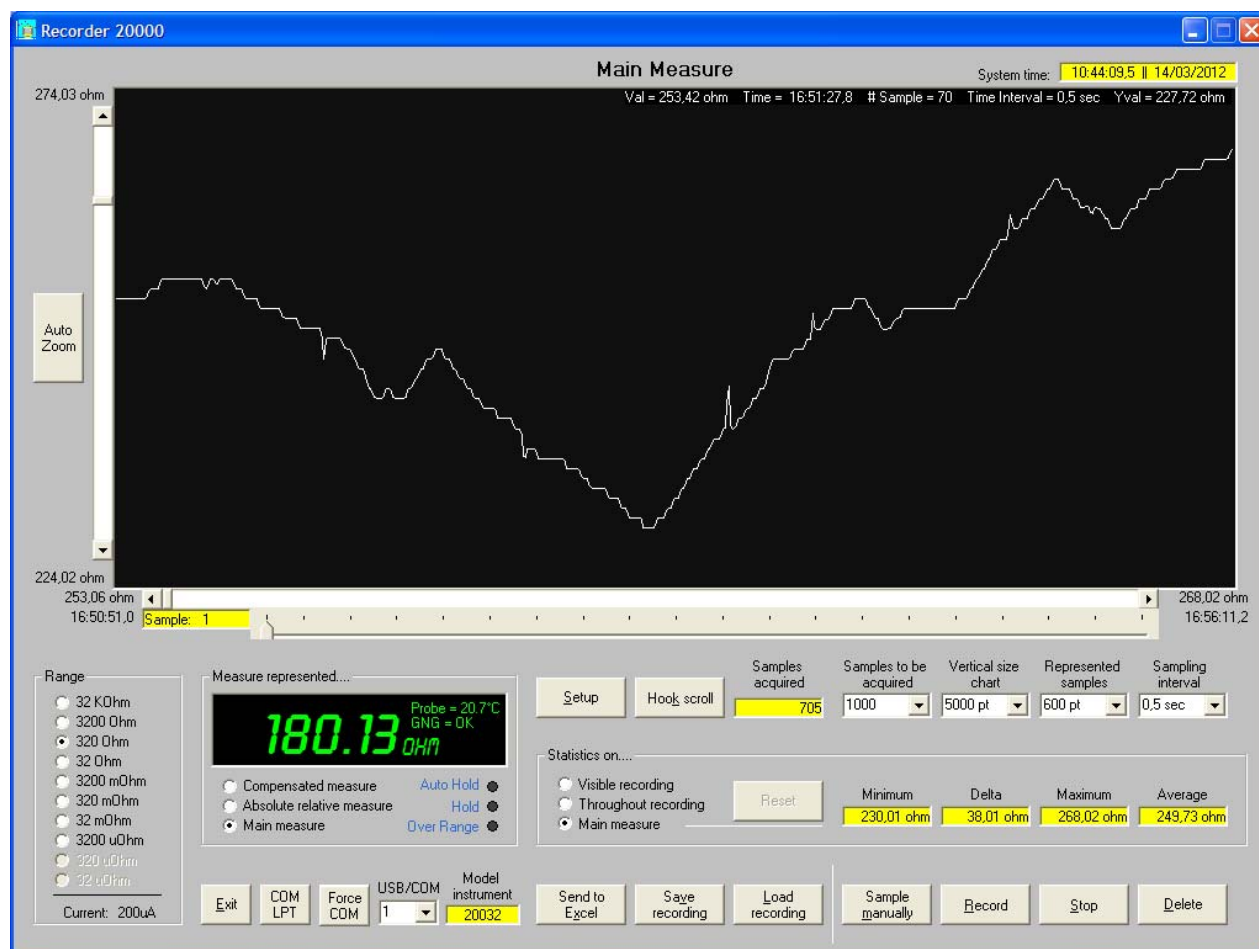


# RECORDER 20000

## RECORDING PROGRAM FOR 200XX OHMMETER FAMILY



PROFESSIONAL MEASURING INSTRUMENTS



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## Chapter 1: Introduction

### 1.1 Welcome to RECORDER 20000

**RECORDER 20000** is a program developed at the request and for the needs of the users of the new ohmmeters 200XX family, in particular for instrument from **20022** onwards. With it you can run the recordings of the measures that can be saved in files or transferred directly to an Excel spreadsheet, setting the number and spacing of sample acquisition for automatic and/or manual recording.

The program is able to automatically recognize the instrument connected and adapt accordingly.

### 1.2 Software installation

The system requirements of the program are very modest. To function **RECORDER 20000** occupies a few hundred kilobytes of hard disk space, requires Windows XP or later and needs a USB port for connection with the ohmmeter.

To install the program you must:

- 1 Insert the CD in your computer's drivers

From the Start menu or Start on the taskbar, click the Run command...

- 3 In the Run dialog box, type **D:\setup.exe** and then press OK. If the disc is located on a different drive, type the drive letter. Alternatively, you can use the Browse button to search for the unit and the installation file.

- 4 After the installation, with first start of the program appears the window visible in Figure 1.2 to allow the registration. Select the letter of the drive where the CD is located and pay attention to the insertion of serial number located on the CD itself and divided into three parts, after which press the **OK** button. In case of incorrect insertion will be prompted to enter the correct code. An error does not allow the recording and the start of the program.

