GTEC UPS MODEL:

SATURN 10-200 kVA

SIRIUS 10-120 kVA

UCOM GP

USER MANUAL

www.gtec-power.eu

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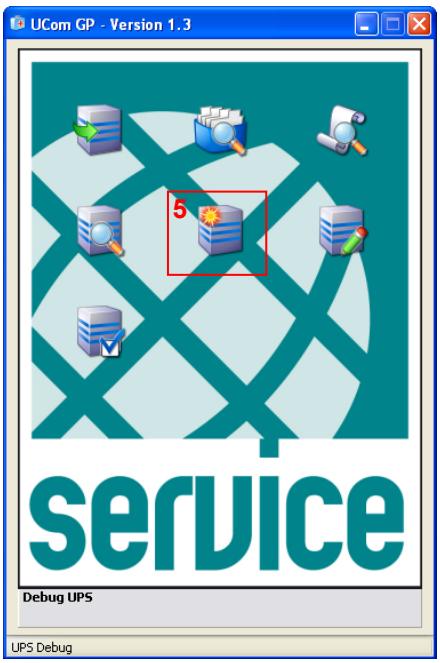
PRESENTATION

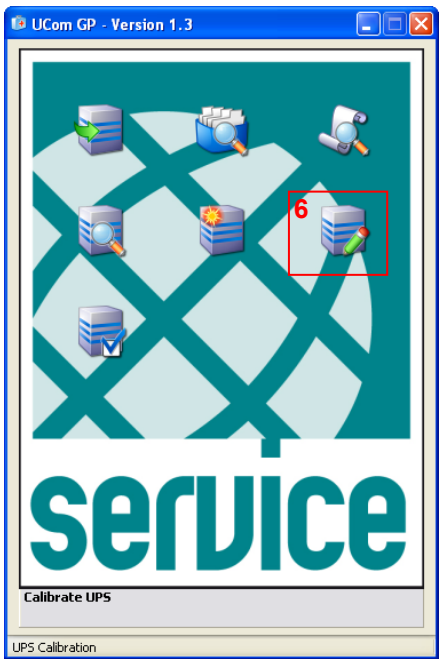
UCom GP is a package of programs for Windows systems[1] for advanced analysis of the historical logs and real time diagnostics of UPSs belonging to the MCM, MSM, MCT, MST families.
The communication between PC and UPS, for programs that require it, is via an RS232 serial communication port. The suite is composed of these different programs:

1. GpDownload – History Downloader
2. GpHistory [2] – History Analyzer
3. GpEvent [2] – Event Analyzer
4. GpRealTime – Status Analyzer
5. GpDebug – UPS Debug
6. GpCalibrate – UPS Calibrate
7. GpConfig - Configurator

[1] *Compatible with Windows 2000, Windows XP, Windows Vista and Windows 7 operating systems.*

[2] *processing of a historical file, active communication with the UPS is not required.*





It is possible to open the desired program from the main window of *UCom GP* (UComGP.exe).

NOTE: all the programs of the suite are independents and completely autonomous. They can be removed or added at any time by deleting or copying the corresponding file in the working folder.

NOTE: all the programs of the suite work properly with the firmware versions FW022-0208, FW028-0208 or higher.

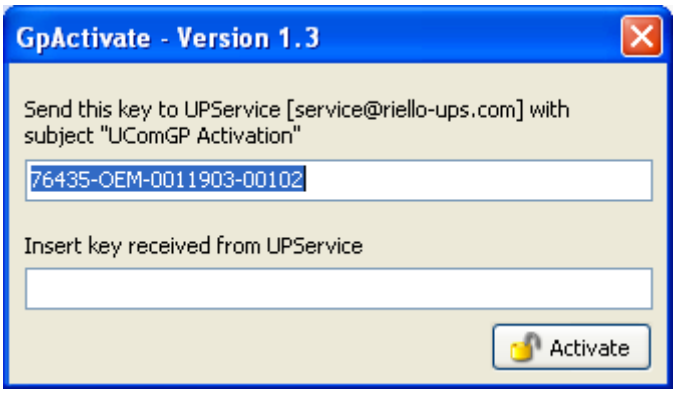
INSTALLATION

INSTALLATION

Copy all the files present in the software kit into the directory

…/UcomGP

GPACTIVATE – ACTIVATE UCOMGP



This program allows the operator to active the UComGP suite.

When the program is activated, at the top of the window, it is possible to read the Windows registration key memorised in the system registry. The Windows keys is composed of 23 alphanumeric characters in a sequence as shown below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
x	x	x	x	x	-	x	x	x	-	x	x	x	x	x	x	x	-	x	x	x	x	x

where a number or letter appears where an x is shown and the '-' symbol must appear in positions 6, 10 and 18.

This activation key must be emailed to the address which is also shown in the window:

service@riello-ups.com

The subject of the email must be:

UComGP Activation

The body of the mail:

Windows Key
Name
Surname
Company
Position

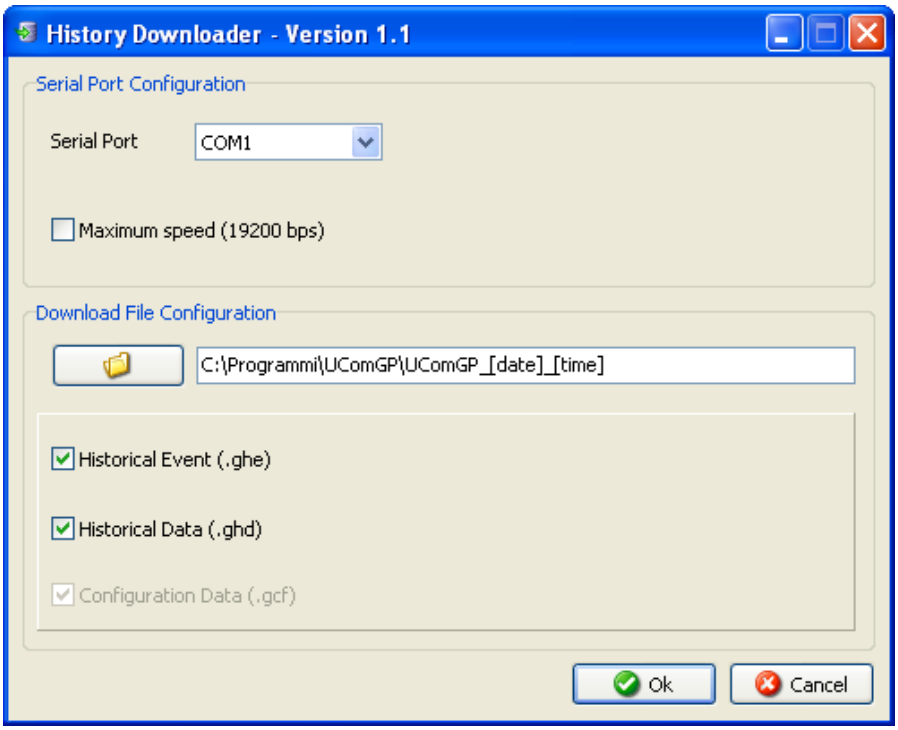
At this point, it is necessary to wait for the service response which will contain the UComGP program unlocking code.
This code, also composed of 23 alphanumeric characters, spaced with '-', must be copied in whole and without additions into the second part of the window.

Once the code received has been entered, by pressing the Activate key, the program will be unlocked, allowing access to all the UComGP suite programs.

UPGRADING OF THE ANNUAL LICENCE

In December, the user will be notified that the licence is going to expire. From this moment, it is possible to request the new activation key for the next year to the service department (by email to the same address mentioned previously and with the same subject).
Once the new key has been received, the licence can be renewed with the GpActivate, by entering the new key in the second part of the window and pressing Activate.
Once the licence has been upgraded, the expiring message will disappear.

GPDOWNLOAD – HISTORY DOWNLOADER



The program allows the two UPS historical logs to be downloaded (they can then be examined using the respective GpEvent and GpHistory analysis programs) and the UPS itself to be configured/calibrated.

Serial Port Configuration. In the first box at the top it is possible to select the RS232 serial port on the PC used for communication with the UPS (COM1 - COM8).
The program will automatically select the maximum usable speed.
It is possible to select the maximum speed (19200bps) only with the MultiCom 362 communication card or with the programming card (present in the kit ACCTT2PRXX-01) setted in communication mode.

Download File Configuration. In the second box it is possible to set the download of the two types of historical file:

- **Historical Event** (file with .ghe extension) for the UPS event log;
- **Historical Data** (file with .ghd extension) for the UPS measurement log;

It is possible to choose which historical file to download (neither, one or both), by checking the relative checkbox.
The program download always the third file:

- **Configuration Data** (file with .gcf extension) for the machine's internal configuration data;

By clicking on the key with the folder icon, it is possible to select the path in which to save the files.
The name suggested will be valid for all three files; the relative extension will change.

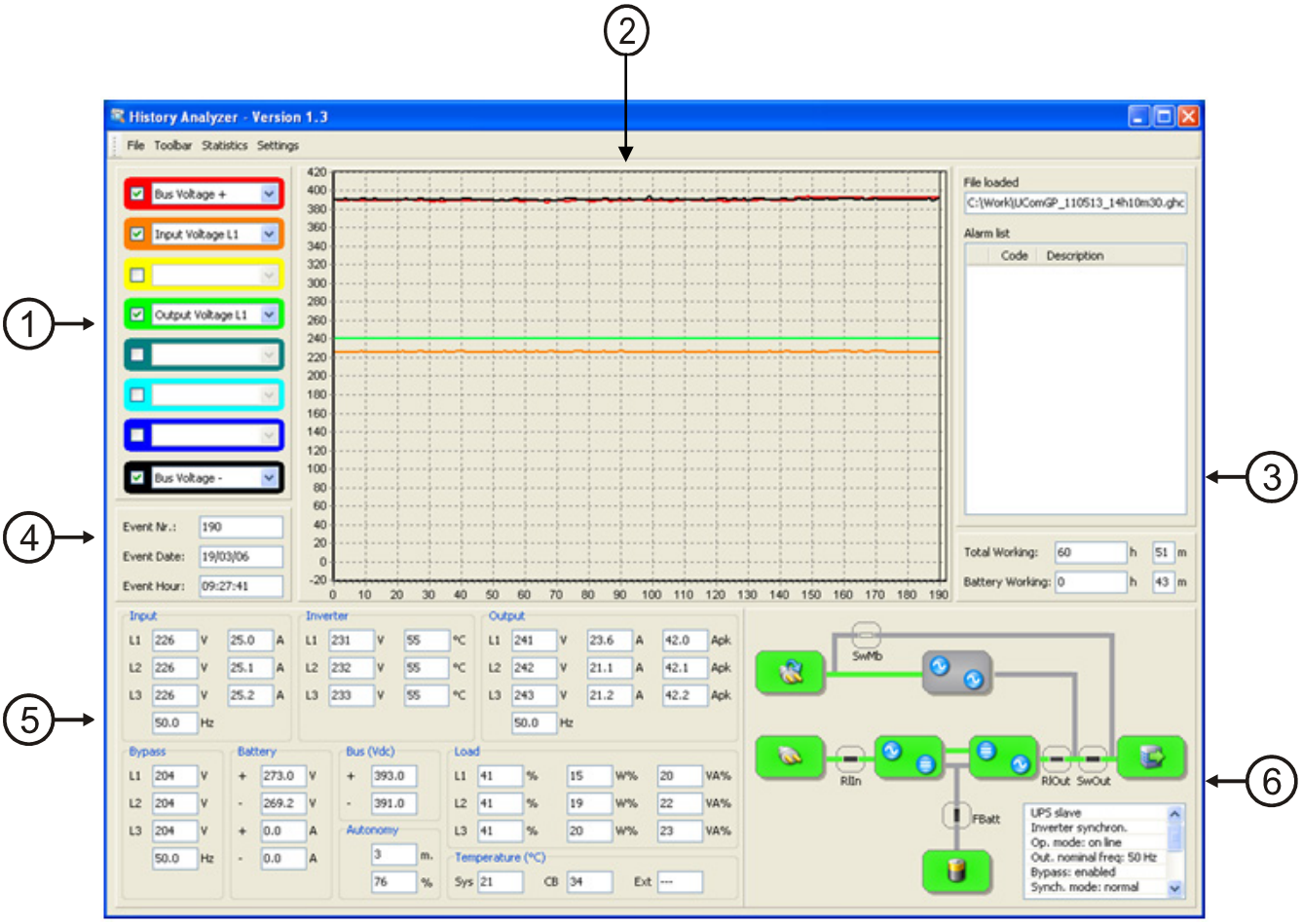
The actual download starts when the **OK** key is clicked. When the download is complete, the program closes automatically.

Once the folder into which the files are to be saved has been chosen, it is possible to enter the name of the file to be generated. The two tags [date] and [time] will be replaced by the date and time of the actual download.

The historical events file (Historical Event) can contain a maximum of 959 events.

The historical data file (Historical Data) can contain a maximum of 191 records (63 in the first revision of the mC+DSP card mounted on the UPS).

GPHISTORY – HISTORY ANALYZER



This program allows the operator to analyse both the historical data file (.ghd) and the configuration file (.gcf) downloaded from the UPS with the GPDownload program. The analysis of the historical data file (.ghd) is obtained from the information contained in blocks 1-6: it is possible to have a detailed display of each individual piece of data recorded. The analysis of the UPS configuration file (.gcf) is obtained from the activation of the Statistics and Settings menus.

MENU

The menu bar displays the options:

File – groups together the operations which can be performed on the files:

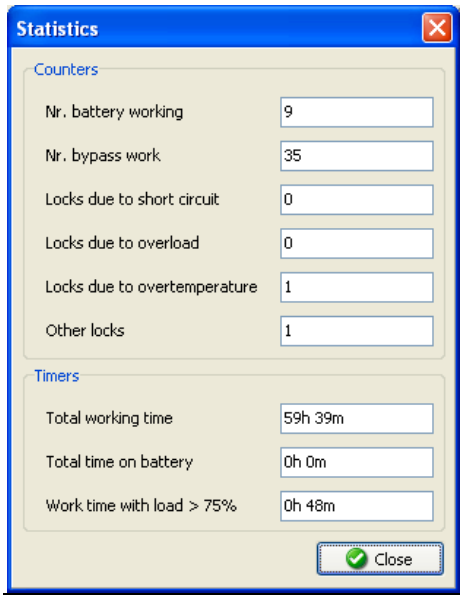
- Open: allows the folder in which the Historical Data file is saved (.ghd) to be opened and loaded onto the display. The UPS configuration file (.gcf) is loaded automatically (the configuration file present in the same folder chosen previously, with the same name as the historical file loaded, is loaded).
- Refresh: allows the file data to be refreshed in the program window.

