, all the files give us a main table called "*Header*" where are shown the main parameters of the file like the number of registers, number of variables, the size, etc.

To learn about the special tables that each type of file may provide, see the specific section of the Driver.

Elsewhere, you have to select the table that you want to see (as you did in the previous visor) and then, you'll obtain the table that you have requested. The main tables look like the following:




| | Phase 1 | Phase 2 | Phase 3 | Phase III |
|---|---|---|---|---|
| Voltage (V) | 230 | 229 | 229 | 229 |
| Maximum Voltage (V) | 231 | 230 | 230 | |
| Minimum Voltage (V) | 228 | 228 | 227 | |
| Current (A) | 407 | 408 | 422 | 412 |
| Maximum Current (A) | 410 | 412 | 428 | |
| Minimum Current (A) | 402 | 404 | 418 | |
| Power (kW) | 64 | 67 | 68 | 199 |
| Reactive P. L (kvar) | 44 | 41 | 45 | 130 |
| Reactive P. C (kvar) | 0 | 0 | 0 | 0 |
| Power factor | 0.69 | 0.72 | 0.70 | 0.70 |

| | Active (kWh) | Reactive L (kvarh) | Reactive C (kvarh) |
|---|---|---|---|
| Energy | 48.970 | 31.985 | 0.000 |

| | |
|---|---|
| Frequency (Hz) | 50.0 |

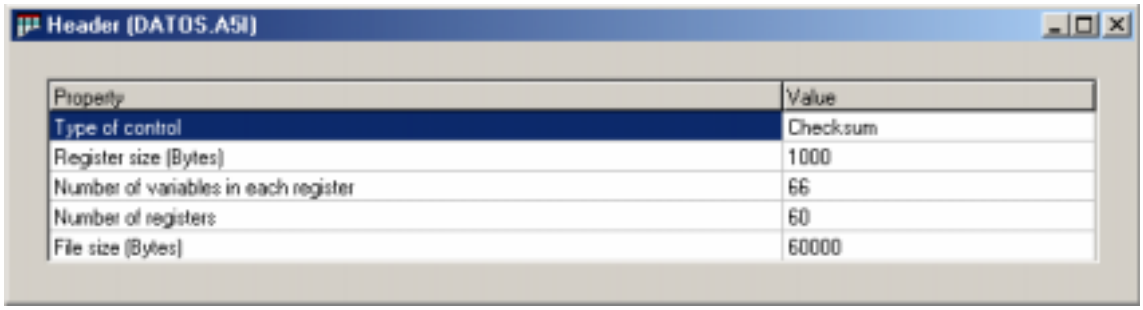
***Table***

In this figure you can see a typical table. The table can have two bars (a horizontal and a vertical one) to move through all values.

The horizontal bar will appear when the table (as the graph) has more than one register, that is, you can display all different time captured data.

The vertical bar will appear when program is not able to display all data registers on the screen, so you may accede to all register data.

As we said before, all files give you a kind of special table with general file values (“Header” table). It would be like this:

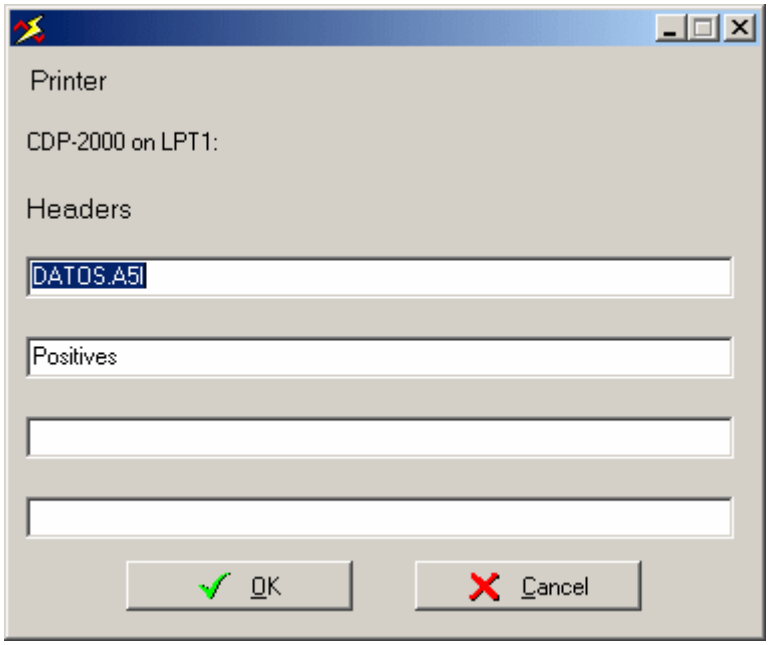



***General properties table***

## 4.14.- Printing a Table

To print a table, you must first accede to printer configuration menu in the same way as you acceded when you wanted to print a graph. (See '***How can I print a graph***' chapter)

There is only one difference from when you wanted to print a graph: Between the printer configuration menu and the range menu, it will appear a label selection menu to define up to four headers to print them on the table title.




***Headers selection menu***

Note that the first two headers have predefined values, but you will be able to change them. When all changes have been set, you can press "***Ok***" button.

## 4.15.- Exporting a table

In order to use the table in any other program (for example in Microsoft Word or Adobe Photoshop), you can export it in other file formats. Power Vision offers you two possibilities: copy it to the clipboard or save it to a BMP data file.

To allow this option click with the mouse right button on the table and the following menu will appear:

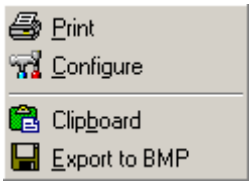
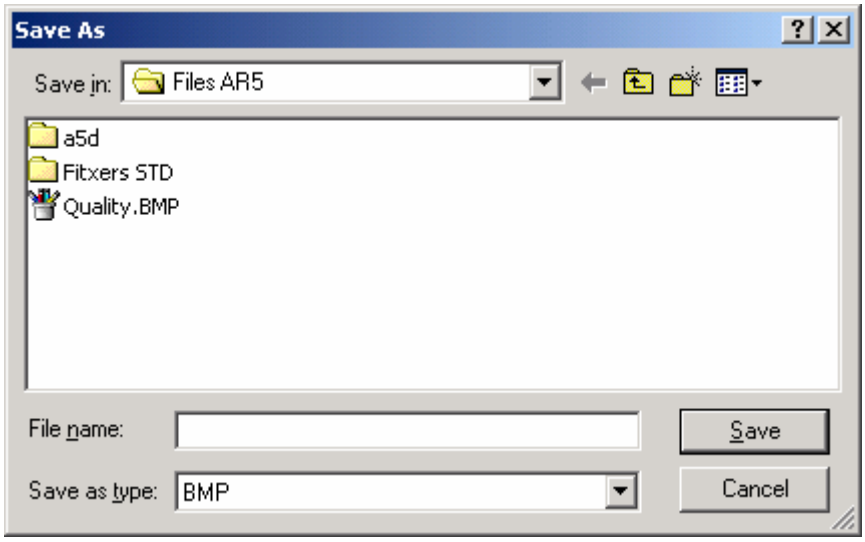



***Table context menu***

As you can note, in this context menu it appears both options named "***Clipboard***" and "***Export to BMP***".

To copy the graph on the clipboard, you must click with the mouse left button on "***Clipboard***" menu option, and the table will be stored automatically in the clipboard, so you would be able to paste it in many other programs.

To save the table to disk in a BMP format, you must click with the mouse left button on the "***Export to BMP***" option and the following dialog box will appear:




***Save Table dialog box***

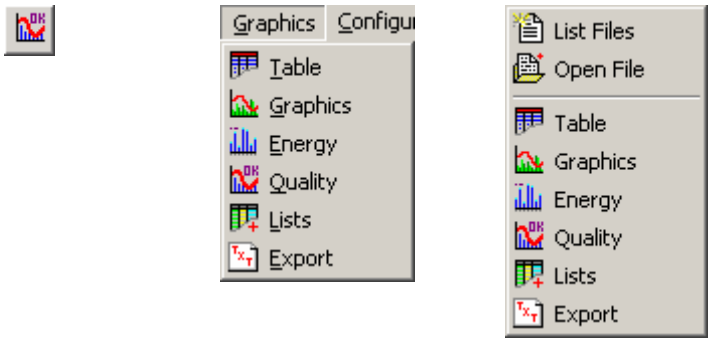
Enter the file name and then click on the “OK” button to accept options. If there was a file on the disk with the same name as the one you have given, program will ask you to replace it or not:

If you have decided tot replace the file, all old file data will be lost.

## 4.16.- Quality studies

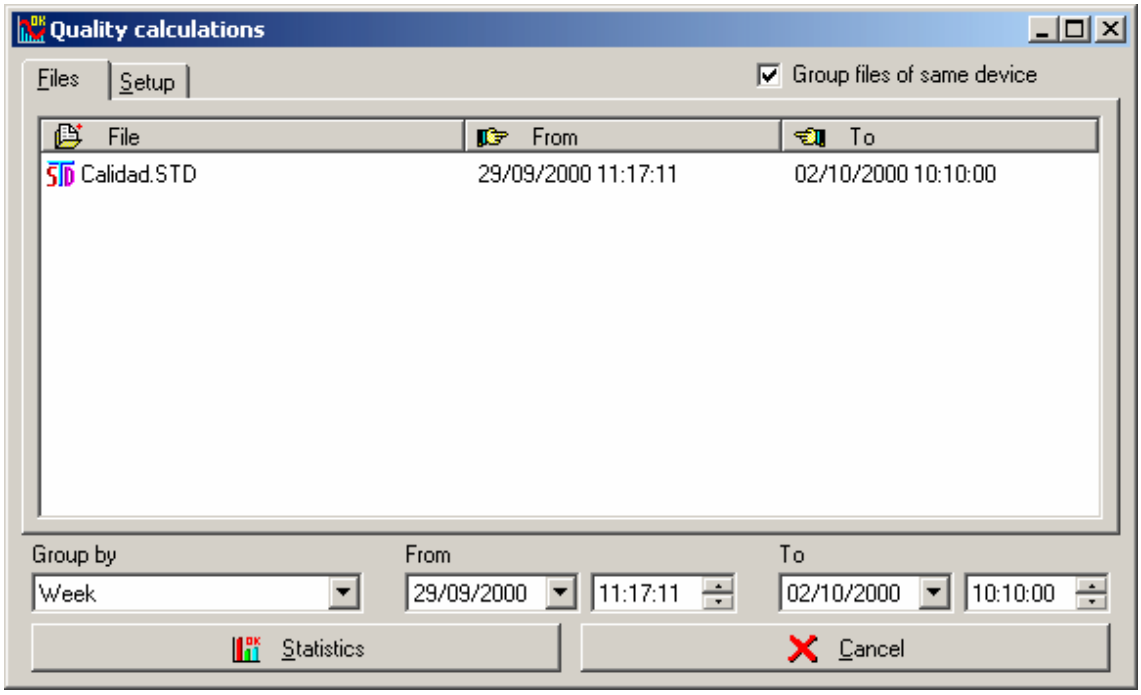
Power Vision counts with a powerful module to do voltage, Flicker and harmonics studies.

To do file quality studies you must go to quality menu option or press quality button from the button bar. You can also access to the quality option through main context menu.




***Ways to quality study access***

When we access to quality option we'll be able to see next window:



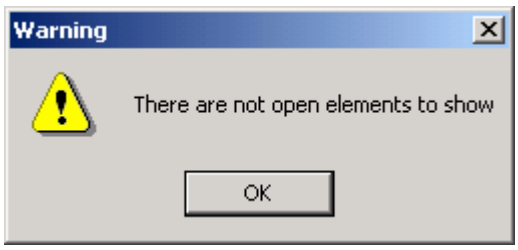

***Quality analysis data selection (files)***

Program will show you the open file list containing quality parameters to study (Voltage, Flicker, Harmonics and Unbalance)

***Note**: You can also view all opened files grouped by device selecting the "**Group files of same device**" option. This option allows us to see under the same name all files grouped by weeks or months generated by communications module. For*

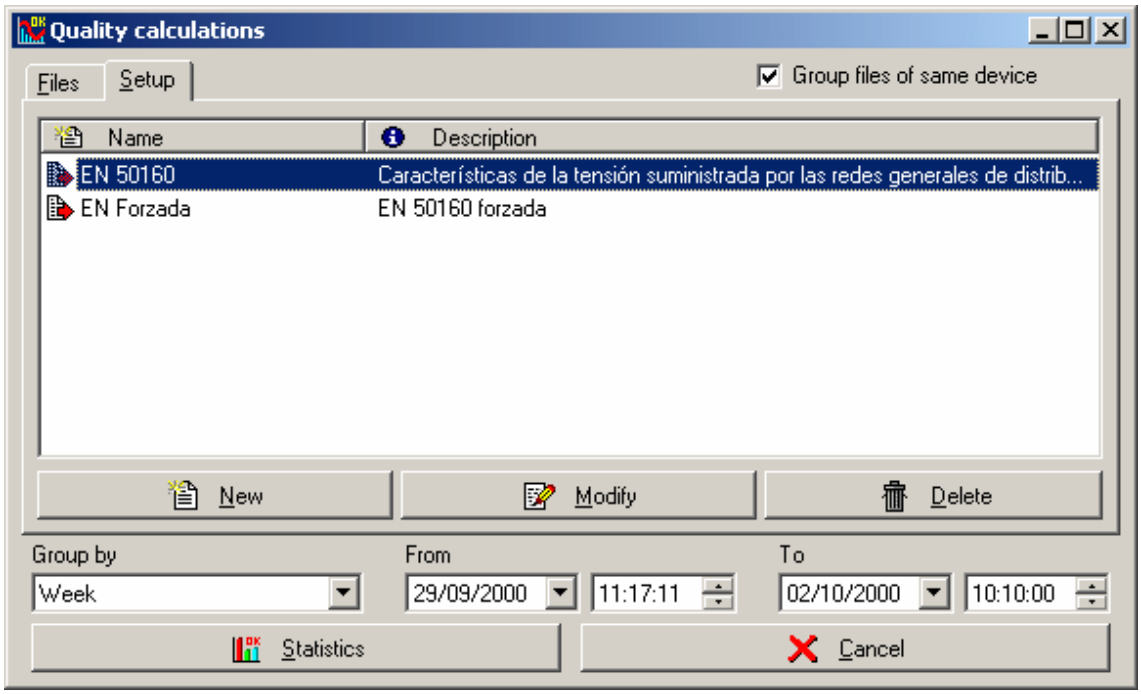
*example, if you check this option, files with names M0030202.STD, M0030302.STD, M0030402.STD appear with the name 003.STD.*

If there aren't files to study program will alert us with next message:




***Error message when there are not file data to study***

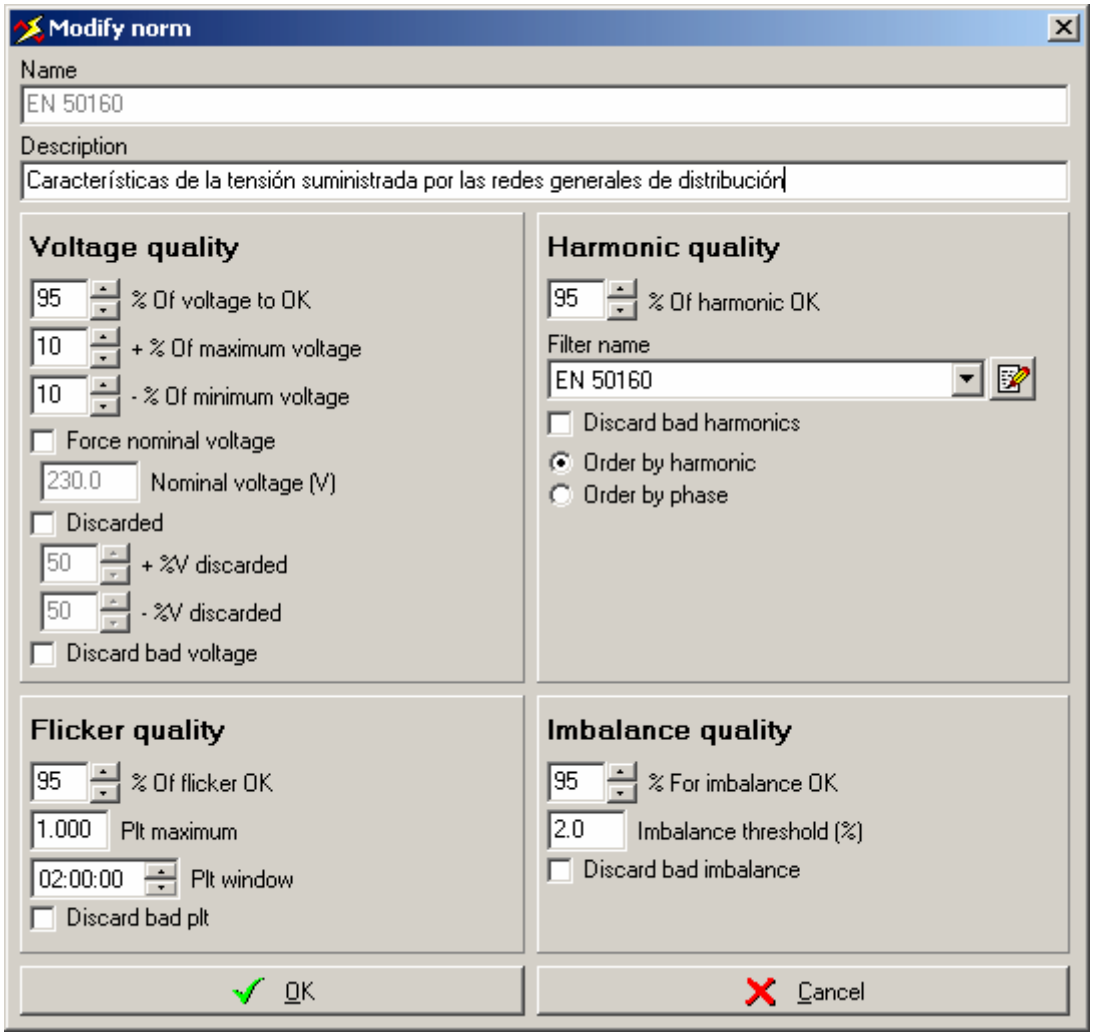
Firstly we must configure all the quality parameters. To do this we should select configuration folder and choose the norm we want.




***Norm selection window***

With the sofware is provided the EN-50160 norm, defined for the harmonics, Flicker, voltage and unbalance parameters. Therefore, it's possible to add new norms defined by the user using the button "**New**", and modify an existign norms using the button "**Modify**" and delete them using the button "**Remove**".

When we modify or add a new norm to the enviroment, the program allows to configure all the things that will be involved in the quality study of Voltage, Flicker, Harmonics and unbalance using the following screen:




***Modify / Add a quality norm screen***

Program allows configuring all the parameters to study Voltage, Flicker and Harmonics quality. So that we can fill in next fields:

**% Voltage OK:** Minimum percentage voltage values into interval margin to consider voltage ok. In this example we will need 95% of the day values into the margin to consider a voltage ok day.

+***% Of Maximum Voltage:*** Maximum percentage upper the base voltage to consider correct a voltage value. In this example, if a voltage value is greater than 4% of the base voltage it is considered a wrong value.

**-% Of Minimum voltage:** Minimum percentage lower the base voltage to consider correct a voltage value. In this example, if a voltage is lower than 10 % of the base voltage it is considered a wrong value.

**Nominal voltage:** We can force this value clicking the check named “Force nominal voltage”. We will compare the samples with this value (percentages refer to this value). This value can be with a decimal accuracy. If we don’t force this value the system will try to get it from the analyzed files.

**Discarded:** If we select this option we can select a margins out of these values do not be worth to calculate voltage quality. If we do not select this option all values be worth.

**+% Discarded voltage:** We select upper base voltage percentage minimum to calculate a value quality voltage. If value is greater than this limit it will not be worth.

**-% Discarded voltage:** We select lower base voltage percentage minimum to calculate a value quality voltage. If value is lower than this limit it will not be worth.

**Discard bad voltage:** If we select this option we do not use bad voltage values to calculate quality. Voltage value is bad if one event has happened in the period or if register is incomplete.

We must fill in these fields to calculate quality Flicker values:

**% Flicker OK:** Percentage of Plt samples that they must be under maximum allowed to consider Flicker in this interval correct. In this example we will need 95% of samples less than 1 to consider correct Flicker quality.

**Maximum Plt:** Plt maximum value upper it we consider not correct. In this example if Plt value is greater than 1 it is consider not correct. This value can be written with three decimals.

**Plt window:** We can define Plt desired calculated window to files with Pst saved data. In this example Plt window is two hours, so that to calculate Plt we must use last two hours Pst (if we have files with 10 minutes then we have 12 Pst/Plt). We always ignore first window Plt because they will be incomplete.

**Discard bad Plt:** If we select this option we do not use bad Plt when we calculate Flicker quality. Plt calculation can be bad if a Pst has been calculated while one event has happened or if register is incomplete.

We must fill in these fields to calculate quality harmonics parameters:

**% Of Harmonic OK:** In a time period a register percentage must be inside Harmonics and THD standard, to consider correct quality harmonics in this interval. We compare harmonic decomposition of all file registers with selected norm and if this decomposition is inside norm (harmonics and THD) we consider it correct.

**Filter Name:** We apply this harmonic and THD norm to prove if all decompositions are correct. Application define as a default EN50160 norm but it is possible add new norms, delete them and modify (see "**Harmonic filtered"**).

**Harmonic Order:** We can order harmonic study by phase or by harmonic.

**Discard bad harmonics:** If we select this option we do not use bad harmonics values (or THD) to calculate quality. Harmonics or THD values are bad if one event has happened in the period or if register is incomplete.

We must fill these fields to define the unbalance quality parameters:

**% of unbalance OK:** Samples percentage of Kd (unbalance coefficient) that should be under the maximum value allowed to consider the unbalance in studied

period is correct. In the example will need 95% of the samples under 2 to consider the unbalance quality is correct.

**Max. unbalance (%):** Maximum value of the unbalance coefficient (Kd) that any value over it will be considered incorrect. In the example the unbalance value that is higher than 2 will be considered incorrect. This value may be given with a decimal.

**Discard bad unbalance:** If we select this option we won't take the erroneous Kd in the calculation of the unbalance quality. The calculation of a Kd may be erroneous if there were events during a register (quick voltage variations) or if this Kd hasn't be analyzed during all the programmed period.

Beyond studies configurations, we can select calculation intervals (by days) and their margins (calculation begin time and end time). Default calculations margins are all the available samples.

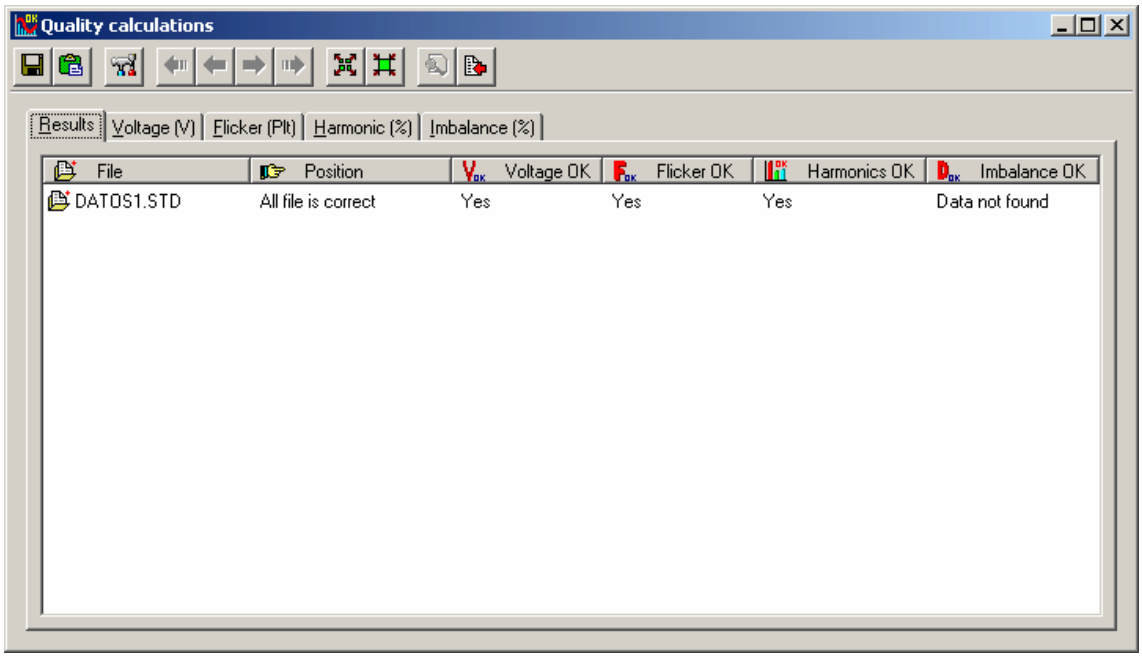
Then, percentage of correct number samples to consider a good quality data is always allude to selected interval (in our example we have 95% day samples must be good to consider a good day quality). We can choose study year quality, months, weeks, days, hours and totality.

All configuration data of quality study are stored when we press statistics button, that next quality calculation we will do we will have configured parameters.

Although when we do calculations it is possible change all the parameters with context menu and we can do configuration adjustments.

### 4.16.1.- Quality studies results

When we have finished configure all the parameters we push statistics button and we will obtain calculation results:



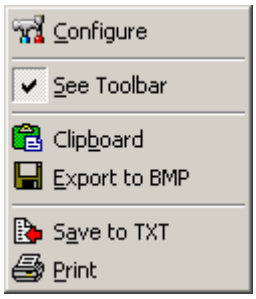

***Dialog of general quality calculations.***

We can see one list with all the bad study data (in this example we can not see anything because there are not errors).

We could see norm transgression file name, offset (according to interval selected) and failed calculations (Voltage, Flicker or Harmonics).

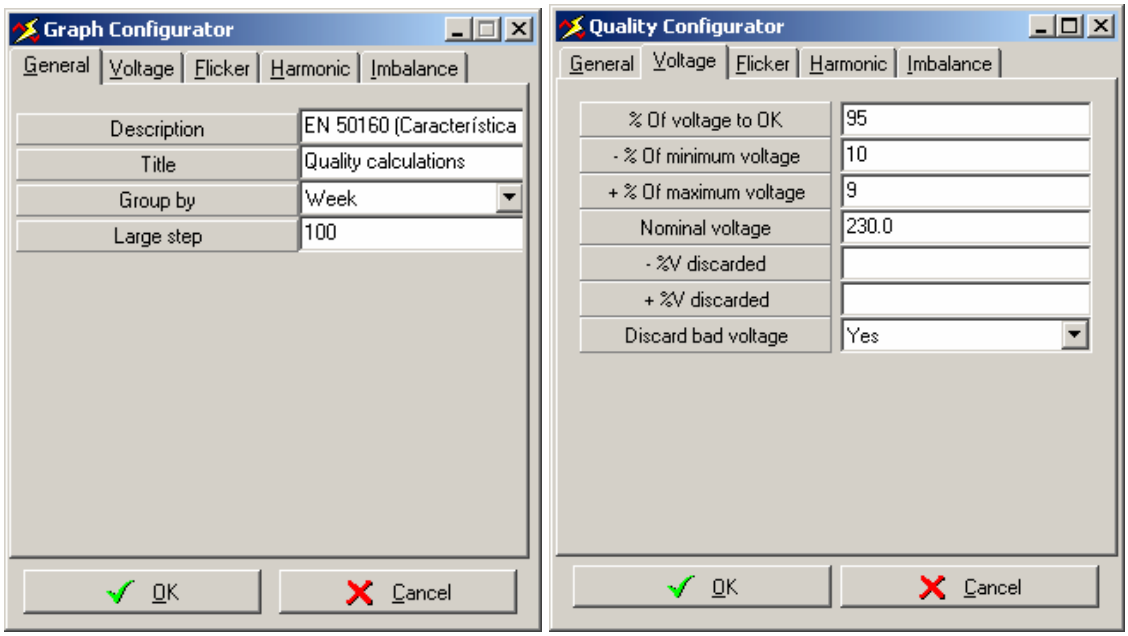
There are also three folders where we can see detailed voltage, Flicker and harmonics study. We can also access to not correct intervals if we do double-click over the row, then automatically we will move over the transgression norm folder.

We can change parameters configuration with the context menu ("***Configure***" option).

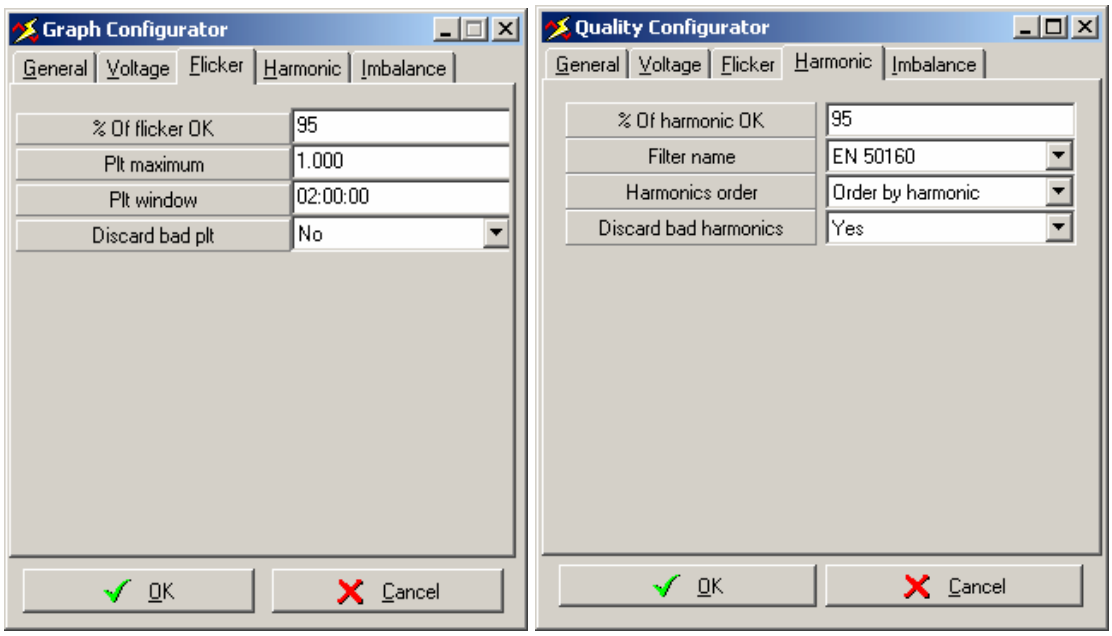



***Quality Pop-up menu***

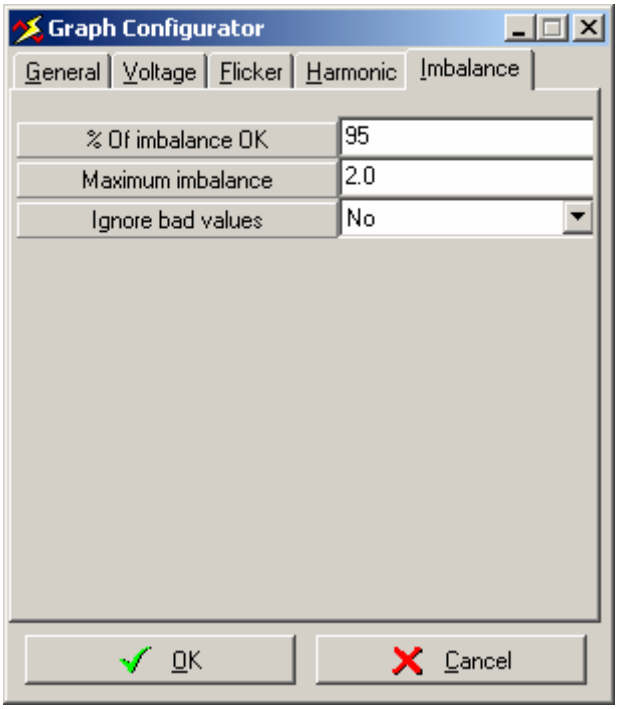
A window appears and it allows us changing all the study parameters configured before. This allows us to make adjust.




