NDL8000
TrueGraph

Data Logger & Software

User's Manual
English

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Data Logger

NDL8000 series

&

TrueGraph

Management software

USER'S MANUAL

EDITION: APRIL 2006

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TABLE OF CONTENTS

INTRODUCTION

This manual provides information on the installation, configuration and use of the main instrument functions. The manual is not intended for general use, but for qualified technicians; this term indicates a professional and skilled technician, authorised to act in accordance with the safety standards relating to the dangers posed by electric current. Moreover, this person must have basic first aid training and be in possession of suitable Personal Protective Equipment.

WARNING: It is strictly forbidden for anyone who does not comply with the above-mentioned requirements to install or use the instrument.

The instrument complies with the European Union directives in force, as well as with the technical standards implementing these requirements. It is strictly forbidden to use the instrument for purposes other than intended ones, understood by the manual content.

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SYMBOLS

In the manual and on the instrument, some instructions are highlighted by graphic symbols to draw the reader's attention to the operational dangers. Hereby the list of used symbols:

DANGER: It indicates the possible presence of voltage exceeding 1 kV on the marked terminals (even for short periods).

WARNING: It indicates the possible occurrence of an event which may cause a serious accident or considerable damage to the instrument, if suitable precautionary countermeasures are not taken.

ATTENTION: It indicates the possible occurrence of an event which may cause a light accident or damage to the instrument, if suitable precautionary countermeasures are not taken.

NOTE: It indicates an important information which must be read carefully.

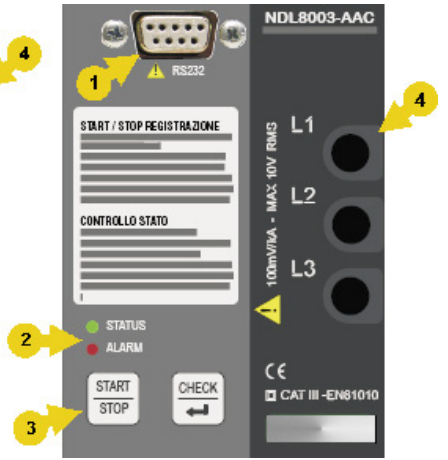
DESCRIPTION

FRONT PANEL DESCRIPTION

The instrument is available in four different models:

- NDL8001-VAC ➡ single phase voltage
- NDL8003-VAC ➡ three-phase voltage
- NDL8001-AAC ➡ single phase current
- NDL8003-AAC ➡ three-phase current

Picture A



Picture B

Front panel description:

1. RS232 serial communication port connector
2. STATUS LED (green) and ALARM LED (red): these LED signals can have different meanings (see sections Recordings and Diagnostic Function)
3. **START/STOP** key and **CHECK/ENTER** key: allow to start and stop a recording, and to display (through LEDs) the instrument diagnostic
4. Inputs:
   - NDL8001-VAC ➡ single phase voltage input (as pict. A but with only 2 sockets)
   - NDL8003-VAC ➡ three-phase voltage inputs (as pict. A)
   - NDL8001-AAC ➡ single phase current input (as pict. B but with only one connector)
   - NDL8003-AAC ➡ three-phase current inputs (as pict. B)

KEYS

The keys are designed to be not much sensitive to avoid that they are pressed accidentally during carriage. Therefore, put the finger to the centre of the key and push fairly hard.

WARNING: Do not use any hard or angular objects, nails included, to avoid a damage on the overlay layer of the key.

NDL8001-VAC & NDL8003-VAC MODELS FOR VOLTAGE MEASUREMENT

NDL8001-VAC is a single channel Data Logger for single phase voltage measurement.

NDL8003-VAC is a three channels Data Logger for three-phase voltage measurement with the possibility of neutral connection.

Both models provide accurate True RMS calculation even by distorted waveform through the 12 bit AD Converter.

NDL8001-AAC & NDL8003-AAC MODELS FOR CURRENT MEASUREMENT

NDL8001-AAC is a single channel Data Logger for single phase current measurement.

NDL8003-AAC is a three channels Data Logger for three-phase current measurement.