If the data entry is correct after pressing the **OK** button, the program starts.

- 5 When installation is complete remove the disc from the unit.

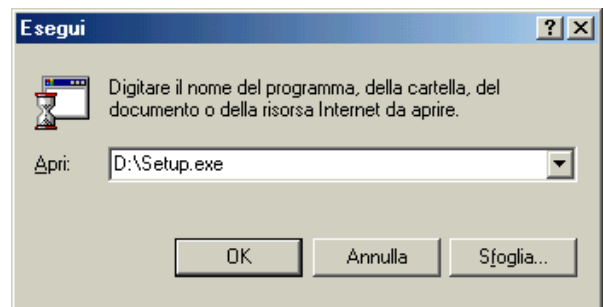


Fig. 1.1 Windows box to install the program.

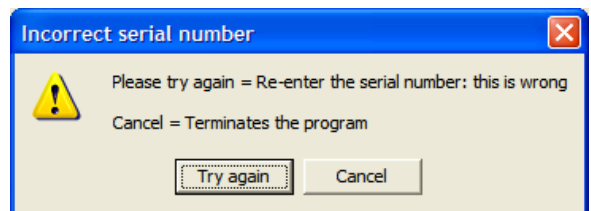
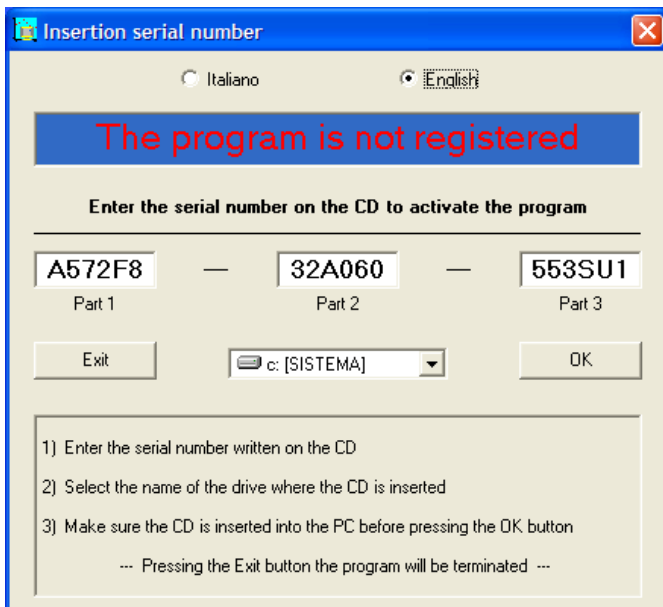


Fig. 1.3 Warning window registration code wrong.

Fig. 1.2 Window for entering the registration code.

## **Chapter 2: The software**

### **2.1 Overview**

The form, or window, with which he presents the program contains all the commands in the form of buttons or selections, avoiding the use of drop-down menu. Given the low number of possible selections this solution allows to obtain immediately all options available, making it faster and more comfortable to use the program, which is also able to automatically recognize the connected device.

With it you can:

- *Select the sampling interval from 0.25 seconds and 60 seconds*
- *Select the number of samples to acquire between 10 and 600000*
- *Start/stop/cancel the recording*
- *Sampling manually*
- *Run a horizontal zoom from 100 to 3000 samples*
- *Run a vertical automatic or manual zoom from 20 to 32000 points*
- *Save the recording to a text file or send it to Excel, along with the acquisition time of each sample*
- *Recalling a previous recording*
- *Having a statistics (minimum, average, maximum and delta) of the measure, of entire record or of the part displayed*
- *Have full opportunity to set the instrument range, filter, auto-ranging, backlight, save configuration, measurement temperature, reference temperature, and many, many more, limited to the specific characteristics of each instrument*

The values that are presented in boxes with yellow background can not be changed such as: *Minimum, Maximum, Delta, Average, Samples acquired, Model instrument e Sample.*

Pausing the mouse over the controls that populate the window, after about a second appears a brief explanation of the function of the object: like having an easily available on-line manual.

Acquisition and representation of the graph are two independent things. While the program continues to acquire, the operator can see any part of the graph with the vertical and horizontal expansion preferred.

The graph, and thus saving measures directly in the form of files or data sent to Excel, exclusively represents the main measure. The relative or compensated measure can only be displayed in numeric format on the alphanumeric display.

### **2.2 Connecting the instrument to the PC**

The connection between the instrument and the PC occurs through an optically isolated USB cable that is supplied on request.

**2.3 Starting the software**

After installation and restarting the PC the program is operational and accessible via *Start > Programs > RECORDER 20000*. Clicking *20000 RECORDER* the program starts and the initial window appears.