***General configuration of voltage quality parameters***



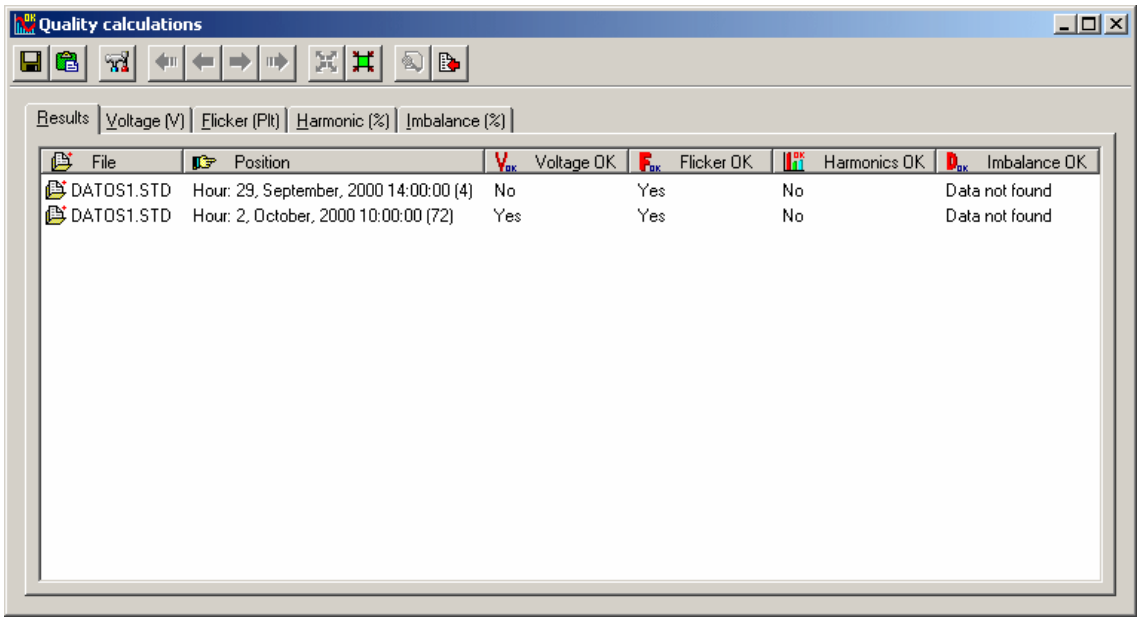

***Configuration of Flicker and Harmonics quality parameters***




***Configuration of unbalance quality parameters***

In the next example we have changed the study interval (one hour), we obtain therefore new analysis results (now an erroneous value is more important).

Now we can see than there are situations where samples do not pass quality test.

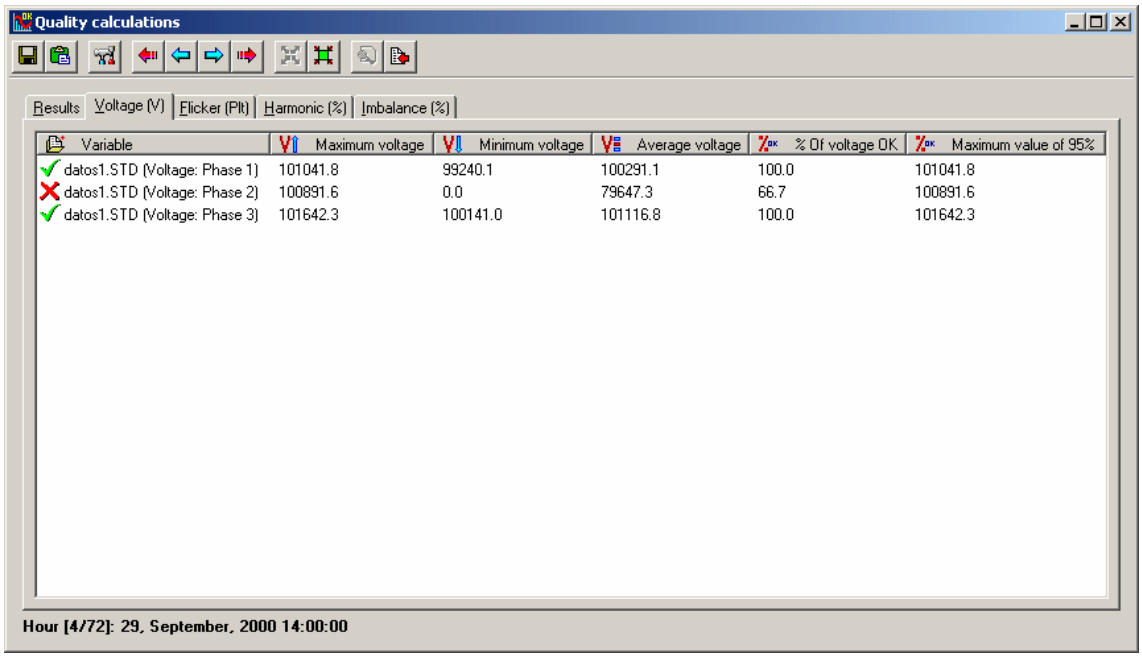



***One-hour interval, new study results***

We can see that September 29, form 14:00 to 14:59 (interval 4), dates have not pass voltage quality test and harmonics quality test.

If we do list double-click we can see this elaborately.

### 4.16.2.- Voltage studies results



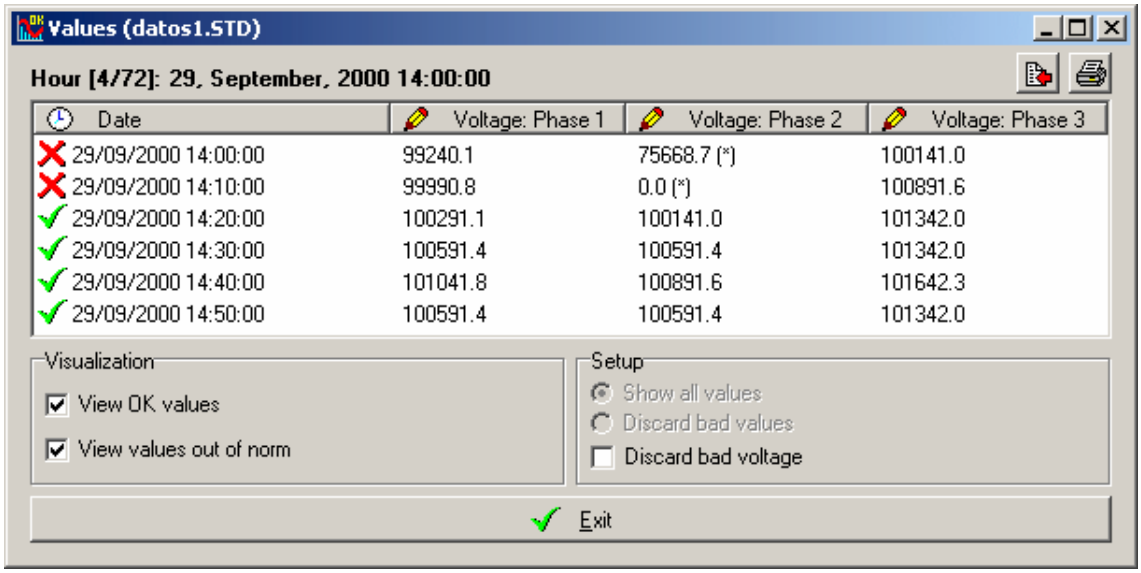

***Result of voltage quality study in an interval***

We can see that phase two voltage quality test has failed (left red symbol), we have 66.7% of good samples (upper 95% required).

Program calculate maximum, medium and minimum samples value of this period (in the example one hour) to every variable (normally three phases), and calculate also samples percentage that is greater than the norm.

Anyway we can move between study intervals with horizontal scroll bar and we can see (in this example) result of three-phase voltage study every hour.

Moreover, if we can do a more detailed study, we can do variable-to-see double-click to consult individual samples.




***Individual values included in a current interval***

If we do this we can see if a value has passed established norm. In this example there are two samples that have not passed phase two test (asterisk mark).

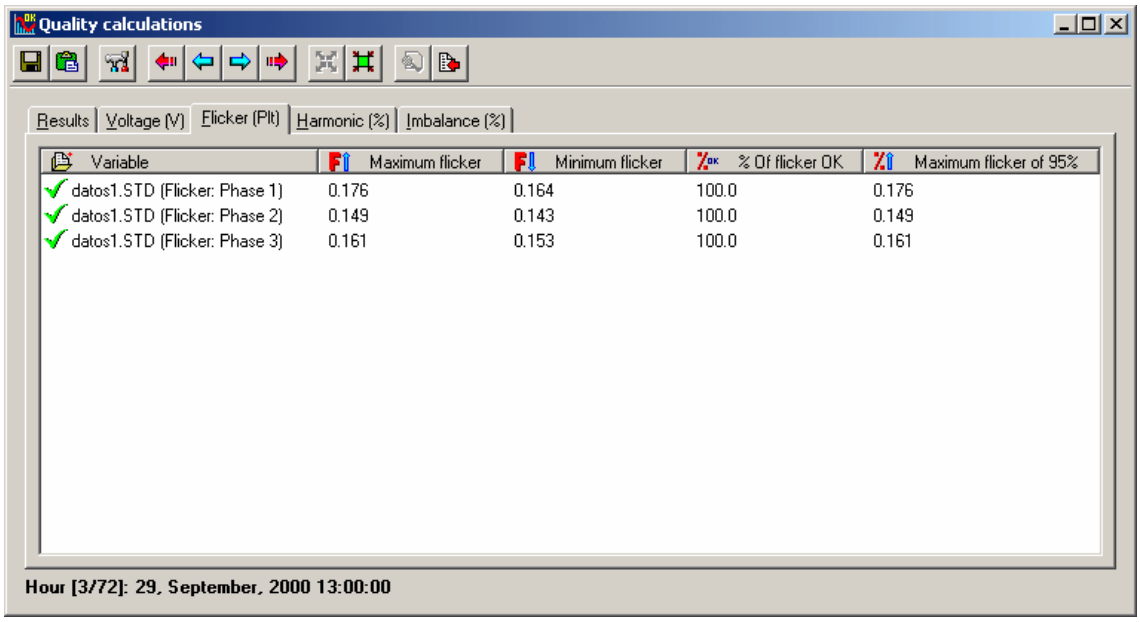
This window allows us, if we have defined discarded margins, to show discarded samples when we apply this filter.

Therefore, we can see just the individual values that don't fullfill the norm, and print the screen (using the up-right button) and export the data to text (using the second button on the up-right side). This option will allow us to read the data from a spreadsheet as Excel.

We can see not only voltage quality study; we also can see Flicker quality study and Harmonics only changing folder.

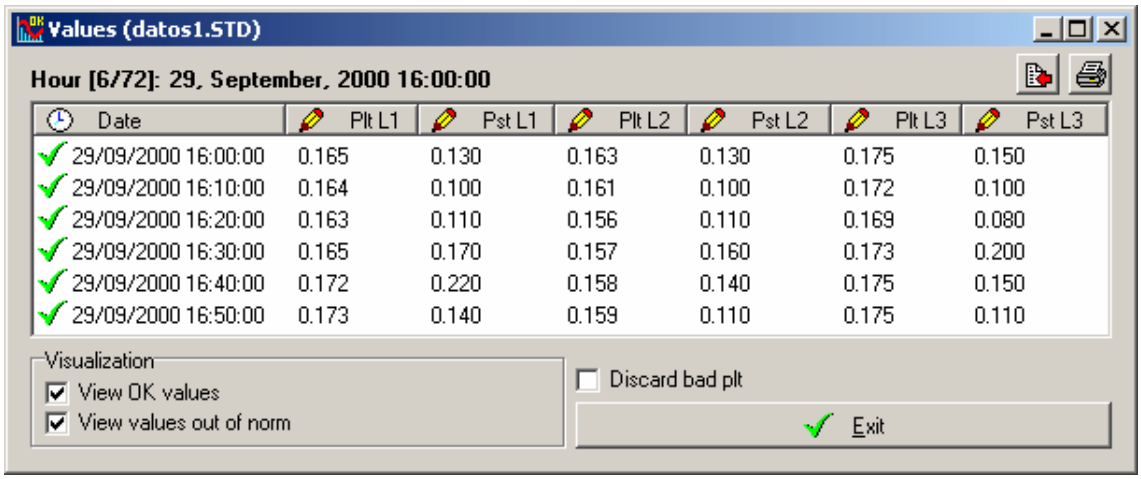
### 4.16.3.- Flicker quality studies results

If we change to Flicker quality folder we can see next window.




***Flicker quality study for an interval***

We can see in this example maximum and minimum interval Flicker (Plt), sample percentage that pass the test, and maximum percentage of samples. This value contains maximum value of 95% of samples in this interval (better 95% of samples). Like when we are working with voltage there we also can know individual Flicker values (Pst and Plt).




***Individual Plt and Pst values in an interval***

Here there are also the Plt values discarded. Plt is not correct if:

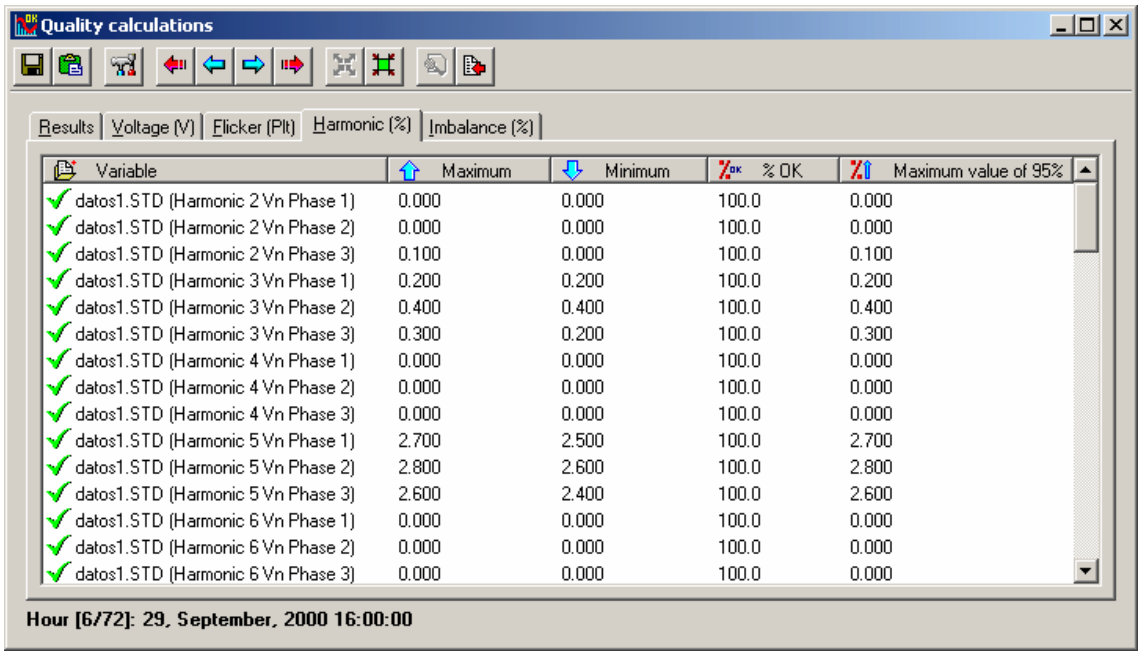
1. **–** If there are events inside the Pst sample period and phase. If current Plt have one Pst calculated while have had events (user decides if this Plt is correct or not).
2. **–** If we could not analyze all the Pst sample period. If current Plt have one Pst calculated before finish the period (user decides if Plt is correct or not).

Therefore, we can see just the individual values that don't fullfill the norm, and print the screen (using the up-right button) and export the data to text (using the

second button on the up-right side). This option will allow us to read the data from a spreadsheet as Excel.

### 4.16.4.- Harmonics quality studies results

We can also compare Harmonics quality study in this interval. If there are not data to analyze (Voltage, Flicker or Harmonics) then this window will be empty (but there is almost one window). In our example result is this.

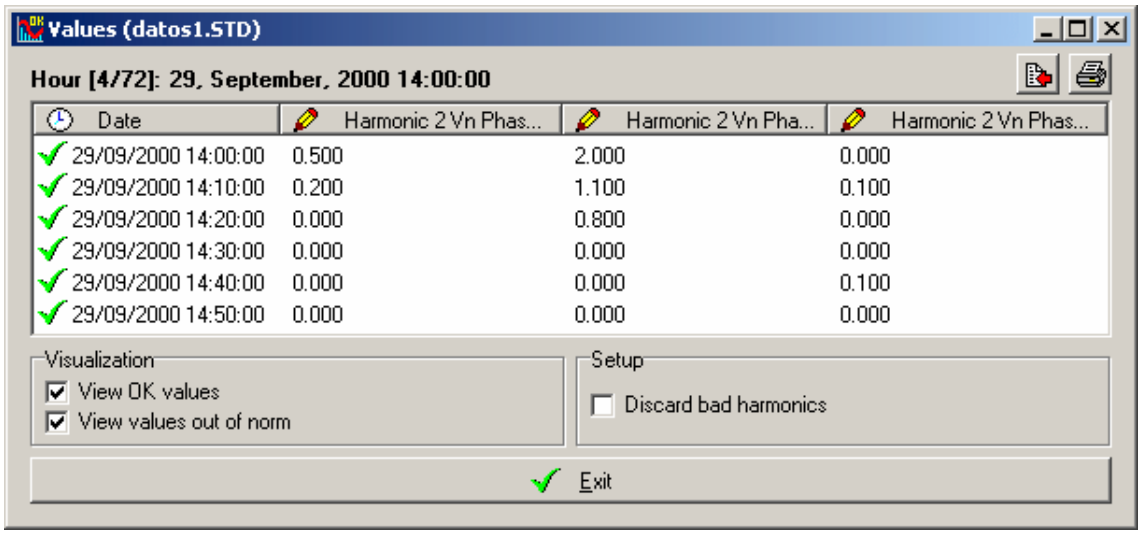



***Harmonics quality study in an interval***

We can see maximum and minimum interval variables, percentage of samples that pass this test, and percentage defined maximum value of samples, for every individual harmonic of phase and every phase THD. In this example this value is maximum value of 95% of this interval (the best 95% of samples).

It is important to know that the number orders harmonics, and we can see results ordered by phase (firstly phase 1 harmonics, after phase 2 and then phase 3).

Like when we are working with voltage and Flicker, there we could know individual harmonics values and THD and see if they pass the norm. We must do double-click on the variable to see.



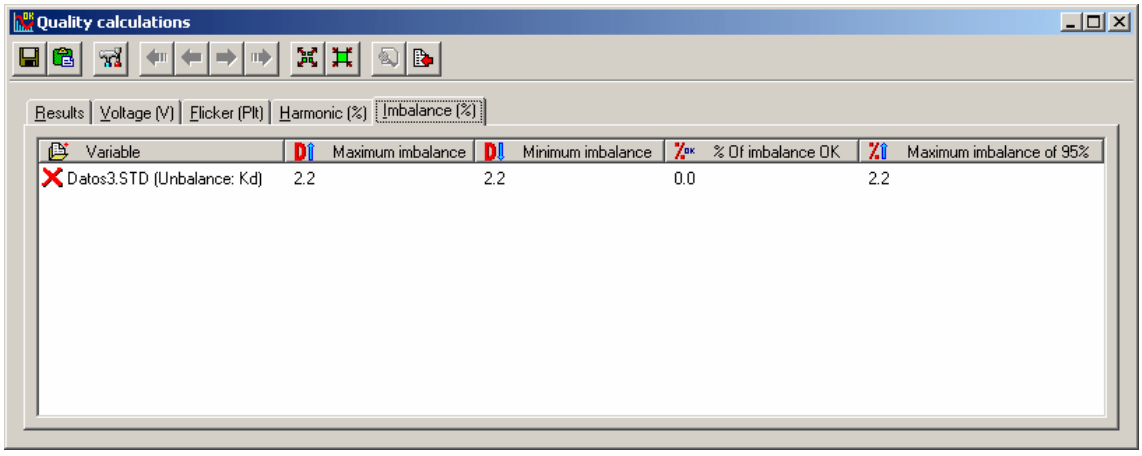

***Harmonics individual values in an interval***

We can see all the values in selected harmonic interval (three phases) or THD.

Therefore, we can see just the individual values that don't fullfill the norm, and print the screen (using the up-right button) and export the data to text (using the second button on the up-right side). This option will allow us to read the data from a spreadsheet as Excel.

### 4.16.5.- Unbalance quality studies results

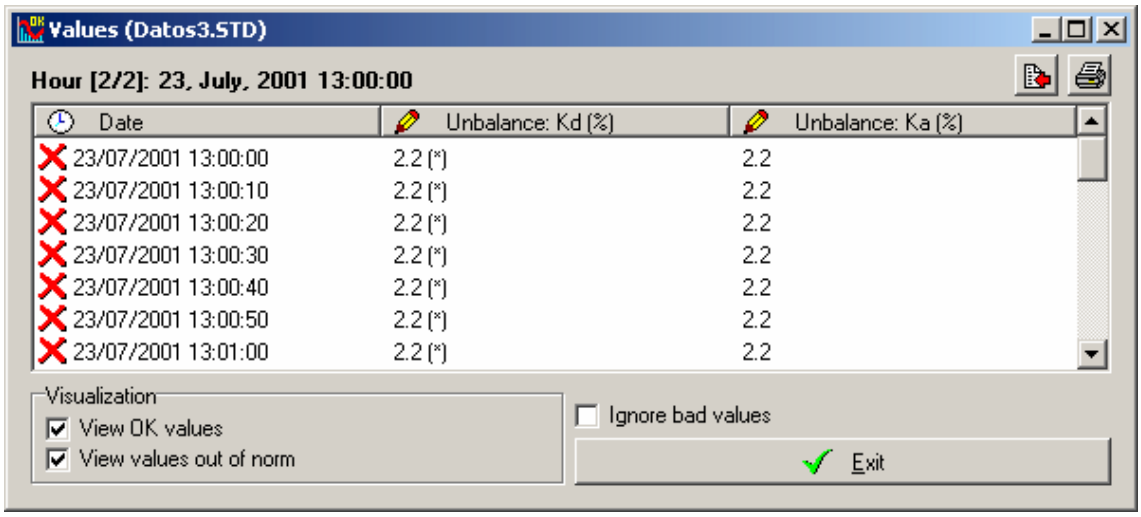
If we want to see the unbalance quality study we have to choose a file that contains the Kd variable (unbalance coefficient), for example the file "***Datos3.STD***".




***Unbalance quality study for a period***

In this case we can see the maximum and minimum Unbalance (Kd) of the period, the percentage of samples are over the norm, and the maximum value of the defined percentage of samples. In our case, this value has the maximum value of the 95% of the samples in the period (the best 95% of the samples)

As the other variables, here also we can consult the individual values of the Unbalance and see the behavior of them according the defined norm.




***Individual values of the unbalance coefficient in a stablished period***

Here, there is the discard the Kd values are bad. A Kd is incorrect if:

**1. –** There are events in a Kd sample period (quick voltage variations). If one Kd is taken during a period where there were events, it's possibly considered incorrect (it'll be a decision of the user to take it or not take it for the quality study)

**2. –** The period of a Kd sample couldn't be analyzed. If one of the Kd is the result of the analisis of an incomplet register, it will be possibly considered incorrect (it will be decision of the user to take it or not take it for the quality study)

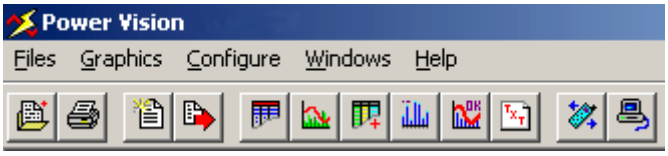
Therefore, we can see just the individual values that don't fullfill the norm, and print the screen (using the up-right button) and export the data to text (using the second button on the up-right side). This option will allow us to read the data from a spreadsheet as Excel.

**Note:** You can also see the Ka parameter but it is not used for quality calculations.

## 4.17.- Energy

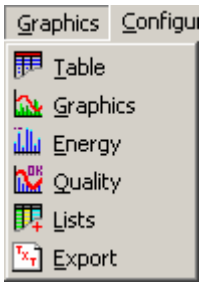
There is a module in Power Vision to study energy variables. This module allows studying energy consumption or energy generation stored on time intervals (total, years, months, days and hours). It allows grouping data easily, print information and export them.

If you want access to this module you can click energy left button in icon bar.

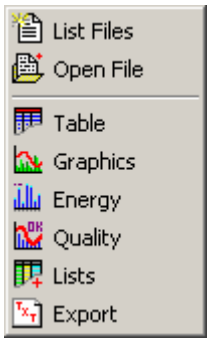



***Toolbar***

You can also access to "***Energy***" option in the context menu or in the "***Graphics***" menu.



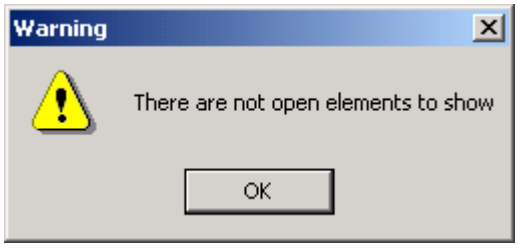

***Graphics Menu***




***Main window context menu***

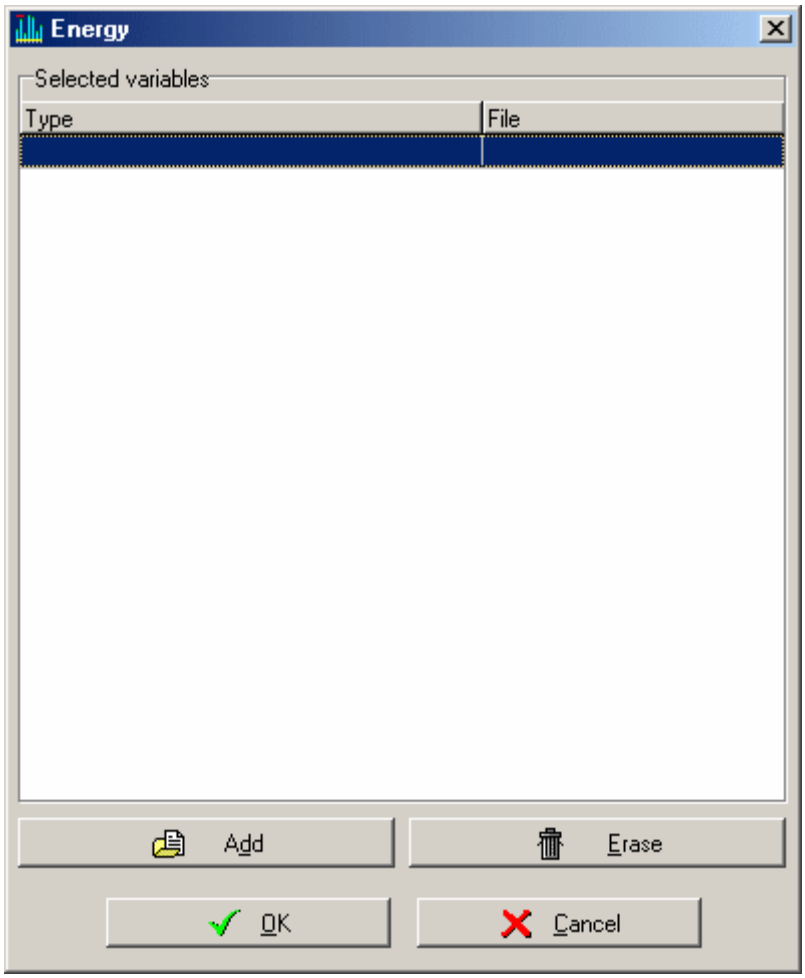
When you choose this option you can access to the energy study module. This module collects all the energy variables available and allows studying these variables with graphics and tables.

If there are not energy variables program give us this message:




***There are not energy variables Message***

If program detect that there are files with energy variables this window will appear:

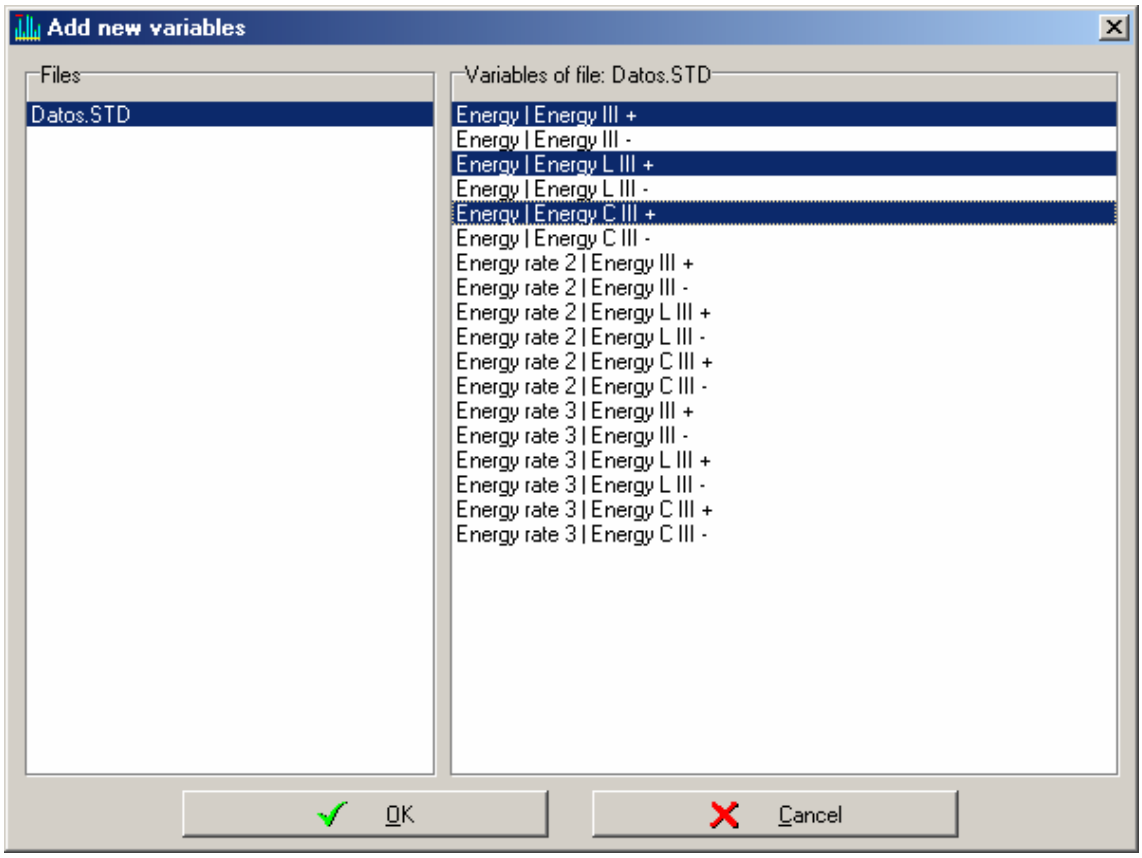



***Dialog of selected energy variables***

We could see selected variables in this moment, program allows to add new variables and delete selected variables with "***Add***" and "***Erase***" buttons (we also can delete variables with key <Del>). When we delete a selected variable, program adds this variable to the available variable list (we could add it to study when we want).

We can cancel energy study with "***Cancel***" button and make the selected variables study with the "***Ok***" button (if there are not energy variables selected we return to Power Vision window without do an energy study).