Both models use, as current transducers, Rogowski flexible coils which can be connected without any external adapter.

COMMON FUNCTIONS

The RS232 serial port, in combination with the provided **TrueGraph** software, allows the instrument configuration and the downloading of recorded data.
Data are recorded in a non-volatile Flash memory; therefore data are not lost even with low battery or during its replacement.
The instrument is equipped with a 2MB of memory which can be programmed for ring or fill mode recordings.
The measurement sampling rate can be set from 1 second to 24 hours.

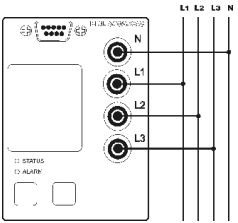
MEMORY SIZE EXAMPLES
NDL8001-VAC: sampling rate 6 sec. with 1 recorded value=18 giorni circa
NDL8003-VAC: sampling rate 6 sec. with 7 recorded values=10 giorni circa
NDL8001-AAC: sampling rate 6 sec. with 1 recorded value=73 giorni circa
NDL8003-AAC: sampling rate 6 sec. with 4 recorded values=18 giorni circa

CONNECTIONS

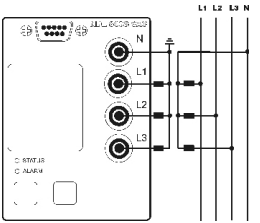
WIRING MODES

Connections are made on the instrument front panel, as described in the following pictures.

NDL8003-VAC

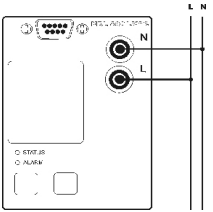


Direct connection

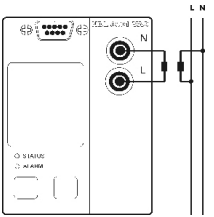


Connection with voltage transformer

NDL8001-VAC

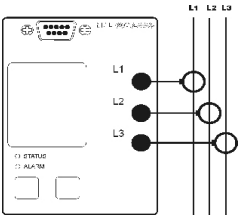


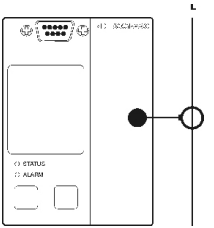
Direct connection



Connection with voltage transformer

NDL8003-AAC & NDL8001-AAC





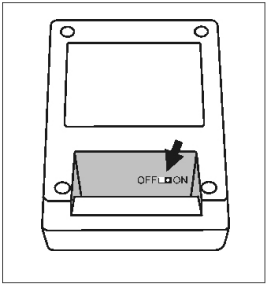
RS232 SERIAL COMMUNICATION PORT

The RS232 serial port allows to connect the instrument to a PC. For the connection, use the DB9 shielded cable provided with the instrument.

POWER SUPPLY

The instrument is powered by a 9V battery, common 6F22 model; it is possible to use either rechargeable or alkaline battery: the alkaline type is suggested. During battery replacement date and time settings are lost, while recorded data and recording settings are retained. As the instrument is not provided with a recharge circuit, batteries must be recharged using a stand alone recharger.

The battery compartment contains a little switch; if activated, it switches OFF the instrument, stopping all the current operations. When the instrument is not used for a long time, this useful action grant longer lifetime to the battery.



The instrument is already provided with a new battery. To switch ON the instrument, move the switch on the “ON” position as indicated in the picture (see on the instrument back label).

If the instrument is switched ON, the internal realtime clock is in timekeeping mode even if no recording in progress. In this condition, the battery lifetime is:

Ni-Cd 120 mAh minimum	Zn-Cl 300 mAh minimum	Alk 600 mAh minimum
250 days	625 days	1250 days

NOTE: The following table shows the battery lifetime of the model with three current inputs in the worst case: active instrument recording, without active communication.

RECORDING FREQUENCY	Ni-Cd 120 mAh minimum	Zn-Cl 300 mAh minimum	Alk 600 mAh minimum
1 second	> 5 days	> 15 days	> 30 days
6 seconds	> 25 days	> 2,5 months	> 5 months
1 minute	> 2,5 months	> 7 months	> 1 year

NOTE: When the instrument is switched OFF or the battery is removed for more than 15 seconds, date and time settings are lost. At the next switching ON, these settings must be programmed from the software.

