

String Box Setup

“String Box” Configuration Software

User Manual

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Warnings

This “String Box Setup” software can be used only and exclusively with the String Box device manufactured by RPS S.p.A.

No other uses are permitted. RPS is in no way responsible for problems caused by the software used in any way other than that for which it was designed, in particular when the software is connected to any other device that is not the RPS String Box.

Always use the latest version of the software that can be downloaded from the website <http://www.ups-tech.net.com> under the section “Photovoltaic Area” and from the Download section on the manufacturer’s website.

Requisites: Windows XP or later version, an RS232 or USB port with a USB/RS232 converter and a monitor with minimum resolution of 1024x768.

Users of this software should be familiar with the RPS String Box device and with the set of configuration parameters. The String Box installation and user manual should be consulted for reference.

Installing the software and connection

Run the installation program (StringBoxSetup.exe) and wait until the installation is complete.

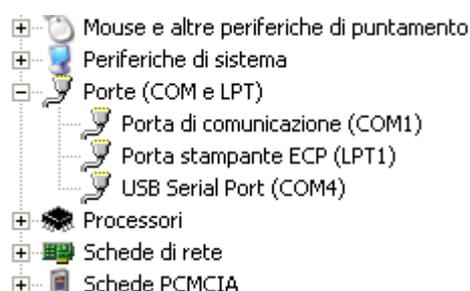
To ensure that the software functions correctly, the PC on which it is installed should be connected with a serial cable to the configuration port (marked RS232) on the box.

The cable used should be pin-to-pin with DB9-F/DB9-M terminals.

If the PC does not have a serial port, a USB/RS232 converter should be used.

This converter creates a COMx serial port, where x is the number of the allocated port. Establishing the virtual COM port created by the converter is a simple operation:

1. Locate **My Computer** on the desktop
2. Right click on **My Computer** and choose **Properties**
3. The **System Properties** window appears. Click on **Hardware**
4. Click on the **Device Manager** button
5. The list of peripherals connected to your PC appears. Expand the item **Ports (COM and LPT)**
6. A list of the ports appears, as shown in the figure below:



- The correct port – in the example – is called USB Serial Port, COM4. Note the number of the port (4), which will be used to activate the connection with the box.