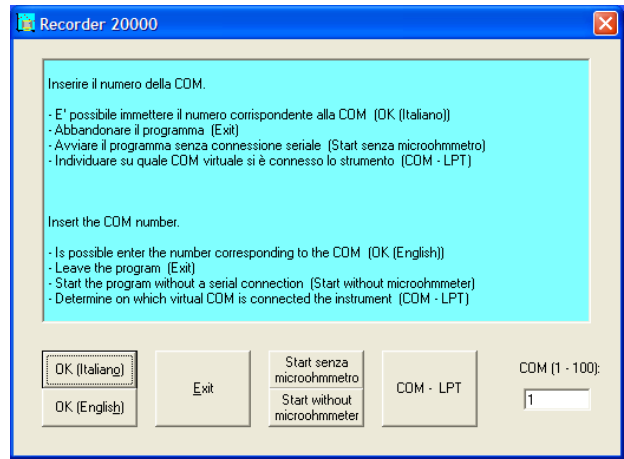


Fig. 2.1 Start window of the program where you can select the COM port that is connected to the instrument, verify on which COM is located, start the SW with or without the device connected.

**Buttons *OK (Italiano) - OK (English)***

The two buttons select the language (English or Italian) used for generating reports or various ads from the program, as well as the inscriptions that appear on the form.

Pressing the button **OK (Italiano)** or **OK (English)** you select the desired language and at the same time you start the program itself.

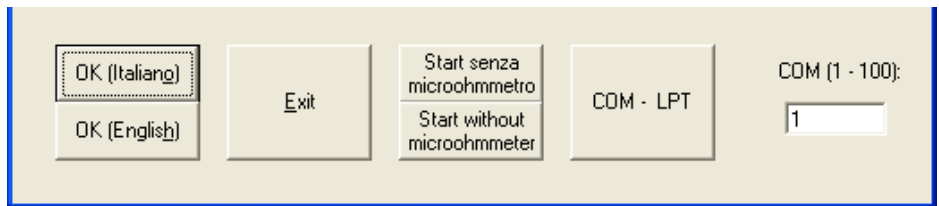


Fig. 2.2 Buttons in the start window of the program.

**Button *Exit***

Terminates the program.

**Buttons *Start senza microohmmetro - Start without microohmmeter***

These buttons start the program without the connected device, while still allowing you to upload and analyze a previous recording.

Pressing the button *Start senza microohmmetro* or *Start without microohmmeter* you enable this option, you select the language corresponding to the button pressed and start the program.

In the case where it is subsequently connected the instrument is still possible, by selecting the appropriate COM, enable communication with it without having to exit the program and restart it in normal mode.

**Button *COM - LPT***

In case you have not know which port is used for the connection, you can use the **COM - LPT** button. This will open a window similar to that shown where appear the virtual COM used to connect the USB Serial Port.

**Text Box *COM (1-100)***

In this text box you can set the number of virtual serial port to which you connected the device.

Valid values range is from 1 to 100. As set is automatically saved and recalled the next time, regardless of what you start the program with or without the device connected.

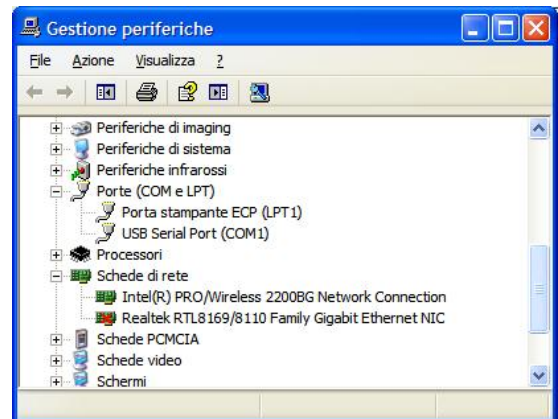
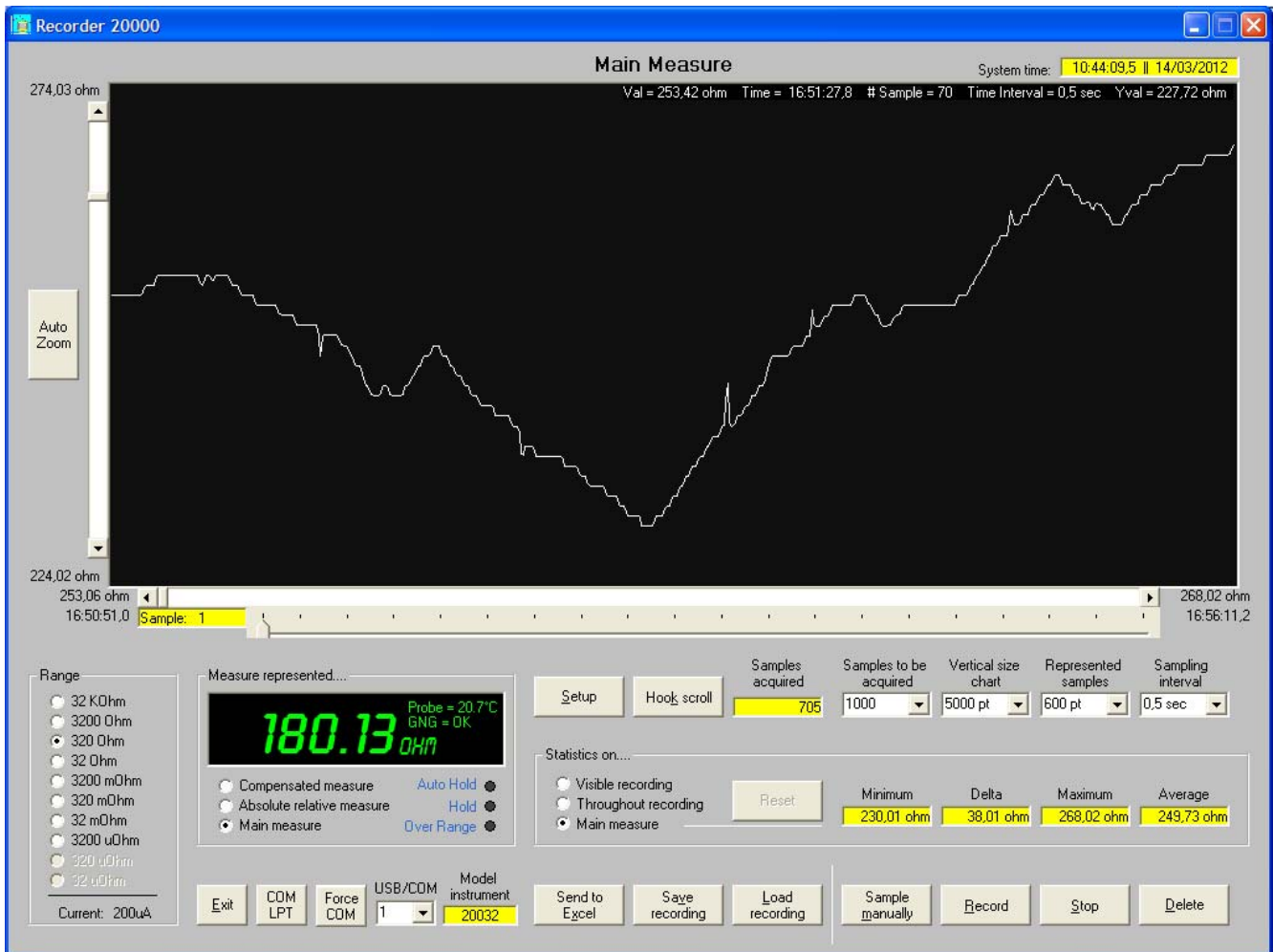