When we press the "***Add***" button this window will appear:

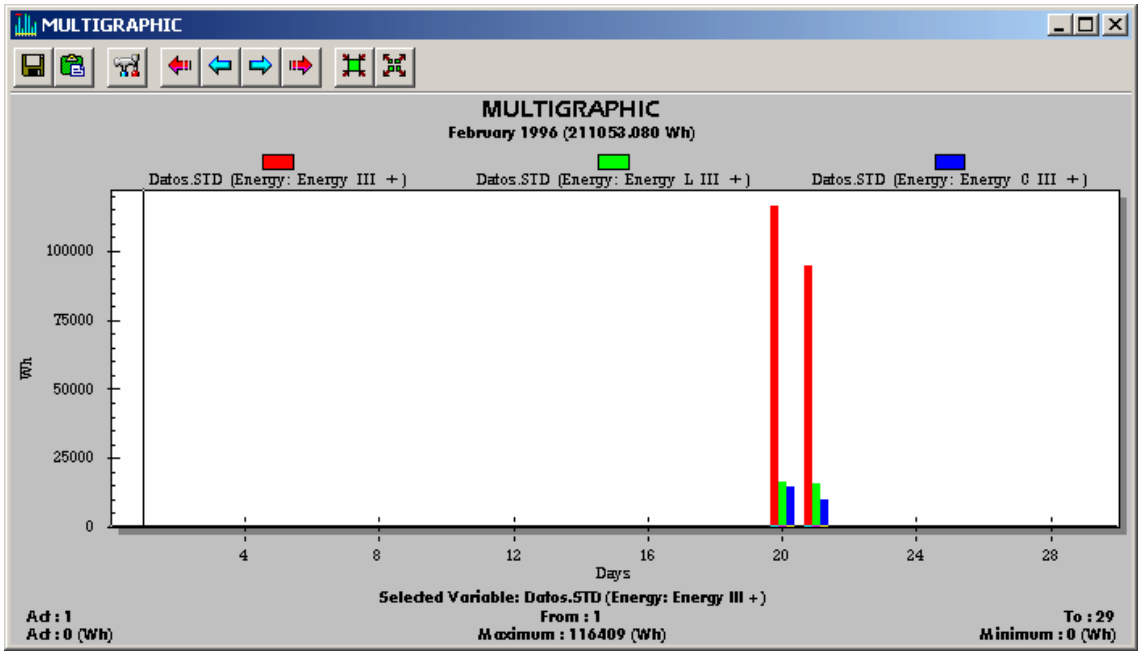



***New variables selection window to energy study***

We can choose those variables that we want to study. On left list we will see open files with energy variables and on right list we will see all energy variables from file.

If we want choose variables we must select a left list file and variables to study in left list. When we finish we must push "***Ok***" key. If we want choose a different file we must return to do "***Add***" operation.

When we had selected studied variables we will accept selection and will see next window:



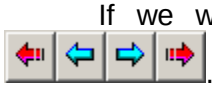

***Month energy graphic divided in day's groups***

Application, by samples and time distribution, do data suitable group (differences).

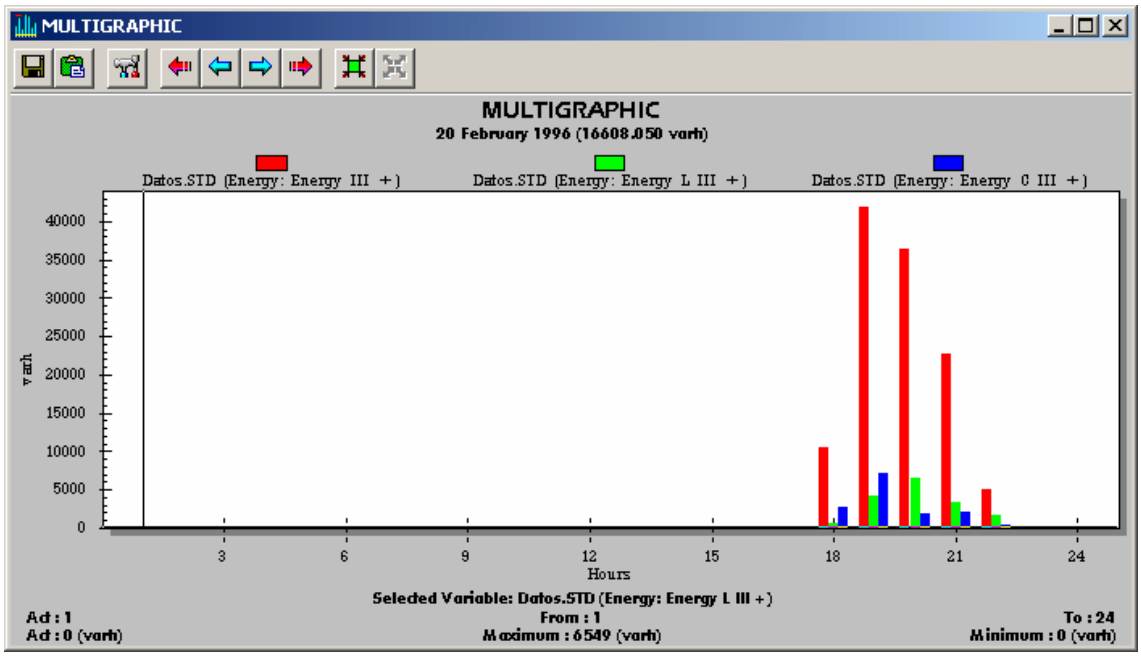
Then, in this example, program group data by days and we can see month intervals (because file contain a little data days but without to have a different data month). Program groups all variables likewise and place cursor in first calculation value of first selected variable.

We can see that always we can obtain information about placed value (value position inside group interval, value variable, selected interval margins and maximum and minimum current interval value).

We can see also current interval up (in this example 1996 February), and total quantity of consumed/generated energy.

If we want to move across intervals we can do this with the buttons  . According to selected interval we will move from month to month (in example), from day to day, etc. And we will group data by days, hours, etc.

Once program place cursor on desired interval we could change interval and group. Then, in our example, if we can see better February 20 consume/production we can do day bar double-click and we will go to lower interval (daily interval group by hours)




***Day energy graphic in hour groups***

Where we can see the same that the previous graph but with the data of a day and grouped by hours. However, we can move across the period using the moving bar (in that case day by day)

We can also return to the last interval (we will return to month group by) we can do that selecting grouping options placed in the context menu and in the toolbar ( )

***Graphic energy context menu***

If we choose this option we will be able to see greater data intervals and group by greater times. Interval and group possible combinations are this:

**Total – Year:** Is the most general. It is an interval that group data by years (yearly consumption/ production energy)

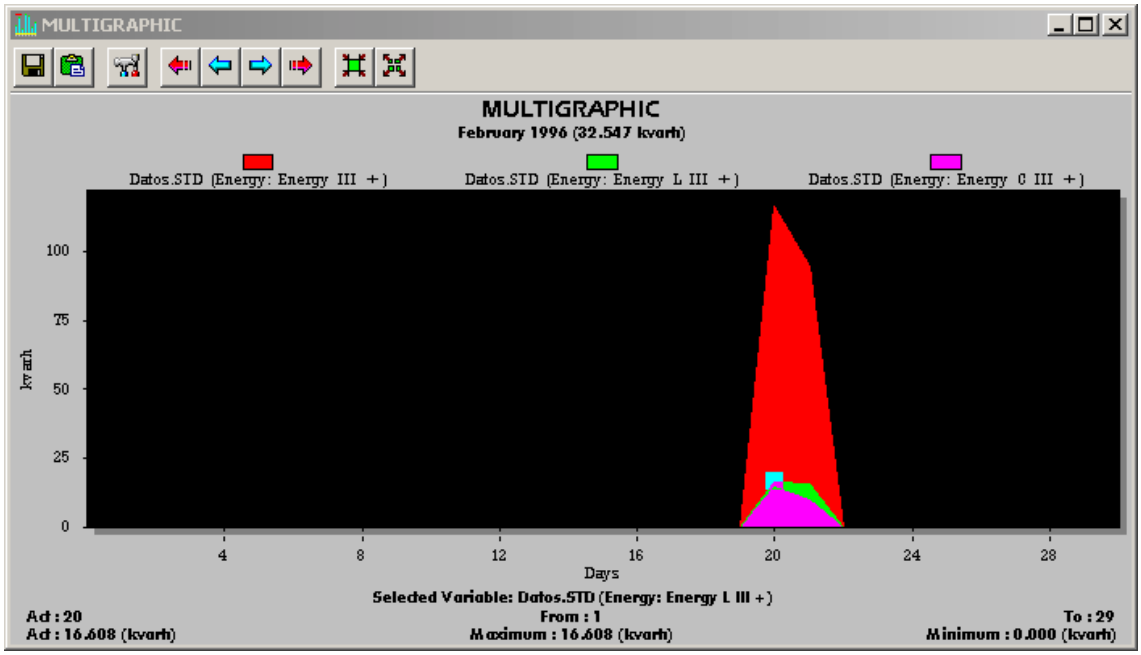
**Year – Month:** Year intervals with data group by months (monthly consumption/production energy)

**Month – Day:** Month intervals with data group by days (daily consumption/production energy)

**Day – Hour:** Daily intervals with data group by hours (consumption/production energy per hour).

It is important to remark than, like general graphics, it is possible to configure graphic appearance with “Configure” option in energy menu context. We can change title and graphic subtitle, energy units, representation type, variable color, background color, etc.

We will be able to obtain next graphic:

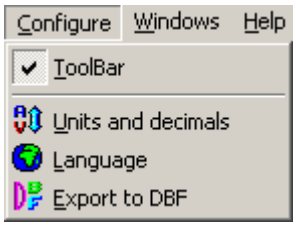



***Energy graphic***

We can also print graphic and export it (as BMP or clipboard), to include them into external studies and reports.

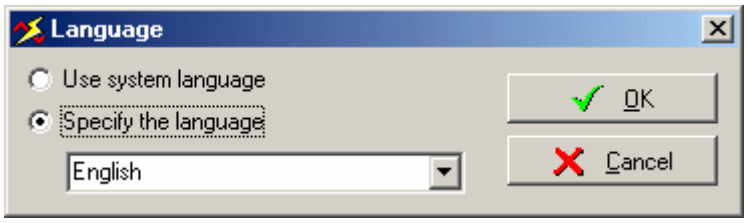
## 5.- LANGUAGE MANAGEMENT

As a default value, Power Vision tries to use the same language as the Windows system where is run. If the language is not available, then the default language is English. It's possible to configure the application to use other languages. This can be made using "***Language***" option on the "***Configure***" menu.



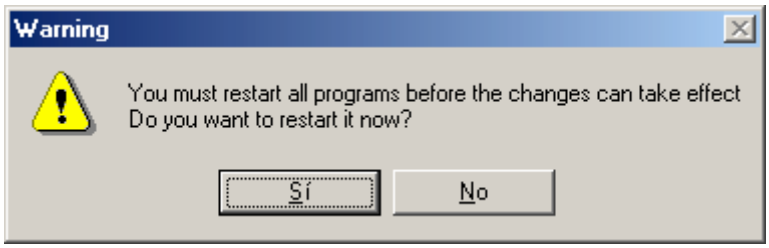

***Configure Menu***

When this option is selected, it appears the following dialog box.




***Language menu***

Once you have selected the language, the program will remember you that it is necessary to restart Power Vision to allow language changes. This dialog box allows you close program now, or to continue with your work, and change it later.



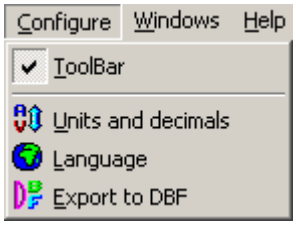

***Language change warning***

## 6.- UNITS AND DECIMALS MANAGEMENT

Power Vision allows you to configure what kind of units you want to see the variables saved in files and the decimals you want to see (**It's not the same that the device precision**). In general, you can configure if you want to see default units configuration or if you want to change it and take a personal units configuration (same with decimals).

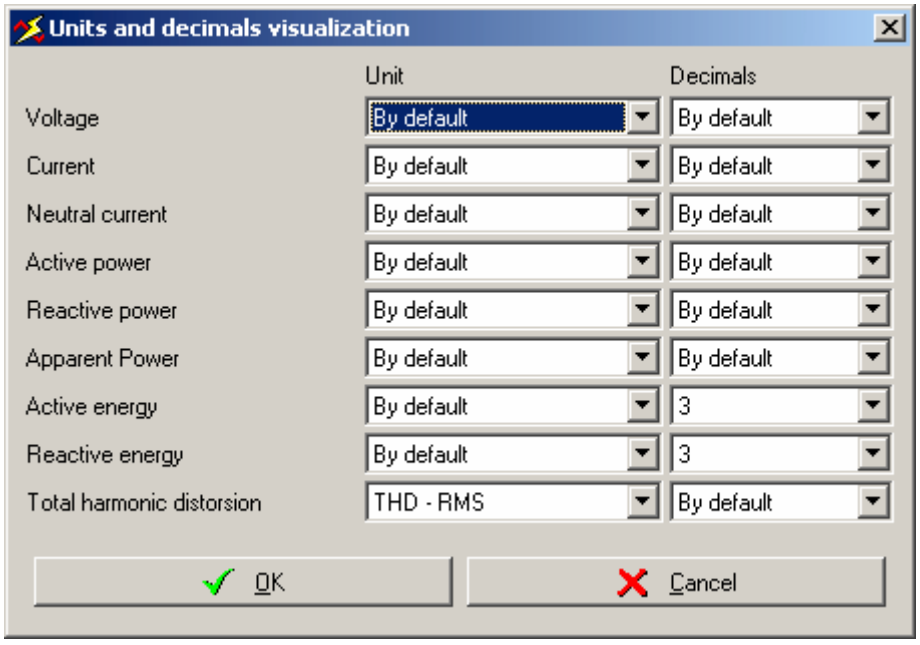
We'll be able to change voltage, current, active power, reactive power, apparent power, active energy and reactive energy.

So, if you want to accede to this option you have to select "***Units and decimals***" option inside "***Configure***" menu in main menu.




***Configuration Menu***

Next screen will appear:



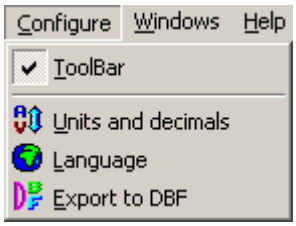

***Units configuration screen***

In this screen we will be able to change units configuration and decimals for each variable and, if you want, you will be able to keep default units and decimals configuration.

Also, we can indicate if we want to see the total distortion harmonic rate in THD (respects RMS) or d (respects to the fundamental) and which decimals we want to apply to this kind of variables.

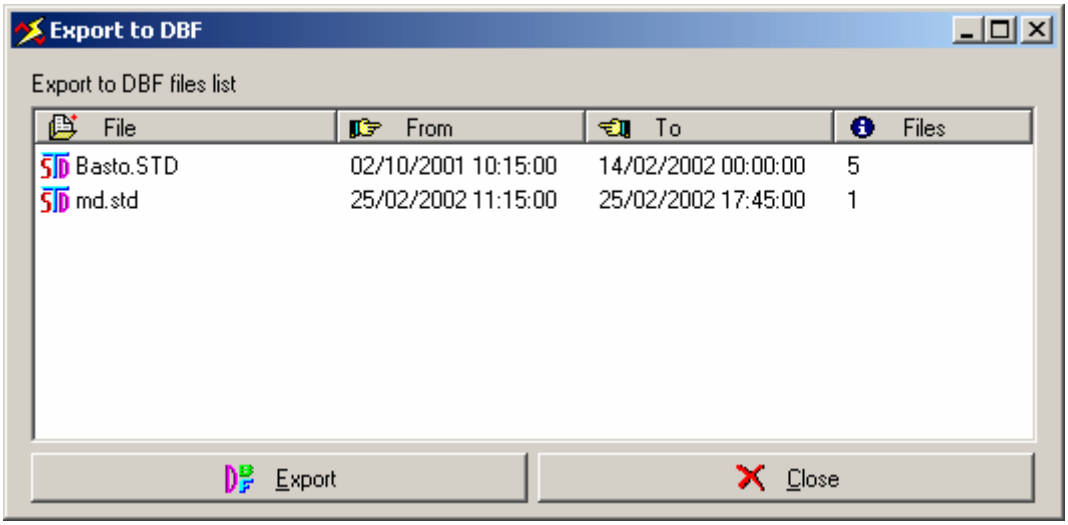
## 7.- EXPORT TO DBF

Power Vision allows you to export energy and maximum demand values to DBF file format in order to use the information in the program CirEnergy to calculate tariffs and much more. This option can be found in menu "***Configure***" of main menu ("***Export to DBF***" option)




***Configure menu***

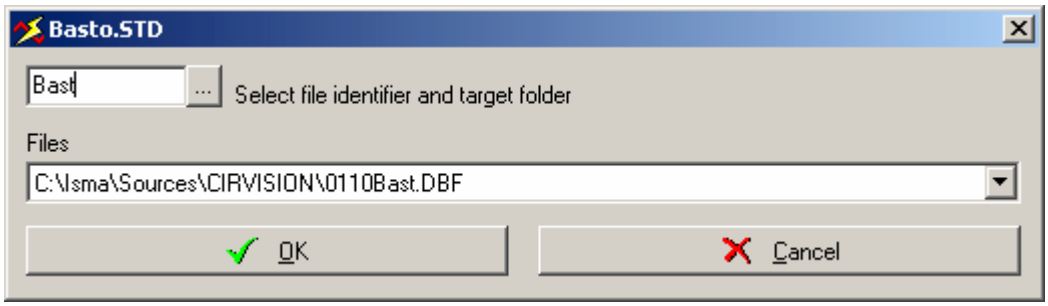
The program will search in the environment in order to find energy or maximum demant variables stored in the opened files. If something is found the next window appears:




***export to DBF main window***

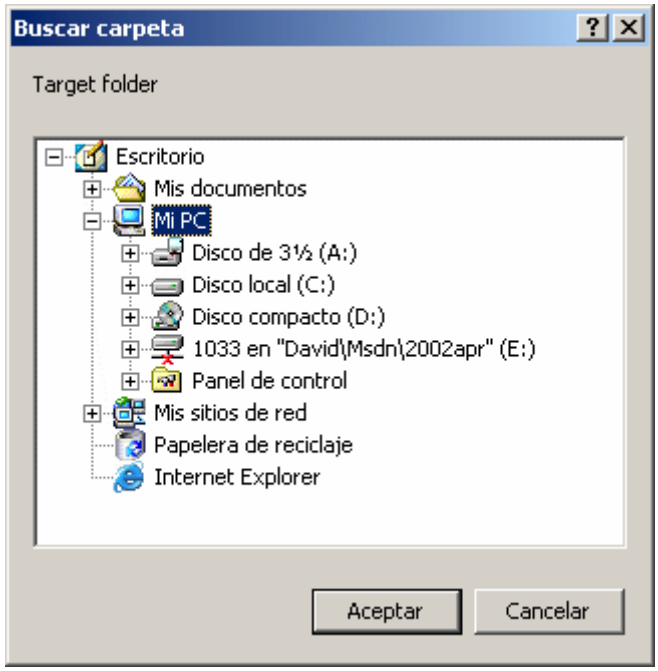
Here you can see a list with all files containing energies or maximum demands. You can also see the date / time range of each file and the number of files that we will obtain after exportation (software divide all files in months in order to maintain compatibility with CirEnergy)

You should select the file to export and click on "***Export***" button. Next window wiil appear:




***Export a file to DBF***

In this window you can choose the last four chars of the siles name to save (by default these are the first four chars of file name we are exporting) and the target folder where we will save generated files (three-points button behind indentifier) If you press this button next window will appear:



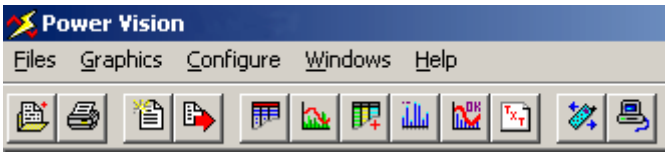

***Target folder window selection***

Once you have selected the target folder you should accept the selection. Note that you can see in the bottom combobox named "**Files**" a list with the files will be created (one file every month)

## 8.- FILE EXPORT

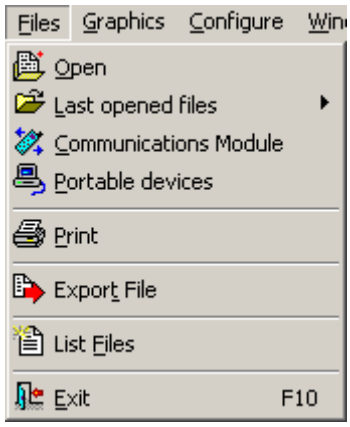
It is possible that sometimes you need to pass all numerical data to other applications. All data can be exported to text files, which are easy to be loaded with other common applications like MS Excel. To export data files follow one of these two points:

- Click with the mouse left button on the icon, which is in the top tool bar (Note that if you leave the cursor on it, it appears the "***Export file***" message).



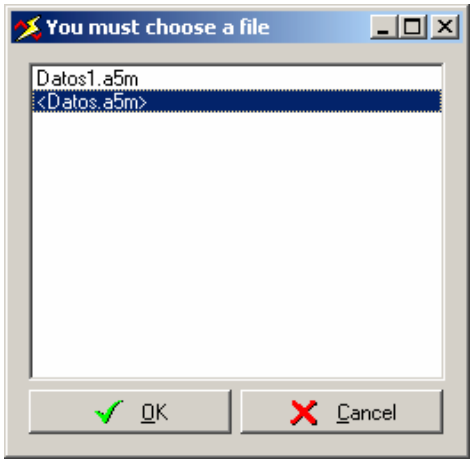

***Toolbar***

- Acceding to "***Files***" option on the menu bar and then select "***Export File***" option.



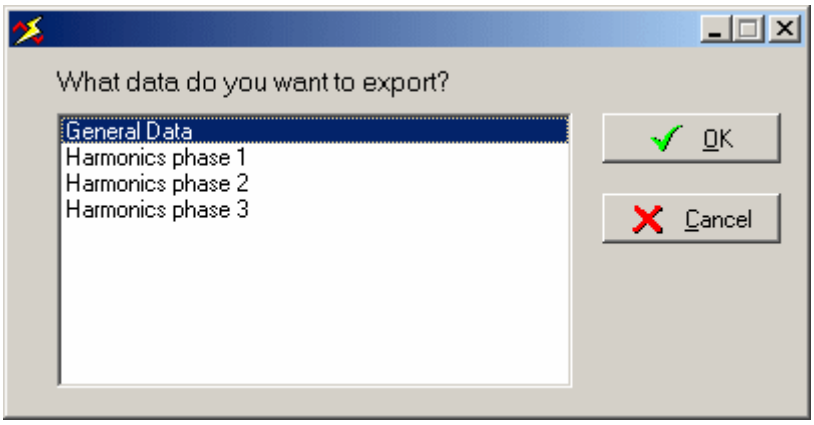

***Files menu***

Once you have done one of these two actions, it will appear a dialog box to select the file (between all opened files) to be exported.



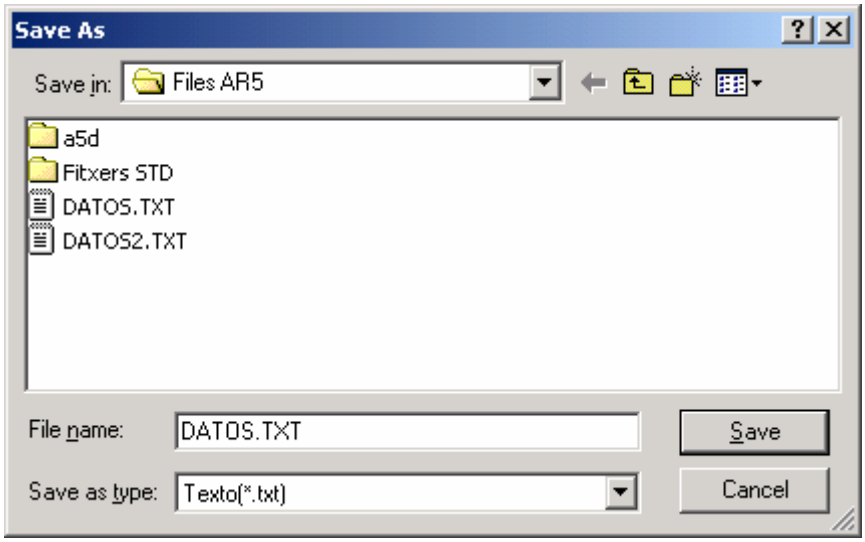

***File selection dialog box***

Once you have selected the file, it will appear another dialog box to select all data group to be exported (in this figure A5I data groups are shown).



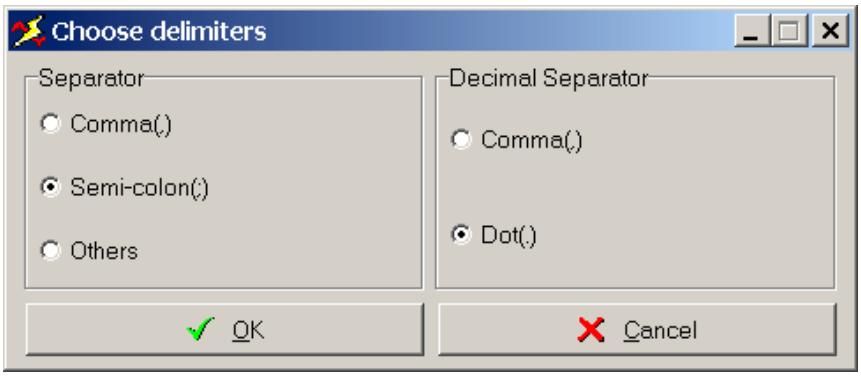

***Data group selection***

Once you have selected the data group to be exported, it will appear a standard Windows menu to save the file to disk.




***Save as Dialog box***

As a default value, the program tries to save all data files giving it the same name as the original file, with the ”TXT” extension. Then, it will appear a menu to select decimal separators and the characters to separate different values.



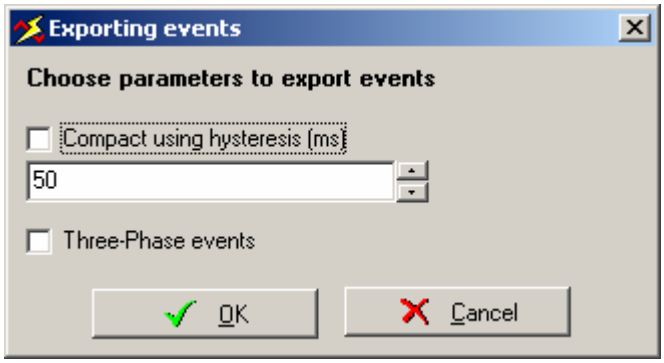

***Delimiters selection dialog box***

As the decimal separators, you can use a comma or a dot, depending on how Windows is configured. Separators have no special defined character, but cannot be any number, letter or any of the following characters:

**-  :  (  )  +  ,  .  <  >  ?  /  SPC**

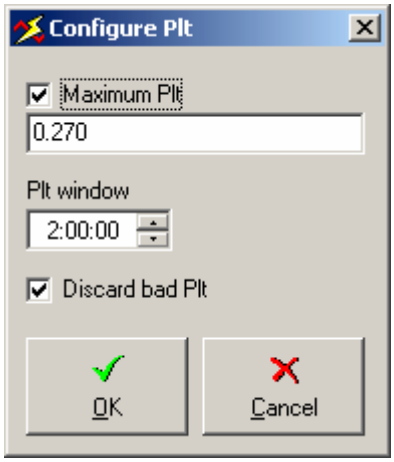
The exported file is saved in a table where all the rows are file time registers and the columns are different captured data.

***Note:*** *In quality events files (EVQ) a new window will appear in order to select some parameters regarding to certain characteristics of them (see chapter related to EVQ driver for more information)*




***Events export setup window***

***Note:*** *In some STD files you can export Plt values and, in this case, you can configure this parameter in order to decide the kind of Plt calculation. You can decide if you want to discard bad Plt (when there are events in Plt window) and what's the Plt window.*




***Plt configuration dialog***

The parameter "***Maximum Plt***" is not used in exportation (only in graphs and lists of values)

# 9.- POWER VISION FILE TYPES

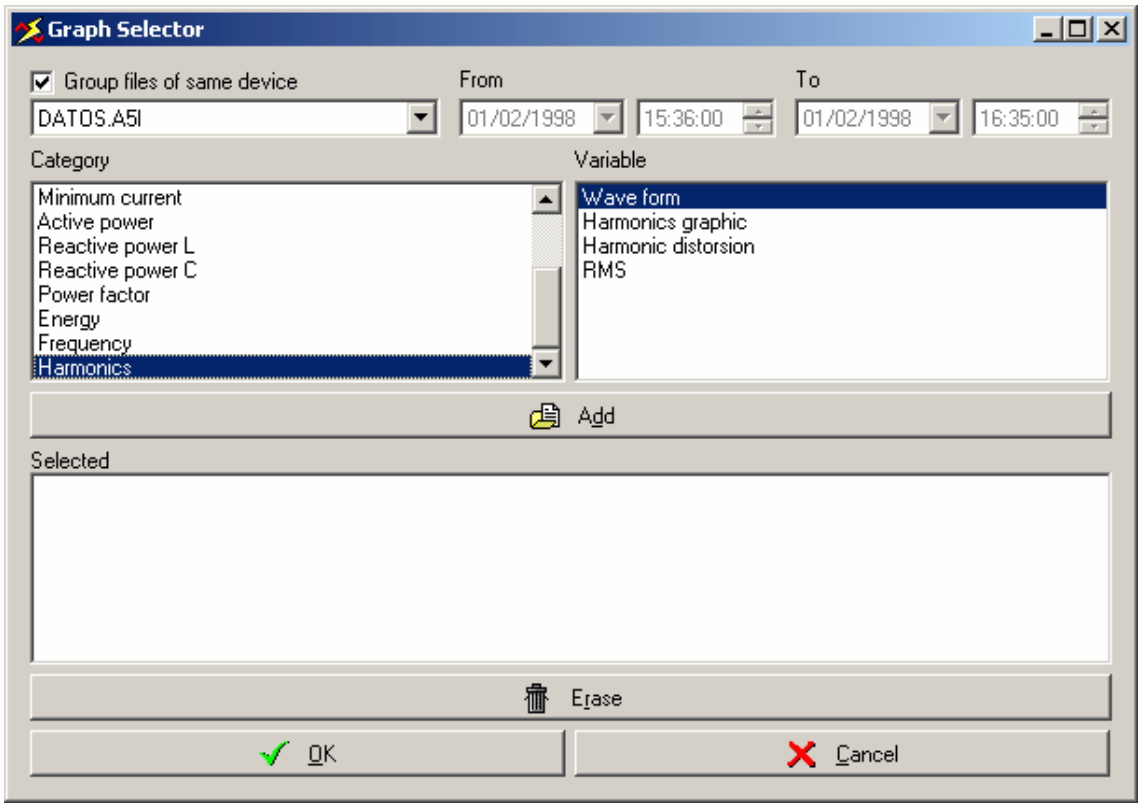
## 9.1.- A5I File

### 9.1.1.- A5I File Information

The A5I file gives user the same information as a standard A5M file but it adds harmonics information. This way, using an A5I file you will be able to display data about waveforms, harmonics, THD and RMS.

There are 2 different A5I files; ones have 30 harmonics and the other ones have 50 harmonics. These files can be configured using AR.5 set-up.

Moreover, to represent all these new data, Power Vision gives a new category with 4 variables to be represented (*Wave form*, *Bars Graphic*, *THD*, *RMS*). Each one of these graphics will be displayed on different windows.

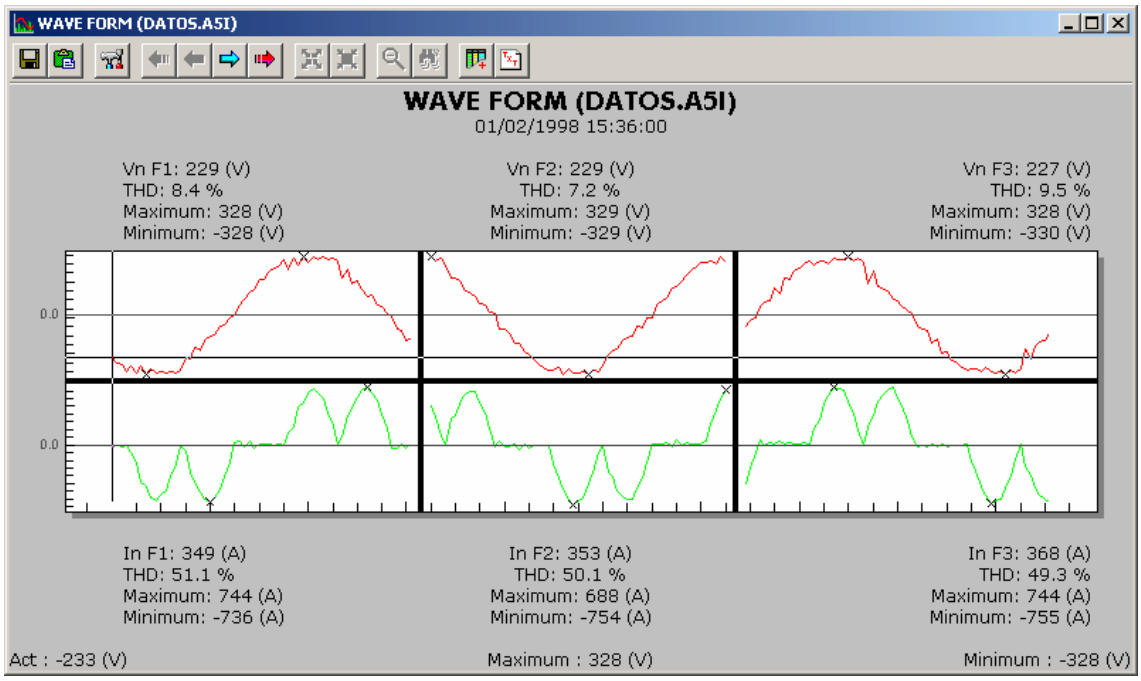



***Graph selector***

If you click on “Wave form” variable and then on the “***Add***” button, the waveform graph will be selected and the “***End***” button would be pressed, the wave form graph or the 3 phase current and voltage will be displayed.