Toolbar - groups together only one command in its sub menu

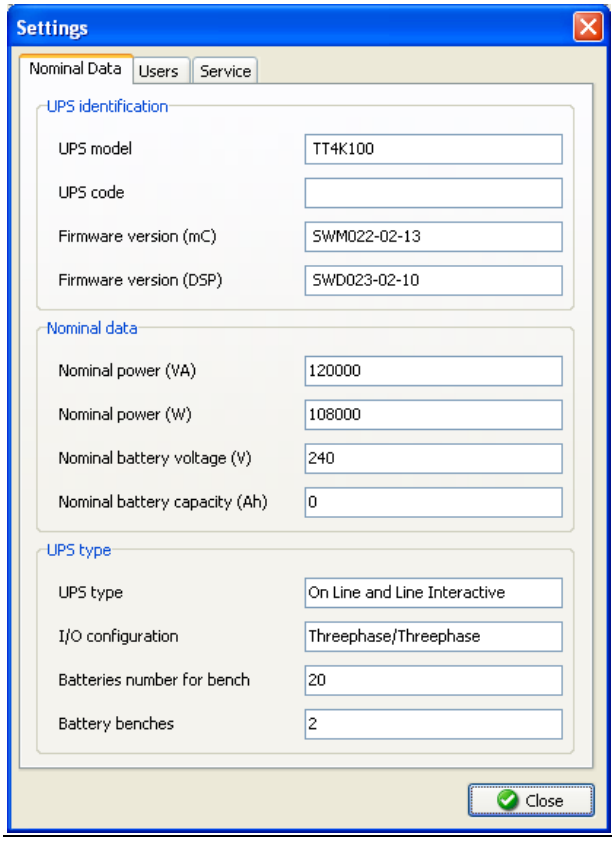
- Show Toolbar: if enabled, this allows for the visualization of the toolbar, where all the above-mentioned commands are displayed. It is useful for reducing the dimensions of the window if the monitor's resolution is low.

Statistics/Settings – allow the UPS configuration file to be displayed:

- Statistics: allows the UPS statistics (counters and timers) to be displayed.



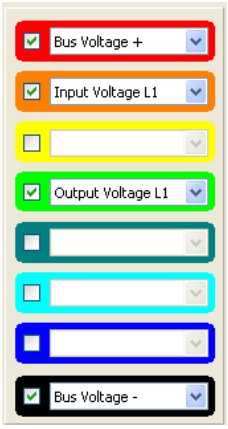
- Settings: allows the UPS's internal settings to be displayed: the rated data (the rating of the UPS in question), the User variables and the Service variables.



DISPLAY

The program display window is divided into 6 panels.

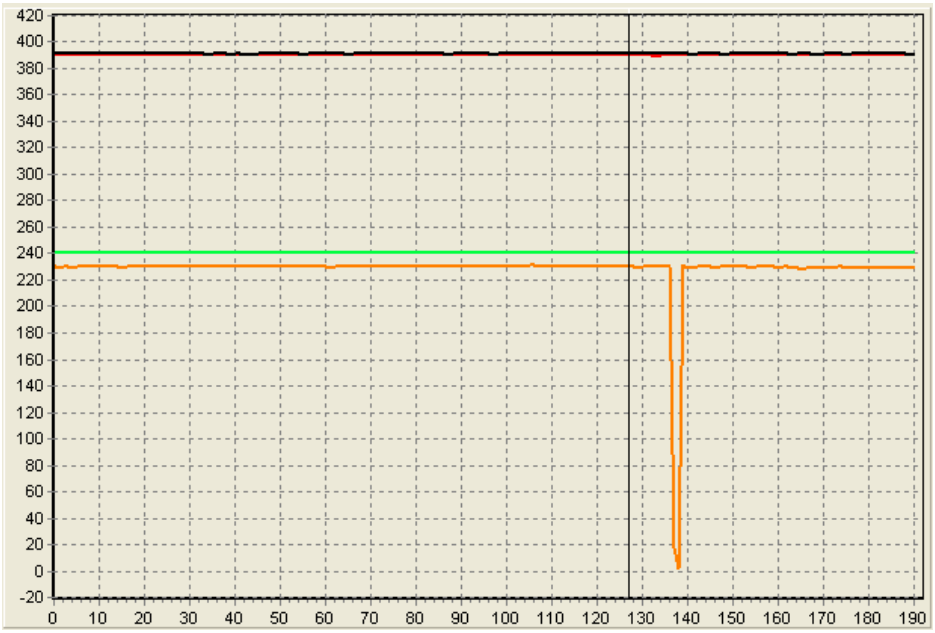
Panel ①



Using these menus it is possible to select the values to be monitored on the graphic display. It is possible to view, at most, eight values simultaneously, enabling them with the subscript command. Each signal is represented by a different color and therefore is easily discernible from the others in the panel.

Panel ②

Panel (2) contains the graph in which the waveforms of the historical file previously selected in panel (1) are displayed.



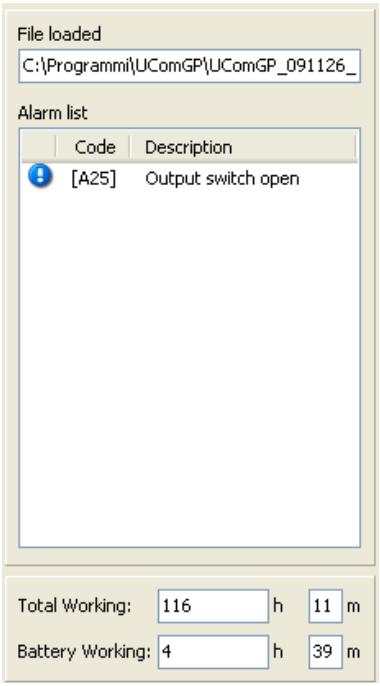
The (y) axis represents the measured value (V for Voltage, A for current and Hz for frequency), while the x-axis represents the number of the sampling (a maximum of 191 samples are displayed).
By reading the graph, all the events logged can be checked. It is possible to view all of the logged events, one by one, using the cursor and clicking on any point within the graph.

The objective is to allow the user to individually check in detail an event, or the events deemed most important for the resolution of the problem.

Once the user has moved the cursor onto the display, the directional keys located on the keyboard (left and right arrows) can be used to move from the event displayed to the previous or the next event. In this way, once the single, most significant, event has been identified it will be easier to conduct an immediate check of its previous or subsequent status.

Panel ③

In panel (3) there is window in which the UPS signals are displayed.



On the top line, (File Loaded), the name of the historical file loaded by the program and from which the samples are viewed is shown.

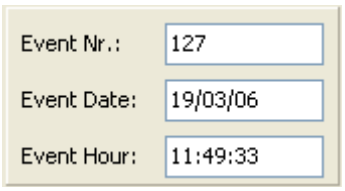
In the Alarm List all of the alarms that were active during registration are listed. There are various alarms with different typologies and levels of gravity (abnormalities, defects, malfunctions, faults). The alarms are recognizable via the associated icons.

The list is made up of three columns: in the first is the icon that identifies the type of signal (alarm or status). In the second is the event code and in the third is the event description.

In the lower part of the panel two types of information are given:

- **Total Working** represents the total time during which the machine operated in online mode;
- **Battery Working** represents the total time during which the machine operated on batter

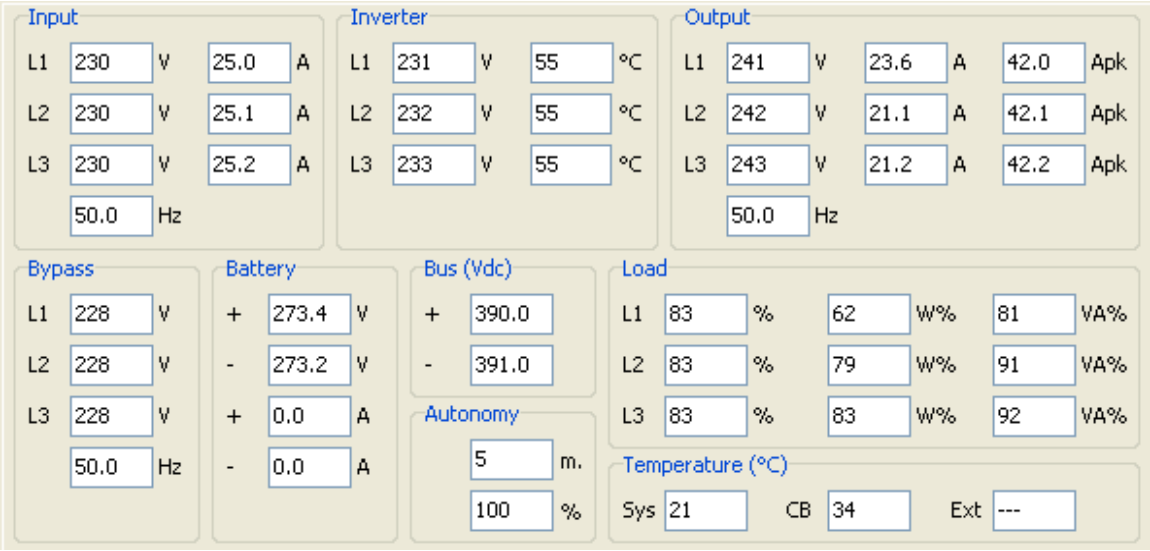
Panel ④



In this panel the number of the event (Event Nr) currently selected, and the date (Event Date) and time (Event Hour) of the event are displayed.

Panel ⑤

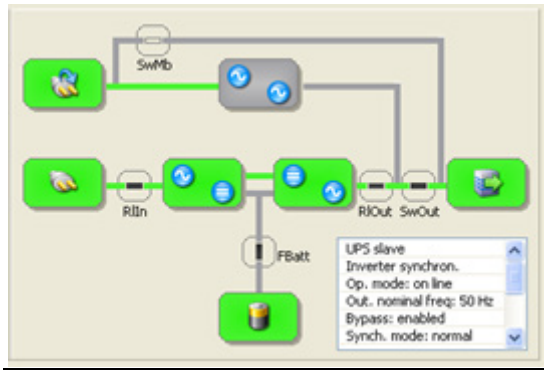
In panel (5) all of the readings logged by the UPS during a specific event are displayed.



- In the **INPUT** section users can check the voltage in the three input phases, the corresponding currents and the frequency.
- In the **INVERTER** section users can check the three voltages generated by the inverter and the temperatures on the heat sink for each of the three phases (in case of UPS with more than one sensor per phase, the temperature shown is the highest one).
- In the **OUTPUT** section users can check the voltage on the machine's three output phases, the relative currents and their peak.
- In the **BYPASS** section users can check the three bypass voltages and the incoming frequency to the UPS.
- In the **BATTERY** section users can check the voltages on the positive and negative arms generated by the battery charger and the current absorbed by the two different branches.
- In the **BUS(Vdc)** section users can check the banks voltage +/- of the capacitators.
- In the **AUTONOMY** section users can check the percentage of battery power remaining and the estimated time remaining before its discharge.
- In the **LOAD** section users can check the percentage of applied charge during each phase and the relative power in KW and kVA.
- In the **TEMPERATURE** section users can check the temperatures reported by the sensors on the system board (Sys) and the battery charge board (CB) as well as the ambient temperature (Ext.).

Panel ⑥

Panel (6) represents a block diagram of the machine's operation.



Through this panel it is possible to monitor the UPS operating status, that is:

- **Condition of the most important stages of the UPS:**
  Main Input, Bypass Input, Rectifier, Inverter, Static Bypass, Load and Battery
  Green (active), **grey** (inactive), **red** (anomaly)

- **Condition of RLIn, RLOut, SwOut, FBatt and SwMb:**
  RIIn = Input Relay / Contactor
  RlOut = Output Relay / Contactor
  SwOut = Output Switch
  FBatt = Battery Fuses
  SwMb = Manual bypass Switch
  Black (closed) or **white** (open)

- **Battery Conditions**
  Green downward-pointing arrow (active and charged)
  Green with upward-pointing arrow (active and discharged)
  Yellow with upward-pointing arrow (active with low battery)
  With open fuses, the panel remains **green** while the arrow remains, but FBatt becomes **white**

Examples of mode of operation:

- **Operation in Stand-By**
  The battery power stages and rectifier are **green** (active), while the inverter, the static Bypass and the Load are **grey** (inactive)
  RLIN **black** (closed) while RLOut, SWOut and SWMb are **white** (open)
  FBatt can be either open or closed, it does not have any influence on this status.

- **Operation by Inverter (on/off)**
  When the Power, Rectifier, Inverter and battery stages are **green** and RLin and RLOut **(black),** the INVERTER is ON.
  When the inverter stage is **grey** (inactive) and RLOut is **white** (open), the INVERTER is ON
  FBatt can be either open or closed, it does not have any influence on this status.

- **Powered or non-powered Load**
  By operation with Inverter on, with SWOut **black** (closed) and the charge panel **green** (active) the load is powered.
  By operation with Inverter on, SWOut becomes **white** (open) and the charge panel **grey** (inactive) the load is not powered.

- **Operation by Static Bybass (or electronic)**
  By operation with inverter on, the RLOut opens and the static Bybass panel becomes **green** (active)
  The other stages remain as if the UPS were in Inverter ON.