Fig. 2.3 In the *Device Manager* window, you can find out which COM is connected to the instrument.

**2.4 The capabilities of RECORDER 20000**

If you have started the program without the instrument connected the buttons *Save recording*, *Sample manually*, *Record* and *Stop* are disabled because in this context does not have operational function. If, however, the program detects the presence of a instrument rehabilitate them automatically.



**Fig. 2.4** This is the main window of **RECORDER 20000**, where are grouped all the controls and settings, as well as almost all the reports provided by the instrument. Other settings and reports, specific to each instrument, are accessible via the **Setup** button.

**2.4.1 Range**

The ranges enabled and therefore selectable depend on the connected device. Since the selection of the ranges is one of the most used setting functions has been put properly in evidence. Other settings of secondary importance or less frequently modified are accessible via the **Setup** button.

At the bottom of the pane is visible the current used in that range. The value depending on the current high or low selected for measurement, for instruments that provide this possibility.

**2.4.2 Measure represented....**

The display can represent the desired function between the three possible selections using the appropriate button:

- **Compensated measure** → Value of the measure calculated in function of the temperature coefficient of the selected material and at the temperatures of the reference and measurement.
- **Absolute relative measure** → The difference between the measure at the moment at which the relative measure has been selected or was acquired a new reference value, and the actual value measured by the instrument.
- **Main measure** → Value measured by the instrument without any compensation.



If the instrument involves the measurement of temperature for the compensation of the measure, in the upper right shows the value of the temperature measured by the probe.

Another possible signaling, if the instrument has the ability, regards the result of the test Go - No Go. Depending on the outcome provides reports *GNG = DOWN*, *GNG = OK* or *GNG = UP* respectively for the measurement below, within or above the range of validity.

Another type of signaling provided in this pane regards the validity of the measure.

- **Auto Hold** → The instrument detects the interruption of the circuit and "freezes" the display of the last valid value indicating this condition in three different ways:
  - a) Switching on the *Auto Hold* red indicator
  - b) Viewing the red represented measure value
  - c) Reporting the red wording *Instrument in AUTO HOLD* in the graph window
- **Hold** → Was performed a manual Hold. Even in this condition are provided the three different signals of the previous case, namely:
  - a) Switching on the *Hold* red indicator
  - b) Viewing the red represented measure value
  - c) Reporting the red wording *Instrument in HOLD* in the graph window

In the case of concomitantly of the reports of *Hold* and *Auto Hold*, is given the prevalence to reporting *Instrument in HOLD*.

- **Over Range** → Indicates that the measured value has exceeded the full scale of the selected range in two ways:
  - a) Switching on the *Over Range* red indicator
  - b) Displaying "O V L" instead of the numeric value on the display of measurement

### 2.4.3 Statistics on....

This pane shows the minimum, maximum, delta (difference between minimum and maximum) and the average of the measured values of:

- **Visible recording** → Calculate the four statistical values of the recording, but only those visible in the graph window.  
The values are calculated only during recording and are updated each time you view a different area of the graph.
- **Throughout recording** → Calculate the four statistical values of the entire recording hitherto acquired.  
The values are calculated only during recording with each new acquisition.
- **Main measure** → Calculate the minimum, maximum, and the delta of the measure.  
The only value that is not calculated is the average.  
The values are always calculated either during recording, either when recording is stopped or even not running.  
Using the **Reset** button you can reset the statistics, to start again.