### 9.1.1.1.- Wave from

Each phase (L1, L2 & L3) current and voltage waveforms captured with AR.5 are represented.




***Current and Voltage waveforms graph***

This graph is repeated by each sample, so we can display many registers.

As you can note, there is much new information in this graph type. First, note that the graph is divided in 6 parts corresponding to the 6 following waveforms:

| | | |
|---|---|---|
| **Phase 1 Voltage** Wave form | **Phase 2 Voltage** Wave form | **Phase 3 Voltage** Wave form |
| **Phase 1 Current** Wave form | **Phase 1 Current** Wave form | **Phase 1 Current** Wave form |

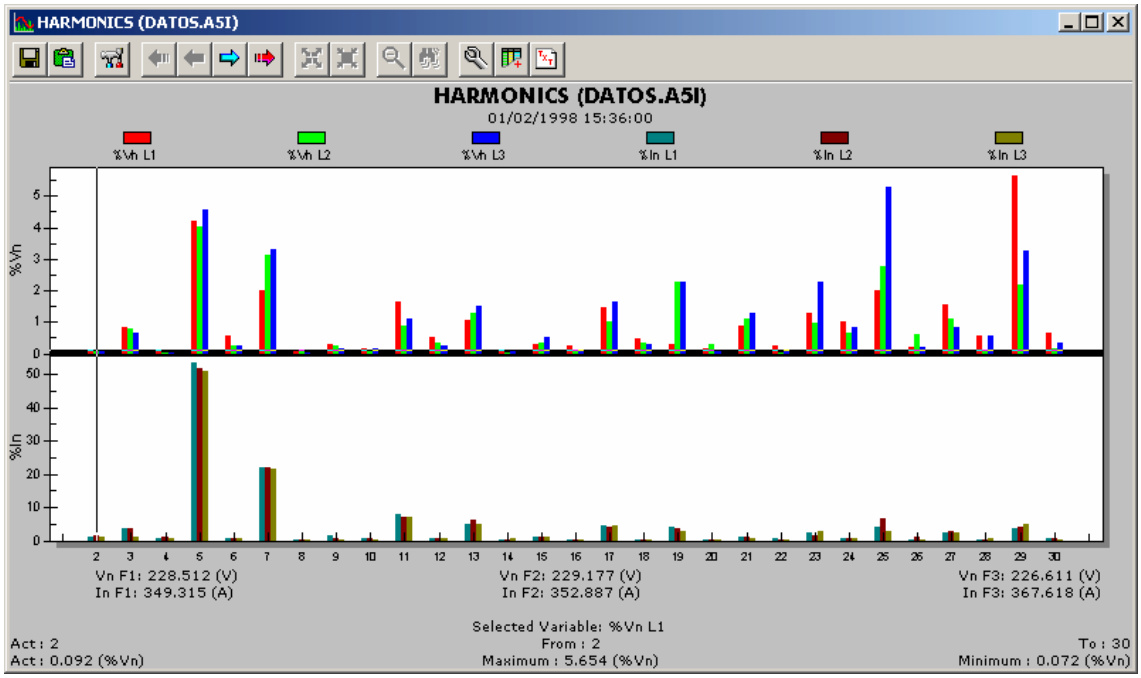
You can find the sample capturing date under the graph title.

You can display nominal voltage (Vn) and voltage harmonic distortion refereed to THD corresponding to the 3 phases over each waveform. Below the waveform you can find information about nominal current (In) and current harmonic distortion for each phase.

### 9.1.1.2.- Bar graph

This function represents graphically harmonic distortion (in %) for current and voltage.

In the following figure you can display a graph for a 30 harmonic file:



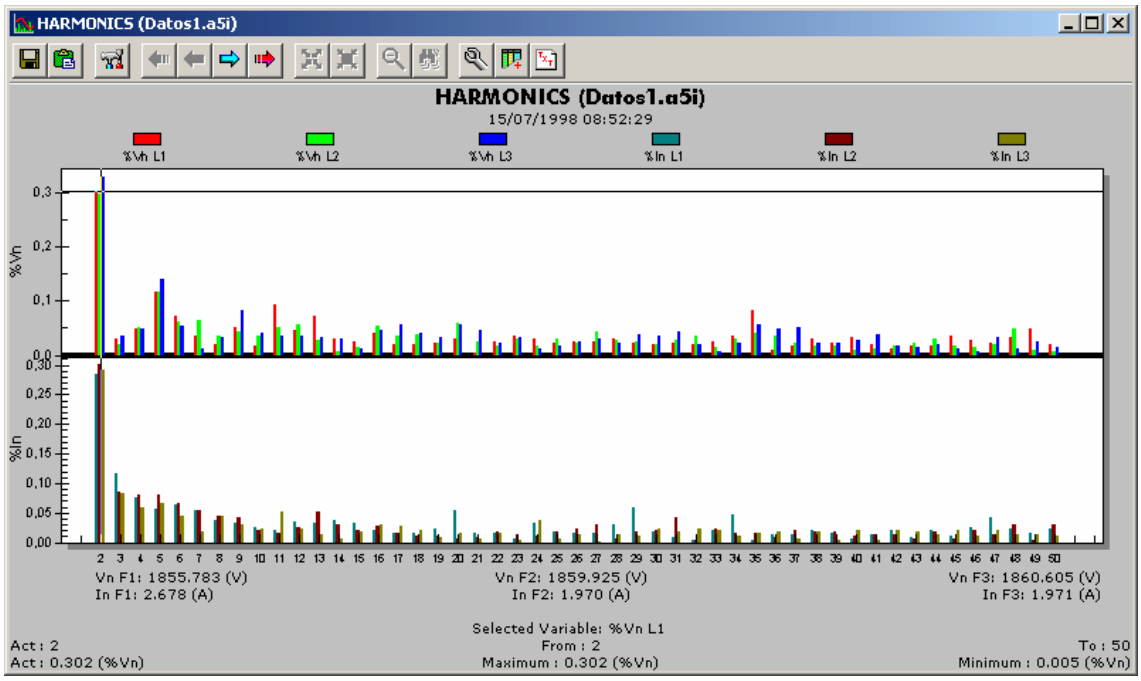

***30 harmonic bar graph representation***

When the graph is displayed, on the top part you can display 3-phase voltage harmonic distortion for the 30 harmonics. At the bottom part of the graph, you can display the 3-phase current harmonic distortion.

Below the title you can find the sample capture time (and many other registers) and below the graph you can find 2 lines which content the 3 phase nominal current and voltage. This information also appears when you represent the waveform.

On the two bottom lines you can display the information about the harmonic you have selected and the actual value for current or voltage harmonic distortion, depending on the graph you have selected. You can also display harmonic distortion maximum and minimum for each active register harmonic.

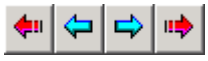
A 50 harmonic file will have the following aspect:




***50 harmonic bar graph representation***

The information you can find in the graph is the same as the 30-harmonic graph.

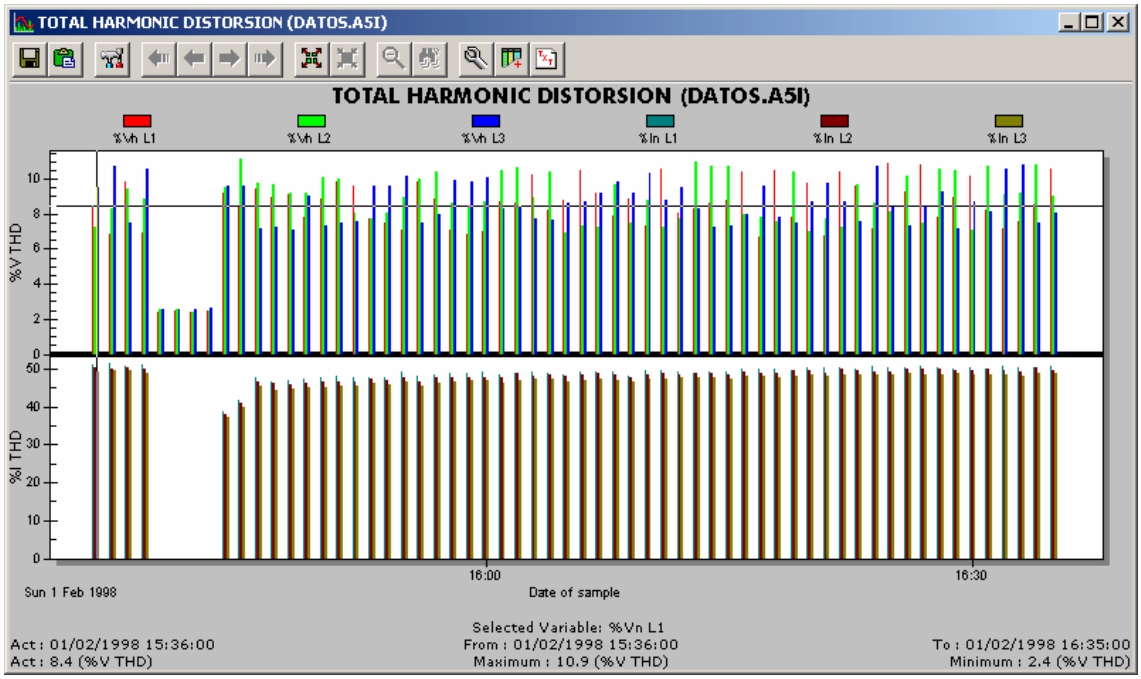
If you want to change displayed registers, you can use this buttons:



***Buttons to change the register***

### 9.1.1.3.- THD Graphic (Total harmonic distortion)

This graph displays time evolution for current and voltage THD. This allows user to display the moment of maximum THD or to observe THD medium percentage.




***THD graph representation***

You display voltage total harmonic distortions (3-pahses) on the top part and current total harmonic distortions on the bottom part of the graph.

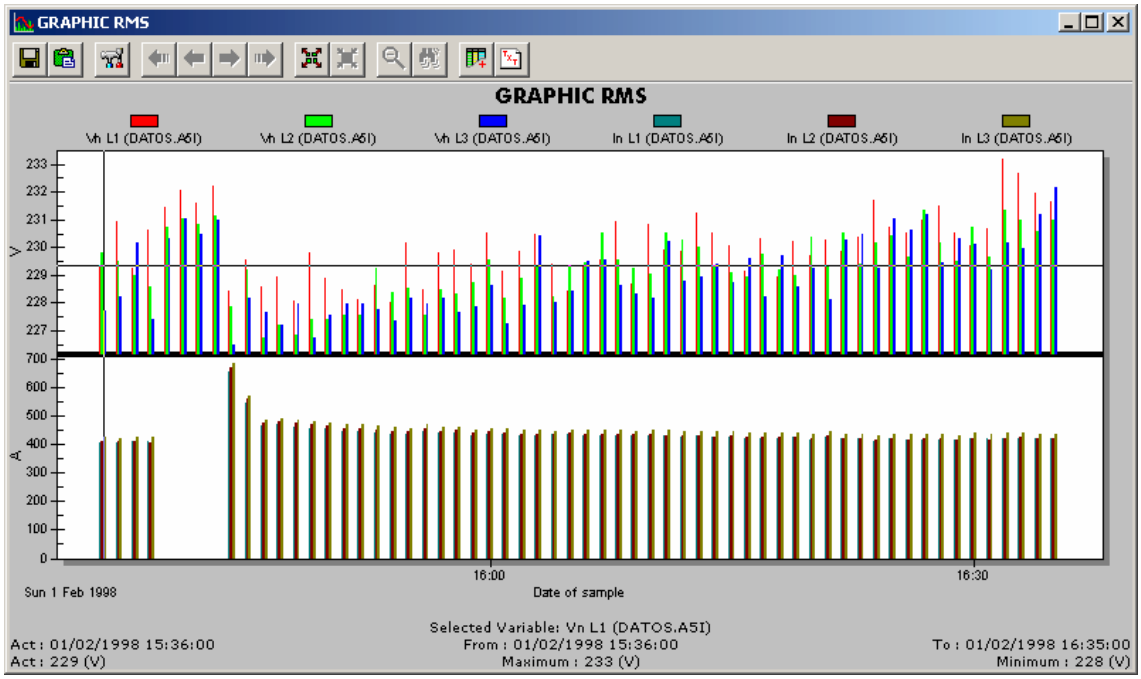
This way, we can display each moment THD for Phase1 Voltage (blue), Phase 2 Voltage (red), Phase 3 voltage (green), Phase 1 current (dark blue), Phase 2 current (brown) and Phase 3 current (light-brown color).

On the bottom part of the graph you can display active sample date (*Act: [01/02/98 15:36:00]*) and it's value (*Act: 8 (V)*). You can also display sample date range (*From: [01/02/98 15:36:00]* to*: [01/02/98 16:35:00]*), and the maximum and minimum value (*Max: 10 (V)* & *Min: 2 (V)*).

### 9.1.1.4.- RMS Graphic

Allows displaying the voltage and current RMS time evolution, calculated from stored waveforms.

The graph will have the following aspect:




***RMS graphic representation***

You can display the three RMS voltages (top part) and the three RMS currents (bottom part)

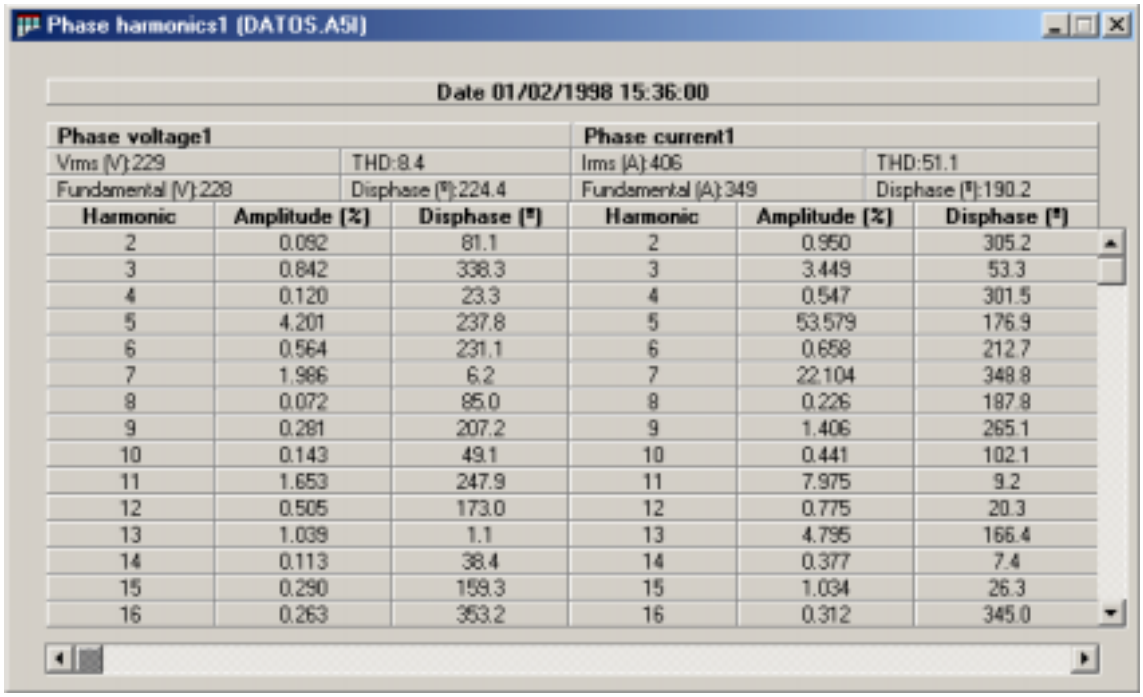
This way, you can display Phase 1 voltage RMS (blue), Phase 2 current RMS (red) and Phase 3 current RMS (green), Phase 1 current RMS (dark blue), Phase 2 current RMS (brown) and Phase 3 current RMS (light brown).

On the bottom part of the graph you can display active sample date (*Act: [01/02/98 15:36:00]*) and its value (*Act: 229 (V)*). You can also display sample date range (*From: [01/02/98 15:36:00]* to*: [01/02/98 16:35:00]*), and the maximum and minimum value (*Max: 233 (V)* & *Min: 228 (V)*).

### 9.1.1.5.- Numerical Table

You can represent three harmonic tables, one for each phase.

For example, you can find a harmonic table like this one:



Phase harmonics1 (DATOS.A5I)

Date 01/02/1998 15:36:00

| Phase voltage1 | | | Phase current1 | | |
|---|---|---|---|---|---|
| Vrms [V]:229 | THD:8.4 | | Irms [A]:406 | THD:51.1 | |
| Fundamental [V]:228 | Disphase [°]:224.4 | | Fundamental [A]:349 | Disphase [°]:190.2 | |
| **Harmonic** | **Amplitude (%)** | **Disphase (°)** | **Harmonic** | **Amplitude (%)** | **Disphase (°)** |
| 2 | 0.092 | 81.1 | 2 | 0.950 | 305.2 |
| 3 | 0.842 | 338.3 | 3 | 3.449 | 53.3 |
| 4 | 0.120 | 23.3 | 4 | 0.547 | 301.5 |
| 5 | 4.201 | 237.8 | 5 | 53.579 | 176.9 |
| 6 | 0.564 | 231.1 | 6 | 0.658 | 212.7 |
| 7 | 1.986 | 6.2 | 7 | 22.104 | 348.8 |
| 8 | 0.072 | 85.0 | 8 | 0.226 | 197.8 |
| 9 | 0.281 | 207.2 | 9 | 1.406 | 265.1 |
| 10 | 0.143 | 49.1 | 10 | 0.441 | 102.1 |
| 11 | 1.653 | 247.9 | 11 | 7.975 | 9.2 |
| 12 | 0.505 | 173.0 | 12 | 0.775 | 20.3 |
| 13 | 1.039 | 1.1 | 13 | 4.795 | 166.4 |
| 14 | 0.113 | 38.4 | 14 | 0.377 | 7.4 |
| 15 | 0.290 | 159.3 | 15 | 1.034 | 26.3 |
| 16 | 0.263 | 353.2 | 16 | 0.312 | 345.0 |

***Harmonic representation with a numerical table***

You can display all harmonic values using the vertical movement bar on the right side of the table. To display the other registers, use the horizontal movement bar at the bottom part of the table.

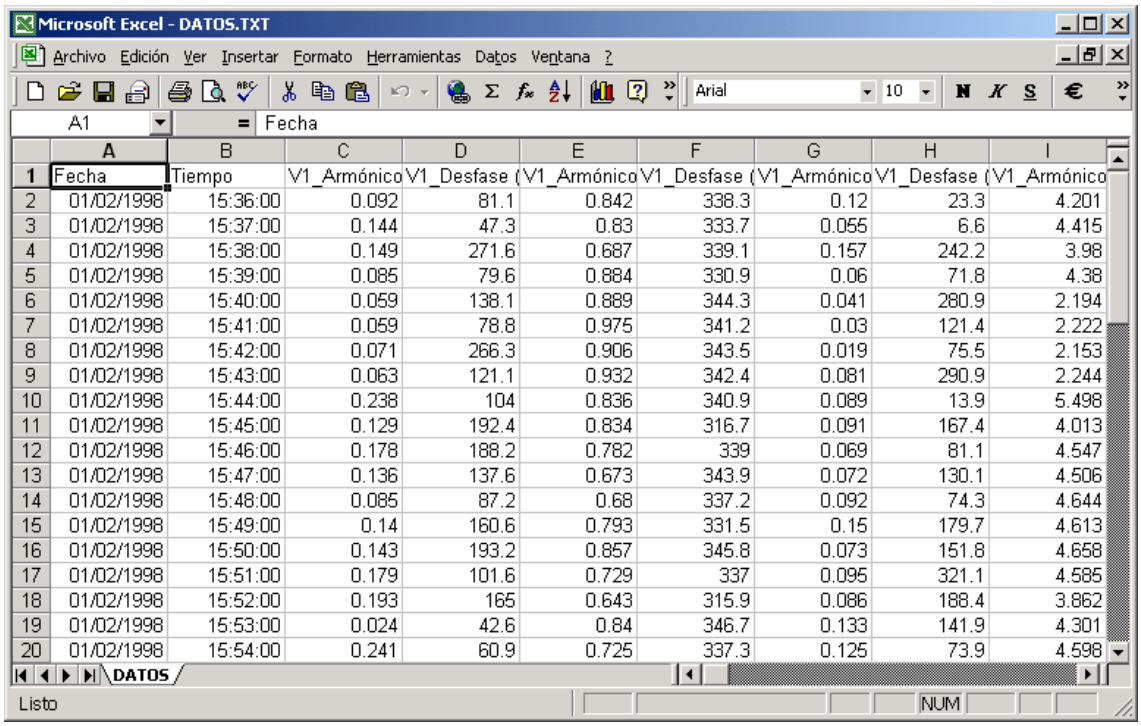
In this table you can display all *Phase 1 Voltage and Current* data (Voltages on the left side and currents on the right side). These data are RMS, and THD values, fundamental voltage value and its disphase.

For each harmonic we can display its number (starting with number 2, because 0 and 1 are not shown), its amplitude (in %) and its disphase (in degrees).

### 9.1.1.6.- File Export

To export data files, you do it in the same way as normal tables, but you will find three new data variables: Phase 1, Phase 2 and Phase 3 harmonics.

For example, the following figure shows the result of exporting a harmonics A5I data file and displaying it with MS Excel:




| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Fecha | Tiempo | V1_Armónico | V1_Desfase ( | V1_Armónico | V1_Desfase ( | V1_Armónico | V1_Desfase ( | V1_Armónico |
| 2 | 01/02/1998 | 15:36:00 | 0.092 | 81.1 | 0.842 | 338.3 | 0.12 | 23.3 | 4.201 |
| 3 | 01/02/1998 | 15:37:00 | 0.144 | 47.3 | 0.83 | 333.7 | 0.055 | 6.6 | 4.415 |
| 4 | 01/02/1998 | 15:38:00 | 0.149 | 271.6 | 0.687 | 339.1 | 0.157 | 242.2 | 3.98 |
| 5 | 01/02/1998 | 15:39:00 | 0.085 | 79.6 | 0.884 | 330.9 | 0.06 | 71.8 | 4.38 |
| 6 | 01/02/1998 | 15:40:00 | 0.059 | 138.1 | 0.889 | 344.3 | 0.041 | 280.9 | 2.194 |
| 7 | 01/02/1998 | 15:41:00 | 0.059 | 78.8 | 0.975 | 341.2 | 0.03 | 121.4 | 2.222 |
| 8 | 01/02/1998 | 15:42:00 | 0.071 | 266.3 | 0.906 | 343.5 | 0.019 | 75.5 | 2.153 |
| 9 | 01/02/1998 | 15:43:00 | 0.063 | 121.1 | 0.932 | 342.4 | 0.081 | 290.9 | 2.244 |
| 10 | 01/02/1998 | 15:44:00 | 0.238 | 104 | 0.836 | 340.9 | 0.089 | 13.9 | 5.498 |
| 11 | 01/02/1998 | 15:45:00 | 0.129 | 192.4 | 0.834 | 316.7 | 0.091 | 167.4 | 4.013 |
| 12 | 01/02/1998 | 15:46:00 | 0.178 | 188.2 | 0.782 | 339 | 0.069 | 81.1 | 4.547 |
| 13 | 01/02/1998 | 15:47:00 | 0.136 | 137.6 | 0.673 | 343.9 | 0.072 | 130.1 | 4.506 |
| 14 | 01/02/1998 | 15:48:00 | 0.085 | 87.2 | 0.68 | 337.2 | 0.092 | 74.3 | 4.644 |
| 15 | 01/02/1998 | 15:49:00 | 0.14 | 160.6 | 0.793 | 331.5 | 0.15 | 179.7 | 4.613 |
| 16 | 01/02/1998 | 15:50:00 | 0.143 | 193.2 | 0.857 | 345.8 | 0.073 | 151.8 | 4.658 |
| 17 | 01/02/1998 | 15:51:00 | 0.179 | 101.6 | 0.729 | 337 | 0.095 | 321.1 | 4.585 |
| 18 | 01/02/1998 | 15:52:00 | 0.193 | 165 | 0.643 | 315.9 | 0.086 | 188.4 | 3.862 |
| 19 | 01/02/1998 | 15:53:00 | 0.024 | 42.6 | 0.84 | 346.7 | 0.133 | 141.9 | 4.301 |
| 20 | 01/02/1998 | 15:54:00 | 0.241 | 60.9 | 0.725 | 337.3 | 0.125 | 73.9 | 4.598 |

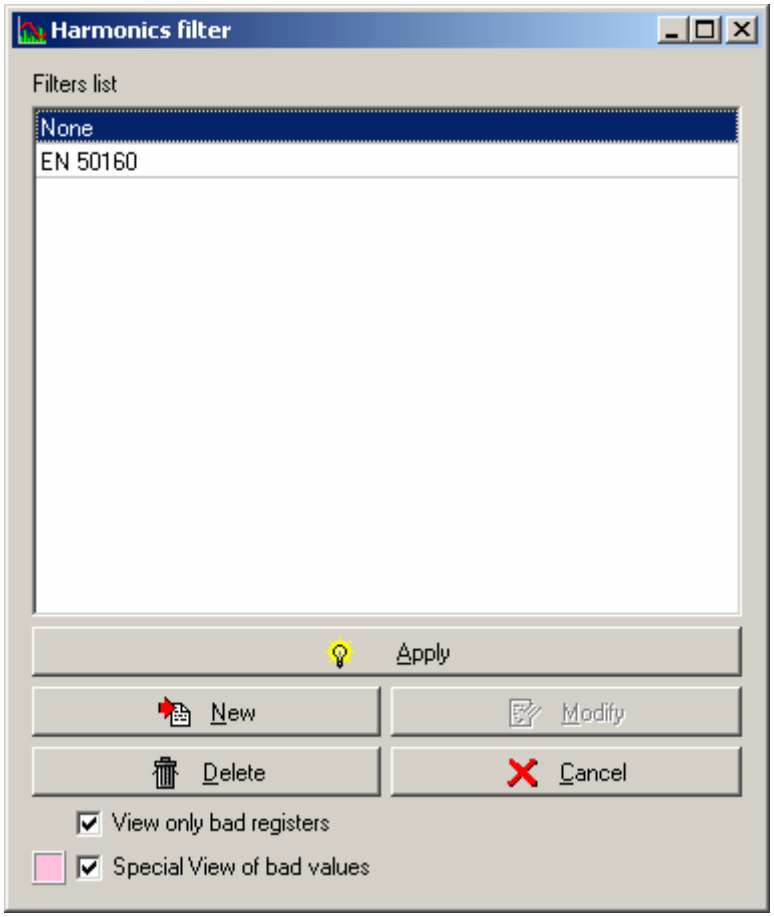
***Representing harmonics with MS Excel***

To display this table, you must export all variable data and open the exported file with MS Excel indicating that the field separator is a semi-colon.

### 9.1.1.7.- Harmonic filtering

You can apply a filter on a harmonic graph (harmonic decomposition) or on a THD graph, indicating some pre-established levels. This way, you can create new filters or modify existing ones, and them apply them to your graphs.

To accede to filter dialog box, you must display the graph context menu (clicking with the mouse right button on the graph) and then selecting "***Harmonics filter***" or with the icon on the graph tool bar. Then it will appear a dialog box with all available filters and all possible actions to do with them. This filtering option could only be applied to any *.A5I file (30 or 50 harmonics) for harmonics graph and THD.

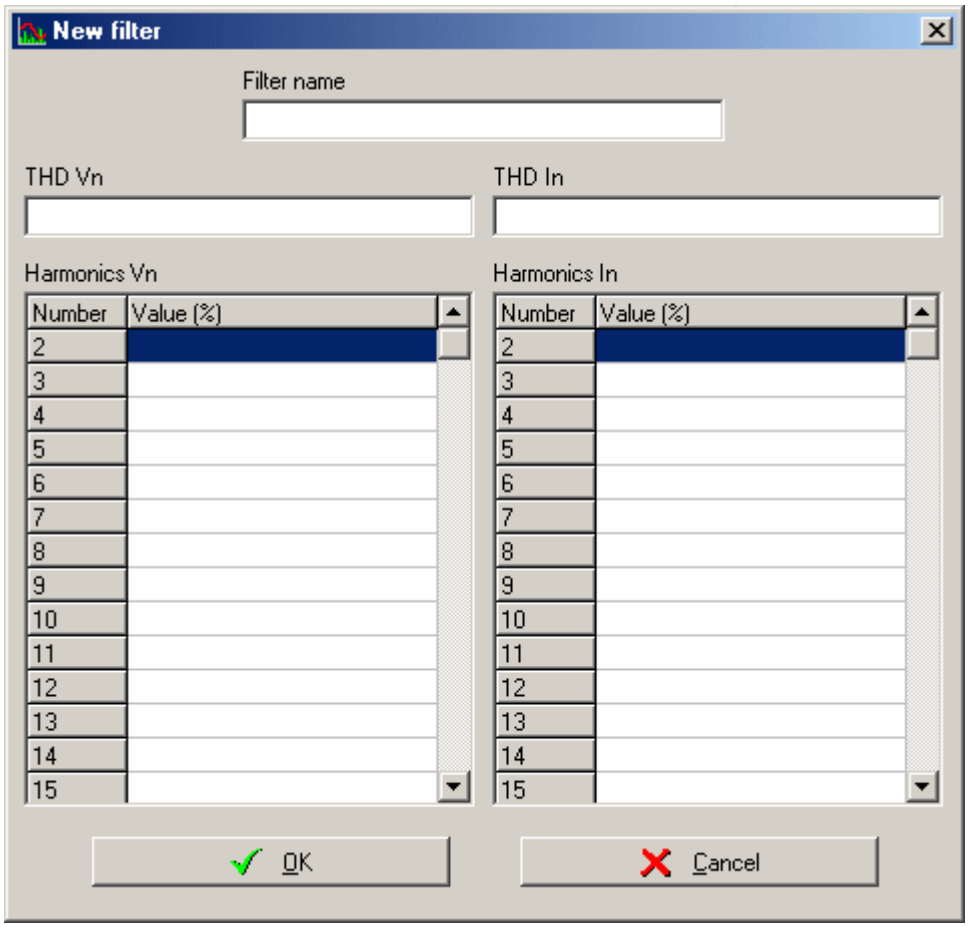



***Harmonic filtering dialog box***

Note that you can create, modify, delete or apply a filter to the graph. You will also be able to choose if you want to display all registers which are bigger than the selected filter (on the harmonics graph) and mark them with an special color (you can change it if you press on the color).

Note that the filter "None" allows you to remove any applied filter to the graph. If you have not applied any filter to the graph this will have no effect.