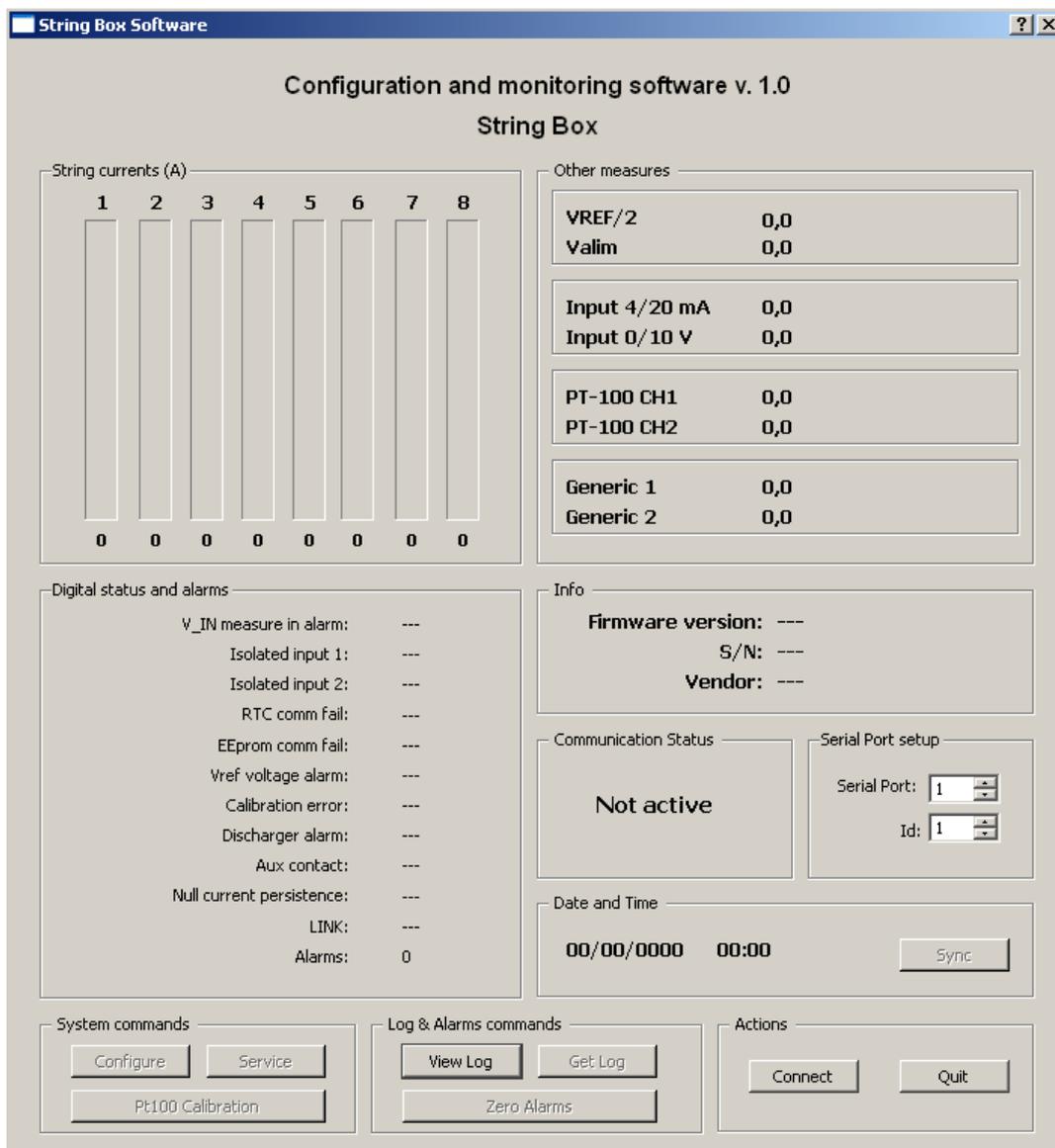
Software Functions

To start the software, run the following program:

C:\Programmi\RPS\StringBoxSetup\SBS.EXE

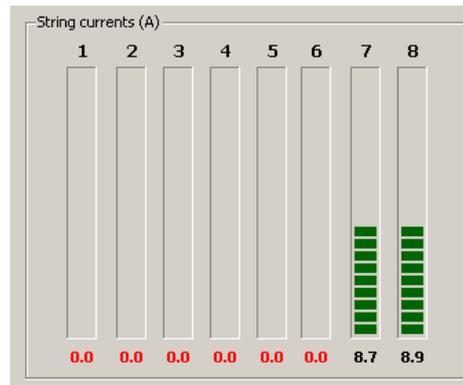
You can create a shortcut to the software, for example on the Desktop of your PC.

The following window will appear when the software is activated:



The window is divided into the following areas:

- **String currents (A).** The string currents are shown in this part of the application in graphic and numeric format. The colour of the graphic bar and the colour of the value indicate the alarm status of the string – red for alarm status and green for normal status:



- **Other measurements.** This section shows the values of the following measurements:

Other measures	
VREF/2	2.410 V
Valim	10.9 V
Input 4/20 mA	N.C.
Input 0/10 V	0.00 W/m ²
PT-100 CH1	N.C.
PT-100 CH2	31.25 °C
Generic 1	2.265 V
Generic 2	2.220 V

VREF/2, reference voltage of the analog measurements on the board; **Valim**, power voltage on the board; **Input 4/20 mA**, value of the 4/20mA probe, if the probe is not connected, N.C. appears; **Input 0/10V**, value of the 0/10 V probe, if the probe is not connected, N.C. appears; the unit of measurement and the scale values can be configured for these two measurements (see the configuration panel). **PT-100 CH1 and CH2**: values of the two temperature probes, if the probe is not connected, the relative wording becomes N.C.

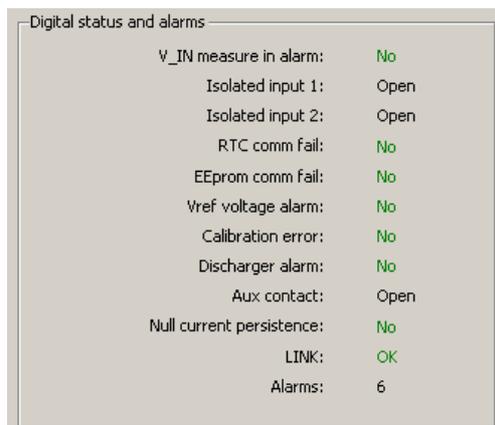
Generic 1 and 2 are two analog measurements inside the box that cannot be used by the end user.