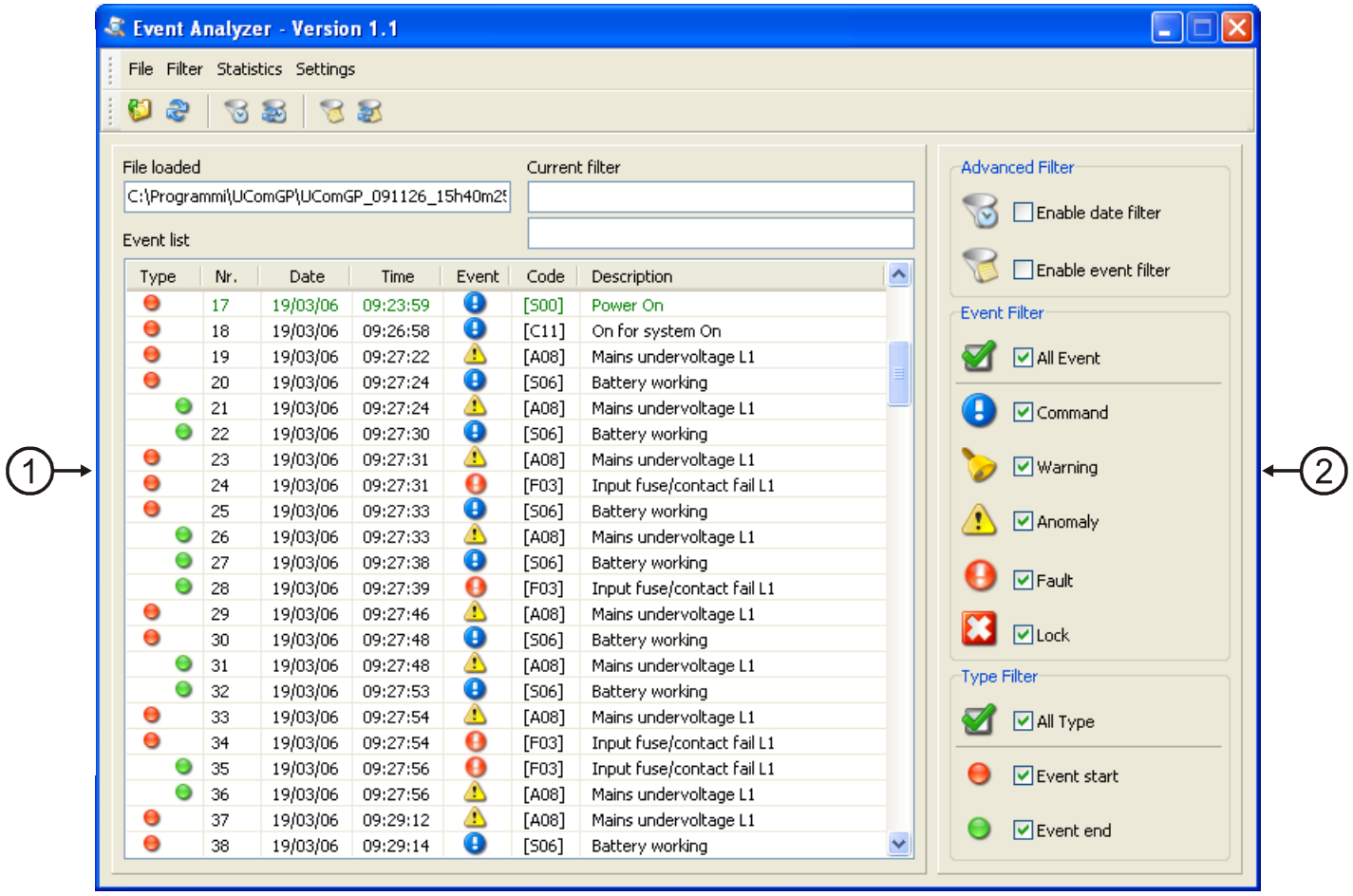
- **Manual Bypass Status**
  The SWOut becomes **white** (open) and the SWMb becomes **black** (closed).
  The SWMb line becomes **yellow**.
  The power, the static bybass and the battery stages remain **green**.
  RLIn, RLOut and FBatt remain **black** (closed).
  The Rectifier stage and inverter become **grey** (inactive).
  There is no arrow that indicates the charge or discharge of the batteries.

- **Operation By Battery**
  The power stages become **red** (anomaly), while the others remain **green** (active).
  RLIn, RLOut, FBatt and SWOut remain **black** (closed) and SWMb is **white** (open).
  The arrow indicates the battery discharge level.
  When the battery is fully discharged, its relative stage becomes **yellow**.

If the UPS notes a GPHistory anomaly, in addition to indicating it in panel (3), it will also be indicated in panel (6), with the affected stage highlighted in red.

Another positive aspect to this program is that it allows a crosscheck to be conducted on each individual event (4) via panels (2), (3), (5) and (6).
This allows us to obtain more information about the defect noted by the UPS.

GPEVENT – EVENT ANALYZER



This program allows the operator to analyse both the historical event file (.ghe) and the configuration file (.gcf) downloaded from the UPS with the GPDownload program. The analysis of the historical event file (.ghe) is obtained from the information contained in blocks 1-2: it is possible to have a detailed display of each individual event recorded. The analysis of the UPS configuration file (.gcf) is obtained from the activation of the Statistics and Settings menus.

MENU

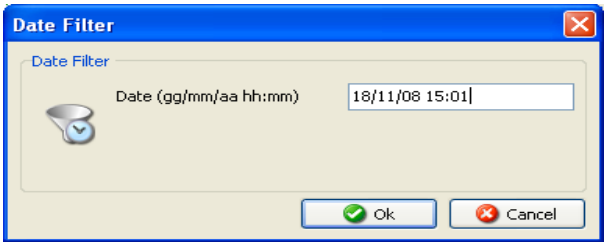
The menu bar displays the options:

File – groups together the operations which can be performed on the files:

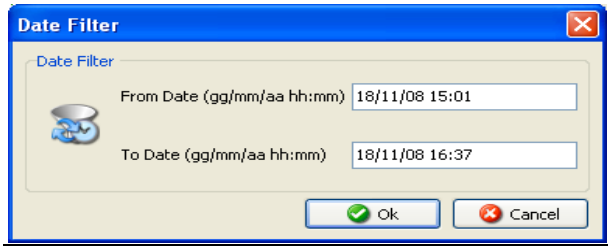
- Open: allows the folder in which the Historical Event file is saved (.ghe) to be opened and loaded onto the display. The UPS configuration file (.gcf) is loaded automatically (the configuration file present in the same folder chosen previously, with the same name as the historical file loaded, is loaded).
- Refresh: allows the file data to be refreshed in the program window.
- Print: allows the list of events recorded by the UPS to be printed. It is only possible to print the events displayed in the event list: if the operator is only interested in some of the events, it is therefore necessary to apply the filters first and then print.
- Export: allows all the events recorded by the UPS to be exported into a text file (.txt). It is only possible to export the events displayed in the event list: if the operator is only interested in some of the events, it is therefore necessary to apply the filters first and then export.

Filter - allow the user to set up a filter on events logged by the UPS:

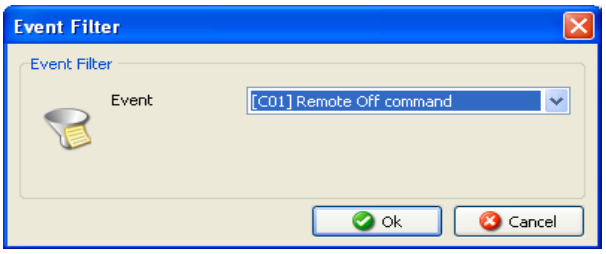
- Day: allows the user to view the events logged by the UPS during a given day (or day/hour):



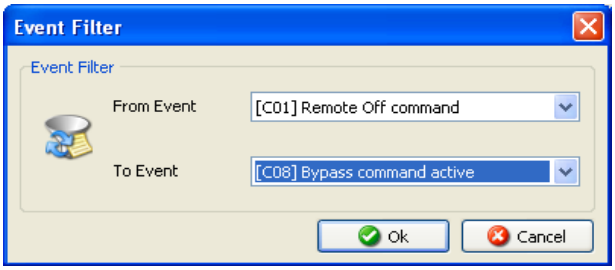
- Period: Allows the user to view the events logged by the UPS during a given period:



- Event: allows the user to view events of a given type logged by the UPS: the type of event can be selected from the drop down menu:



- Event range: allows the user to view all the event types including an interval logged by the UPS: the type of start event can be selected from the drop down menu:



To enable the filters, the user must select the corresponding entry on the main display (see 3.2).

Statistics/Settings – allow the UPS configuration file to be displayed:

- Statistics: allows the UPS statistics (counters and timers) to be displayed.
- Settings: allows the UPS's internal settings to be displayed: the rated data (the rating of the UPS in question), the User variables and the Service variables.

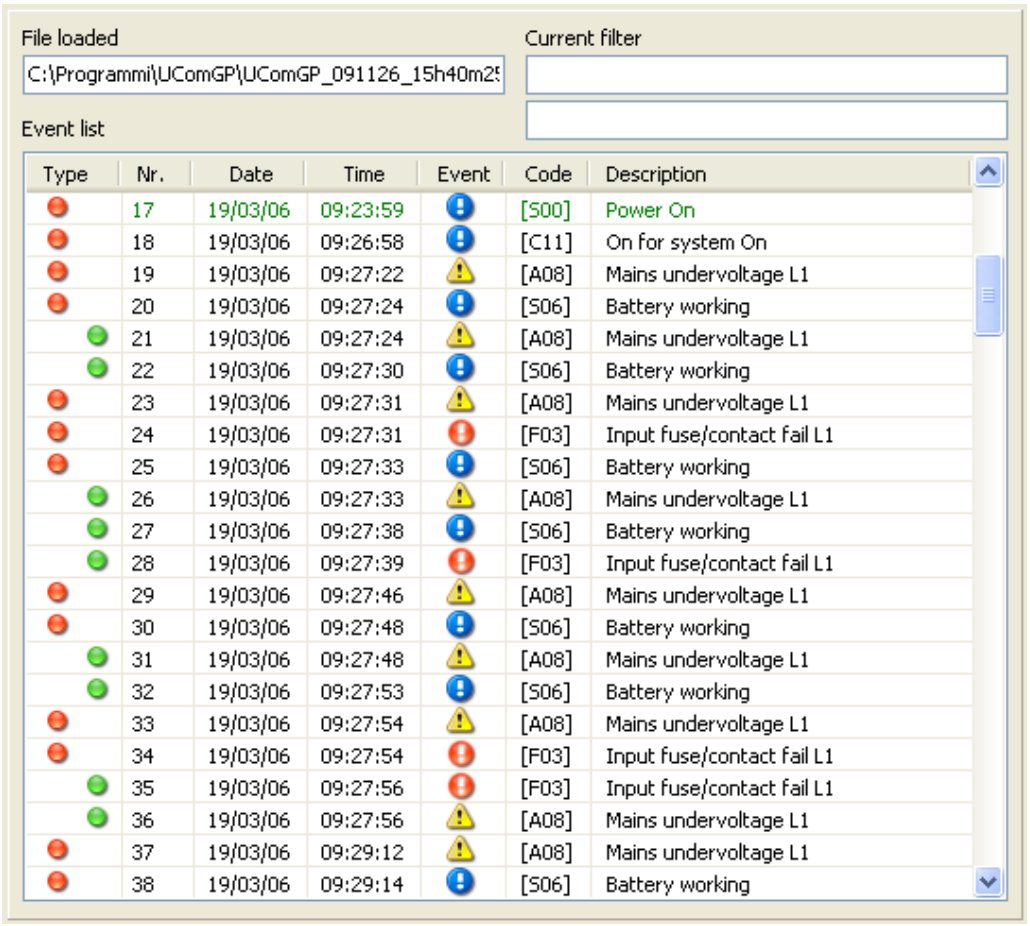
All the above-mentioned commands are located on the **toolbar**. From there, the user can directly access them by clicking on the icon desired.

DISPLAY

The program display window is divided into two panels.

Panel ①

In panel (1) the events selected by the user are shown.

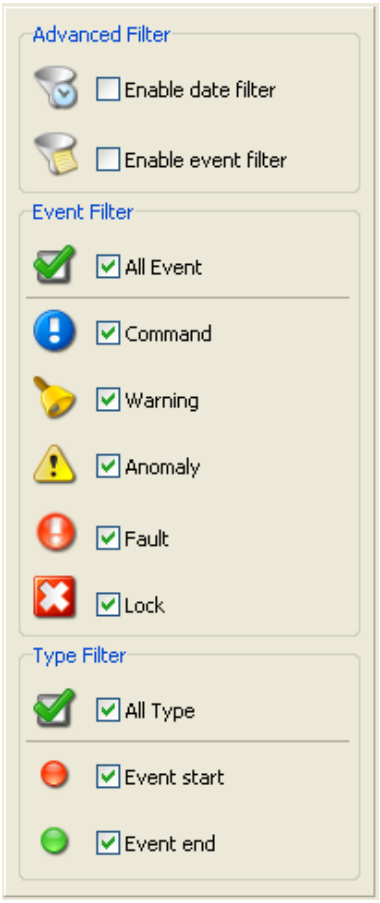


Type	Nr.	Date	Time	Event	Code	Description
	17	19/03/06	09:23:59		[S00]	Power On
	18	19/03/06	09:26:58		[C11]	On for system On
	19	19/03/06	09:27:22		[A08]	Mains undervoltage L1
	20	19/03/06	09:27:24		[S06]	Battery working
	21	19/03/06	09:27:24		[A08]	Mains undervoltage L1
	22	19/03/06	09:27:30		[S06]	Battery working
	23	19/03/06	09:27:31		[A08]	Mains undervoltage L1
	24	19/03/06	09:27:31		[F03]	Input fuse/contact fail L1
	25	19/03/06	09:27:33		[S06]	Battery working
	26	19/03/06	09:27:33		[A08]	Mains undervoltage L1
	27	19/03/06	09:27:38		[S06]	Battery working
	28	19/03/06	09:27:39		[F03]	Input fuse/contact fail L1
	29	19/03/06	09:27:46		[A08]	Mains undervoltage L1
	30	19/03/06	09:27:48		[S06]	Battery working
	31	19/03/06	09:27:48		[A08]	Mains undervoltage L1
	32	19/03/06	09:27:53		[S06]	Battery working
	33	19/03/06	09:27:54		[A08]	Mains undervoltage L1
	34	19/03/06	09:27:54		[F03]	Input fuse/contact fail L1
	35	19/03/06	09:27:56		[F03]	Input fuse/contact fail L1
	36	19/03/06	09:27:56		[A08]	Mains undervoltage L1
	37	19/03/06	09:29:12		[A08]	Mains undervoltage L1
	38	19/03/06	09:29:14		[S06]	Battery working

- **File loaded:** specifies the historical file loaded by the program and of which the events are being displayed.
- **Current Filter:** specifies the type of filter set for the events: on the first line there will be the filter set regarding the Date (Day/period), on the second line the filter set for the events (Event/Event range). **Note**: to activate the filters the user must tick the corresponding checkbox in the panel (2).
- **Event list**: displays the list of events contained in the open file (the file name is displayed in the File loaded box). The maximum number of events displayed (logged by the UPS) is 959 events. It is possible to view only a portion of these using the filters and layout of panel (2). This list has 7 columns:
  - In the **Type** column, a red or a green icon is displayed: a red icon indicates the start of an event; a green icon indicates the end of the same event.
  - The **Nr** column simply indicates the number of the event (1 – 959).
  - The **Date** column indicates the day/month/year of the logged event.
  - The **Time** column indicates the time: the minute and second in which the event was logged.
  - In the **Event** column an icon is shown that represents the type of event logged: the possible types (see also panel (2)) in order of severity are: command (status and/or command), warning (not serious), anomaly (serious), fault (very serious alarms) and lock (machine malfunction).
  - The **Code** column specifies the code that identifies the event logged by the machine.
  - The **Description** column provides a brief description of the logged event.