If you want to edit or create a filter you must click on "***New***" or "***Modify***" button, and then accede to the standard edit window:

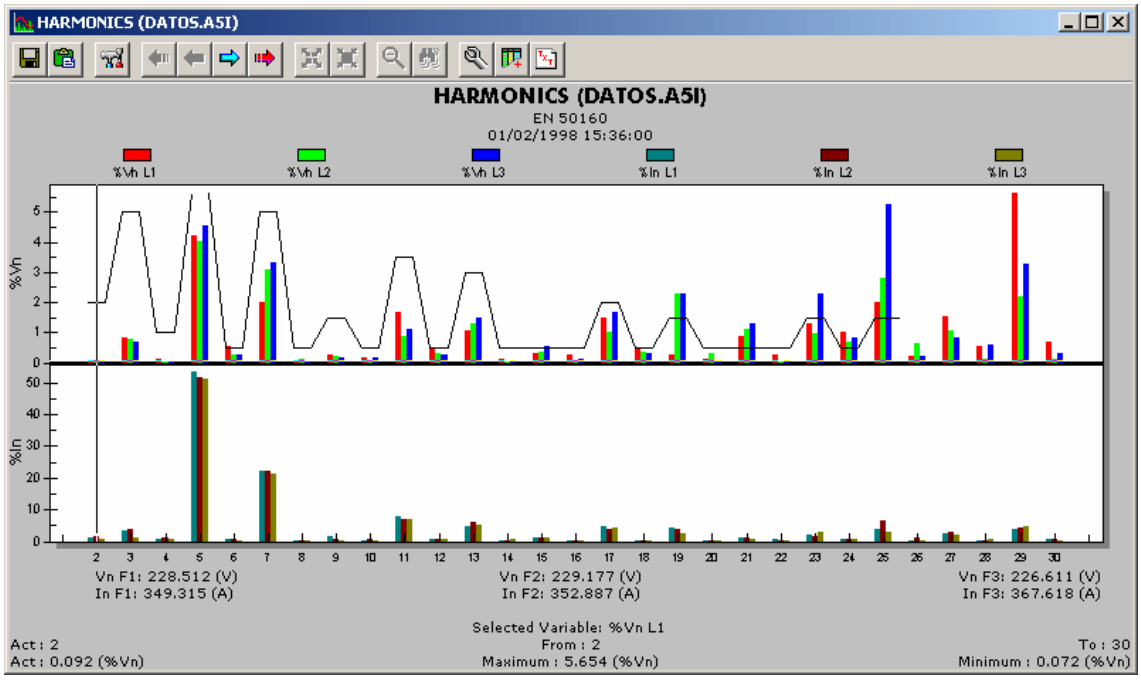



***Filter edition dialog box***

In this dialog box you can enter the file name (if you are creating a new one). **Current and voltage THD maximum values (to be applied on the THD graph) and each single harmonic maximum values for current and voltage (to be applied in a harmonic graph or bar graph only).** That is, you must differentiate between THD data values (THD Vn y THD In) for THD graph application, and each harmonic data for bar graphic application.

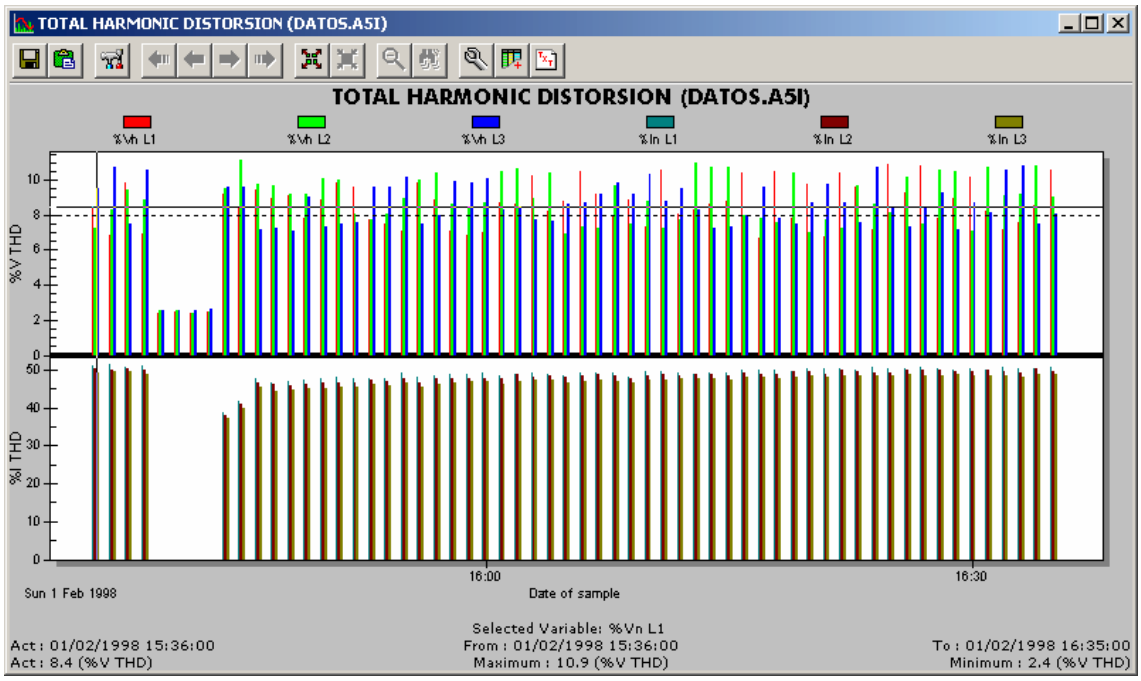
Power Vision is issued with EN 50160 filter: This filter allows you to compare the values obtained with AR.5 with the values of THD and amplitude recommended on EN 50160 standard.

- **Harmonic graphic:** When you apply a filter to a harmonic graphic you will display two continuous stepped lines (one for current and the other one for voltage). To indicate the filter form, so you will be able to display which harmonics are bigger than the filter maximum, and also display only these harmonics that contain defective harmonics.




***Filter applied to a bar graph***

- **THD Graphic:** When you apply a filter to a THD graph you will display two horizontal non-continuous lines (one for current and another one for voltage, if the filter levels have been selected). To mark maximum levels for these THD, and if you have selected the option, you may display defective values in a special color. User chooses this color clicking with the mouse left button on the color box on the window “Harmonic filtering”.




***Filter applied to a THD graph***

## 9.2.- A5F File

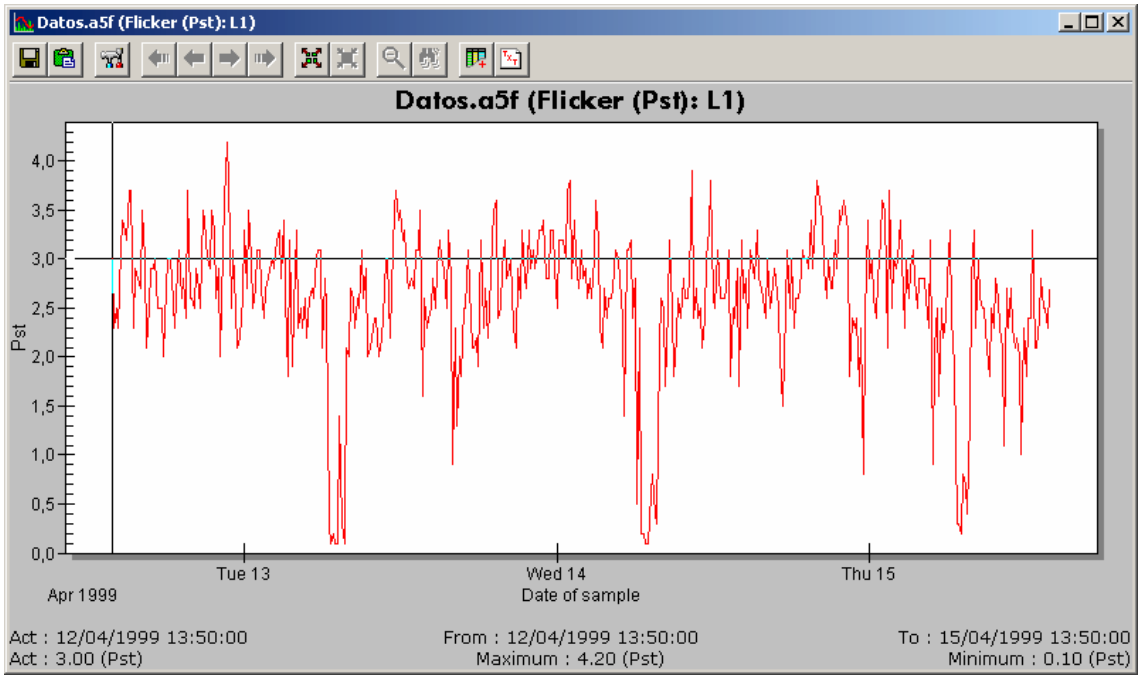
### 9.2.1.- A5F file information

A5F file is like an A5T file but it incorporates 3-phase Flicker information. This information can be displayed in a graph, or you can export it to display it in a database or a simple text editor.

#### 9.2.1.1.- Graphics

Flicker representation can be done the same way as other variables, that is, choosing Flicker category and the desired variable (Phase 1, 2 or 3). As a result you will obtain a graphic with the same characteristics as the other ones.

A Flicker graphic has the following aspect:



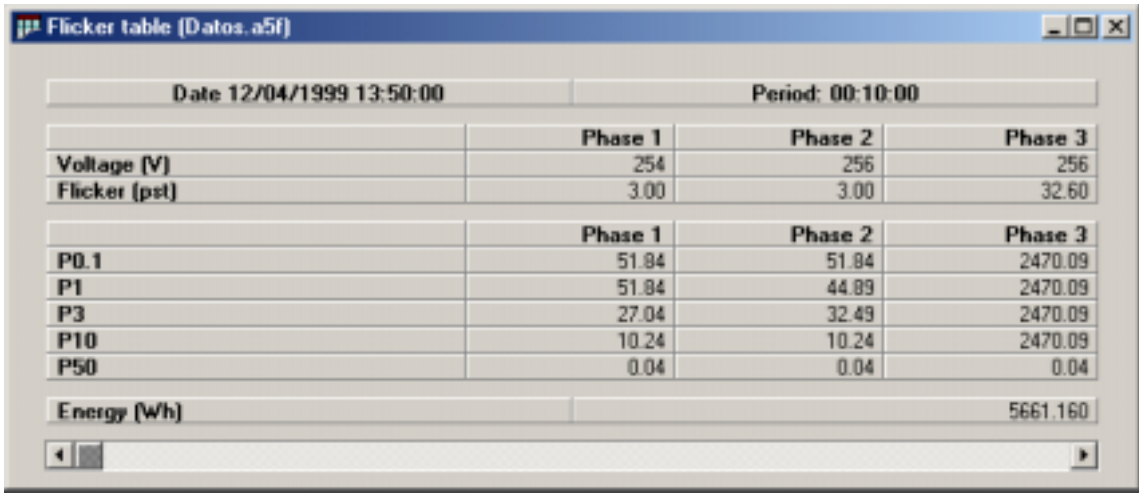

***Flicker graphic representation***

Note that this is a standard graphic, so you will be able to do all common operations to other graphics.

### 9.2.1.2.- Numerical Table

To create procedure tables you may follow the same instructions as to create any other table.

If you create a Flicker table, you may obtain something like this:




Date 12/04/1999 13:50:00 | Period: 00:10:00

| | Phase 1 | Phase 2 | Phase 3 |
|---|---|---|---|
| Voltage (V) | 254 | 256 | 256 |
| Flicker (pst) | 3.00 | 3.00 | 32.60 |

| | Phase 1 | Phase 2 | Phase 3 |
|---|---|---|---|
| P0.1 | 51.84 | 51.84 | 2470.09 |
| P1 | 51.84 | 44.89 | 2470.09 |
| P3 | 27.04 | 32.49 | 2470.09 |
| P10 | 10.24 | 10.24 | 2470.09 |
| P50 | 0.04 | 0.04 | 0.04 |

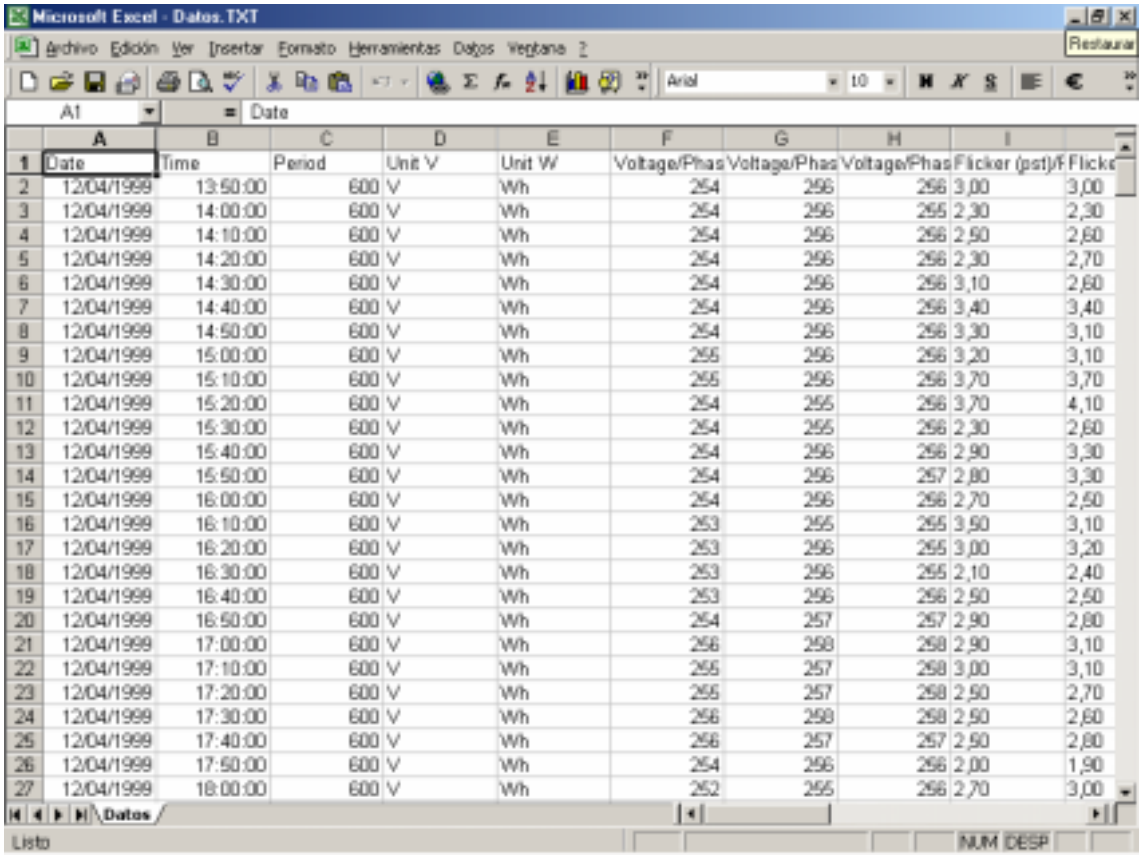
| | |
|---|---|
| Energy (Wh) | 5661.160 |

***Flicker values numerical representation***

Note that the values (**P0.1**, **P1**, **P3**, **P10** y **P50**) can also be displayed as graph.

### 9.2.1.3.- File export

To export A5F data files to text you may follow the same instructions as any other file export. (Display "***Files***" menu and then select "***Export file***" option).



Microsoft Excel - Datos.TXT

Archivo Edición Ver Insertar Formato Herramientas Datos Ventana ?

A1 = Date

| | A | B | C | D | E | F | G | H | I | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Date | Time | Period | Unit V | Unit W | Voltage/Phas | Voltage/Phas | Voltage/Phas | Flicker (pst)/F | Flicke |
| 2 | 12/04/1999 | 13:50:00 | 600 | V | Wh | 254 | 256 | 256 | 3,00 | 3,00 |
| 3 | 12/04/1999 | 14:00:00 | 600 | V | Wh | 254 | 256 | 255 | 2,30 | 2,30 |
| 4 | 12/04/1999 | 14:10:00 | 600 | V | Wh | 254 | 256 | 256 | 2,50 | 2,60 |
| 5 | 12/04/1999 | 14:20:00 | 600 | V | Wh | 254 | 256 | 256 | 2,30 | 2,70 |
| 6 | 12/04/1999 | 14:30:00 | 600 | V | Wh | 254 | 256 | 256 | 3,10 | 2,60 |
| 7 | 12/04/1999 | 14:40:00 | 600 | V | Wh | 254 | 256 | 256 | 3,40 | 3,40 |
| 8 | 12/04/1999 | 14:50:00 | 600 | V | Wh | 254 | 256 | 256 | 3,30 | 3,10 |
| 9 | 12/04/1999 | 15:00:00 | 600 | V | Wh | 255 | 256 | 256 | 3,20 | 3,10 |
| 10 | 12/04/1999 | 15:10:00 | 600 | V | Wh | 255 | 256 | 256 | 3,70 | 3,70 |
| 11 | 12/04/1999 | 15:20:00 | 600 | V | Wh | 254 | 255 | 256 | 3,70 | 4,10 |
| 12 | 12/04/1999 | 15:30:00 | 600 | V | Wh | 254 | 255 | 256 | 2,30 | 2,60 |
| 13 | 12/04/1999 | 15:40:00 | 600 | V | Wh | 254 | 256 | 256 | 2,90 | 3,30 |
| 14 | 12/04/1999 | 15:50:00 | 600 | V | Wh | 254 | 256 | 257 | 2,80 | 3,30 |
| 15 | 12/04/1999 | 16:00:00 | 600 | V | Wh | 254 | 256 | 256 | 2,70 | 2,50 |
| 16 | 12/04/1999 | 16:10:00 | 600 | V | Wh | 253 | 255 | 255 | 3,50 | 3,10 |
| 17 | 12/04/1999 | 16:20:00 | 600 | V | Wh | 253 | 256 | 255 | 3,00 | 3,20 |
| 18 | 12/04/1999 | 16:30:00 | 600 | V | Wh | 253 | 256 | 255 | 2,10 | 2,40 |
| 19 | 12/04/1999 | 16:40:00 | 600 | V | Wh | 253 | 256 | 256 | 2,50 | 2,50 |
| 20 | 12/04/1999 | 16:50:00 | 600 | V | Wh | 254 | 257 | 257 | 2,90 | 2,80 |
| 21 | 12/04/1999 | 17:00:00 | 600 | V | Wh | 256 | 258 | 258 | 2,90 | 3,10 |
| 22 | 12/04/1999 | 17:10:00 | 600 | V | Wh | 255 | 257 | 258 | 3,00 | 3,10 |
| 23 | 12/04/1999 | 17:20:00 | 600 | V | Wh | 255 | 257 | 258 | 2,50 | 2,70 |
| 24 | 12/04/1999 | 17:30:00 | 600 | V | Wh | 256 | 258 | 258 | 2,50 | 2,60 |
| 25 | 12/04/1999 | 17:40:00 | 600 | V | Wh | 256 | 257 | 257 | 2,50 | 2,80 |
| 26 | 12/04/1999 | 17:50:00 | 600 | V | Wh | 254 | 256 | 256 | 2,00 | 1,90 |
| 27 | 12/04/1999 | 18:00:00 | 600 | V | Wh | 252 | 255 | 256 | 2,70 | 3,00 |

Datos

Listo NUM DESP

***A5F file Excel representation***

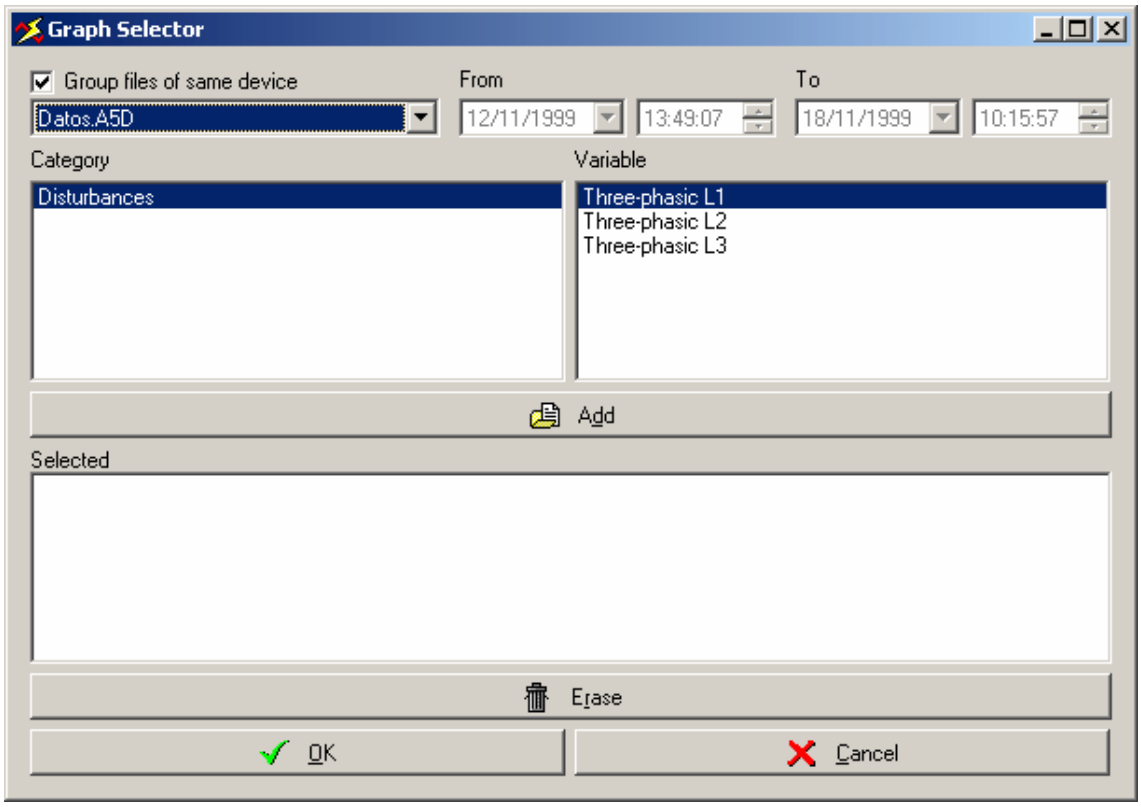
## 9.3.- A5D File

### 9.3.1.- A5D file information

This file type issues information about network possible disturbances. Basically it detects disturbances for voltage surges and notches.

In those files you can find many registers depending on the captured samples. Each sample is a voltage measure during a certain number of milliseconds, which is marked on the horizontal axis legend (X-axis).

A5D files can be used with a single phase or a three-phase measurement, and this way you would be able to display each phase in it's own graphic or all three-phase together.



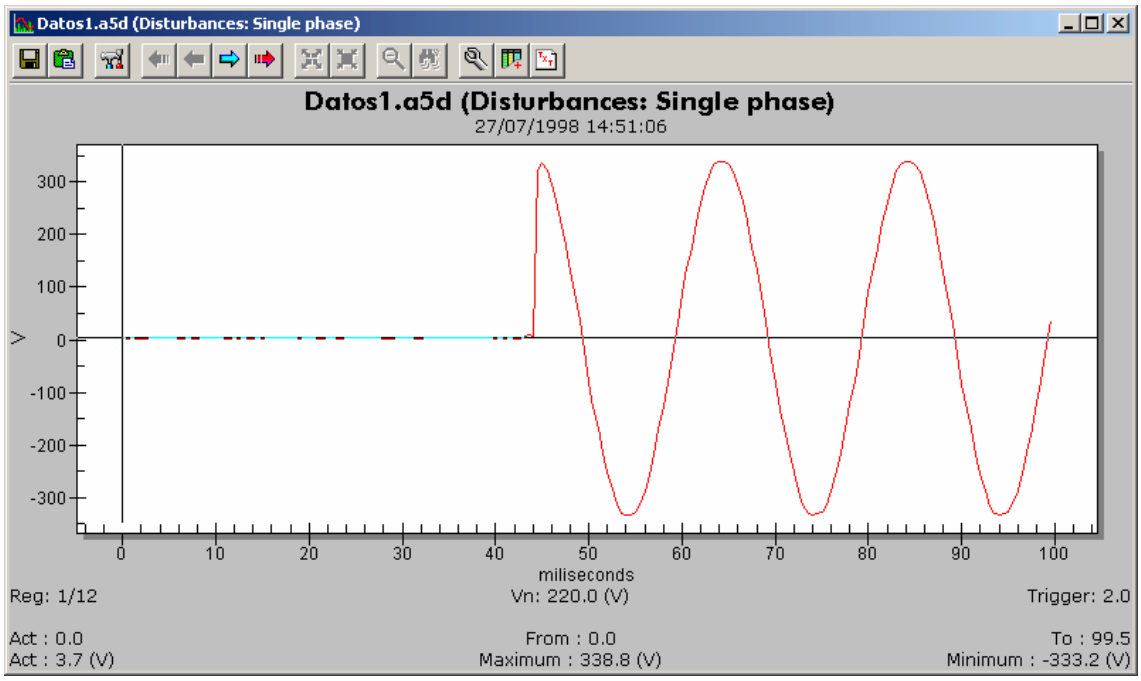

***Graphic selector***

Note that all disturbance variables must be plotted on its graph, except the representation of all three phases together.

#### 9.3.1.1.- Graphics

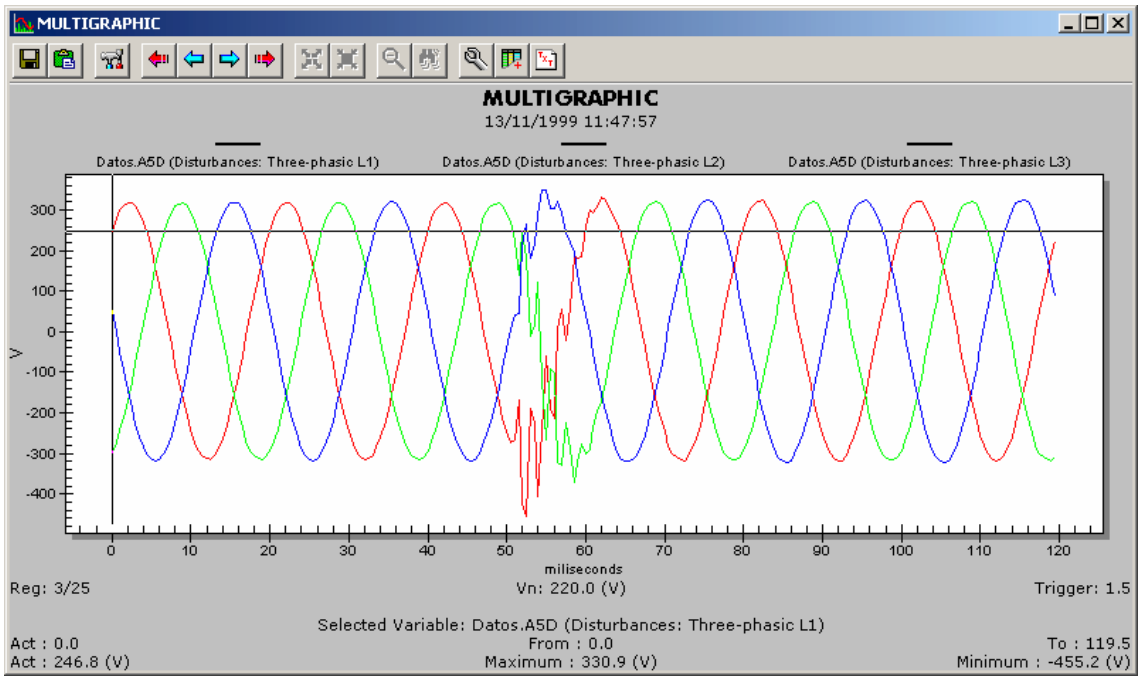
These graphics represent electrical network disturbance data values captured by AR.5 network analyzer. In the graph we display a single register only, but using the horizontal movement bar we can display all the registers.

Here is an example of a single-phase register graphic (or one phase only):




***Plot of a single-phase register***

Plot of all three-phases together:




***Plot of a three-phase register***

As additional information, note that under the title it appears the date when the sample was captured, and at the bottom par of the graph, it appears a line with all this information:

- On the left side, actual register and total number of registers
- On the middle you can find the nominal voltage
- On the right side you find the Trigger.

### 9.3.1.2.- File Export

A Disturbances file cannot be exported as a text file and cannot be represented in a table. If you try to make a table with an A5D file you will find a message like this:

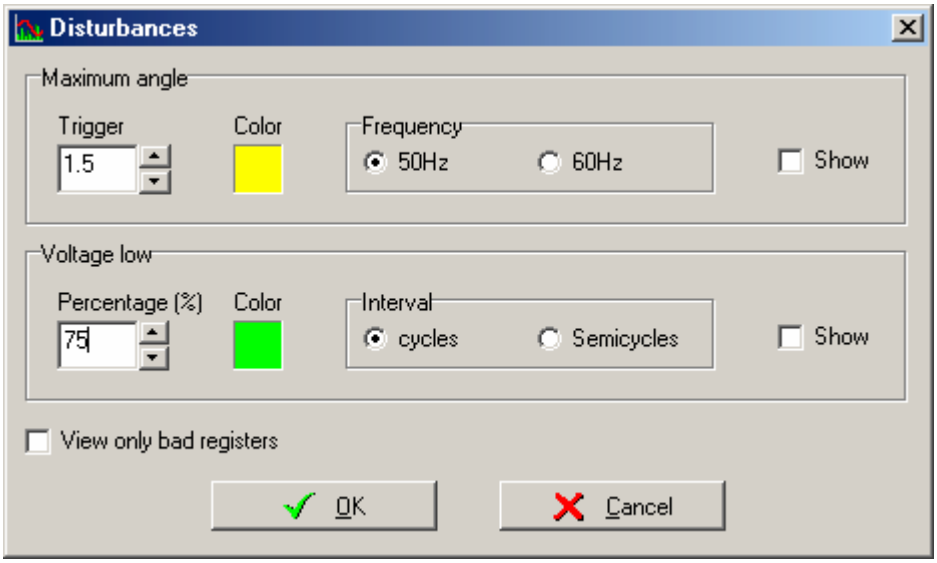
***Error Message***

### 9.3.2.- Disturbances filter

Power Vision allows you to filter all data form an A5D file using the maximum Trigger and the voltage sags.

This analyzing tool, allows you to distinguish all the voltage surges and sags.

To apply this filtering tool, click on the graph with the mouse right button and it will appear the graph context menu. Once the menu is deployed, click on the "***Disturbances filter***" (or press 'D' key) option or press this button in tool bar, and it will appear this dialog box:




***Disturbances filtering dialog box***

As you can observe, this dialog box is divided in two parts. The top part allows filtering the graph by a maximum Trigger, and the bottom part allows filtering by voltage sags.

If you mark "***Show***" on the maximum Trigger zone, program will color these zones that exceed maximum allowed voltage Trigger. You must indicate if the measure is with a 50 Hz or a 60 Hz wave, to allow Power Vision to do all operations correctly.

If you mark "***Show***" on the voltage sags zone, program will color these zones bigger than a cycle or a semicircle (depending on selection) where there are voltage sags, that is, voltage is under a nominal % that user indicates.

Finally, you can indicate to program to hide the correct values marking the "***View only bad registers***" option.

Once you have configured all your filter options, click on the "***Ok***" button to apply your filter to the graphic.

## 9.4.- Check-Meter File

### 9.4.1.- ACM File Information

ACM files contain information about light meters measurements, so you can find on them information about the energy measured by the meter, transformation relationships, the capture date, the policy, etc.

ACM files only allow doing data tables. It is not possible to do any graphic with them.

### 9.4.2.- Tables

To display ACM file contains, you must plot a table. To plot a table you must choose the "***Table***" option in "***Graphics***" menu, or you must click with the mouse left button on the icon on the icon bar.

Then, it will appear a dialog box, to choose the file (in this case an ACM file) and then another dialog box with three possible options:

**1. –** Sort by date
**2. –** Sort by policy
**3. –** Sort by user name

Data will be sorted depending on what you have chosen.