- **Info.** This portion of the window shows the firmware version, the serial number and the String Box brand name:



- **Digital status and alarms.** This panel displays the list of alarms (normal status in green, alarm status in red), and the digital status in the String Box. In particular we have:

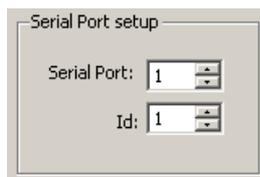
- **V_IN measure:** the power voltage measure alarm (in alarm if the measurement is below 10V and over 14V);
- **Isolated input 1 and 2:** is the status of the two digital inputs available on the String Box
- **RTC and EEPROM comm fail:** are two alarms for the peripherals required by the board to operate (RTC = Real Time Clock, EEPROM = configuration E²prom);
- **Vref voltage alarm:** reference voltage alarm used for analog measurements;
- **Calibration error:** calibration of the current measurements was not successful. This alarm is activated normally for a hardware fault or if attempting to calibrate measurements when the current is different from zero.
- **Discharger alarm:** the signal contact of the overvoltage discharger indicates the end of the component life cycle.
- **Aux contact:** Not currently used
- **Null current persistence:** this alarm is activated when the strings detect current for more than 16 consecutive hours (night-time hours are not counted)
- **LINK:** the control board can find no connection with the power board.
- **Alarms:** Indicates the number of string alarms that occurred since the last time the counter was zeroed.



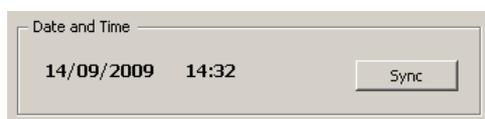
- **Communication Status.** This portion of the application shows the communication status with the device (Active/Not Active).

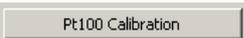


- **Serial Port Setup.** From this point it is possible to select the COM port to be used to communicate with the box and the address of the box, selectable through specific DIP-switches.



- **Date and Time.** When the software communicates with the String Box device, this part of the window shows the date and time set on the device. With the Sync button, it is possible to synchronise the date and time of the String Box with those on the PC (check that they are accurate before pressing the Sync button).



- **System Commands.** Three system buttons are available, ,  and .

With the  button, the user can configure the windows for valid string monitoring, the activation of the relays in cases of alarm as well as the parameters of minimum threshold, tolerance and alarm times. It is also possible to configure the two 4/20 mA and 0/10V inputs on the device.

The  button, which is password protected, gives access to the window reserved to RPS S.p.A. Service technicians. The  button is also password protected and is reserved to the Service technicians.



- **Log & Alarms commands.** There is a log on the board of all the significant events. The  button downloads the log onto the PC and the log file can be consulted using the  button.



Every time the log is downloaded, a new log file is created with a name that has the following structure:

SN_DD-MM-YY_HH-MM-SS.log

where SN = is the serial number of the device and DD-MM-YY_HH-MM-SS is the date and time the log was created.