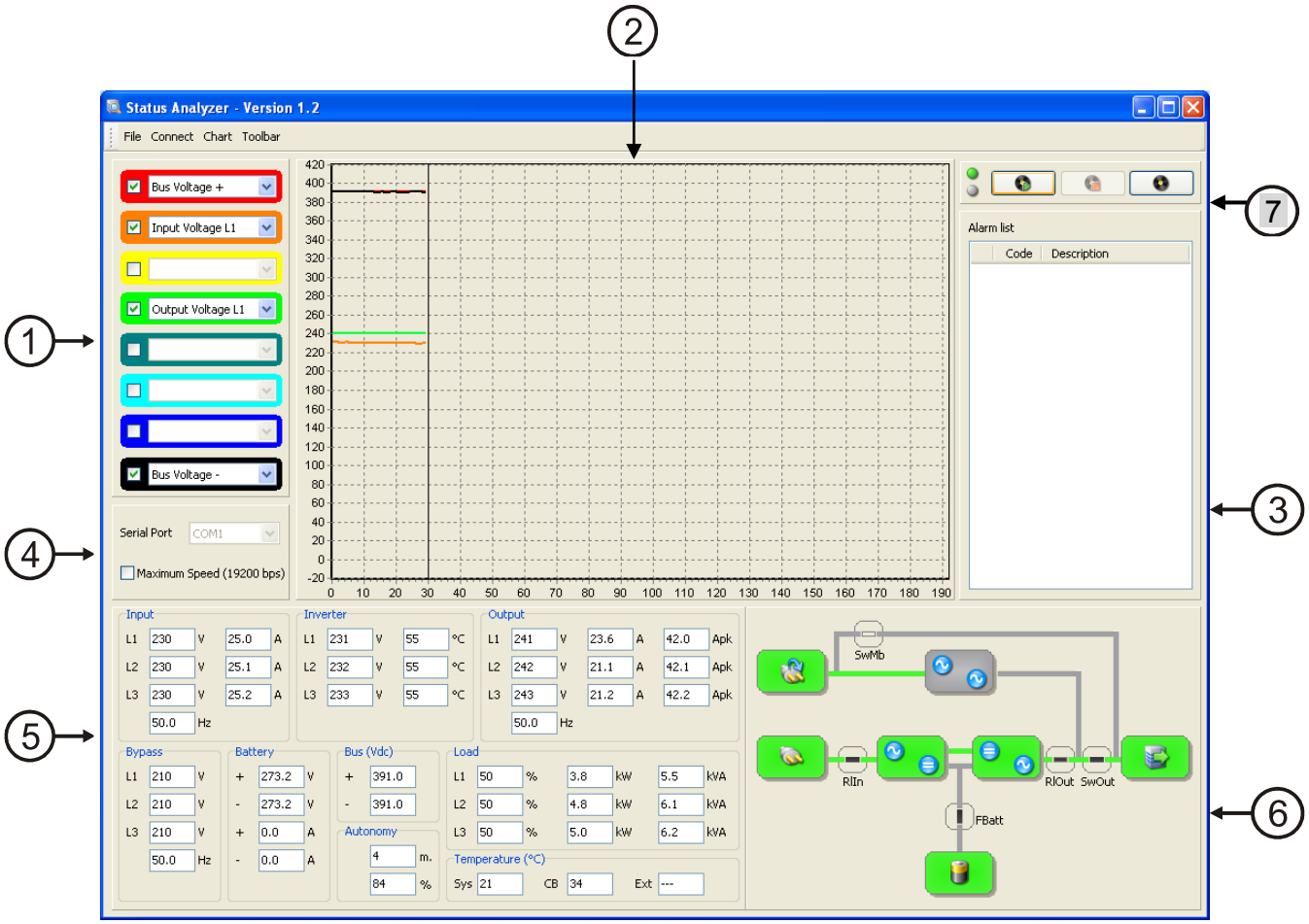
Panel ②

In panel (2) a series of checkboxes are found which the user can use to filter the events shown in the event list. For practical purposes the panel is divided into three sections:



- **Advancer Filter:** in this section the filters set on date (Day/Period) and on the events (Event/Event range), previously set and displayed in panel (1) in the two relevant lines are enabled . **Note**: the setting of the filters will not work if these two checkboxes are not ticked.
  These two options can be used together or separately.
- **Event Filter**: in this section, it is possible to specifically filter only the types, or the type, of event(s) that the user is interested in whether it be a command, an alarm, an anomaly, a defect or a malfunction. Using All Event the users can select by default all of the recognized events
- **Type Filter**: in this section it is possible to filter, in detail, only the start status of the events (Event start – events with red icon), the end status of the events (Event end – events with green icon) or both. Using All Type the user can select both of the events as the default.

GPREALTIME – STATUS ANALYZER



This program allows the operator to communicate in real time with the UPS and therefore to view its status. The operator can also, if so desires, record the data that the program shows into one or more files, that can be successively be analyzed with the same program ("analyze file" mode).

MENU

The menu bar offers the options:

File – groups togheter the operation of opening and closing files:

- Open file: allow to open a previously recorded file and enter "analyze file" mode.
- Close file: allow to close a previously opened file and return to "real time" mode.

Connect – groups together the UPS connection operations.

- Play (connect to ups): to connect to the UPS and start receiving data in real time.
- Pause: to momentarily interrupt communication with the UPS. When communication is resumed (done by re-selecting the command Play) the data previously acquired will not be lost.
- Stop (disconnect from ups): to completely disconnect from the UPS. When communication is resumed (done by re-selecting the command Play) the data previously acquired will be lost.

Chart – groups together the possible operations on the graphic.

- Clear chart : used to voluntarily delete all data that the program has received from the UPS up until that moment, without interrupting communication.

Toolbar – groups together possible operations on the display window.

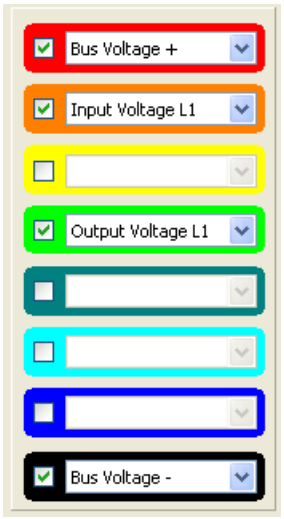
- Show Toolbar : if enabled, it allows the user to view the toolbar, where all the above-mentioned commands are located. It is helpful to reduce the dimensions of the window in the event of the monitor's low resolution.

DISPLAY

The program display window is divided into six panels.

Panel ①

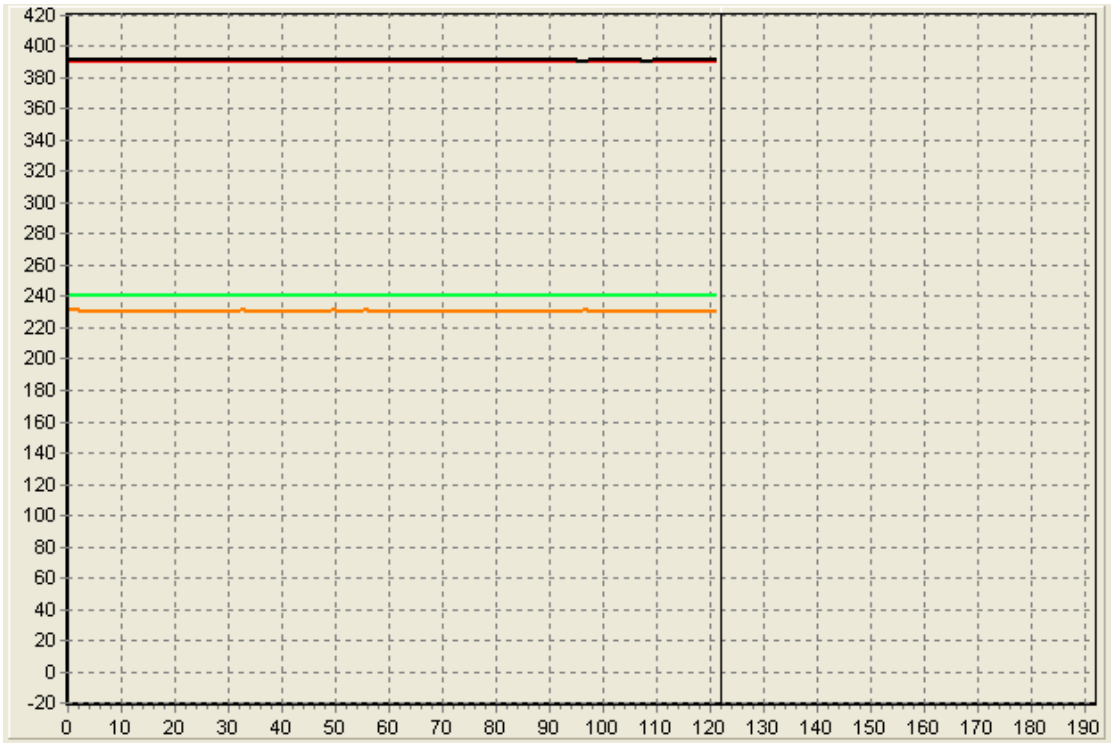
In panel (1) there are eight drop down menus. The configuration shown in the image is the default configuration.



Users are able to select the signal type to be monitored in the display, by selecting the relative value from the drop down menu. The maximum number of values that can be displayed simultaneously is eight and they are enabled by ticking the corresponding checkbox. Each signal is represented by a different color and , therefore, is easily discernable from the others.

Panel ②

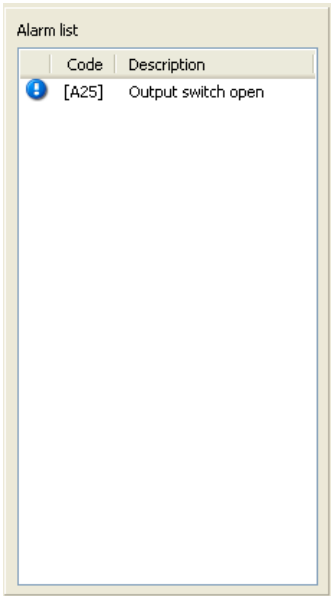
In panel (2) users find the graph that displays the variables previously selected in panel (1).



The y-axis represents the measured value (V for Voltage, A for current and Hz for frequency), while the x-axis represents the number of the sampling (a maximum of 191 samples are displayed).
Reading the graph, users can see directly, and in real time, the progress of the various quantities measured by UPS and, in the event of anomalies, also their values.

Panel ③

In panel (3) there is a window where the UPS warnings and signals are displayed.

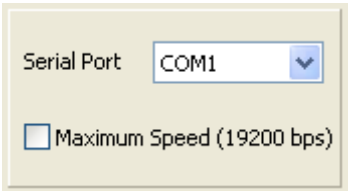


In the list (Alarm list) all of the alarms and the statuses recognized by the UPS are listed. There are various alarms with different typologies and levels of severity (anomalies, defects, malfunctions, faults). The alarms are recognizable by the statuses via the associated icons.
The list is made up of three columns: in the first is the icon that identifies the type of signal (alarm or status), in the second column the event code is displayed and lastly, the third column contains a description of the event.

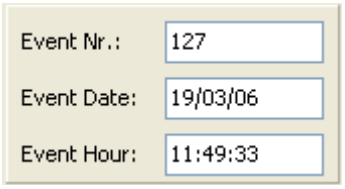
Situation in which no signal appears in the window; it is the status of Normal Operation with SWOUT closed

Panel ④

The view of this block depends on the mode which the program is.