### 2.4.4 Settings, indications and controls

#### Button *Setup*

Opens a specific window of the connected instrument in which it is possible to change the operating parameters such as filter, backlight, auto range, polarity measurement, etc..  
Is active only if the instrument is connected.

#### Button *Hook scroll*

While the recording is in progress, the operator can view any portion of the graph with any scale vertical and horizontal. When you want to return to see the most recent part of the graph, simply pressing the **Hook scroll** button to "hook" the display of the last sample acquired.  
Pressing the button again to exit this mode.

#### Indicator *Samples acquired*

Displays the number of samples acquired up to that point.

**Selector** *Samples to be acquired*

With this selector you set the number of samples you want to acquire. Reached the number of samples selected, ranging from 10 to 600000, the recording stops automatically and the background becomes green.

It's possible to stop recording at any time and/or select a different number of samples. If the selected number is less than those acquired up to that time the recording stops. Vice versa pressing the **Record** button you can start recording again.

The end of the recording, as any other cause of stop, is indicated by a vertical red line on the graphic display.

**Selector** *Vertical size chart*

Sets the number of points, between 20 and 32000, vertically visible on the graphic display.

**Selector** *Represented samples*

Sets the number of samples between 100 and 3000, displayed horizontally on the graphic display.

**Selector** *Sampling interval*

Set the time interval between sampling and the next. Is selectable between 0.25 seconds and 60 seconds.

While the instrument model **20032** reaches acquisition speed of 10 measurements per second, others are slower.

Consult the instrument user manual for informations.

**Button** *Exit*

It is the button to close the program.

If you are running a recording or this, though stops, has not been saved, a warning window will appear asking you if you agree to cancel the registration before closing the program.

**Button** *COM LPT*

It has the same function as the **COM – LPT** button that appears in the start window. Opens a window that allows you to edit or know on what COM is connected the instrument, so you can select the correct COM via the **USB/COM** selector.

**Button** *Force COM*

Force the connection to the selected COM via the **USB/COM** selector, if the connection has been interrupted because the instrument has been switched off or the communication cable has been disconnected.

**Selector** *COM/USB*

Select the COM port with which to connect to the instrument. Is selectable between 1 to 100.

**Indicator** *Model instrument*

Indicates the model of the instrument connected with the program.

**Button** *Send to Excel*

The button becomes active when there is at least an acquisition in the buffer memory of the recorder and the recording is stopped. Simply press it to transfer the entire recording into Excel along with other general information better described in section **2.4.7 Excel spreadsheet** on page 11.

The transfer of data to an Excel spreadsheet does not preclude that they may be saved in a file with the **Save recording** button.

**Button** *Save recording*

Pressing this button opens the classic Windows dialog box asking you where and by what name you want to save the file with the registration, with default extension of *.rcd*.

In addition to the registration data are stored other information of a general nature better described on page 10 in section **2.4.7 Recording format**.

The saving data in a file of course does not preclude that they can also be sent to an Excel spreadsheet in which to run graphics or other processing.

**Button *Load recording***

The button is used to load a previously saved registration, so as to be viewed and analyzed again.

**Button *Sample manually***

This button is always active also, but not only, during the automatic recording. As for this is saved the instant of acquisition and the acquisition progressive number.

**Button *Record***

The button allows you to start recording and is green during recording, returning the original color by pressing the **Stop** button. The time interval between the sampling and the number of them are set up with other controls described above.

The recording can be stopped at any time, even before reaching the limit set of samples. Once recording has started you can not change the sampling interval. Is also disabled the **Delete** button and the selection of the ranges.

When the number of samples acquired equals that set the recording stops automatically and the background of the selector **Samples to be acquired** becomes green, to return to white when you press the **Delete** button.

Reached the limit of acquisitions is not allowed to continue in the acquisition automatic, less than select a higher value of samples to be acquired, bringing the background of the counter to white. However you can manually perform additional samplings, but only until you reach the maximum number of 600000 samples.

**Button *Stop***

Stop recording and the button turns red. Back to the original color when you press the **Start** button or **Delete** button.

Each time you press the **Stop** button, when is reached the limit of samples programmed or there is a break in the circuit of the measurement, recording stops and a vertical red line appears on the graphic display. This is to highlight the interruption in the acquisition.

**Button *Delete***

The button is used to cancel the registration and re-initialize the counter of acquisitions, allowing you to restart with a new recording.

**Button *Auto Zoom***

Expands the graph to the maximum vertical expansion possible, without "cutting" the graph at the top and/or bottom in the time shown on the display.

***Vertical scroll bar***

On the left side of the graphic display is a vertical scroll bar that allows you to bring the graph within the display, with a width determined by the **Vertical size chart** selector.

At the two ends of the scroll bar are indicates the resistance values corresponding to the upper and lower limits shown on the graph.

***Horizontal scroll bar***

Under the graphic display there is a horizontal scroll bar that allows you to bring the graph within the display, with a temporal width determined by the **Represented samples** selector.