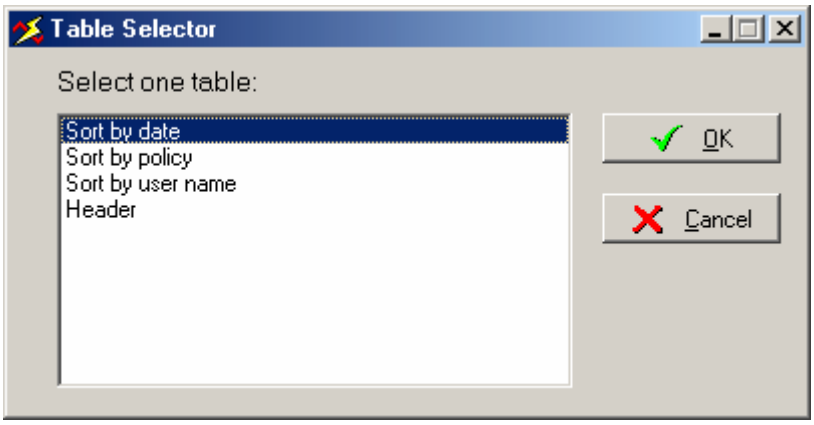
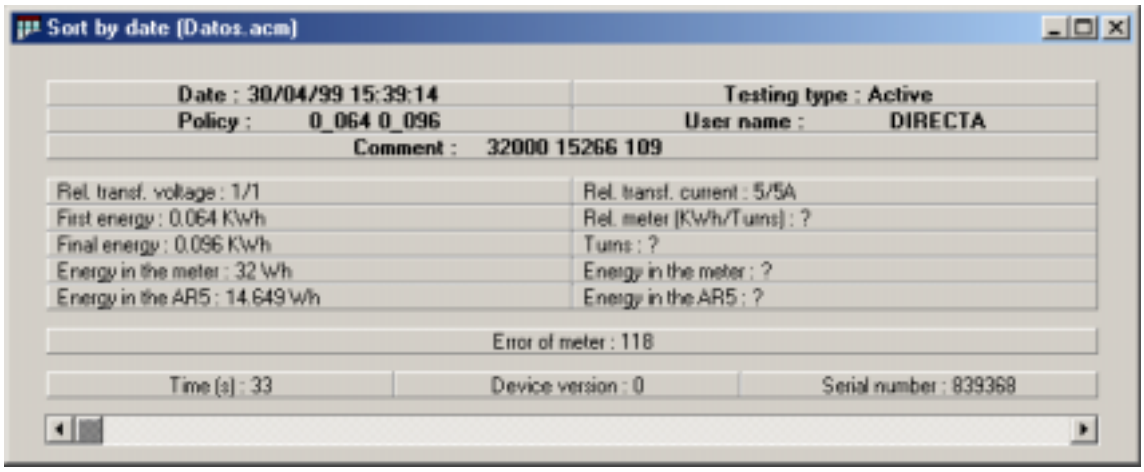



***Table selection dialog box***

Finally, you will display all data, in a table like the following:




***ACM file table sorted by date***

These tables support all tables operations, like printing, exportation to a BMP format or to be copied to the clipboard.

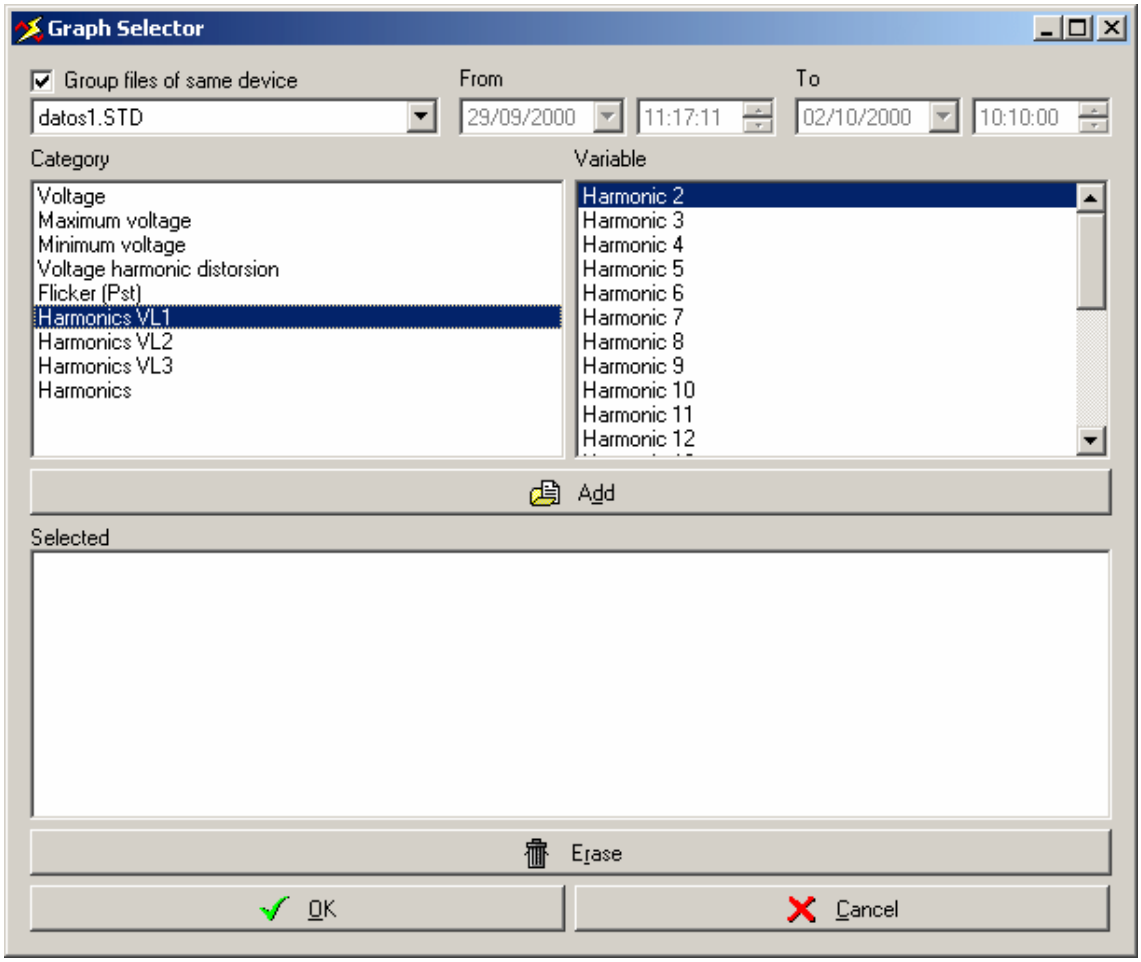
## 9.5.- STD File

### 9.5.1.- STD File Information

STD files issue general information about different electrical parameters as voltage, current, energy, Power, Power factor, etc. Due to its high quality data management, this file type will be a standard in electrical files generation. Nowadays, QNA, CPL, CVM-Q, CVM-COM, CVM-BDM-1M and AR5-L equipment generate these files, but in the future, more equipment will take this file type to save data on the PC.

As it's said, this file issue many parameters contained in other file types, but you can also find new data on them, refereed to quality or production values. To manage all data contained in this file, you must proceed the same as with other file variables, so you will be able to do graphs, tables, prints, exportations, etc.

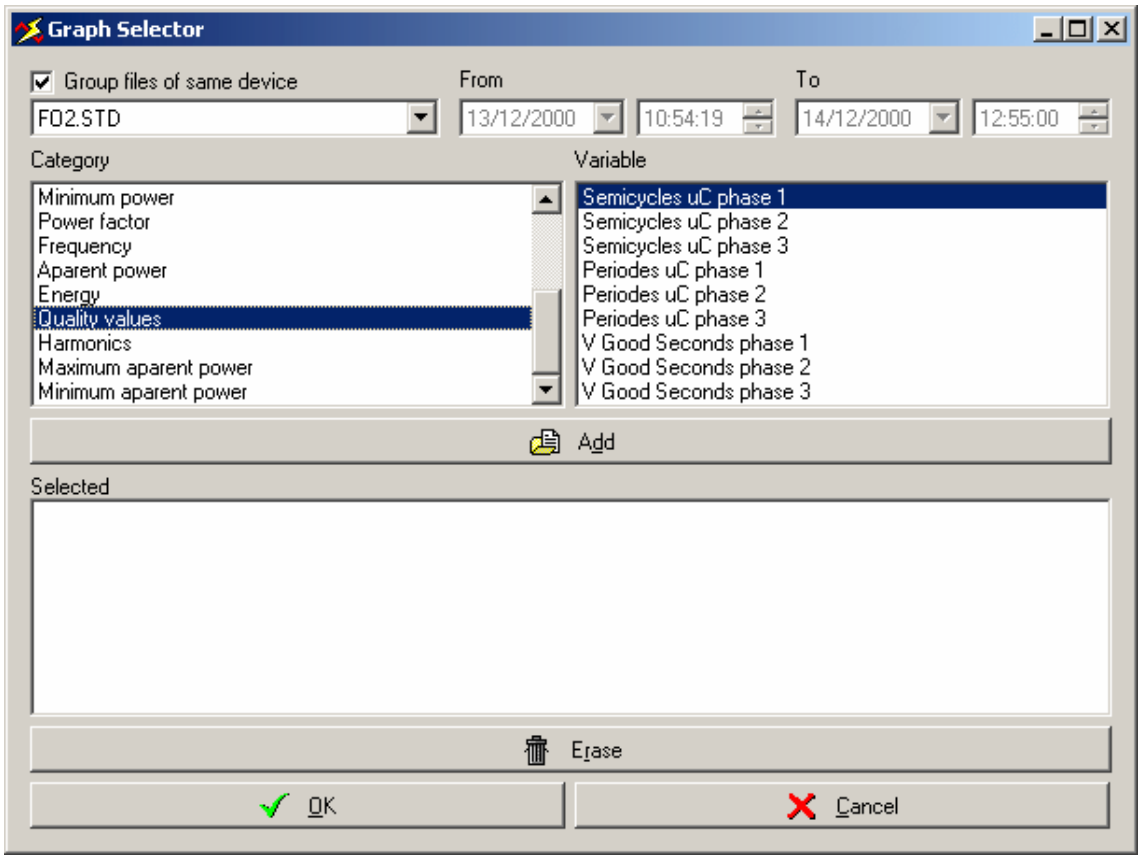
Some types of this STD files have harmonic variables, wave forms, THD and RMS. In this case, we can use all functions we have explained in A5I file. We can also find variables obtained of CVM-COM as different quote energies, maximum demand, DC, ... For each variable, we'll be able to make tables, and graphs (we can do energy study, too) Probably, due to its design, this file will issue in the future more tables and graphs. The QNA 303 group of variables would be the next:




***STD variables generated in a QNA 303***

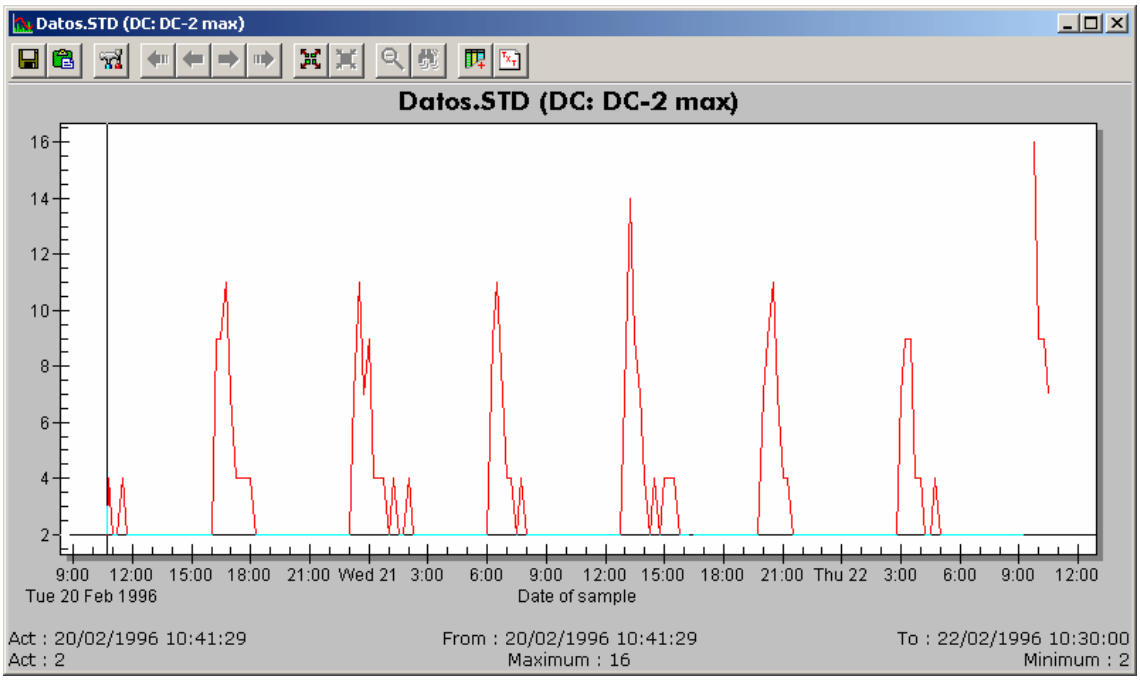
Where you can see how we have the opportunity to study the Flicker, the harmonics, the voltage and the THD. It's interesting to see how we can realize individual harmonic graphs and THD graphs in this file (you can't do it with A5I files).

Elsewhere, we can find STD files that will give us other variables (we already know them) as wave form or RMS (for example, some types of QNA 202 variables) and new variables which have a relationship with quality network studies which program have calculated as we can see in the following file:




***Quality variables which device has calculated***

The STD files of a CVM-COM can contain variables with DC values (analogical inputs) that will issue us new tables and graphs.




***Maximum analogical input graph 2 of a CVM-COM***

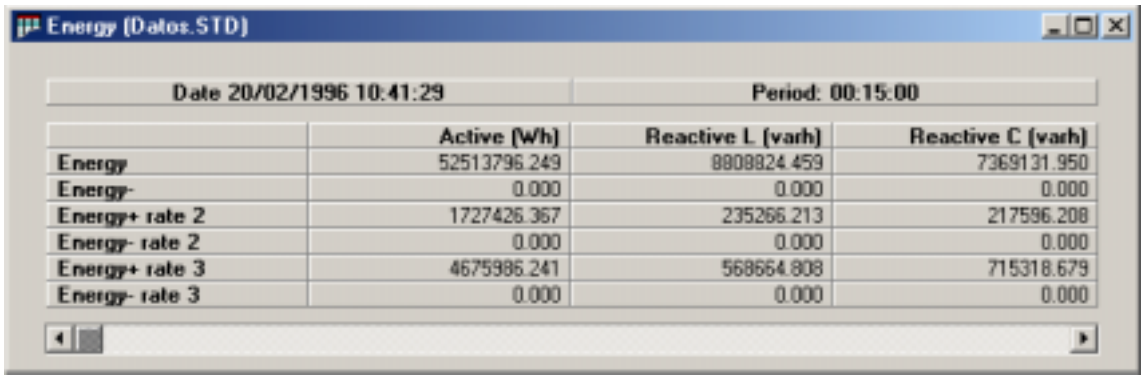
We can also find maximum demand values that will allow us to do tables like the following:

Maximum demand (MaximaDemanda.STD)

| Date | Rate 1, Active Power (W) | Rate 2, Active Power (W) | Rate 3, Active Power (W) |
|---|---|---|---|
| 17/12/2000 14:11:12 | 65367 | | |
| 17/12/2000 02:19:48 | | 65274 | |
| 17/12/2000 23:36:23 | | | 64810 |
| 18/12/2000 03:01:04 | 65367 | | |
| 18/12/2000 00:20:16 | | 65088 | |
| 18/12/2000 22:54:59 | | | 64717 |
| 19/12/2000 03:05:42 | 64532 | | |
| 19/12/2000 00:46:02 | | 64346 | |
| 19/12/2000 23:49:31 | | | 63698 |
| 20/12/2000 05:06:42 | 64346 | | |
| 20/12/2000 01:15:33 | | 63883 | |
| 20/12/2000 21:50:21 | | | 63420 |

***Maximum demand table***

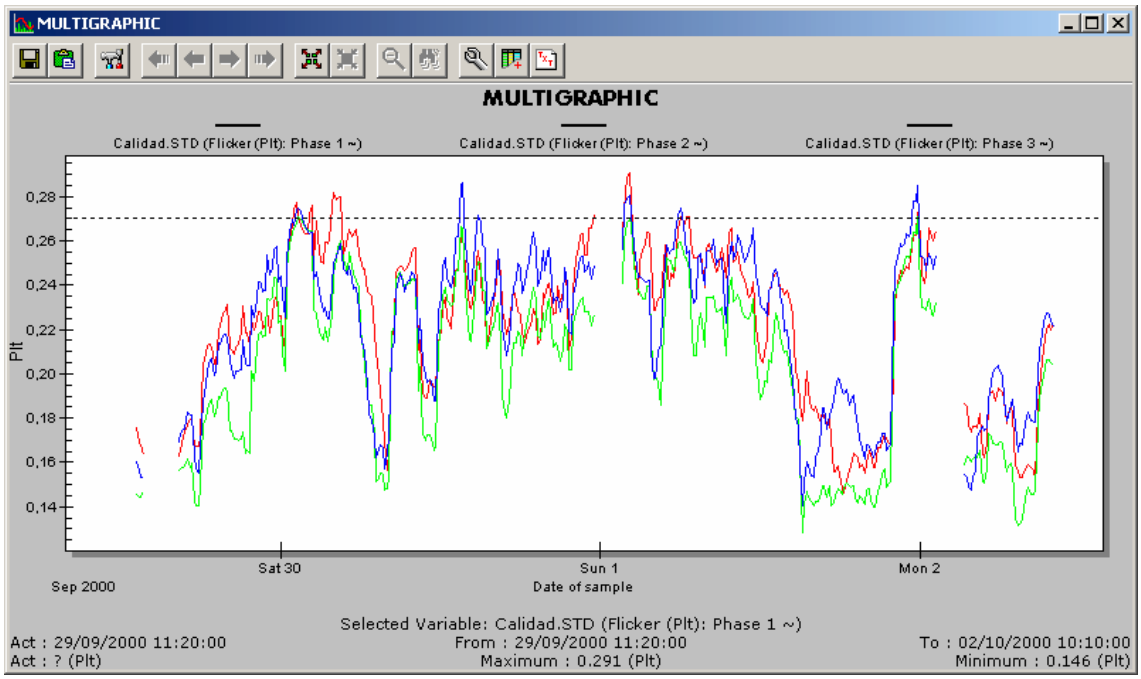
We can also find energies about three different bills, that we can do tables and graphs.




***Energy table about three different bills***

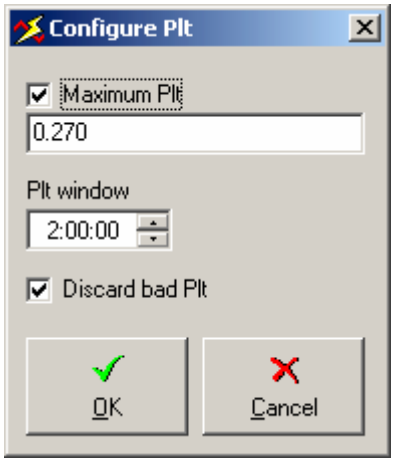
You can also found unbalance variables like Kd and Ka. You can make graphs, lists and quality studies with them and also export to txt.

In some STD files you can also found Plt variables. You can make graphs and lists always in a separated window (like power factor). So, in graphics you will be able to see something like this:




***Plt graph of the three phases at time***

These graphs (or the equivalent lists) can be configured using the button. The next window will appear:




***Plt configuration dialog***

Throught this dialog you can choose a limit for the Plt (representing in the graphs by an horizontal dotted line and in the lists by asterisks showing the values over this limit), the window we will use to calculate this value from Pst (usually we will choose a window with 12 Pst, that's period x 12) and the posibility of discard bad Plt (Plt with events)

As you can observe, despite of this different variables, the management of this file is exactly the same that other files.

## 9.6.- EVE File

### 9.6.1.- EVE File Information

EVE files issue information about events occurred in the equipment that generates the file. An event is a punctual incident that needs to be registered, as an equipment date change, an equipment turn off, a received phone call, a file remove, etc.

That is, EVE file registers all events happened in analyzer equipment to obtain a detailed inform allowing a later analysis.

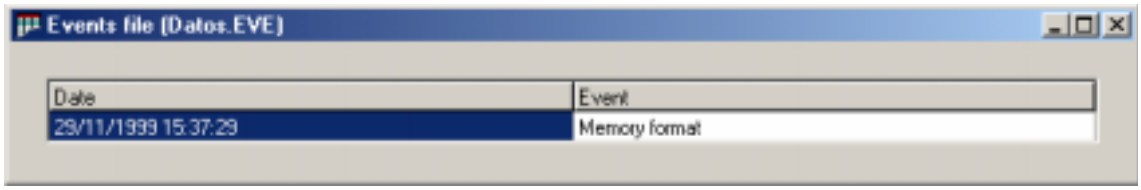
This file only allows a table representation, so you will not be able to plot any graph with this file, or to export it to any text file.

### 9.6.2.- Tables

To display EVE file, you must plot a table. To plot a table you must choose the "***Table***" option in "***Graphics***" menu, or you must click with the mouse left button on the icon on the icon bar.

Then, it will appear a dialog box, to choose the file (in this case an EVE file) and then the program will show you the reports table.

An example of a table generated by an EVE file could be this:




***EVE file table***

Note that an EVE file generates a list of events sorted by date, so you will display a list with two columns: The first one with the event date and the second column with the description of the event.

You can manage EVE file tables as any other Power Vision table, so you will be able to export it to a BMP file, copy it to the clipboard, or print it.

## 9.7.- EVQ File

### 9.7.1.- EVQ File Information

EVQ files issue information about events occurred with voltage signal. You can find in it all information about peaks, surges, notches, sags, etc. (depending on equipment configuration)

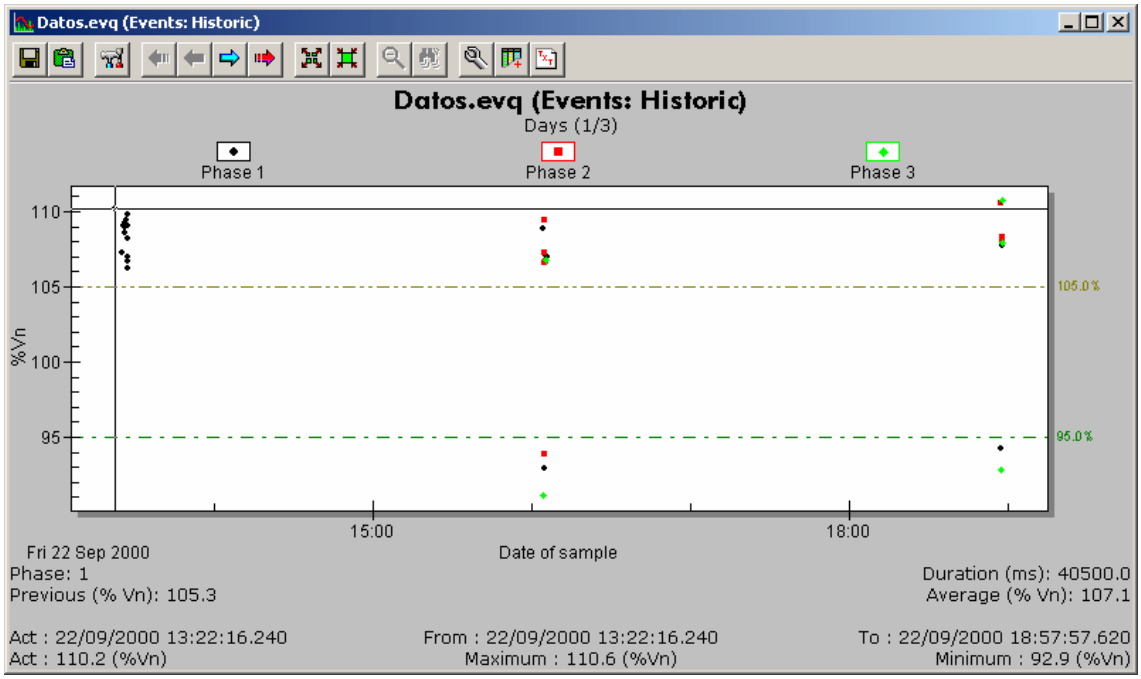
This file allows, at least, three table and three graph representations with a huge amount of data. This data will be useful for a deep study about fast voltage variations detected by the devices. On the other hand, of course, you will be able to export and print the data as you want.

Some of this EVQ files have extra information about every event. This one is an array of semicycles rated voltage captured before and after the beginning of each event and before and after the end of the same event. This array of values will give you important information related to what happened with voltage in these critical moments.

### 9.7.2.- Graphs

EVQ files issue several graphs, one of them with events historic registered by The machine, another one with a classification of them, with a relationship between event value and the duration, and still a third similar to the last one but with an X axis logarithmic (in seconds) and a standard curve drawed (CBEMA/ITIC or SEMI F47)

We have a point representation in events historic graph (each point-one event) of all events saved in the EVQ.



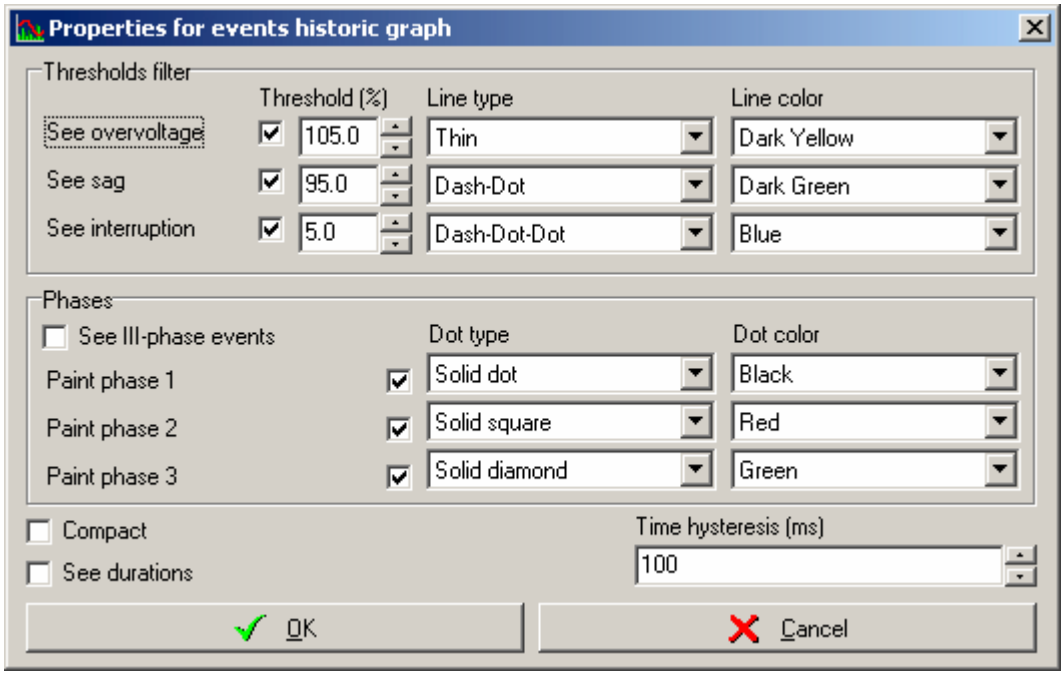

***Events historic graph***

We can see that each phase is represented with a color and a different type of point (user configuration). Moreover, we can see information for each event (down) on

sample date, the phase, the duration (in milliseconds) (%), last voltage before the event (%), and the extreme voltage of the event (%).

We can also see the three horizontal lines that give us the nominal voltage margins in these calculated events (these margins are configurable, although graph is created with defined machine margins)

Don't forget it's a graph like the others, so you'll be able to configure it as you want, export it to BMP file, print it, group it, etc.... However, if you press properties button (or with option in context menu) you'll be able to accede to a special configuration screen of this type of graph.




***Events historic configuration screen***

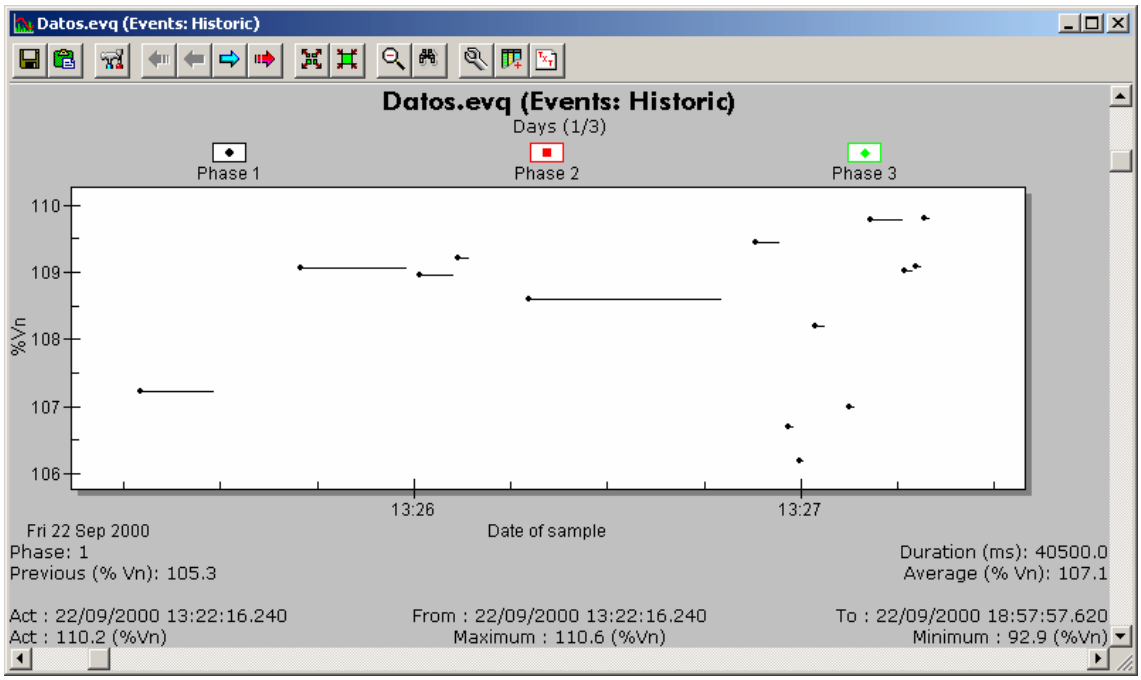
As you can see for this kind of graph, you can configure the maximum and minimum values (say what you want to show and what you don't want to show, what value you want and how you want show them).

If you want to view the events of each phase or if you want to study the III-phase events, you can configure it. If you decide to view them, you can also choose their representation (type of color and point).

Finally, you can also configure if you want to view compress events or not, and if you want to view their durations graphically or not.

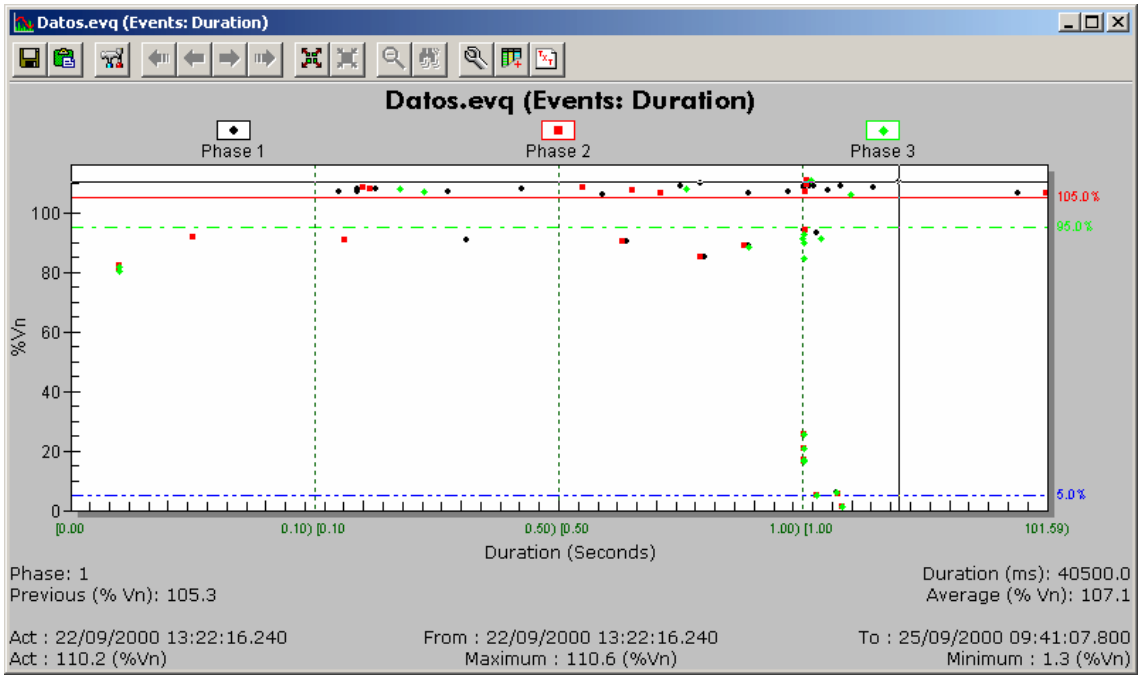
If you compact the events you will see a reduction in the number of events because the software studies what events can be considered (without an acceptable error margin) like the same event. Then, three consecutive events of "Sag, Interrupt, Sag" can be considered as an Interrupt. Moreover, two together Over voltage events can be considered the same Over voltage event but longer. (To manage if two elements are too much near, we can use "time hysteresis" parameter, where you can define maximum distance between two elements to consider that they are together.