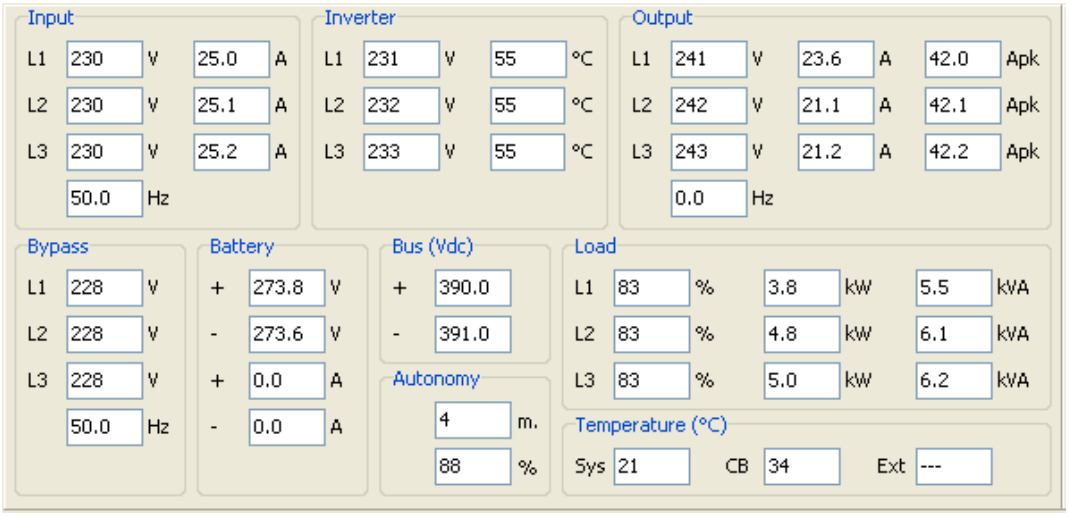
In this panel, it is possible to select the RS232 serial port on the PC used for communication with the UPS (COM1 - COM8). Only in the event that the MultiCom 362 communication card or the programming card in communication mode are being used is it possible to select the maximum speed (19200bps). If this is not the case, do not activate the “Maximum speed (19200bps)” option. In this way, the program will automatically select the maximum usable speed.



On the “analyze file” mode on this block is reported the number of the event currently selected (Event Nr), date (Event Date) and hour (Event Hour) on which the event occurred.

Panel ⑤

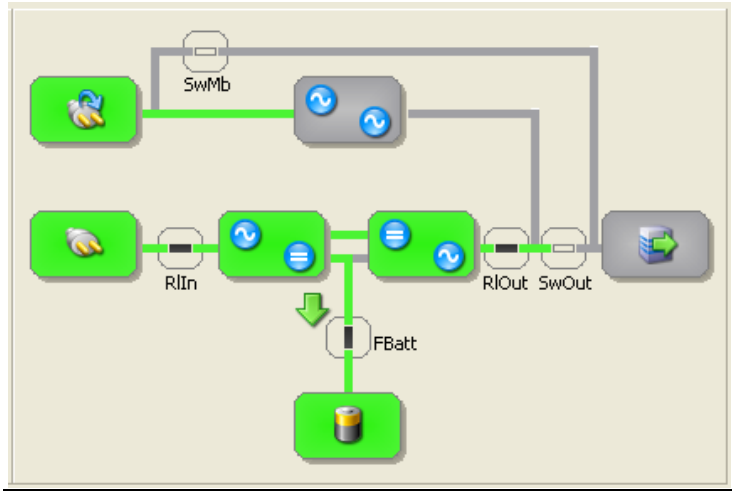
In panel (5) the most important measurements of the UPS are displayed.



- In the **INPUT** section users can check the voltage in the three input phases, the corresponding currents and the frequency.
- In the **INVERTER** section users can check the three voltages generated by the inverter and the temperatures on the heat sink for each of the three phases (in case of UPS with more than one sensor per phase, the temperature shown is the highest one).
- In the **OUTPUT** section users can check the voltage on the machine's three output phases, the relative currents and their peak.
- In the **BYPASS** section users can check the three bypass voltages and the incoming frequency to the UPS.
- In the **BATTERY** section users can check the voltages on the positive and negative branches generated by the battery charger and the current absorbed by the two different branches.
- In the **BUS (Vdc)** section users can check the banks voltage +/- of the capacitators.
- In the **AUTONOMY** section users can check the percentage of battery power remaining and the estimated time remaining before its discharge.
- In the **LOAD** section users can check the percentage of applied charge during each phase and the relative power in KW and kVA.
- In the **TEMPERATURE** section users can check the temperatures reported by the sensors on the system board (Sys) and the battery charge board (CB) as well as the ambient temperature (Ext.).

Panel ⑥

Panel (6) represents a block diagram of the machine's operation.



Through this panel it is possible to monitor the UPS operating status, that is:

- **Condition of the most important stages of the UPS**
  Main Input, Bypass Input, Rectifier, Inverter, Static Bypass, Load and Battery
  Green (active), **grey** (inactive), **red** (anomaly)

- **Condition of RLIn, RLOut, SwOut, FBatt and SwMb:**
  RIIn = Input Relay / Contactor
  RlOut = Output Relay / Contactor
  SwOut = Output Switch
  FBatt = Battery Fuses
  SwMb = Manual bypass Switch
  Black (closed) or **white** (open)

- **Battery Conditions**
  Green downward-pointing arrow (active and charged)
  Green with upward-pointing arrow (active and discharged)
  Yellow with upward-pointing arrow (active with low battery)
  With open fuses, the panel remains **green** while the arrow remains, but FBatt becomes **white**

Examples of mode of operation:

- **Operation in Stand-By**
  The battery power stages and rectifier are **green** (active), while the inverter, the static bypass and the Load are **grey** (inactive)
  RLIN **black** (closed) while RLOut, SWOut and SWMb are **white** (open)
  FBatt can be either open or closed, it does not have any influence on this status.

- **Operation by Inverter (on/off)**
  When the Power, Rectifier, Inverter and battery stages are **green** and RLin and RLOut **(black),** the INVERTER is ON.
  When the inverter stage is **grey** (inactive) and RLOut is **white** (open), the INVERTER is ON
  FBatt can be either open or closed, it does not have any influence on this status.

- **Powered or non-powered Load**
  By operation with Inverter on, with SWOut **black** (closed) and the charge panel **green** (active) the load is powered.
  By operation with Inverter on, SWOut becomes **white** (open) and the charge panel **grey** (inactive) the load is not powered.

- **Operation by Static Bypass (or electronic)**
  By operation with inverter on, the RLOut opens and the static bypass panel becomes **green** (active)
  The other stages remain as if the UPS were in Inverter ON.

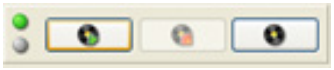
- **Manual Bypass Status**
  The SWOut becomes **white** (open) and the SWMb becomes **black** (closed).
  The SWMb line becomes **yellow**.
  The power, the static Bypass and the battery stages remain **green**.
  RLIn, RLOut and FBatt remain **black** (closed).
  The Rectifier stage and inverter become **grey** (inactive).
  There is no arrow that indicates the charge or discharge of the batteries.

- **Operation By Battery**
  The power stages become **red** (anomaly), while the others remain **green** (active).
  RLIn, RLOut, FBatt and SWOut remain **black** (closed) and SWMb is **white** (open).
  The arrow indicates the battery discharge level.
  When the battery is fully discharged, its relative stage becomes **yellow**.

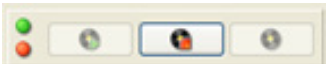
Panel ⑦

The view of this block depends on the mode which the program is.

On the “real time” mode in this block there are information about connection status, registration status and also the button that allows the recording of the viewed data on file.



The led on the high side shows the connection status. When the program is connected to the UPS, the led will blink green.



The led on the low side shows the recording status. When the program is recording data, the led will lit fixed red.

The three buttons that are on the same block allow the recording of the showed data to a file:

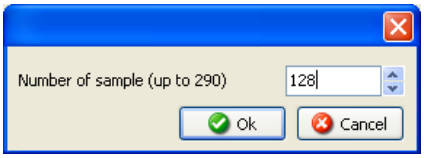
- **Start record:** start recording data to file. After pressing this button the operator will be asked the name of the file on which insert data. After confirming name, the next data will be recorded on the file until the “stop record” button is pressed. When this file is analyzed, the date and hour showed on block (4) on “analyze file” will be the same of the PC, at the time of data acquisition via serial.
- **Stop record:** stops recording data to file. From this point onward the data won’t be recorded on file.
- **Record window:** records the data currently present on the window on block (2). After pressing the button the operator will be asked the file name on which record data. After confirming name, the data present on the window block (2) will be recorded on the file. When this file is analyzed, the date and hour showed on block (4) on “analyze file” will be the time on which the operator pressed the Record show. When this button is pressed, the UPS connection is paused; and for restoring the connection the operator must select Play on menu, inside the Connect menu section.

On the “analyze file” mode in this block there are the navigation button on the file data showed on block (2).

The operator will have the ability to navigate:

- to the beginning of the file (in this case the first 192 records will be shown);
- back half page (in this case it will go back 96 records);
- forward half page (in this case it will go forward 96 records);
- to the end of file (in this case the last 192 records will be shown);
- to a specified record;

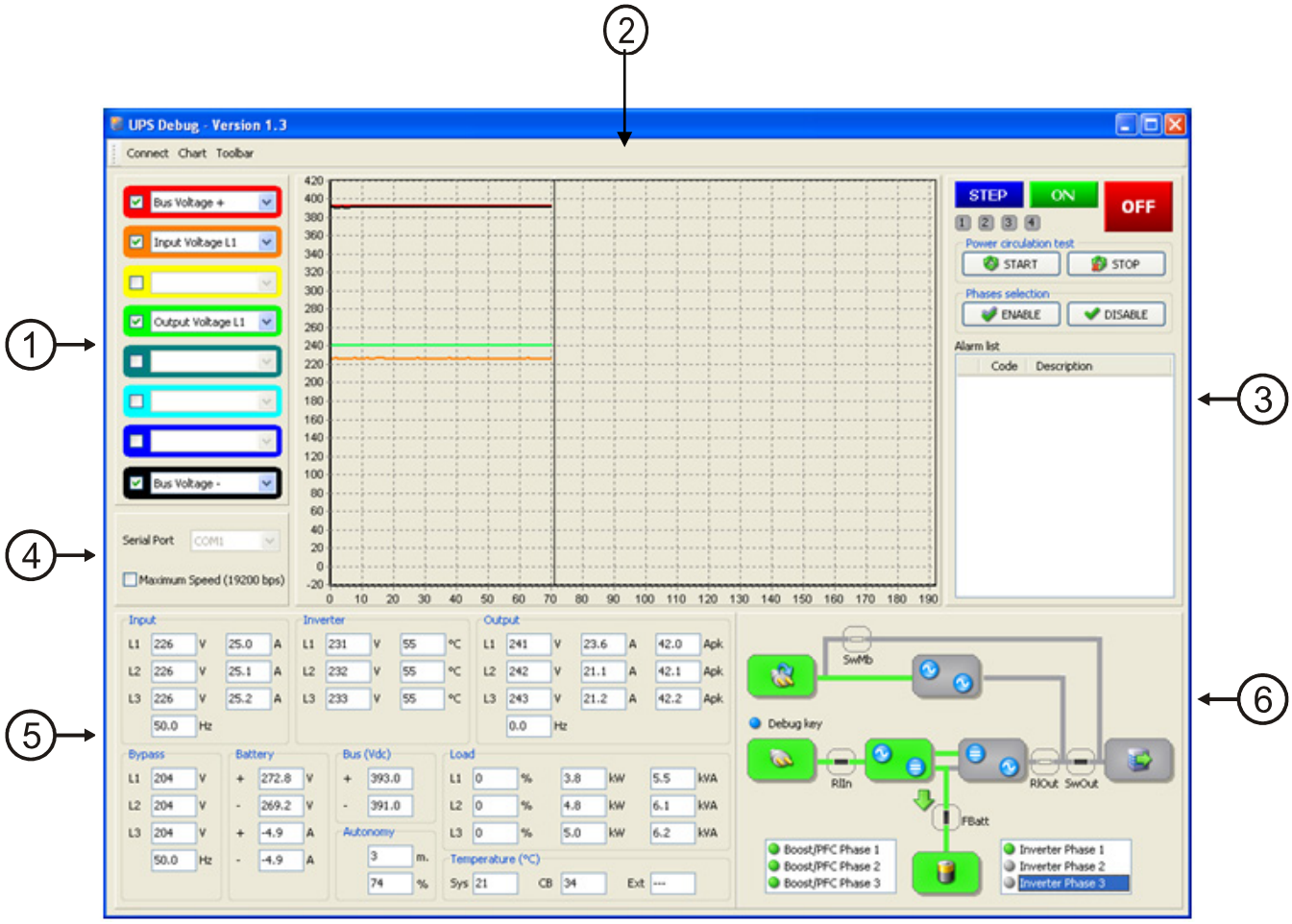
In this case the following insert mask will be shown:



In this mask are showed the total number of records present on the file; the operator will be able to insert the number of record to which move the file. After pressing Ok, the first record showed on block (2) will be the desired record.

The last button allow to execute a play on block (2). The records showed on block (2) will be scanned one after another and the operator will see the flow of all the recorded values in a “fake real time”. After pressing play, it will be replaced by the stop button , with which the “fake real time” view can be stopped.

GPDEBUG – DEBUG UPS



This program allows the operator to communicate in real time with the UPS, to display the status and to turn on the UPS in four distinct steps, with the aim of isolating any problems or turning the UPS on in a safer way after a repair.

Insert the cable **0CBSU0001A (DEBUG KEY)** in the position of the external battery temperature sensor before giving power to the UPS. With the insertion of the debug key the ups will not start completely but will only precharge the DC capacitor and will be waiting for the commands.

MENU

The menu bar offers the options:

Connect – groups together the UPS connection operations.

- Play (connect to ups): to connect to the UPS and start receiving data in real time.
- Pause: to momentarily interrupt communication with the UPS. When communication is resumed (done by re-selecting the command Play) the data previously acquired will not be lost.
- Stop (disconnect from ups): to completely disconnect from the UPS. When communication is resumed (done by re-selecting the command Play) the data previously acquired will be lost.

Chart – groups together the possible operations on the graphic.

- Clear chart : used to voluntarily delete all data that the program has received from the UPS up until that moment, without interrupting communication.

Toolbar – groups together possible operations on the display window.

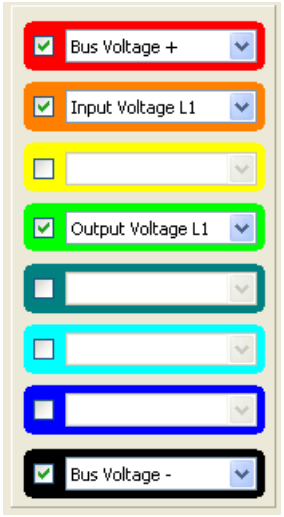
- Show Toolbar : if enabled, it allows the user to view the toolbar, where all the above-mentioned commands are located. It is helpful to reduce the dimensions of the window in the event of the monitor's low resolution.