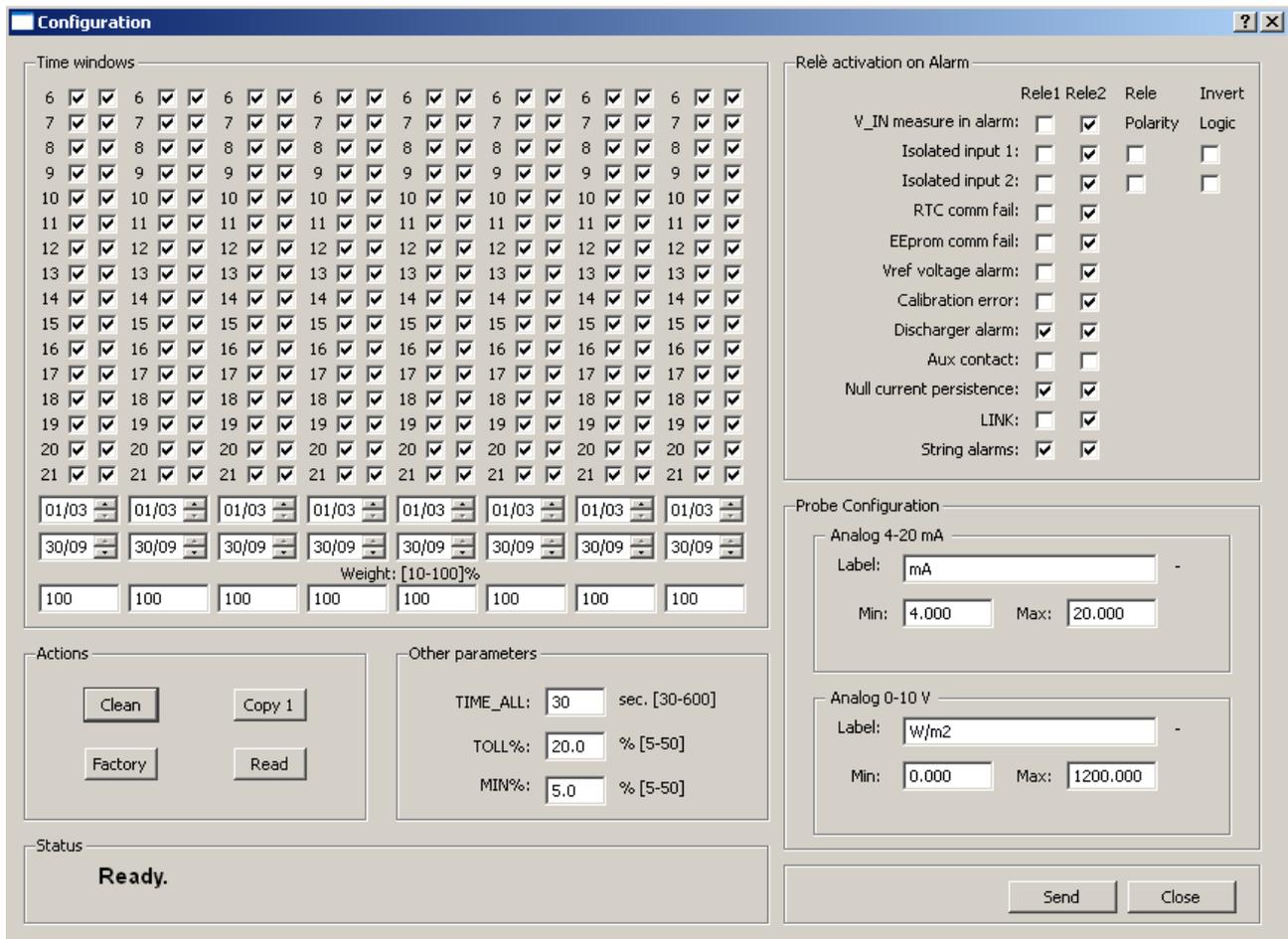
- **Actions.** The buttons  /  are used to connect or disconnect the software from the device. The  key is used to exit the application.



Configuring the board

Once the device is connected, it can be configured using the  button.

The following window appears when this key is pressed:



The first time it is activated the window shows the default configuration of the box.

The window is divided into the following partitions:

- Time Windows
- Relay activation on Alarm
- Probe Configuration
- Other Parameters
- Actions
- Status

Time Windows

In this section of the configuration window, it is possible to configure the following for each of the 8 inputs:

- Two annual time windows (that divide the year into two different time windows). In the example shown above, the first time window starts from 01/03 (first of March) and ends on 29/09. The second starts from 30/09 (30th of September) and ends on 28/02.
- Two hourly time windows, one for each annual time window. The left hand column refers to the first annual time window and the right hand column to the second. The monitoring hours start at 6.00 in the morning until 21.59 at night. To exclude monitoring at a certain time of the day, just deselect the corresponding box; for example, if the panels are in the shade

from 15:00 in the afternoon until 16.59, deselect the boxes 15 and 16. Monitoring will be active until 14:59 and will resume after 17:00:01.

- A weight, which must be proportional to the current supplied by the panels connected to that particular input. Note that, if the user enters a series of weights which do not reach 100%, as a precaution the software will recalculate the maximum weight setting it to 100% and consequently all the other values will be dimensioned proportionately. Moreover, each value lower than 10% will be mandatorily set to 10% by the software. Zero weight will be accepted and indicates that the channel does not need to be monitored as no string is connected.

Relay activation on Alarm

In this section it is possible to configure the activation of the relays in the box to correspond to the alarm status.

For each alarm, it is possible to decide whether or not to activate the two relays in a totally independent manner. If more than one alarm activates a relay, the latter will be activated if at least one alarm occurs (OR condition).

Only for the two isolated inputs, it is also possible to configure the alarm logic (Invert logic) and the polarity of the relays; in other words it is possible to invert both the alarm logic and the relay activation logic.

Probe Configuration

From this section, it is possible to configure the parameters of the two 4/20 mA and 0/10V inputs in order to connect the probes compatible with these two standards and simultaneously be able to correctly view the values and the chosen units of measurement.

In the set of default parameters, for example, the irradiance probe has been configured which uses W/m^2 as the unit of measurement – minimum value is 0 and maximum is 1200 W/m^2 .