If we choose to view the events duration, we'll see a horizontal line for each event that give us the event duration. (If you can't see the line, maybe you'll have to make some zoom)




***Historic events graph with "see durations" option enabled***

However, there is other graph in EVQ files. It's duration graphs where we'll be able to see the events sorted by their duration.

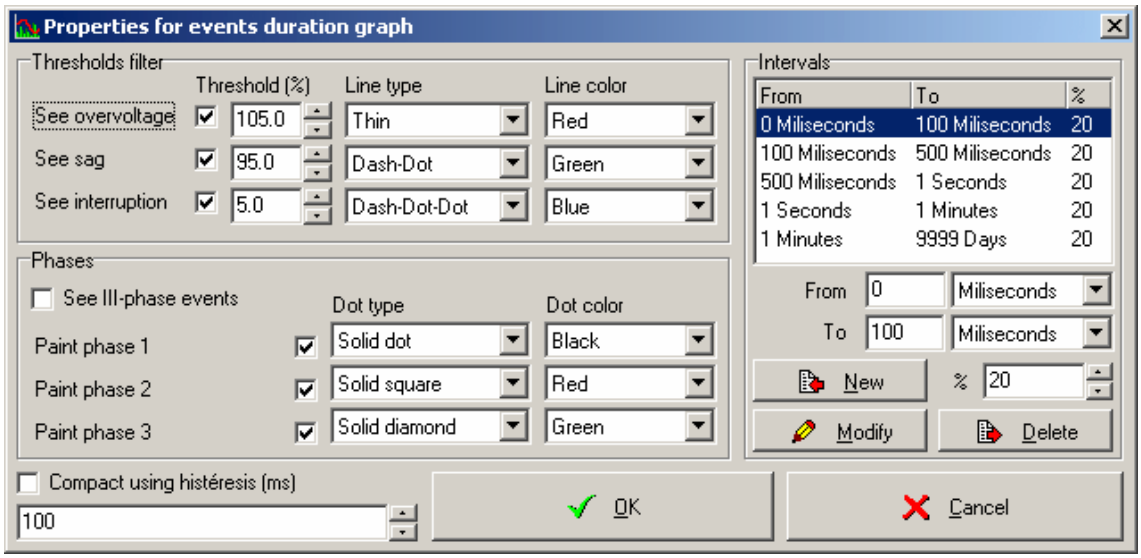



***Events graph sorted by duration***

This graph is similar than before graph, but the events are classified in X axis by their duration in a periods that user can configure. (Vertical dashed lines).

We can see in last example that periods are between 0 to 0.1 seconds, 0.1 to 0.5 seconds, 0.5 to 1 seconds, etc. You can configure all these periods length.

This graph, like the last one, can be configured to standard form, printed, grouped, ... and, moreover, it has a default configuration that we can accede with button (or in context menu option).



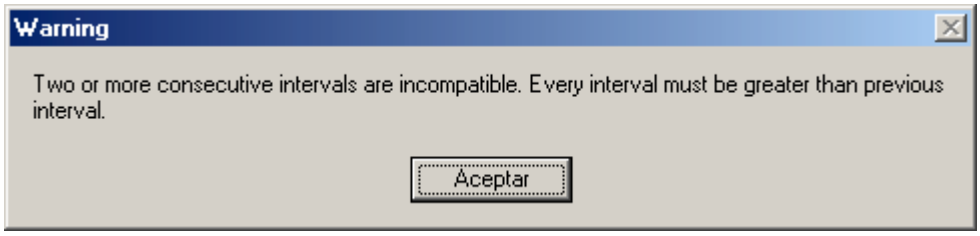

***Events duration graph configuration screen***

Like in last one graph, we can configure horizontal margins, how you can see the phases (or three phase events) and if you want to see compacted events.

Then, we can add periods to our classification, modify exist periods or delete some of them. Each period has a starting duration, ending duration and a % of X axis that it will be displayed. Periods can't be displayed in same location (over placed), although we don't need to create them one after one (we can define [0,1] seconds period and after we can define [5 seconds, 1 minute] period.

All percentages don't have to plus 100. Power Vision do a distribution of them looking top value of the percentages.

If you accept all changes, Power Vision will analyze introduced periods and it is possible that it finds some problem with them, displaying message errors like this:




***Over placing periods error***

***Incorrect period error***

If all periods are correct, new configuration will be displayed.

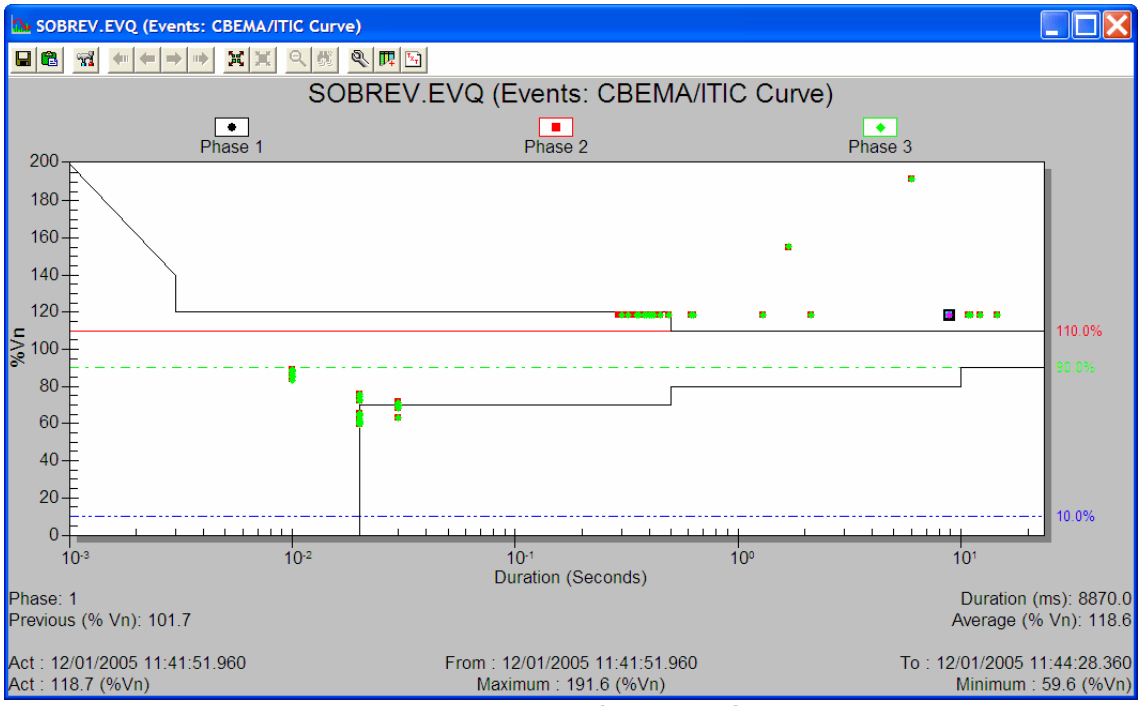
***Note**: When we do the three phase events study we have to know the following definitions:*

*Sag: Temporal reduction of the voltage under a stablished threshold. In a three phase system the sag status starts when the voltage of at least one channel falls under the threshold and finishes when the voltage of all the measured channels is equal or higher than this threshold.*

*Overvoltage: Temporal increasing of the voltage over a stablished threshold. In a three phase system the overvoltage status starts when the voltage of at least one channel is over the threshold and finishes when the voltage of all the measured channels is equal or lower than the threshold.*

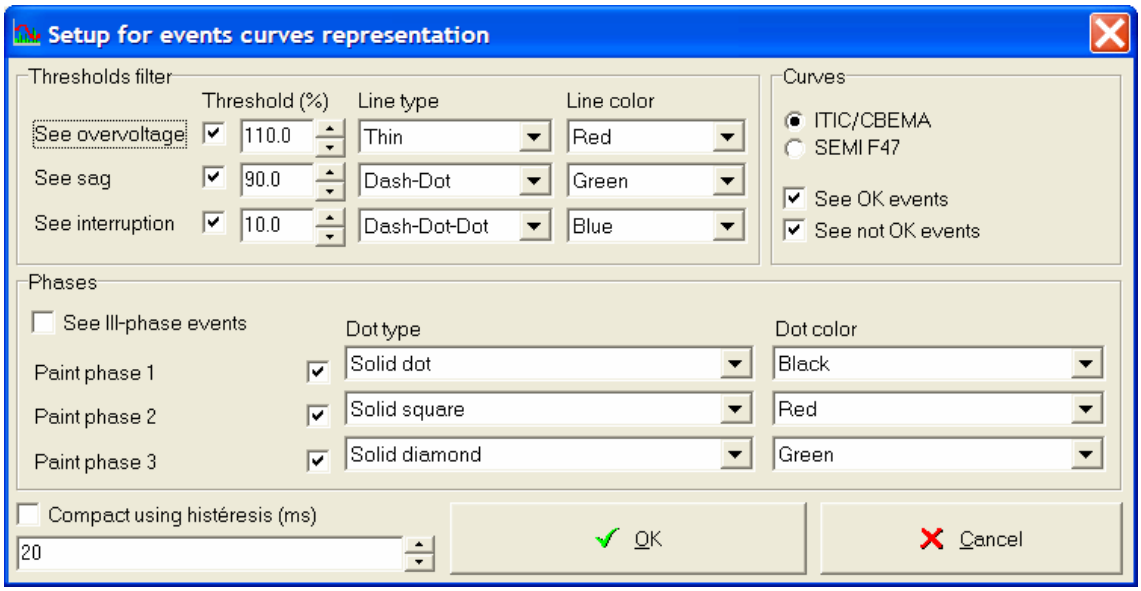
*Interruption: Voltage reduction under a stablished threshold. In a three phase system the interrupt starts when the voltage of the three channels falls under the stablished threshold and finishes when the voltage of some channel is equal or higher than the threshold.*

Another possible graph you can view is a curves graph. This graph is like the durations graph but the X axis is drawed in logarithmic scale, in seconds, and events are plotted against two possible standard curves selected by user (CBEMA/ITIC and SEMI F47) Graph obtained could have the next appearance:



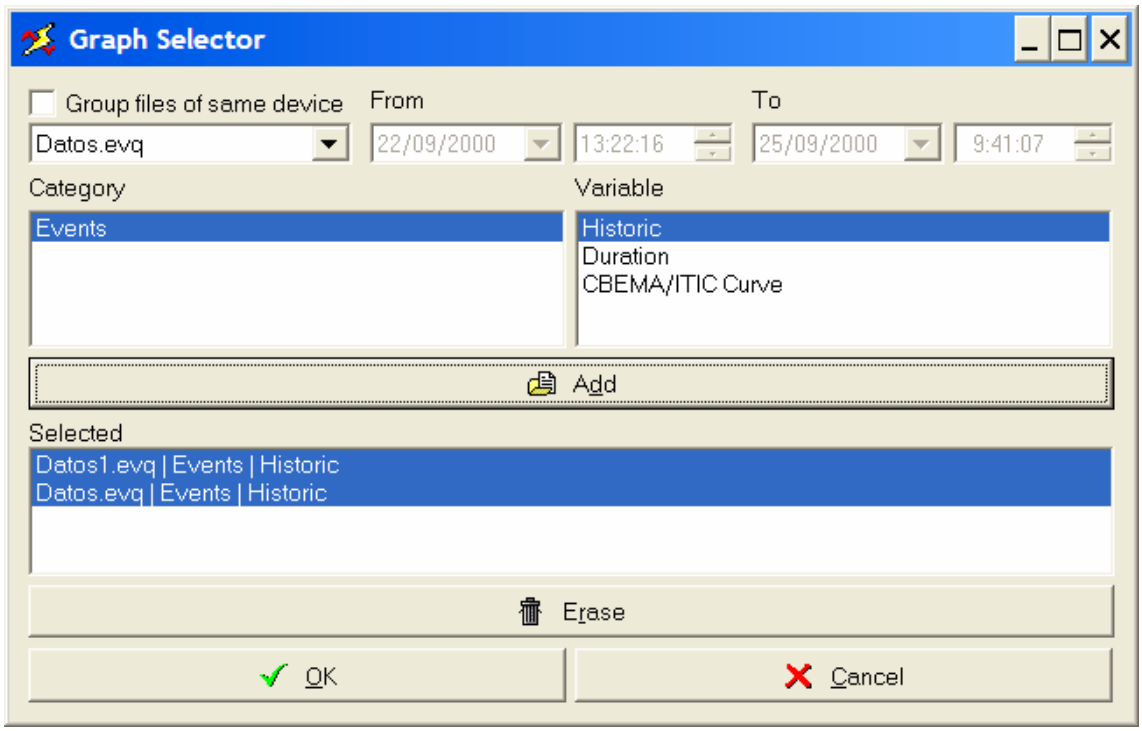

***Curve CBEMA/ITIC graph***

As you can see, events are plotted against the selected standard curve, here CBEMA/ITIC curve. This kind of graphs can be configured like the others but also you can select the curve you want to see and how you can filter the events (it's possible, for example, to draw only the events sited in an allowed zone or in a not allowed zone of selected curve)




***Curve graphs setup***

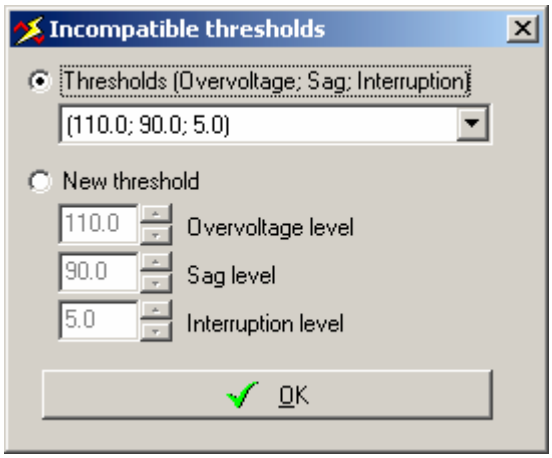
In all graphs we can add several variables of different files in one graph adding them to the graph visor, all together.




***Adding two variables in the same graph***

If we do it, it's possible that the program detects that the defined thresholds in each variable are different. In this case, will appear a dialog box where we'll be able to

choose what is the threshold we want to apply to the graph and also, we can define a new threshold.

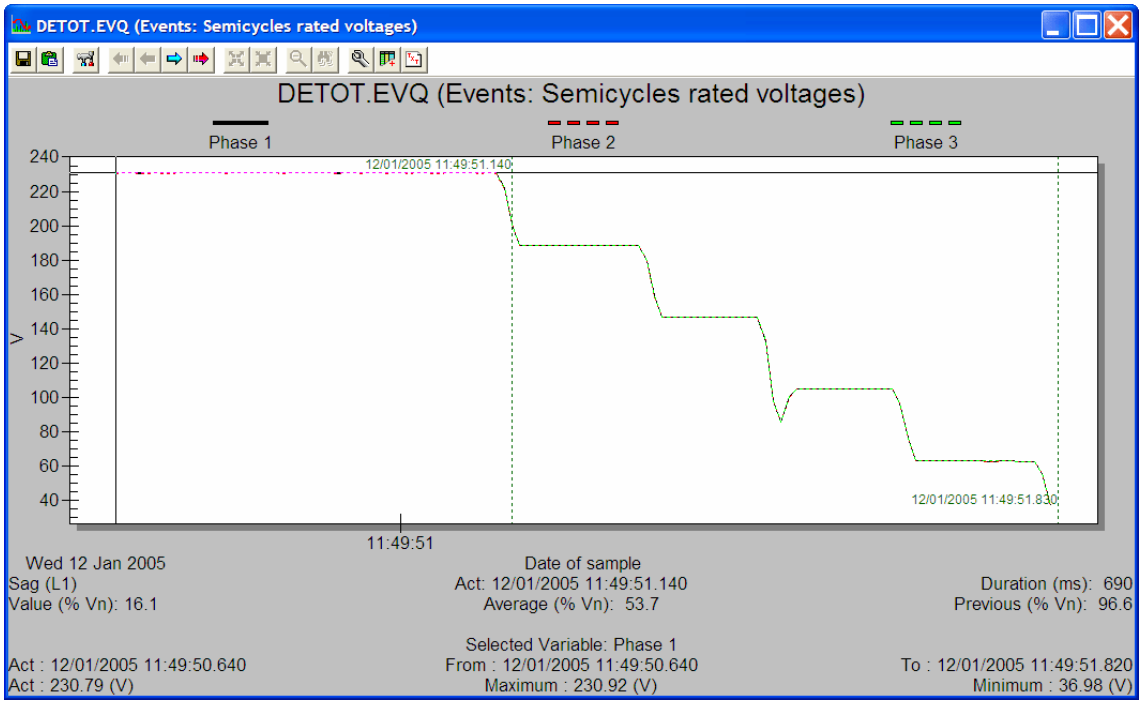



***Events Thresholds Setup window***

Finally, when we have selected the threshold we want to apply to the graph, will appear the result in a graph.

As you can observe, this graph brings you the option to make an especial table with the configuration of the graph. To do it press the button on the icon bar or choose "***Lists***" option in context menu. It is already possible to export the information to a text file pressing the button.

In some EVQ files will be posible to analyze extra information about each event. In these cases an extra graph named "semicycles rated voltage" will be available. Next picture shows you the aspect of this graph and, like the others, it has an equivalent table and, of course, it's posible to print it:

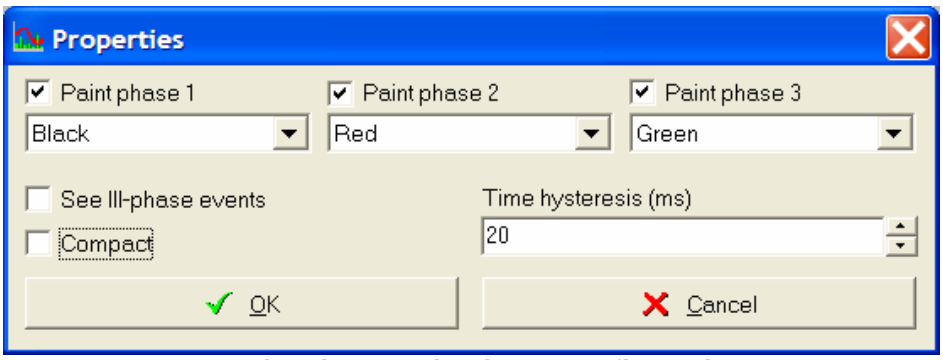



***Semicycles rated voltage graph***

For each event we can see the evolution of semicycles rated voltages before and after critical points, that is, begin and end of the event. We can also see the same evolution in the other phases but only if the information is available it is produced approximately in the same time.

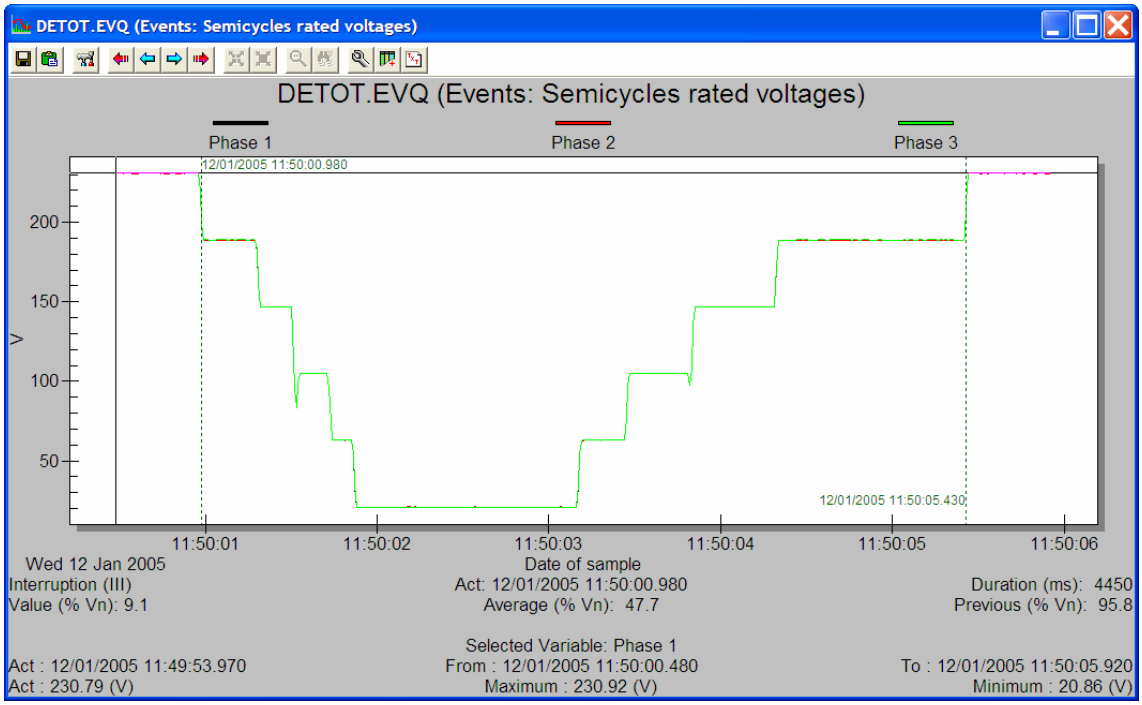
You will be able to navigate throw the events clicking the arrows in the toolbar. The subset related to the analized event has a solid line. We can also see two vertical dotted lines representing the begin and the end of the event. Above, in text form, there are all the information about the analyzed event.

As the other two graphs explained before this graph can be configured and, so, it's posible to decide how you want to visualize the events.




***Semicycles rated voltage configuration***

As you can see, we can define if you want to compact the events, whitch time hysteresis do you want to apply or if we want to see three-phasic events instead mono-phasic events. So, for example, if we want to see three-phasic events compacted with 20 milliseconds of hysteresis we will obtain something like this:




***Semicycles rated voltages graph (three-phasic compacted events)***

Now the three phases are painted with solid line because all of then are part of the analyzed event (remember that dotted lines are only extra information and there aren't part of the target event)

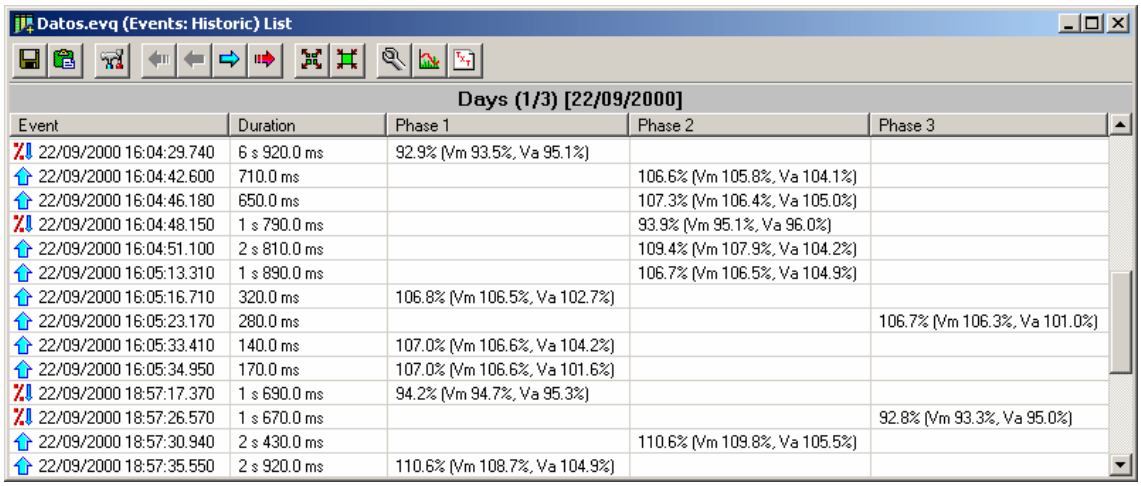
**Note**: You can directly access to the semicycles rated voltaje graph from historic and duration graphs double-clicking over the event we want to see with more detail.

### 9.7.3.- Tables

#### 9.7.3.1.- Events historic list

From Lists button ( ) or using the events historic and the events duration graphs, we can do two different lists with numerical values. In some EVQ files we can do another list with the semicicles rated voltage of each event.

The events historic list will look like this:




| Event | Duration | Phase 1 | Phase 2 | Phase 3 |
|---|---|---|---|---|
| 22/09/2000 16:04:29.740 | 6 s 920.0 ms | 92.9% (Vm 93.5%, Va 95.1%) | | |
| 22/09/2000 16:04:42.600 | 710.0 ms | | 106.6% (Vm 105.8%, Va 104.1%) | |
| 22/09/2000 16:04:46.180 | 650.0 ms | | 107.3% (Vm 106.4%, Va 105.0%) | |
| 22/09/2000 16:04:48.150 | 1 s 790.0 ms | | 93.9% (Vm 95.1%, Va 96.0%) | |
| 22/09/2000 16:04:51.100 | 2 s 810.0 ms | | 109.4% (Vm 107.9%, Va 104.2%) | |
| 22/09/2000 16:05:13.310 | 1 s 890.0 ms | | 106.7% (Vm 106.5%, Va 104.9%) | |
| 22/09/2000 16:05:16.710 | 320.0 ms | 106.8% (Vm 106.5%, Va 102.7%) | | |
| 22/09/2000 16:05:23.170 | 280.0 ms | | | 106.7% (Vm 106.3%, Va 101.0%) |
| 22/09/2000 16:05:33.410 | 140.0 ms | 107.0% (Vm 106.6%, Va 104.2%) | | |
| 22/09/2000 16:05:34.950 | 170.0 ms | 107.0% (Vm 106.6%, Va 101.6%) | | |
| 22/09/2000 18:57:17.370 | 1 s 690.0 ms | 94.2% (Vm 94.7%, Va 95.3%) | | |
| 22/09/2000 18:57:26.570 | 1 s 670.0 ms | | | 92.8% (Vm 93.3%, Va 95.0%) |
| 22/09/2000 18:57:30.940 | 2 s 430.0 ms | | 110.6% (Vm 109.8%, Va 105.5%) | |
| 22/09/2000 18:57:35.550 | 2 s 920.0 ms | 110.6% (Vm 108.7%, Va 104.9%) | | |

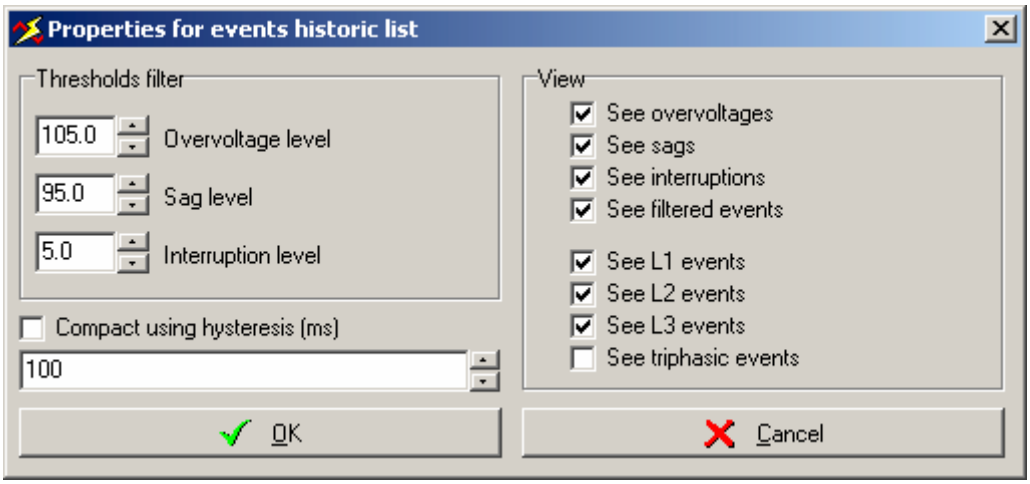
***Events historic list***

As we can see, it's a table of maximum 5 columns, with so many rows as events have been happened, but the number of columns goes from 3 to 5 according to the information we want to see.

In the first column appears the date when the event has happened (with a miliseconds precision) and an icon that will indicate us if it is a sag (), overvoltage (), interruption () or if it's correct () according to the defined percentages over the nominal voltage.

In the second column appears the event duration (with a second hundredth precision) and the following store the phases where the events have happened (we can choose the information we want to show, so, the phases we want to see or if we want to do a three phase study). In this columns, for each phase, there is the maximum or minimum value of the event (depending on the type of event), the average value of the event (Vm) and the value previous to the event, all in percentage over the nominal voltage.

Therefore, we'll be able to group the table as we want, and we'll be able to move across the different periods as we want. We'll be able to configure the main parameters of the list  with the configuration button and, finally, we'll be able to do a special configuration for this kind of list using the properties button (on the right). This action will open the following screen:




***Configuration screen of the events historic list***

In this window we can configure the voltage thresholds respect the nominal voltage, and if we want to see the events compacted or not (and what will be the time histeresis)

Therefore, we'll be able to decide the inforamtion we'll see, checking the options on the right side, in the "**view**" section. Then, we'll be able to choose the type of events we want to see (overvoltages, sags, interrupts or correct), the phases we want to show and if we want to do a three phase or single phase study.

Then, if we change the parameters to do a three phase study and if we change the margins of the nominal voltage for overvoltage and sag, will obatin the following list:

Datos.evq (Events: Historic) List

**Days (1/3) [22/09/2000]**

| Event | Duration | Phase III |
|---|---|---|
| 22/09/2000 13:27:17.920 | 750.0 ms | 109.1% (Vm 107.3%, Va 105.4%) |
| 22/09/2000 13:27:19.180 | 790.0 ms | 109.8% (Vm 108.1%, Va 105.5%) |
| 22/09/2000 16:04:01.690 | 3 s 990.0 ms | 108.8% (Vm 107.4%, Va 105.5%) |
| 22/09/2000 16:04:17.340 | 8 s 190.0 ms | 91.1% (Vm 93.0%, Va 95.8%) |
| 22/09/2000 16:04:29.740 | 6 s 920.0 ms | 92.9% (Vm 93.5%, Va 95.1%) |
| 22/09/2000 16:04:42.600 | 710.0 ms | 106.6% (Vm 105.8%, Va 104.1%) |
| 22/09/2000 16:04:46.180 | 650.0 ms | 107.3% (Vm 106.4%, Va 105.0%) |
| 22/09/2000 16:04:48.150 | 1 s 790.0 ms | 93.9% (Vm 95.1%, Va 96.0%) |
| 22/09/2000 16:04:51.100 | 2 s 810.0 ms | 109.4% (Vm 107.9%, Va 104.2%) |
| 22/09/2000 16:05:13.310 | 1 s 890.0 ms | 106.7% (Vm 106.5%, Va 104.9%) |
| 22/09/2000 16:05:16.710 | 320.0 ms | 106.8% (Vm 106.5%, Va 102.7%) |
| 22/09/2000 16:05:23.170 | 280.0 ms | 106.7% (Vm 106.3%, Va 101.0%) |
| 22/09/2000 16:05:33.410 | 140.0 ms | 107.0% (Vm 106.6%, Va 104.2%) |
| 22/09/2000 16:05:34.950 | 170.0 ms | 107.0% (Vm 106.6%, Va 101.6%) |
| 22/09/2000 18:57:17.370 | 1 s 690.0 ms | 94.2% (Vm 94.7%, Va 95.3%) |
| 22/09/2000 18:57:26.570 | 1 s 670.0 ms | 92.8% (Vm 93.3%, Va 95.0%) |
| 22/09/2000 18:57:30.940 | 2 s 430.0 ms | 110.6% (Vm 109.8%, Va 105.5%) |
| 22/09/2000 18:57:35.550 | 2 s 920.0 ms | 110.6% (Vm 108.7%, Va 104.9%) |
| 22/09/2000 18:57:40.480 | 4 s 330.0 ms | 110.8% (Vm 109.5%, Va 104.6%) |
| 22/09/2000 18:57:46.580 | 550.0 ms | 108.3% (Vm 108.0%, Va 102.4%) |

***Three phase events historic list with disturbed margins***

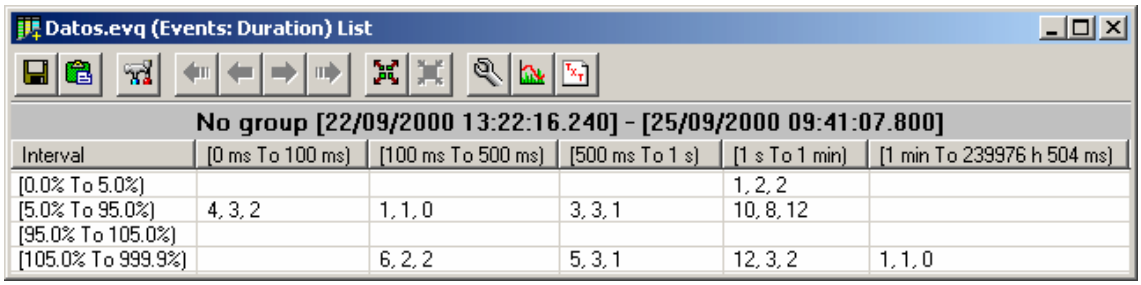
As you can observe, we can obatin the events are inside the correct nominal voltage margins because we have defined them, in this case, increasing the voltage threshold and decreasing sag threshold, so, the events previously considered erroneous, now are considered correct.