LOW BATTERY

When a diagnostic procedure is carried out (see section Diagnostic Function), but both LEDs are not flashing, check if the switch, inside the battery compartment, is in ON; otherwise replace the battery.

NOTE: The programmed recording parameters and the recorded data are retained in memory even with low battery.

BATTERY REPLACEMENT

WARNING: Before removing battery or switching OFF the instrument (see section Power Supply), stop the recording in progress. This operation avoids the loss of data.

WARNING: Before replacing the battery, disconnect all the cables from the instrument.

WARNING: Check the expiry date of the battery: do not use expired battery.

WARNING: Batteries must not be disposed in the household waste. The law requires that the consumer returns the waste batteries either to public collection points in town or village or to any outlet selling batteries of the same kind (statutory instructions on battery disposal).

WARNING: Batteries which contain polluting substances are marked as follows:
Pb = lead battery
Cd = cadmium battery
Hg = mercury battery

NOTE: All batteries provided with the instrument do not contain polluting substances.

For battery replacement, follow the procedure below:

- open the battery compartment cover
- remove the low battery
- disconnect the connector
- connect the new battery
- insert the new battery
- close the cover

NOTE: When battery is replaced, or the instrument is switched ON again, check the instrument status with a diagnostic function.

USE

NOTE: At the opening of the box, check that the instrument is not damaged due to transport. If the instrument looks damaged, please contact the Technical Service.

The box must contains:
in case of NDL8001-VAC & NDL8003-VAC

- Data Logger
- n. 2/4 flexible leads with safety banana-jack ∅ 4mm EN61010 with different colors for phases and neutral
- n. 2/4 crocodile clips
- DB9 cable for RS232 serial connection
- instrument bag and accessories
- CD-ROM with **TrueGraph** software
- user's manual
- battery

in case of NDL8001-AAC & NDL8003-AAC

- Data Logger
- n. 1/3 flexible transducer Rogowski
- DB9 cable for RS232 serial connection
- instrument bag and accessories
- CD-ROM with **TrueGraph** software
- user's manual
- battery

RECORDINGS

The Data Logger is an instrument for measured data recording. To carry out a recording, follow the procedure below:

- check the instrument is ON and no recording is currently set
- connect the instrument to PC, run **TrueGraph** software, check clock setup and carry out the settings in **Memory Setup** window
- to start or stop a recording, keep **START/STOP** key pressed and simultaneously press twice **CHECK/ENTER** key

The instrument replies with confirmation messages through the two LEDs, described in the following table.

INFO messages	STATUS (GREEN)	ALARM (RED)
START recording	5 times fast	-
STOP recording	once for 1 sec.	-
Recording not set	-	5 times fast
FULL memory	-	once for 1 sec.
LOW BATTERY	5 times fast	

DIAGNOSTIC FUNCTION (INSTRUMENT STATUS)

At any time, the Data Logger allows to know the current instrument status. If **CHECK/ENTER** key is pressed for at least 1 sec., the two LEDs provide a diagnostic message.

DIAGNOSTIC message	STATUS (GREEN)	ALARM (RED)
Recording in progress	5 times fast	-
Ready to record	once for 1 sec.	-
Recording not set	-	5 times fast
FULL memory	-	once for 1 sec.
BATTERY LOW	5 times fast	

TECHNICAL FEATURES

INPUTS

N. of channels	single phase voltage	➡ NDL8001-VAC
	three phase voltage	➡ NDL8003-VAC
	single phase current	➡ NDL8001-AAC
	three phase current	➡ NDL8003-AAC
Input voltage	0 ÷ 600 VAC_{L-N}	➡ NDL8001-VAC
	0 ÷ 600 VAC_{L-L}	➡ NDL8003-VAC
Input sensitivity	0 ÷ 350 mV ➡ NDL8001-AAC & NDL8003-AAC	
Input impedance	>1.3 Mohm	
Load	max 0.15 VA per phase	
Frequency	45 ÷ 65 Hz	