At the two ends of the scroll bar are indicated respectively the resistance value and the instant of acquisition time of the value placed on the left edge of the graph and, if the recording occupies the entire width of the display, respectively the resistance value and the instant of acquisition time of the value placed on the right edge of the graph.

On the left side there is also an indicator with the progressive number of the sample placed on the left edge of the display.

With the cursor and the arrows of the scroll bar you can choose to display the number of samples set with the **Represented samples** selector among 30,000 available, if acquired.

With the slider below, you can select which part of the registration view among the 20 sectors of 30000 samples that divide the memory of 600000 points.

2.4.5 Auxiliary informations

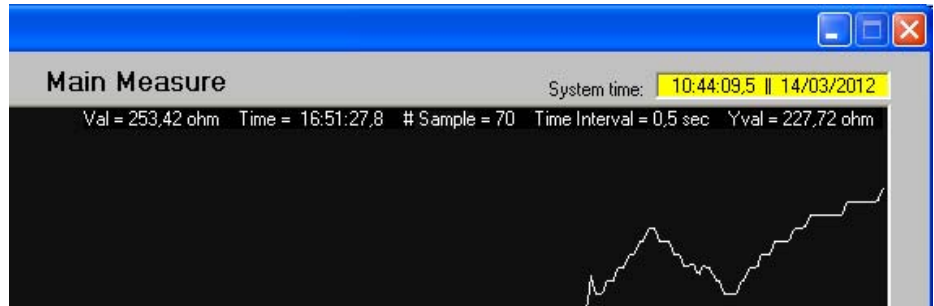


Fig. 2.5 At the top of the main window there are other useful information.

**System time**

Indicates the system time of the PC and provides the instant of sample acquisition as stored in the buffer of the recorder to be subsequently sent to Excel, or saved to a file.

**Informations from mouse pointer**

Moving the mouse pointer within the graphic display, in correspondence with recorded data, even if not visible, at the top right of the display shows some particularly interesting information.

- Val** Value of the sample that is located directly on the vertical position of the mouse pointer.
- Time** Moment of acquisition of the sample that is located directly on the vertical position of the mouse pointer.
- # Sample** Progressive number of the sample that is located directly on the vertical position of the mouse pointer.
- Time Interval** Sampling interval of the program. Is a copy of what is set with the *Sampling interval* selector.
- Yval** Indicates the resistance in which it is located the mouse pointer.  
The vertical position of the mouse pointer corresponds to a resistance value between the minimum and the maximum value displayable on the graphic display and that correspond to the two values on the left, top and bottom, the outside of the display itself.

**2.4.6 Setup windows**

Pressing the **Setup** button on the main window of the program opens a specific window for the instrument at that time connected. By way of example are indicated two windows corresponding to the two instruments model **20022** and model **20032**.

Through them you have the option to change some parameters and/or mode of operation of the instrument.

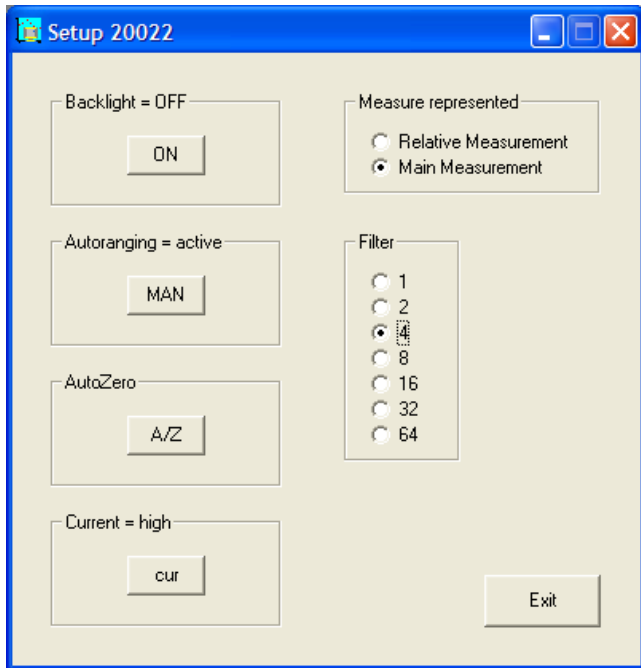


Fig. 2.6 From this window it is possible to remote modify the remaining parameters of the instrument.

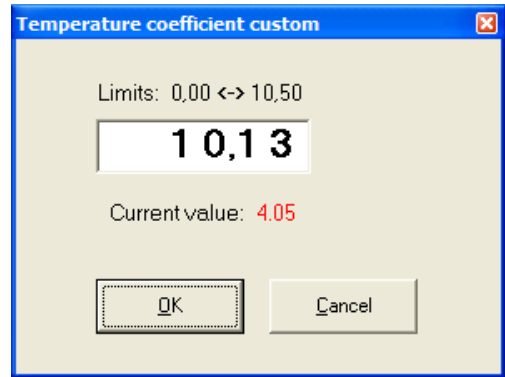


Fig. 2.7 One of the windows of parameter input. If being typed a value that exceeds the allowed limits the error is signaled.

By a simple click on the indicators with light blue background opens a window for entering values such as the one above. In the window, specify for each value, appears at the top in the title, the name of the variable to which it refers, followed by the minimum and maximum limits included in which the parameter is valid, and the value currently in use. In case of incomplete or incorrect entry is given an error message specifying the cause.