Therefore, we would be able to decide ignore any type of events (overvoltage, sag, interrupt or correct), so, they won't appear in the list.

Moreover, we can do usual actions over the graphs, as export it to text, or BMP, to the clipboard, group by different periods, move across the same, configure the colours, the title, etc.

### 9.7.3.2.- Events duration list

You'll be able to see a table like this:




No group [22/09/2000 13:22:16.240] - [25/09/2000 09:41:07.800]

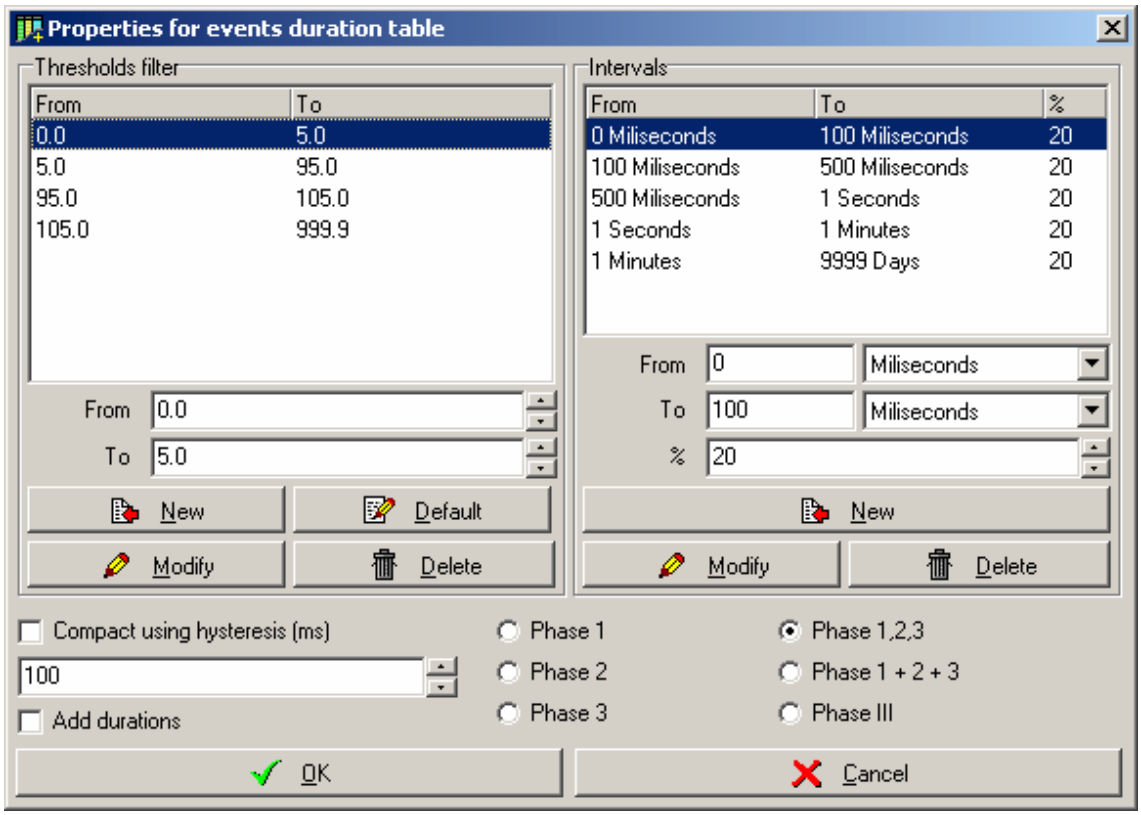
| Interval | [0 ms To 100 ms) | [100 ms To 500 ms) | [500 ms To 1 s) | [1 s To 1 min) | [1 min To 239976 h 504 ms) |
|---|---|---|---|---|---|
| [0.0% To 5.0%) | | | | 1, 2, 2 | |
| [5.0% To 95.0%) | 4, 3, 2 | 1, 1, 0 | 3, 3, 1 | 10, 8, 12 | |
| [95.0% To 105.0%) | | | | | |
| [105.0% To 999.9%) | | 6, 2, 2 | 5, 3, 1 | 12, 3, 2 | 1, 1, 0 |

***Events durations table***

In this table, we'll be able to see the number of events of displayed period that there are in each period delimited for a tension value percentage and duration.

This table can be configured with standard configuration button (colors, title, subtitle, description, large step...) and, moreover, it has a special configuration window that you can accede with properties button.

In this window, we can configure events duration periods, percentage of nominal voltage, compact events option and what information will be displayed.




***Configuration screen of duration events table***

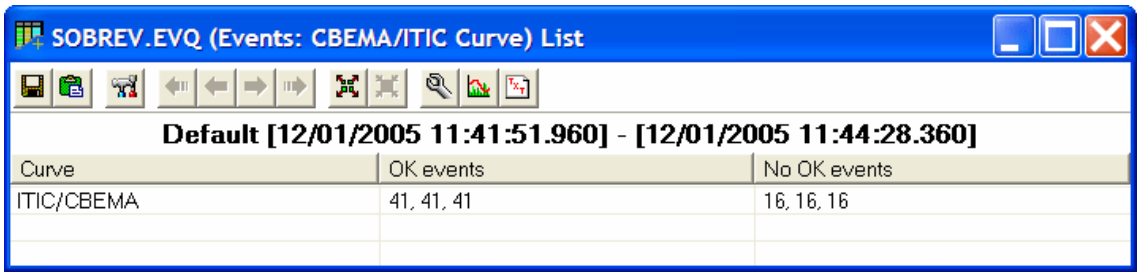
As we can see, we can choose if we want represent just phase 1, phase 2, phase 3 events, the three phases, the result of add all phases or three-phasic results. We can also view the global duration of all events.

We can also observe that it's allowed full periods configuration over nominal voltage percentages, duration events periods and if you want to compact them.

Once we have done our configuration, the program will do a test of the nominal voltage percentage periods and thresholds, and it will alert you if there is some error.

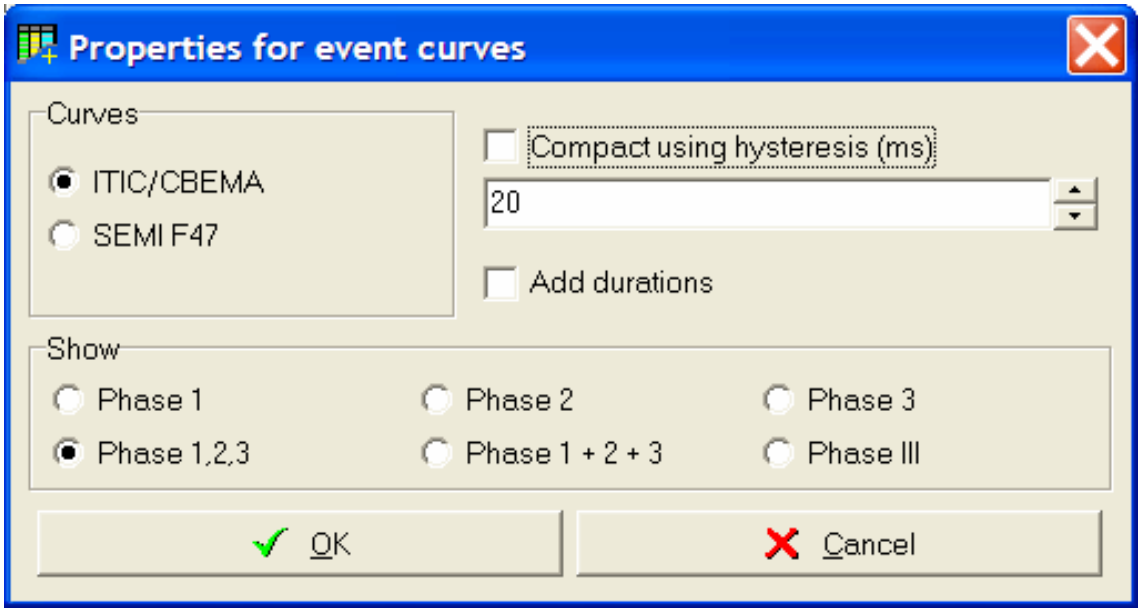
### 9.7.3.3.- Events curve list

If you select this option, a new table will appear:




***Curve table***

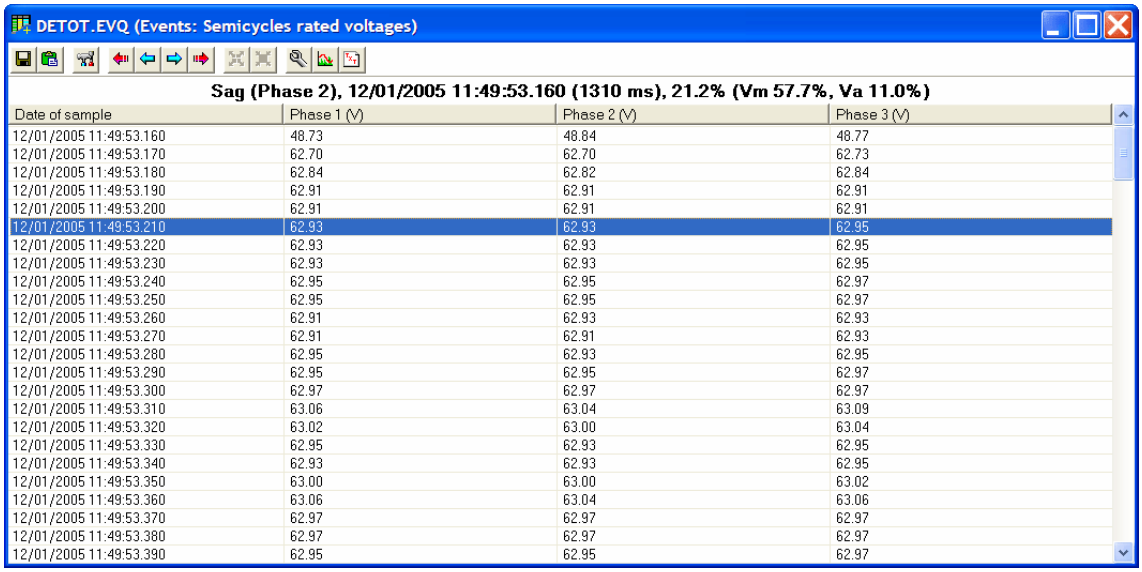
In this table events will be discriminated between Ok events and not Ok events. Ok events are sited in the allowed zone of selected curve and not Ok events are sited in the not allowed zone of selected curve. You can configure this table selecting, for example, the curve you want to use to discrimine events and many others parameters (most of them like the durations table)




***Curve table setup***

### 9.7.3.4.- Semicycles rated voltage list

Some EVQ files have extra information about each event and, so, it's possible to make another graph named "*Semicycles rated voltages*". This graph looks like next figure:




| Date of sample | Phase 1 (V) | Phase 2 (V) | Phase 3 (V) |
|---|---|---|---|
| 12/01/2005 11:49:53.160 | 48.73 | 48.84 | 48.77 |
| 12/01/2005 11:49:53.170 | 62.70 | 62.70 | 62.73 |
| 12/01/2005 11:49:53.180 | 62.84 | 62.82 | 62.84 |
| 12/01/2005 11:49:53.190 | 62.91 | 62.91 | 62.91 |
| 12/01/2005 11:49:53.200 | 62.91 | 62.91 | 62.91 |
| 12/01/2005 11:49:53.210 | 62.93 | 62.93 | 62.95 |
| 12/01/2005 11:49:53.220 | 62.93 | 62.93 | 62.95 |
| 12/01/2005 11:49:53.230 | 62.93 | 62.93 | 62.95 |
| 12/01/2005 11:49:53.240 | 62.95 | 62.95 | 62.97 |
| 12/01/2005 11:49:53.250 | 62.95 | 62.95 | 62.97 |
| 12/01/2005 11:49:53.260 | 62.91 | 62.93 | 62.93 |
| 12/01/2005 11:49:53.270 | 62.91 | 62.91 | 62.93 |
| 12/01/2005 11:49:53.280 | 62.95 | 62.93 | 62.95 |
| 12/01/2005 11:49:53.290 | 62.95 | 62.95 | 62.97 |
| 12/01/2005 11:49:53.300 | 62.97 | 62.97 | 62.97 |
| 12/01/2005 11:49:53.310 | 63.06 | 63.04 | 63.09 |
| 12/01/2005 11:49:53.320 | 63.02 | 63.00 | 63.04 |
| 12/01/2005 11:49:53.330 | 62.95 | 62.93 | 62.95 |
| 12/01/2005 11:49:53.340 | 62.93 | 62.93 | 62.95 |
| 12/01/2005 11:49:53.350 | 63.00 | 63.00 | 63.02 |
| 12/01/2005 11:49:53.360 | 63.06 | 63.04 | 63.06 |
| 12/01/2005 11:49:53.370 | 62.97 | 62.97 | 62.97 |
| 12/01/2005 11:49:53.380 | 62.97 | 62.97 | 62.97 |
| 12/01/2005 11:49:53.390 | 62.95 | 62.95 | 62.97 |

***Semicycles rated voltages list***

In this list we can see semicycles rated voltages related to the event we are analyzing. Event data are posted in top of list, in text form. You can navigate throw all events clicking the arrows in the toolbar.

We can also configure how we want to see the events (compact, hysteresis, three-phasic, etc.), like in the equivalent graph. Of coure, it's also possible to launch the equivalent graph and event export or print this list.

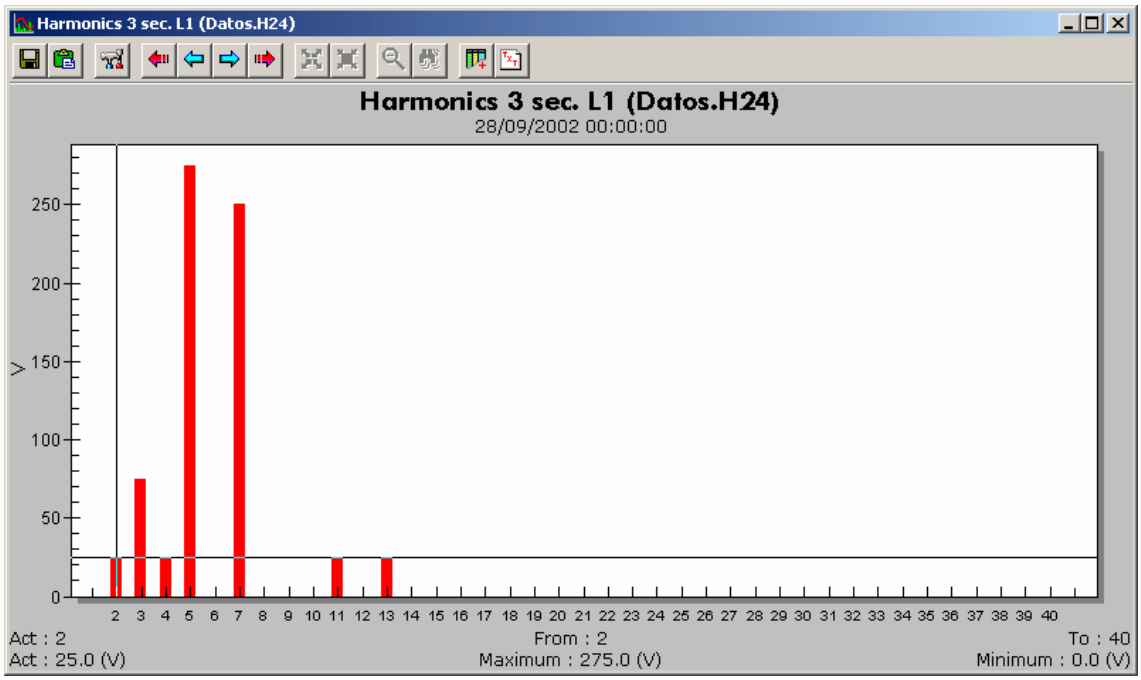
**Note**: We can launch this list directly from the historic events list double-clicking on the event we want to analyze.

## 9.8.- H24 File

This files give us daily statistical information about harmonics. In each register we can found the maximum value of all effective values obtained in differents 10 minutes intervals included in one 24 hours interval, the maximum value of all effective values obtained in differents 3 seconds intervals included in one 24 hours interval and the accumulative probability of all effective values obtained in differents 3 seconds intervals included in one 24 hours interval.

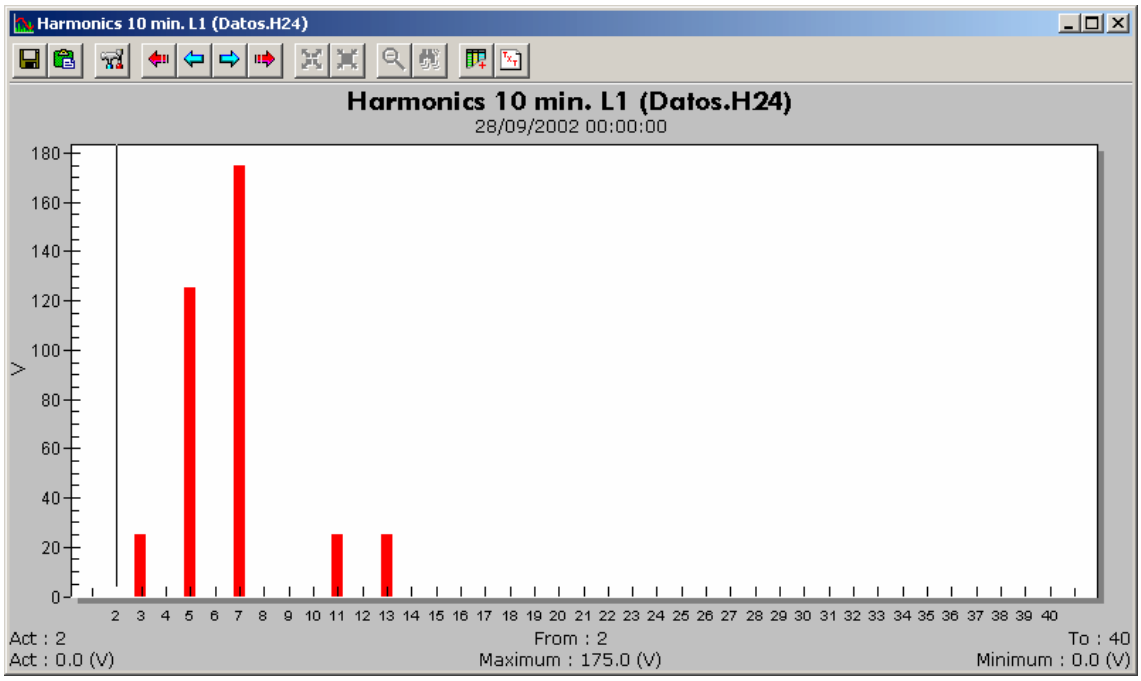
The program give us several graphs and lists based on this information. This graphs and lists allow us to make a detailed study about harmonics influence in the installation we are analyzing. So, the program makes:

**Maximum of all effective values obtained in 3 seconds intervals in one 24 hours interval study:** We can make lists and graphs of each individual value along time. For example, we can make a graph of maximum effective value of harmonic 5 L1 obtained in 3 seconds intervals included in one 24 hours interval. We can also make a graph or list including all harmonics of same phase, in this case we will see a graph by day.



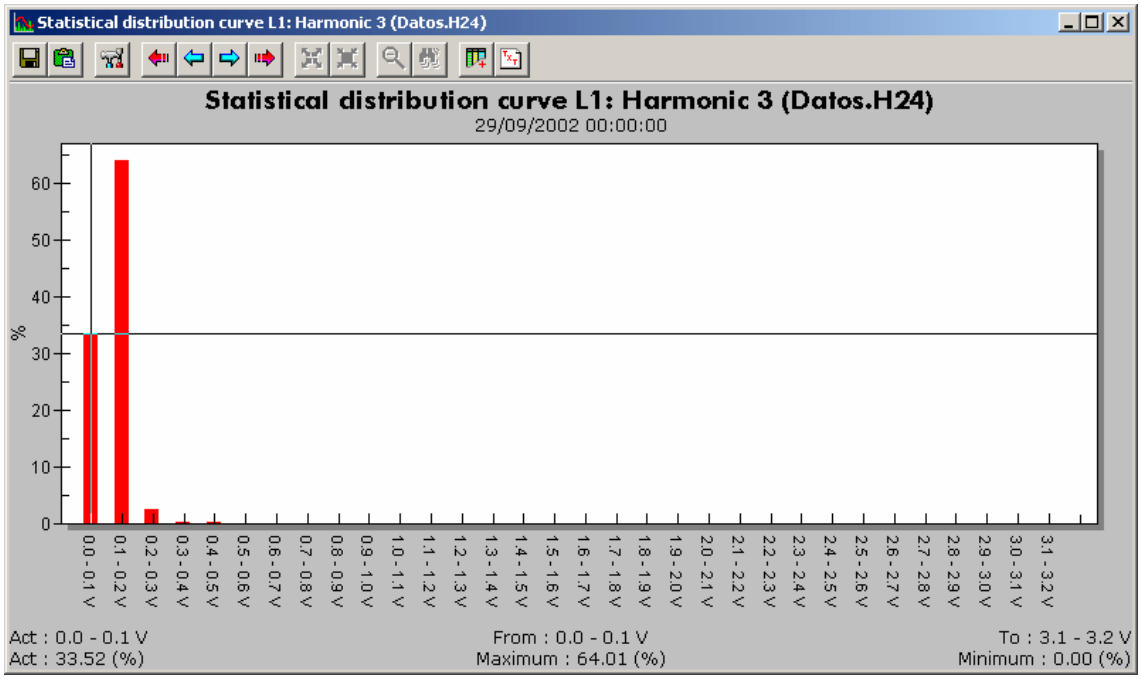

***Maximum effective values in 3 seconds intervals grouped by days***

**Maximum of all effective values obtained in 10 minutes intervals in one 24 hours interval study:** We can make lists and graphs of each individual value along time. For example, we can make a graph of maximum effective value of harmonic 5 L1 obtained in 10 seconds intervals included in one 24 hours interval. We can also make a graph or list including all harmonics of same phase, in this case we will see a graph by day.



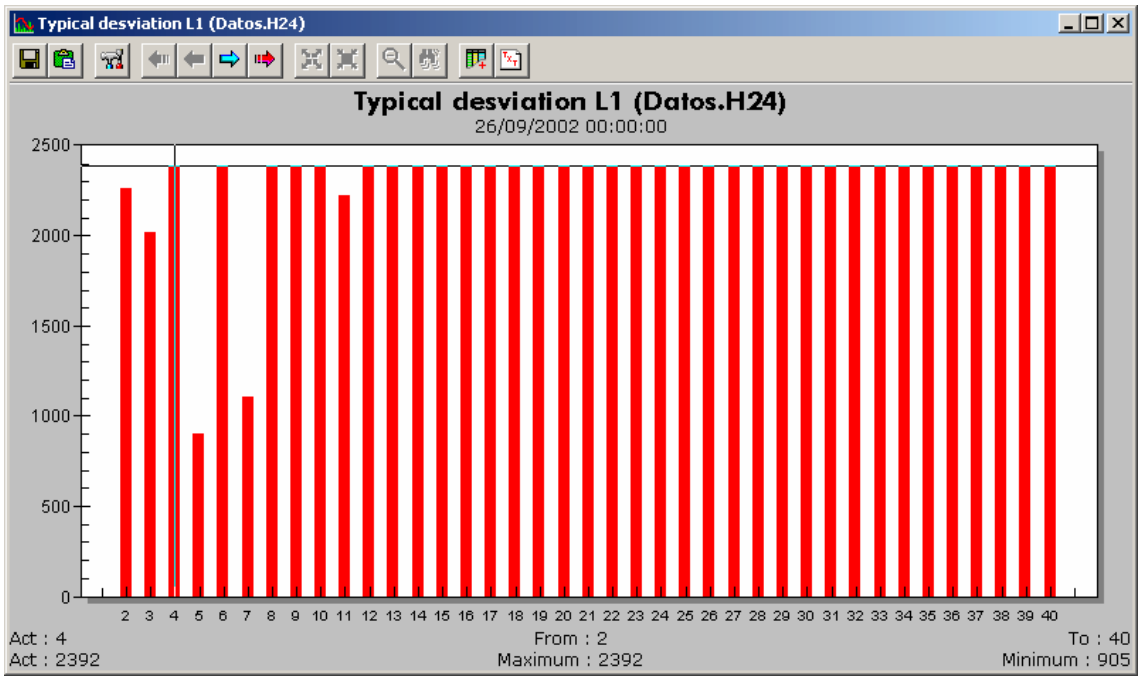

***Maximum effective values in 10 minutes intervals grouped by days***

**Statistical distribution curve of effective values obtained in 3 seconds intervals in one 24 hours interval:** We can make a graph or list for each individual harmonic in each phase of the statistical distribution every 24 hours. Usually 28800 values are distributed according to amplitude. We can travel along the graph or list day by day.




***Statistical distribution of effective values obtained in 3 seconds intervals***

**Typical desviation of effective values obtained in 3 seconds intervals in one 24 hours interval:** For each phase, we can make a graph or a list of typical desviation of each harmonic (effective values obtained in 3 seconds intervals) every 24 hours.




***Typical desviation of effective values in 3 seconds intervals***

**50%, 95% y 99% effective values obtained in 3 seconds intervals in one 24 hours interval:** For each individual harmonic we can make a graph or list of this percentage value according to statistical distribution in 24 hours, note that harmonics are obtained in 3 seconds intervals.

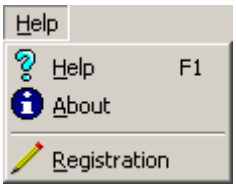
## 9.9.- STP File

These files give us a summary of weekly statistics related to quality network. These statistics are calculated from 10 minutes registers. These files contain a register every week and store several parameters like frequency, voltage, Plt, Pst, imbalance, and THD, all of them calculated according to all registers and valid registers (registers without events)

The program give us graphs, tables and lists and allow us to study the network quality of our installation. In graphs and lists the number of week is added (between parenthesis) before date in each register.

## 10.- ON LINE HELP

Power Vision gives user a complete on line help. You will find it on the "***Help***" option on "***Help***" menu option:

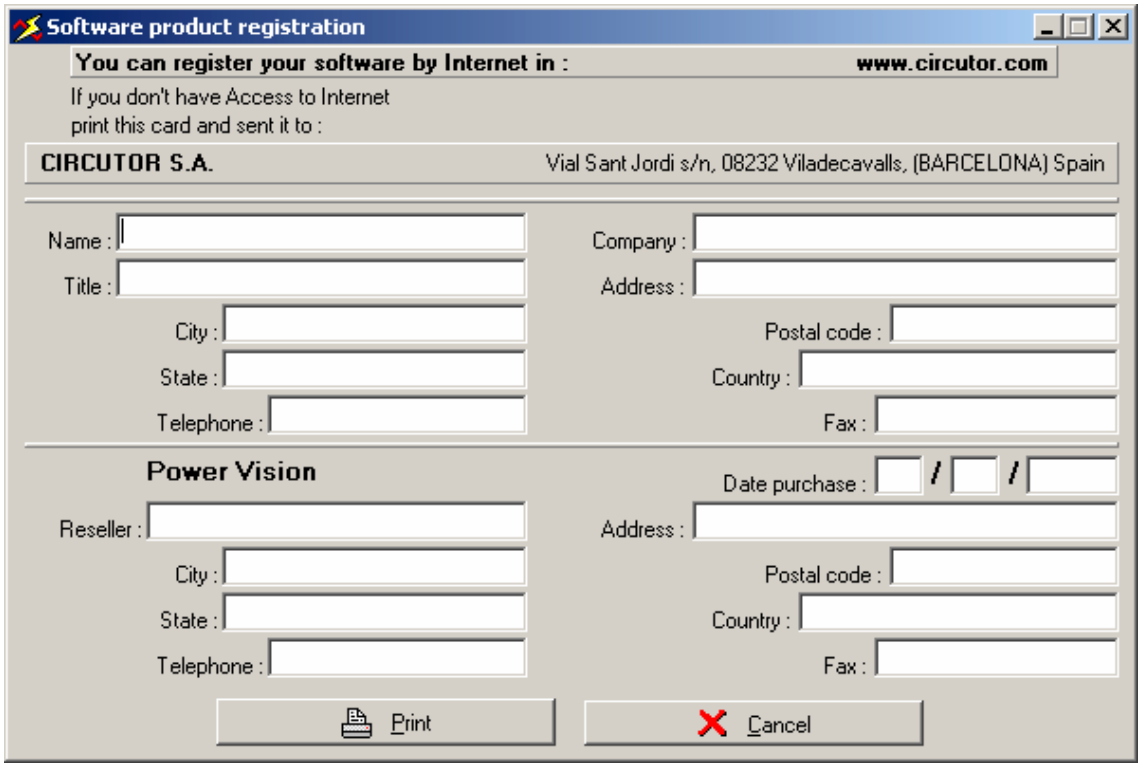



***Help menu***

In this on line help you will find all Power Vision options.

### 10.1.- Registration

If you choose "***Registration***" option in "***Help***" menu it will appear a dialog box to allow you to register you as a Power Vision user.

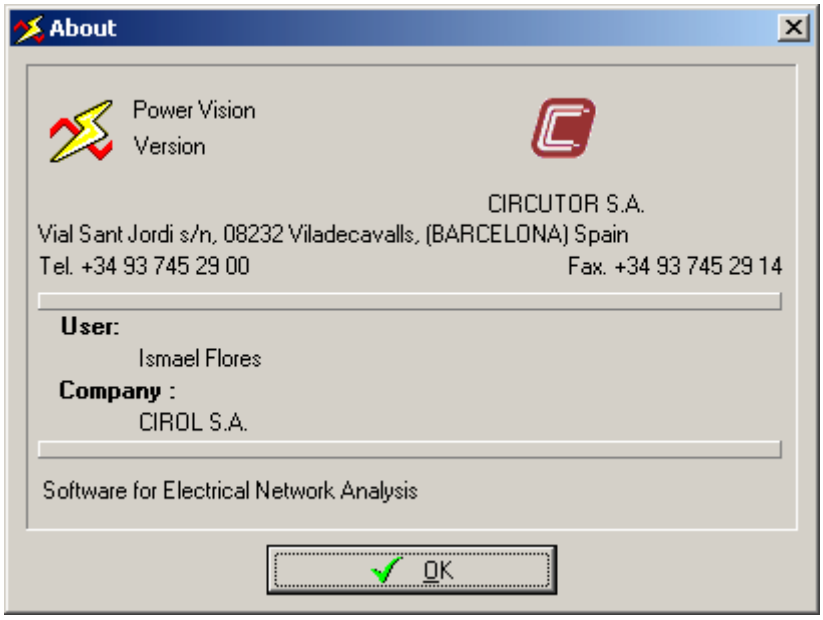



***Register Screen***

You must fill all this formulary fields and send it to the direction that appears in your screen. Once Circutor has received your answer you will be registered as a Power Vision User.

## 10.2.- About

In this dialog box you will find Power Vision most interesting data, that is, provider and program name as well as user name and serial number. This serial number is important to contact with the technical service.




***"About" dialog box***

## 11.- TECHNICAL SERVICE

In case of any doubt please contact with CIRCUTOR S.A. technical service, or with your nearest CIRCUTOR distributor.

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Web: www.circutor.com