DISPLAY

The program display window is divided into six panels.

Panel ①

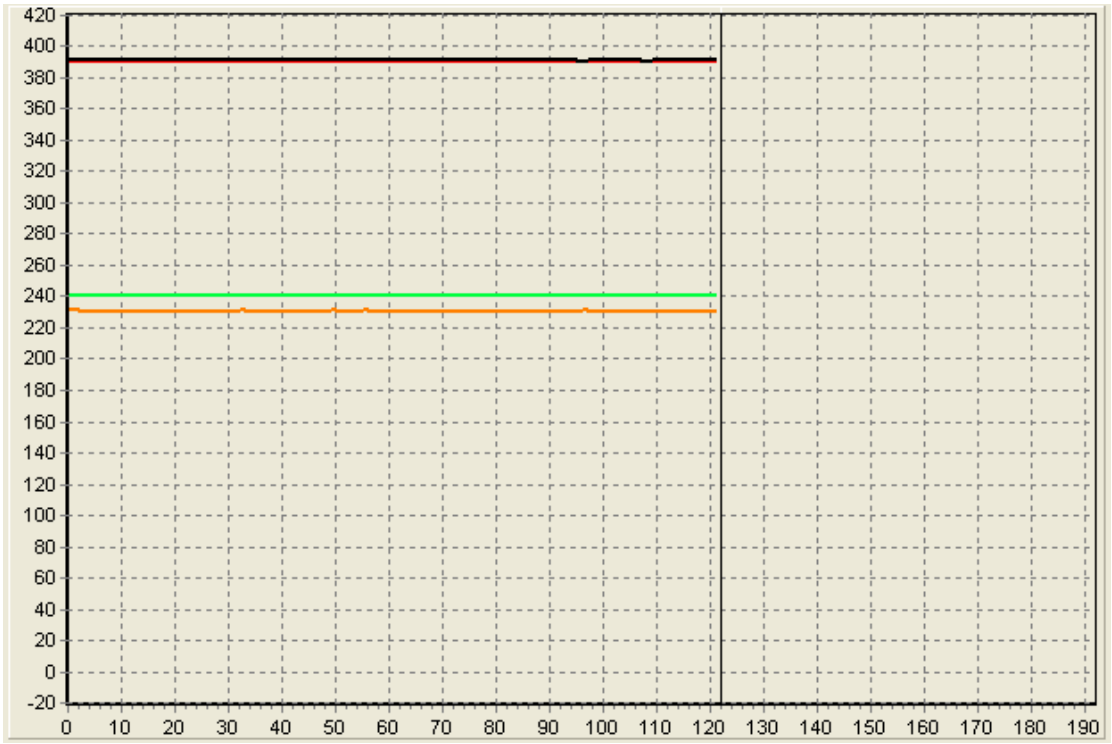
In panel (1) there are eight drop down menus. The configuration shown in the image is the default configuration.



Users are able to select the signal type to be monitored in the display, by selecting the relative value from the drop down menu. The maximum number of values that can be displayed simultaneously is eight and they are enabled by ticking the corresponding checkbox. Each signal is represented by a different color and , therefore, is easily discernable from the others.

Panel ②

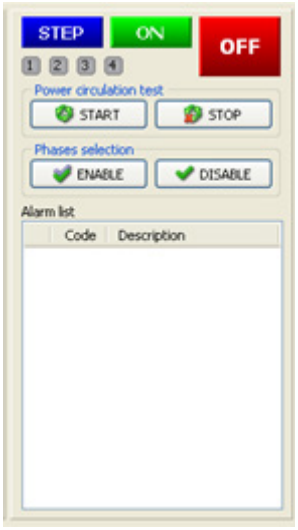
In panel (2) users find the graph that displays the variables previously selected in panel (1).



The y-axis represents the measured value (V for Voltage, A for current and Hz for frequency), while the x-axis represents the number of the sampling (a maximum of 191 samples are displayed).
Reading the graph, users can see directly, and in real time, the progress of the various quantities measured by UPS and, in the event of anomalies, also their values.

Panel ③

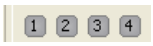
In the block (3) are present the essential buttons for debugging the UPS (i.e. turning it on in individual steps), the buttons for power circulation test, the buttons for enabling and disabling the turning on of the singles power modules and the list of UPS alarms.



Turning on step by step

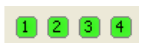
- **Step (blue button):** using this button, it is possible to turn on the UPS in distinct steps. Each time the Step button is pressed, this corresponds to one step towards power on.
- **On (green button)**: using this button, it is possible turn the UPS on directly and totally.
- **Off (red button)** using this button, it is possible to turn the UPS off directly and totally, both when it is fully on and when it is on in any of the debugging steps.

Using the power on step indicator, the operator is always able to find out which debugging step the UPS is at:



UPS fully off;

UPS on in debug mode;



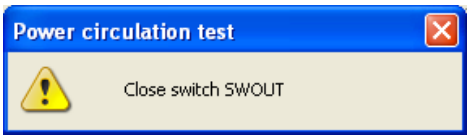
UPS fully on;

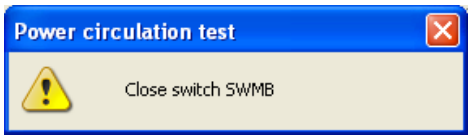
Start and Stop commands for Power circulation test

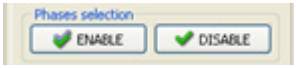
These commands are enabled only with UPS connected and the “debug key” inserted.

Before starting the test (START), it is necessary that the UPS is in stand-by mode and the SWMB switch is open.

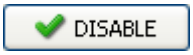
The manual operations to be made for the proper execution of the test will be displayed.



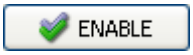




Commands to enable and disable the turning on of the singles power modules. (Phases selection)



Disabled mode. All power modules are active.



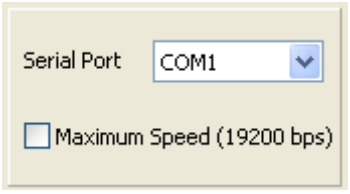
Enabled mode. Only the modules marked by the green LED are active..

To enable/disable a power module, click on the corresponding LED.
The command is executed immediately and can be sent either by UPS in stand-by (in this case, the selected modules will be turned on only after an ON or STEP command) and with UPS on.

In “Alarm List” are shown all the alarms and statuses of the UPS. There are various types of alarm and various levels of seriousness (anomalies, defects, locks, faults). The alarms can be recognised from the states using the associated icon.
This list is composed of three columns: in the first appears the icon which identifies the type of alert (alarm or status); the second shows the code belonging to the event encountered and the third shows its description.

Situation in which no signal appears in the window; it is the status of Normal Operation with SWOUT closed

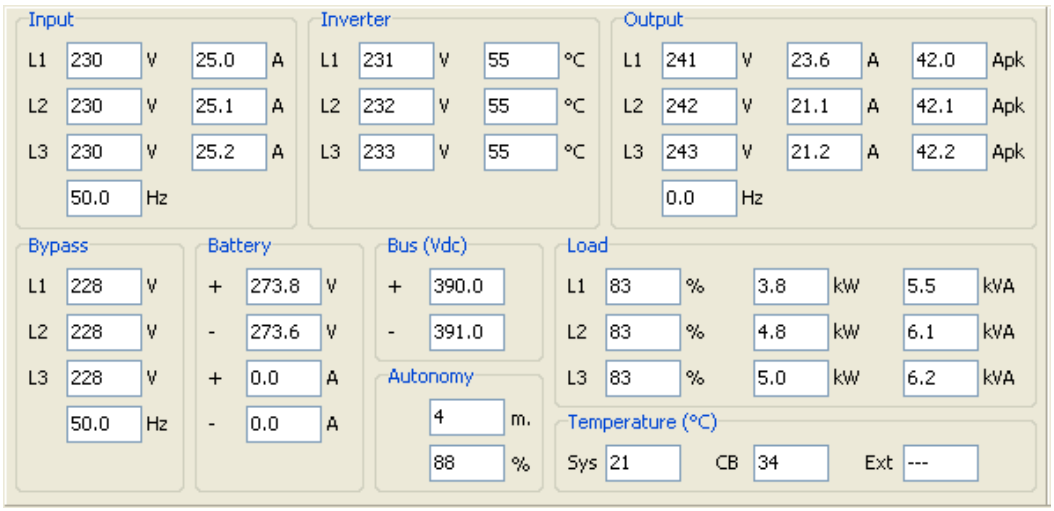
Panel ④



In this panel, it is possible to select the RS232 serial port on the PC used for communication with the UPS (COM1 - COM8). Only in the event that the MultiCom 362 communication card or the programming card in communication mode are being used is it possible to select the maximum speed (19200bps). If this is not the case, do not activate the "Maximum speed (19200bps)" option. In this way, the program will automatically select the maximum usable speed.

Panel ⑤

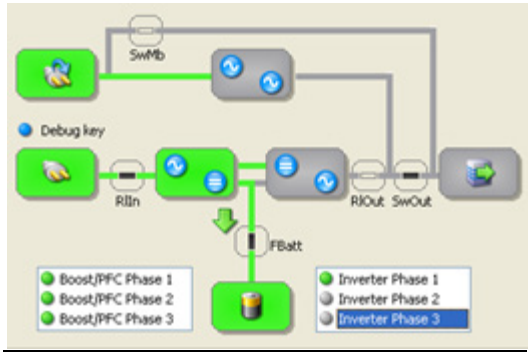
In panel (5) the most important measurements of the UPS are displayed.



- In the **INPUT** section users can check the voltage in the three input phases, the corresponding currents and the frequency.
- In the **INVERTER** section users can check the three voltages generated by the inverter and the temperatures on the heat sink for each of the three phases (in case of UPS with more than one sensor per phase, the temperature shown is the highest one).
- In the **OUTPUT** section users can check the voltage on the machine's three output phases, the relative currents and their peak.
- In the **BYPASS** section users can check the three bypass voltages and the incoming frequency to the UPS.
- In the **BATTERY** section users can check the voltages on the positive and negative branches generated by the battery charger and the current absorbed by the two different branches.
- In the **BUS (Vdc)** section users can check the banks voltage +/- of the capacitators.
- In the **AUTONOMY** section users can check the percentage of battery power remaining and the estimated time remaining before its discharge.
- In the **LOAD** section users can check the percentage of applied charge during each phase and the relative power in KW and kVA.
- In the **TEMPERATURE** section users can check the temperatures reported by the sensors on the system board (Sys) and the battery charge board (CB) as well as the ambient temperature (Ext.).

Panel ⑥

Panel (6) represents a block diagram of the machine's operation.



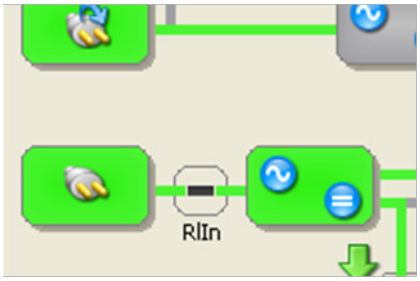
Through this panel it is possible to monitor the UPS operating status, that is:

- **Condition of the most important stages of the UPS**
  Main Input, Bypass Input, Rectifier, Inverter, Static Bypass, Load and Battery
  Green (active), **grey** (inactive), **red** (anomaly)

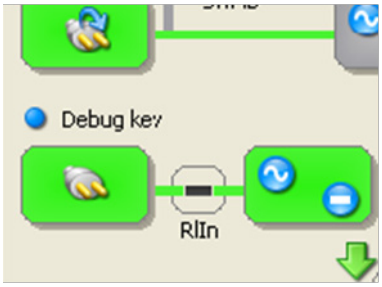
- **Condition of RLIn, RLOut, SwOut, FBatt and SwMb:**
  RIIn = Input Relay / Contactor
  RIOut = Output Relay / Contactor
  SwOut = Output Switch
  FBatt = Battery Fuses
  SwMb = Manual bypass Switch
  Black (closed) or **white** (open)

- **Battery Conditions**
  Green downward-pointing arrow (active and charged)
  Green with upward-pointing arrow (active and discharged)
  Yellow with upward-pointing arrow (active with low battery)
  With open fuses, the panel remains **green** while the arrow remains, but FBatt becomes **white**

You can also check the status of the debug key:



Debug key NOT inserted



Debug key inserted

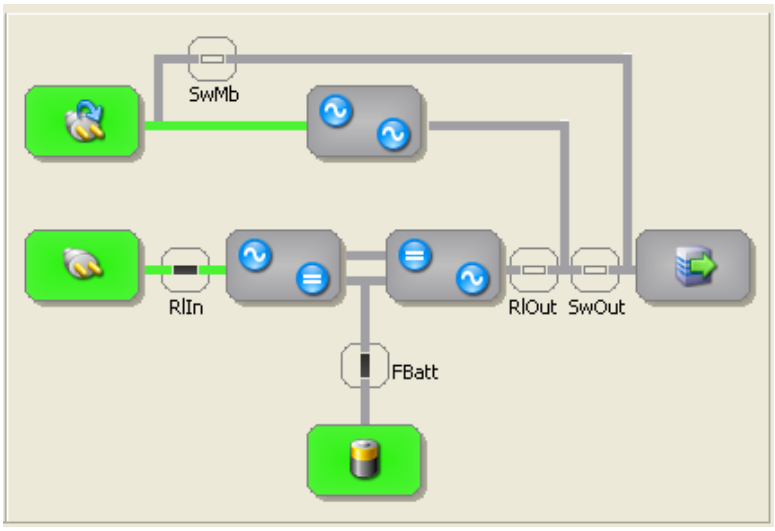
Examples of mode of operation

- **Operation in Stand-By**
  The battery power stages and rectifier are **green** (active), while the inverter, the static bypass and the Load are **grey** (inactive).
  RLIN **black** (closed) while RLOut, SWOut and SWMb are **white** (open)
  FBatt can be either open or closed, it does not have any influence on this status.
- **Operation by Inverter (on/off)**
  When the Power, Rectifier, Inverter and battery stages are **green** and RLin and RLOut **(black),** the INVERTER is ON.
  When the inverter stage is **grey** (inactive) and RLOut is **white** (open), the INVERTER is ON
  FBatt can be either open or closed, it does not have any influence on this status.
- **Powered or non-powered Load**
  By operation with Inverter on, with SWOut **black** (closed) and the charge panel **green** (active) the load is powered.
  By operation with Inverter on, SWOut becomes **white** (open) and the charge panel **grey** (inactive) the load is not powered.
- **Operation by Static Bypass (or electronic)**
  By operation with inverter on, the RLOut opens and the static bypass panel becomes **green** (active)
  The other stages remain as if the UPS were in Inverter ON.
- **Manual Bypass Status**
  The SWOut becomes **white** (open) and the SWMb becomes **black** (closed).
  The SWMb line becomes **yellow**. The power, the static Bypass and the battery stages remain **green**.
  RLIn, RLOut and FBatt remain **black** (closed). The Rectifier stage and inverter become **grey** (inactive).
  There is no arrow that indicates the charge or discharge of the batteries.
- **Operation By Battery**
  The power stages become **red** (anomaly), while the others remain **green** (active).
  RLIn, RLOut, FBatt and SWOut remain **black** (closed) and SWMb is **white** (open).
  The arrow indicates the battery discharge level.
  When the battery is fully discharged, its relative stage becomes **yellow**.