Other parameters

The following can be configured in this section:

- **TIME_ALL**: this is the time (expressed in seconds) that the alarm condition of the measure channel must persist before it is effectively generated and sent to the remote control. The default value is set at 300 seconds. The same time is applied for the recovery of the alarm condition. The valid range for this parameter is 30 to 600 seconds.
- **TOLL%**: this is the maximum percentage that a measure channel can deviate from the channel with maximum current value, beyond which an alarm condition is generated. The default value is set to 20%. The valid range for this parameter is 5 to 50%.
- **MIN%**: this is the minimum current percentage below which the comparison between the various strings is no longer performed. If the current string value at maximum current is lower than this value, it will not be monitored. When this condition persists for two days, a “prolonged null current” alarm will be generated. The default value is set to 10% of the full scale for each channel, i.e. 20°. The valid range for this parameter is 5 to 50%.

Actions

The Actions section has 4 buttons:



The  button clears the configuration, the  button copies the configuration of the first column of the time configuration on the other 7 columns, the  button sets the default configuration on the window (but does not confirm it – use the  button to do this), while the  button, reads the configuration of the device.

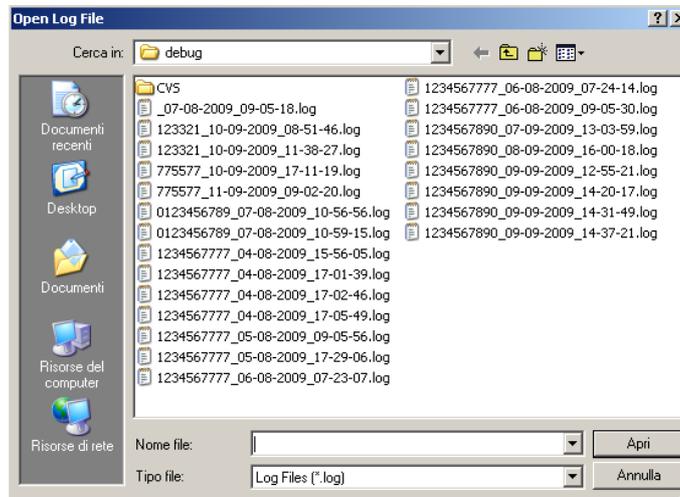
Status

Software information messages are displayed in the **Status** section.

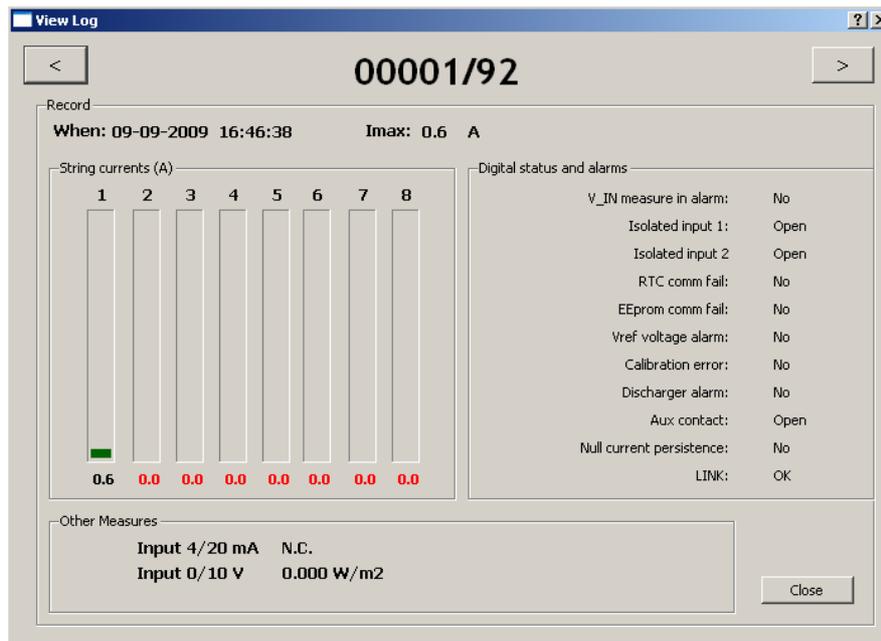
The Logs

The board saves its configuration as well as a log of 430 events in its internal non-volatile memory. The instants in which a status or alarm varies are stored so that it is possible to trace the instant that each condition begins and when it ends.

The log stored on the board can be recovered and saved on file using the **Get Log** button; a file is created in the same directory as the application. The format of the file is readable, but using the **View Log** button it is possible to consult the log. When this button is pressed, a dialogue window opens showing the list of files:



Choose the file to open and press the **Apri** button. The following window will open:



This window lets the user scroll through all the records in the log using the two buttons  and . In the example, the window is positioned on the first record of a total of 92 records. Press the  button to close the window at the end of the viewing session.