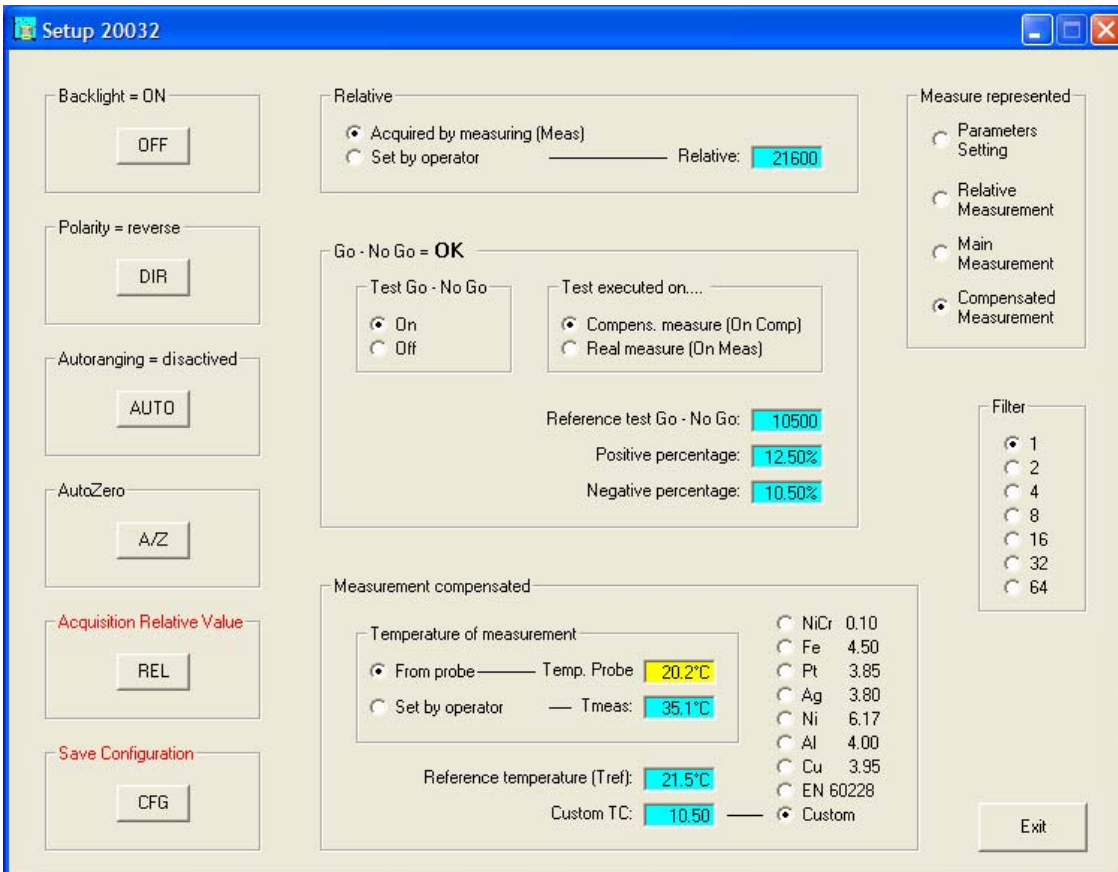


Fig. 2.8 This is the window that opens if the connected instrument is model 20032.

### 2.4.7 Saving the recording

Once you have finished recording, both having completed it with all the samples set in *Samples to be acquired* selector, either with a reduced number of samples due to a premature interruption of the acquisitions, you can save the recording in two different modes, as indicated below.

#### Recording format

At the end of the acquisition data can be sent in an Excel spreadsheet or saved in an ASCII text file readable by any program editor: Notepad, Word or others. In both cases, the format is identical, except that in the file is a line that indicates the path and name of the file. That line does not appear in the Excel sheet.

The following is an example of the contents of a recording file saved as File2.rcd.

As you can see at the beginning of the file, before the list of measured values, appear some useful information to identify the mode of recording, the date and the instrument with which it is performed.

```
Recorder 20000
Software version = 1.02
Save date = 09/03/2012 17:30:06
File name = C:\Recorder 20000\File2.rcd

Instrument = 20022
Range = 320 Ohm
Measurement current = 100uA
Sampling time = 0,5 sec
Samples acquired = 705
Samples to be acquired = 1000

1; 25307E-2; 16:50:51,0; 09/03/12;
2; 25306E-2; 16:50:51,5; 09/03/12;
3; 25305E-2; 16:50:52,0; 09/03/12;
4; 25305E-2; 16:50:52,6; 09/03/12;
5; 25304E-2; 16:50:53,2; 09/03/12;
6; 25305E-2; 16:50:53,8; 09/03/12;
7; 25307E-2; 16:50:54,4; 09/03/12;
```

Fig. 2.9 Format of the save file of the recording.