POWER ON IN DEBUG MODE

Step 0

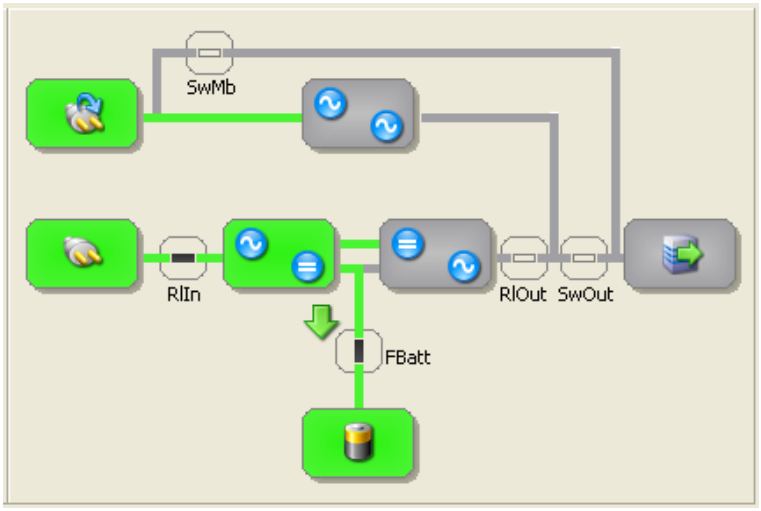
In this status, the UPS has finished preloading and is waiting for the first Step command.



- The input, bypass and battery stages are active (green).
- RLin is closed.
- RLout, SwOut and SwMb are open.
- The boost, inverter and static bypass stages are inactive (grey).

Step 1

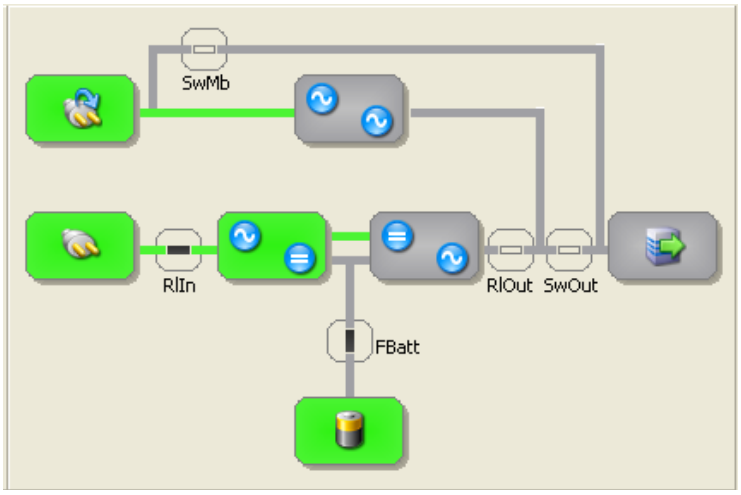
In this status, the UPS has turned on the boost and the battery charger.



- The input, bypass and battery stages are active (green).
- RLin is closed.
- The boost stage is active (green).
- The line which connects the battery and the boost virtually is active, with the green arrow facing downwards. This means that the battery charger is on and that the batteries are being charged.
- RLout, SwOut and SwMb are open.
- The inverter and static bypass stages are still inactive (grey).

Step 2

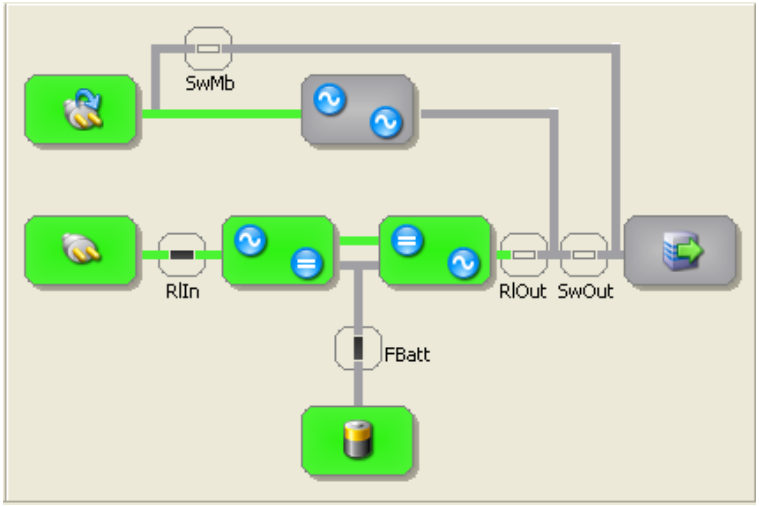
1 2 3 4 In this status, the UPS has simply turned off the battery charger.



- The input, bypass and battery stages are active (green).
- RLin is closed.
- The boost stage is active (green).
- The line which connects the battery to the boost stage virtually is deactivated. This means that the battery charger has been turned off.
- RLout, SwOut and SwMb are open.
- The inverter and static bypass stages are still inactive (grey).

Step 3

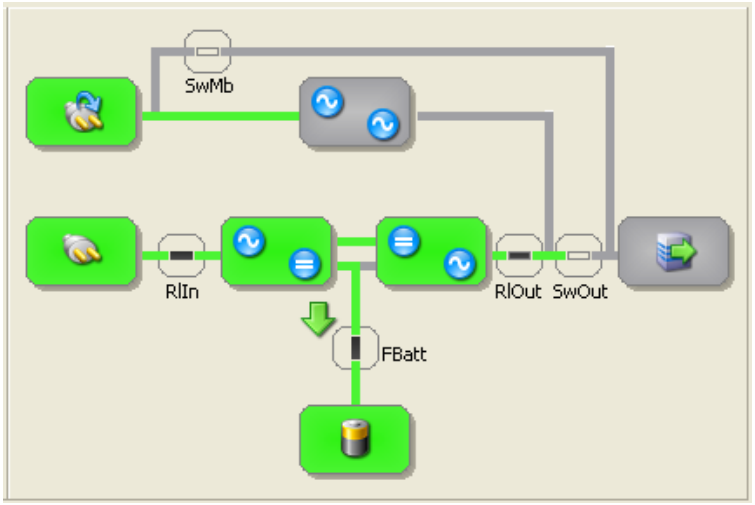
1 2 3 4 In this status, the UPS has turned on the inverter stage and the static bypass stage.



- The input, bypass and battery stages are active (green).
- RLin is closed.
- The boost stage is active (green).
- The green line which connects the battery and the boost virtually has been reactivated, with the green arrow facing downwards. The battery charger is therefore operating and recharging the batteries.
- SwOut and SwMb are open.
- The inverter stage is on, as is the static bypass stage.
- RlOut is closed.
- The line which joins the bypass stage and the output between RlOut and SwOut is active. This means that the UPS is working from the static bypass.

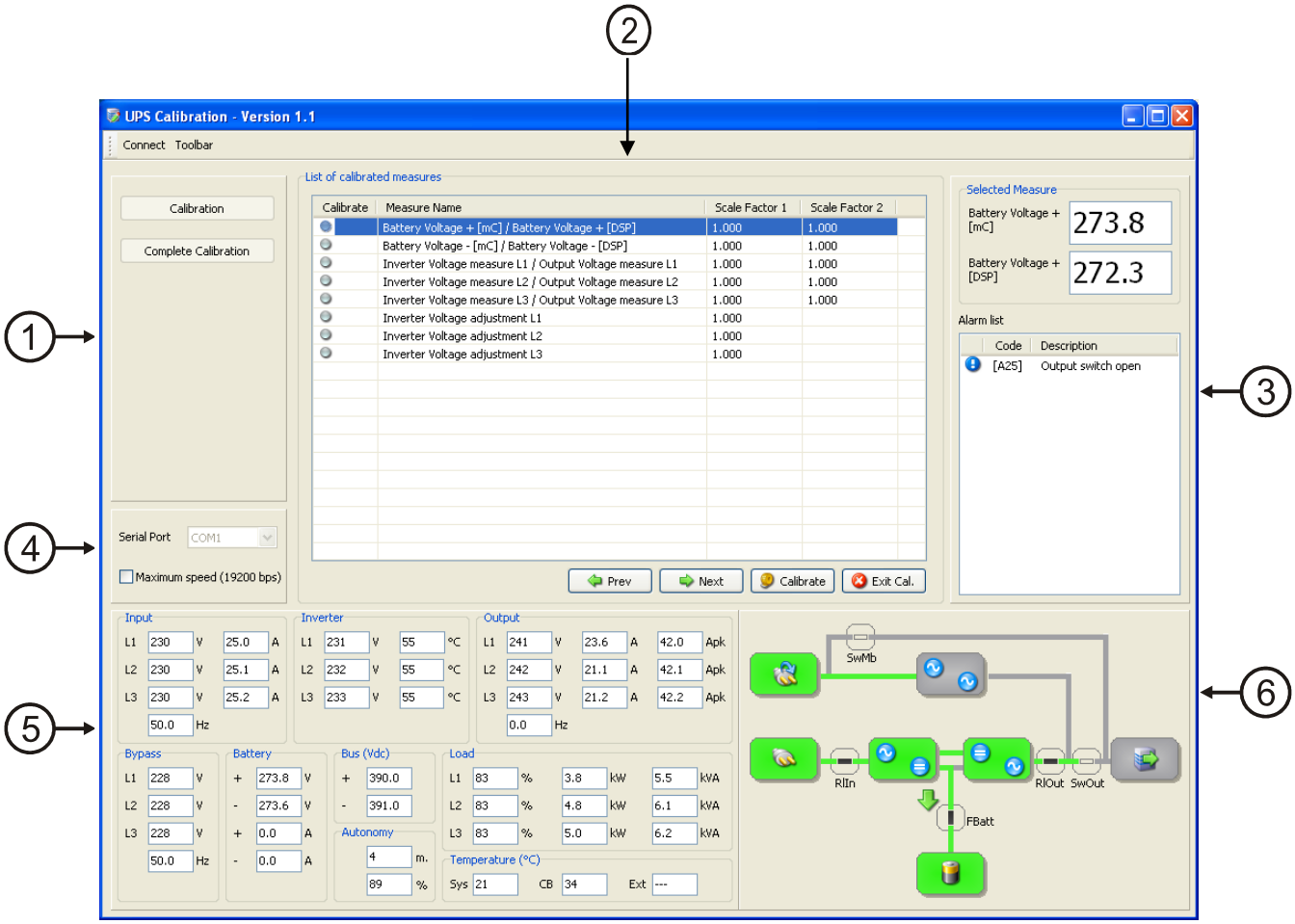
Step 4

1 2 3 4 In this status, the UPS works from the inverter.



- The input, bypass and battery stages are active (green).
- RlIn is closed.
- The boost stage is active (green).
- The line which connects the battery and the boost virtually is active, with the green arrow facing downwards. The battery charger is therefore operating and recharging the batteries.
- SwOut and SwMb are open.
- The inverter stage is on.
- The static bypass stage is off.
- RlOut is closed.
- The bypass stage and consequently the line which joins it to the output between RlOut and SwOut are deactivated. This means that the machine is working from the inverter.

GPCALIBRATE – CALIBRATE UPS



This program allows the operator to calibrate the most important UPS voltages and currents.

MENU

The menu bar offers the options:

Connect – contains groups together the UPS connection operations.

- Connect: to connect to the UPS and start receiving data in real time.
- Disconnect: to completely disconnect from the UPS. When communication is resumed (done by re-selecting the command Play) the data previously acquired will be lost.

Toolbar – groups together possible operations on the display window.

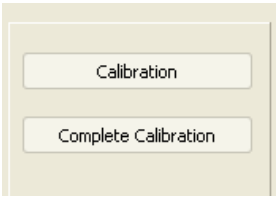
- Show Toolbar : if enabled, it allows the user to view the toolbar, where all the above-mentioned commands are located. It is helpful to reduce the dimensions of the window in the event of the monitor's low resolution.

DISPLAY

The program display window is divided into six panels.

Panel ①

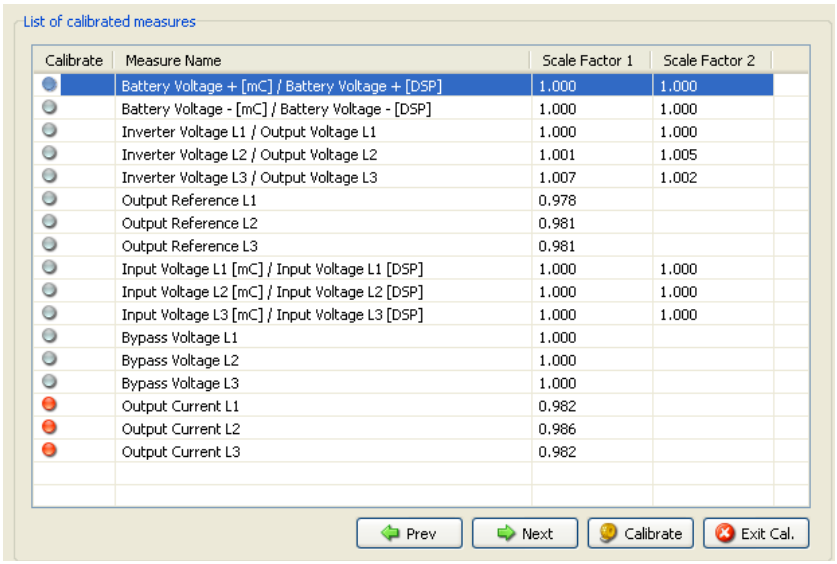
In the block (1), there are two keys which allow the required calibration to the chosen.

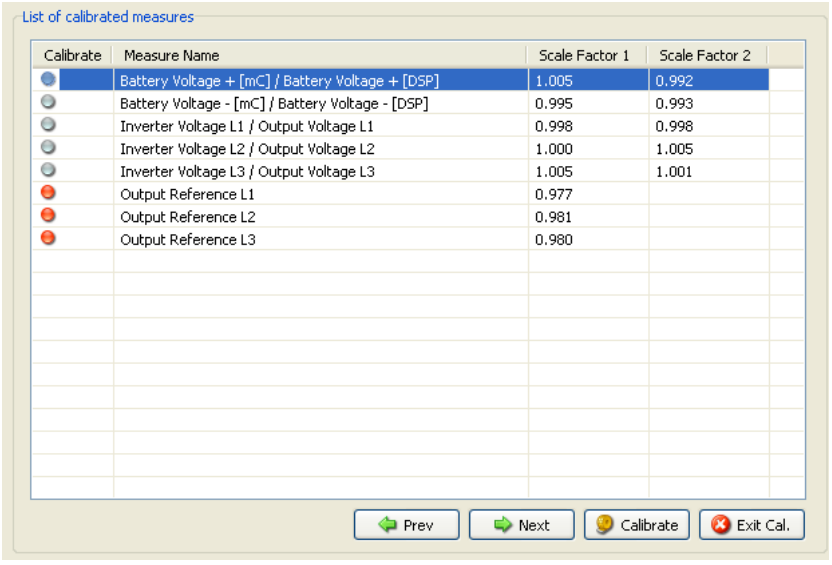


The **Calibration** key allows entry to the machine's partial calibration mode.
The **Complete Calibration** key allows entry to the machine's complete calibration mode.

Panel ②

In the block (2), it is possible to see the list of measurements which it is possible to calibrate (list of calibrated measures). The figures below show the list of calibrated measurements in complete and partial calibration.





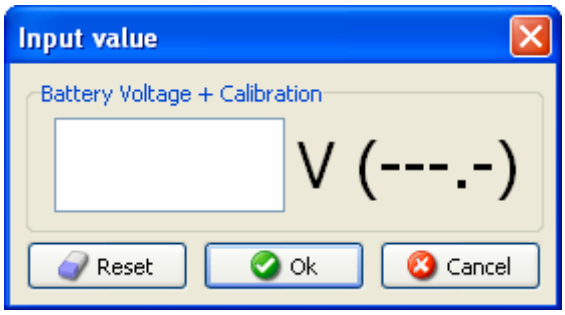
The block list (2) has four columns:

- Calibrate: the dot in this column shows the status of that measurement when it enters the program. If the dot is grey, the measurement has still to be calibrated; if the dot is green, the measurement has already been calibrated; if the dot is red, the measurement cannot be calibrated.
- Measure Name: this column shows the name of the measurement(s) which can be calibrated. Some calibrations envisage the calibration of two measurements, which will be performed one after the other. For these calibrations, this column of the list will show the name of both the measurements which can be calibrated, separated by a slash (/).
- Scale Factor 1: conversion factor applied to the measurement shown in Measure Name. In the case of a double measurement, this conversion factor refers to the first measurement (the one to the left of the slash (/)).
- Scale Factor 2: conversion factor applied to the measurement shown in Measure Name. This conversion factor refers to the second measurement (the one to the right of the slash (/)).

At the bottom of the block (2), it is possible to find four keys:

- **Prev**: allows the selection of the measurement to be calibrated, scrolling upwards through the list.
- **Next**: allows the selection of the measurement to be calibrated, scrolling downwards through the list.
- **Calibrate:** allows the measurement selected in the list (highlighted by the darker colour line) to be calibrated. It is possible to select the measurement using the **Prev / Next** keys or using the mouse to click directly on the measurement on the list to be calibrated.
- **Exit Cal**: allows the user to exit calibration mode (which was entered by clicking on the block (2) keys).

Clicking on **Calibrate** opens up a window (**Input value**) in which it will be possible to enter the reference value for the calibration of the measurement in question.



This window should show the voltage or current values measured on the multimeter used for calibrating the measurement in question. As shown in the figure, the value which appears must include a decimal after the point.
There are three ways of returning to the main window:

- **OK** key: allows the measurement to be calibrated, using the value entered on the video screen as a reference.
- **Cancel** key: cancels the calibration of the measurement, leaving the previous conversion factor unaltered;
- **Reset** key: cancels the calibration of the measurement, taking the conversion factor back to the unit;

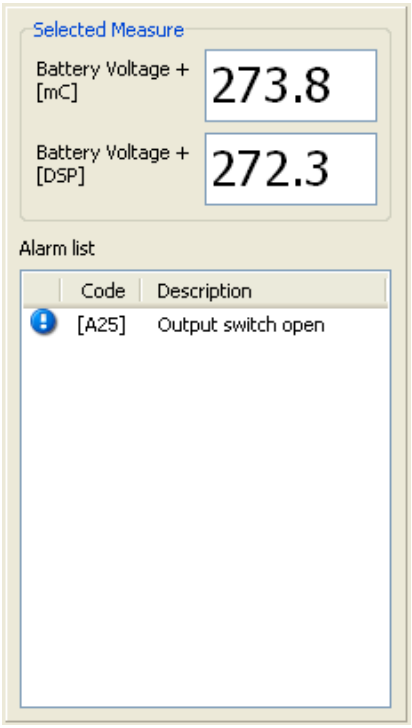
In order to calibrate the Inverter Voltage/Output Voltage L1-L2-L3 measurements, the UPS must be on and operating from the inverter.

In order to calibrate the Output Reference L1-L2-L3 measurements, the SwOut must be open.

In order to calibrate the Output Current L1-L2-L3 measurements, there must be a load of at least 50% of that which the UPS can take.

Panel ③

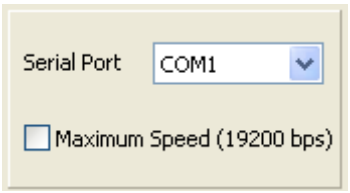
In the block (3), in addition to the list where the UPS alerts are displayed, there are also two indicators which, in real time, represent the value of the measurement selected in the block (2) list.



The list (Alarm List), on the other hand, lists all the alarms and statuses that the UPS acknowledges. There are various types of alarm and various levels of seriousness (anomalies, defects, locks, faults). The alarms can be recognised from the states using the associated icon.
This list is composed of three columns: in the first, the icon which identifies the type of alert (alarm or status) appears; the second shows the code belonging to the event encountered and the third shows its description.

Situation in which no signal appears in the window; it is the status of Normal Operation with SWOUT closed

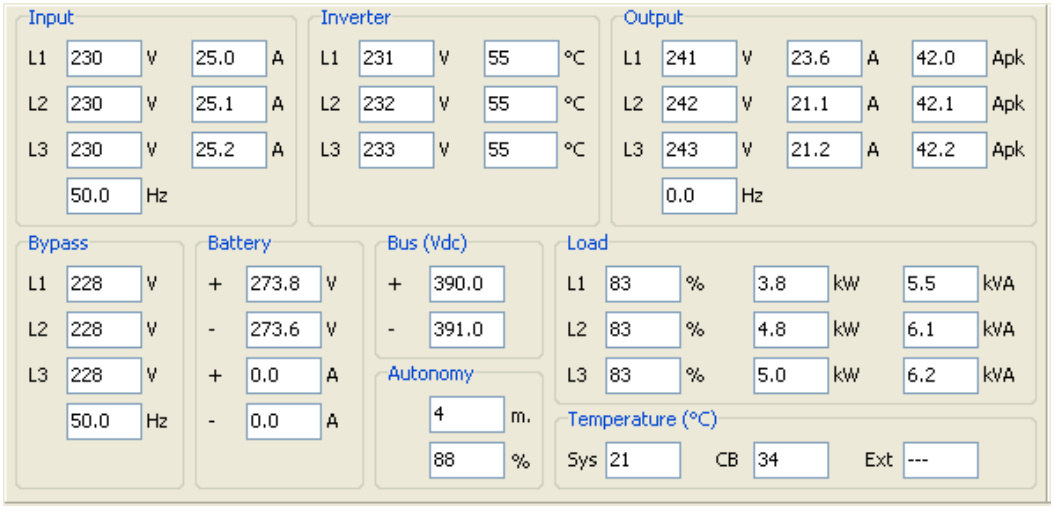
Panel ④



Serial Port Configuration. In this part it is possible to select the RS232 serial port on the PC used for communication with the UPS (COM1 - COM8).
The program will automatically select the maximum usable speed.
It is possible to select the maximum speed (19200 bps) only with the MultiCom 362 communication card or with the programming card (present in the kit ACCTT2PRXX-01) setted in communication mode.

Panel ⑤

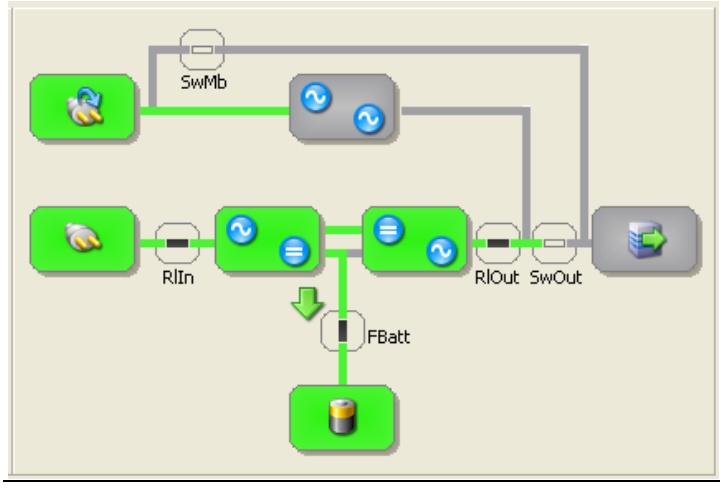
In panel (5) the most important measurements of the UPS are displayed.



- In the **INPUT** section users can check the voltage in the three input phases, the corresponding currents and the frequency.
- In the **INVERTER** section users can check the three voltages generated by the inverter and the temperatures on the heat sink for each of the three phases (in case of UPS with more than one sensor per phase, the temperature shown is the highest one).
- In the **OUTPUT** section users can check the voltage on the machine's three output phases, the relative currents and their peak.
- In the **BYPASS** section users can check the three bypass voltages and the incoming frequency to the UPS.
- In the **BATTERY** section users can check the voltages on the positive and negative branches generated by the battery charger and the current absorbed by the two different branches.
- In the **BUS (Vdc)** section users can check the banks voltage +/- of the capacitators.
- In the **AUTONOMY** section users can check the percentage of battery power remaining and the estimated time remaining before its discharge.
- In the **LOAD** section users can check the percentage of applied charge during each phase and the relative power in KW and kVA.
- In the **TEMPERATURE** section users can check the temperatures reported by the sensors on the system board (Sys) and the battery charge board (CB) as well as the ambient temperature (Ext.).

Panel ⑥

Panel (6) represents a block diagram of the machine's operation.



Through this panel it is possible to monitor the UPS operating status, that is:

- **Condition of the most important stages of the UPS**
  Main Input, Bypass Input, Rectifier, Inverter, Static Bypass, Load and Battery
  Green (active), **grey** (inactive), **red** (anomaly)

- **Condition of RLIn, RLOut, SwOut, FBatt and SwMb:**
  RIIn = Input Relay / Contactor
  RlOut = Output Relay / Contactor
  SwOut = Output Switch
  FBatt = Battery Fuses
  SwMb = Manual bypass Switch
  Black (closed) or **white** (open)

- **Battery Conditions**
  Green downward-pointing arrow (active and charged)
  Green with upward-pointing arrow (active and discharged)
  Yellow with upward-pointing arrow (active with low battery)
  With open fuses, the panel remains **green** while the arrow remains, but FBatt becomes **white**

Examples of mode of operation:

- **Operation in Stand-By**
  The battery power stages and rectifier are **green** (active), while the inverter, the static bypass and the Load are **grey** (inactive)
  RLIN **black** (closed) while RLOut, SWOut and SWMb are **white** (open)
  FBatt can be either open or closed, it does not have any influence on this status.

- **Operation by Inverter (on/off)**
  When the Power, Rectifier, Inverter and battery stages are **green** and RLin and RLOut **(black),** the INVERTER is ON.
  When the inverter stage is **grey** (inactive) and RLOut is **white** (open), the INVERTER is ON
  FBatt can be either open or closed, it does not have any influence on this status.

- **Powered or non-powered Load**
  By operation with Inverter on, with SWOut **black** (closed) and the charge panel **green** (active) the load is powered.
  By operation with Inverter on, SWOut becomes **white** (open) and the charge panel **grey** (inactive) the load is not powered.

- **Operation by Static Bypass (or electronic)**
  By operation with inverter on, the RLOut opens and the static bypass panel becomes **green** (active)
  The other stages remain as if the UPS were in Inverter ON.

- **Manual Bypass Status**
  The SWOut becomes **white** (open) and the SWMb becomes **black** (closed).
  The SWMb line becomes **yellow**.
  The power, the static Bypass and the battery stages remain **green**.
  RLIn, RLOut and FBatt remain **black** (closed).
  The Rectifier stage and inverter become **grey** (inactive).
  There is no arrow that indicates the charge or discharge of the batteries.

- **Operation By Battery**
  The power stages become **red** (anomaly), while the others remain **green** (active).
  RLIn, RLOut, FBatt and SWOut remain **black** (closed) and SWMb is **white** (open).
  The arrow indicates the battery discharge level.
  When the battery is fully discharged, its relative stage becomes **yellow**.