In detail here is the auxiliary information provided:

- *Name of the recording program*
- *Version of recording program*
- *Date and time when the file was saved*
- *Name of the file and its full path* (not present in the Excel spreadsheet)

and also

- *Instrument model who performed the measurements*
- *Range on which the measurements were made*
- *Measurement current*
- *Sampling interval*
- *Number of samples actually acquired*
- *Number of samples set to the automatic acquisition*

## RECORDER 20000 for 200XX ohmmeter family

### Excel spreadsheet

The same information saved in the file also appear in the Excel sheet, but in addition you can make graphs, statistics, reports, and anything else you can do in a vast and versatile environment as Windows.

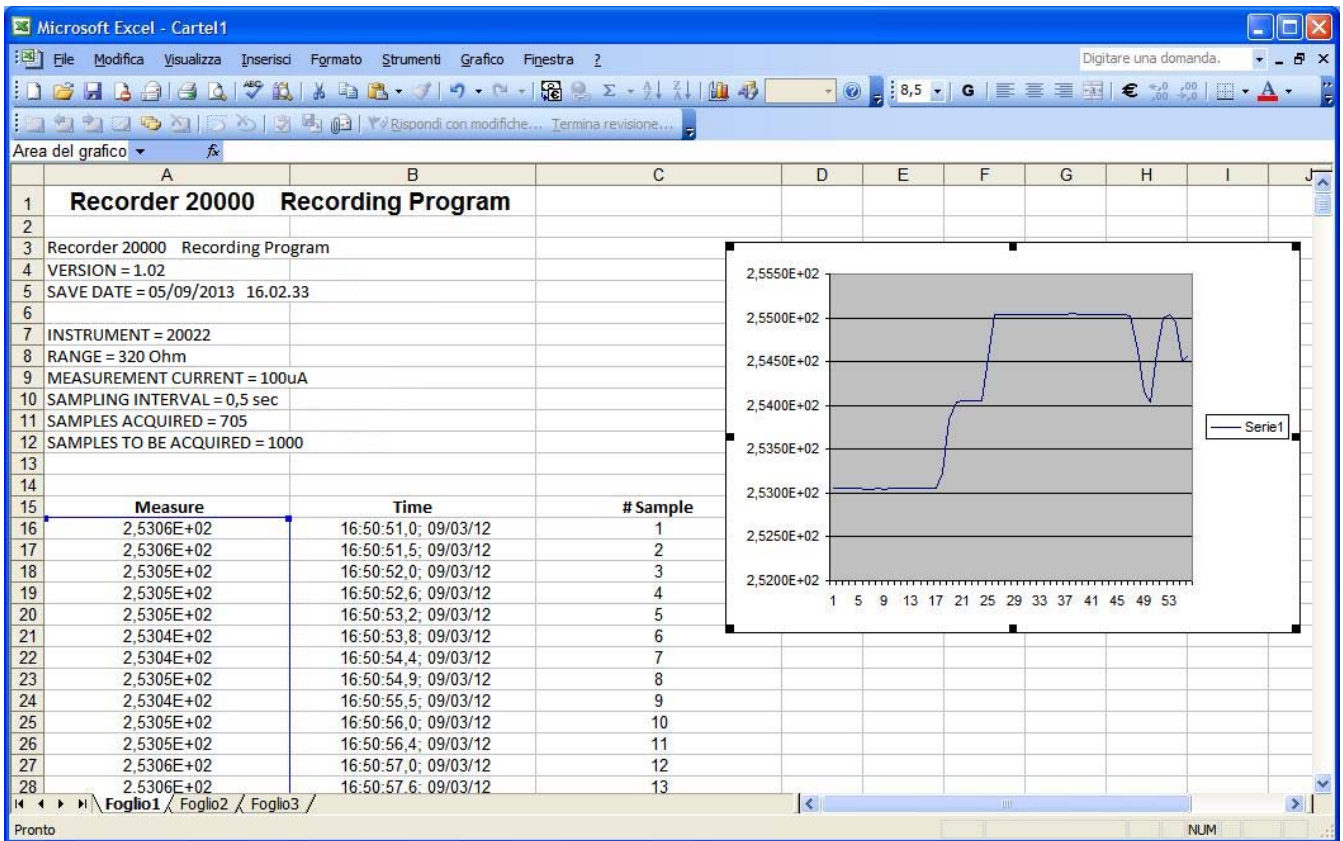


Fig. 2.10 Thanks to the data sent on a sheet of Excel you can get the graphs.

### **Chapter 3: The microohmmeter**

The microohmmeter is a special instrument that use the classic and simple Ohm's law. It is often not understood and not taken into account sufficiently that what you measure is so small that the contact resistance, the resistance of the leads, the contact potential and the associated thermal drift can be 10, 1000, 100,000 times higher than the resolution of the range used. It's absolutely normal use cables with a total resistance of a few tens of milliohms to measure resistances that require resolutions down to 0.01 microOhm: several million times the resolution, as can be seen.

As briefly mentioned should be carefully evaluated and better is to ask people who are truly knowledgeable, rather than attributing immediately to instrument errors in the repetition of the measures or instability of these due, for example, to mechanical or thermal stress. If measurements are made in a workmanlike are also reliable, vice versa can be frustrating psychologically and technically unreliable. For proper use of these instruments the experience is essential, although it is not uncommon in cases where, due to special geometrical and mechanical circumstances of the element under test, it becomes necessary to carry out some tests in order to obtain best possible measurement.

When using the program **RECORDER 20000** remember what was said.