MEASUREMENT

Accuracy	±0.5% lettura ±0.05% fondoscala
Sampling	128 samplings/period for 2 waves
Calculation	true RMS
A/D converter	12 bits

RECORDING

Parameters	NDL8001-VAC: V_{L1}
	NDL8003-VAC: V_{Σ}, V_{L1-N}, V_{L2-N}, V_{L3-N}, V_{L1-L2}, V_{L2-L3}, V_{L3-L1}
	NDL8001-AAC: I_{L1}
	NDL8003-AAC: I_{L1}, I_{L2}, I_{L3}, I_N

Memory	Flash type
Memory size	2MBytes
Frequency	1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 sec. 1, 2, 5, 10, 15, 20, 30 min. 1, 6, 12, 24 ore (selectable)
Mode	• fill • ring with partial overwrite of data already recorded, mantaining the recording rate previously set • ring with partial overwrite of data already recorded, with recording rate slowing at each cycle

COMMUNICATION PORT

Type	RS232
Power supply	from PC RS232 port
Baud Rate	from 2400 to 19200 bps, programmable

SIGNALS AND COMMANDS

Signals	n. 2 LED for operating status and battery status
Keypad	n. 2 multifunction keys

ENVIRONMENTAL REQUIREMENTS

Operating temperature	-10°C e +60°C
Storage temperature	-20°C e +75°C
Altitude	0 ÷ 2000 m on sea-level
Humidity	max 90% without condensation

POWER SUPPLY

Battery	9V type (alkaline, Zn-Cl, Ni-Cd)
Battery life	> 1 month with recording frequency at 6 seconds with Ni-Cd battery

MECHANICAL FEATURES

Material	autoextinguish plastic
Protection degree	IP50 (case), IP30 (opened battery compartment)
Connections	safety sockets ∅ 4mm EN61010 with different colors for phase and neutral ➡ VAC clamp connectors ∅ inside diameter about 200mm, connection cable l=2.5m, double insulation 600V_{RMS} rated ➡ AAC
Size	about 110 x 80 x 40 mm
Marking	front label with electrical specifications, connections, user's instructions; back label with model, number, code, power supply specifications, input specifications, memory size, battery switch description

STANDARD COMPLIANCE

Safety	CEI EN61010-1 and CEI EN61010-031 (overvoltage CAT III 600V, double insulation - class 2)
CE Marking	93/68/EEC standard

ACCESSORIES

Transducers	NDL8001-AAC & NDL8003-AAC tipo flessibile Rogowski, ∅ interno 200mm circa, cavo di connessione l=2.5m, double insulation 600 V_{RMS} rated
Connections	NDL8001-VAC & NDL8003-VAC flexible leads with safety banana-jack 4mm EN61010 with different colors for phases and neutral, n.2/4 crocodiles clips 30mm max width
PC connection	DB9 cable for RS232 port
Transport	instrument bag
Battery	9V type
Software	CD-ROM
Manual	paper

ATTENTION: As the flexible clamps have a low level signal, in order to grant the best measurement accuracy the instrument has been calibrated with its own current transducers. Therefore, do not use transducers of other similar instruments to avoid unaccurate measurements. The instrument and its transducers have the same serial number.

FIRMWARE UPDATING

To add new functions on the instrument, the firmware update can be carried out via serial communication port, using a specific software utility.

TrueGraph SOFTWARE

TrueGraph is the software provided with the instrument which allows the Data Logger management; it allows to:

- set the instrument parameters
- set recordings
- download recordings
- analyze downloaded or previously stored data
- display processed data in different modes (table, graphic..)

TrueGraph can be used only on IBM PC compatible in a Microsoft Windows® 98, ME™, NT™ 4.0, 2000, XP environment.

INSTALLATION

To install **TrueGraph** it is necessary to check the compatibility between PC and software.
Minimal configuration:

- IBM PC compatible with Pentium processor
- O.S. Microsoft Windows® 98, ME™, NT™ 4.0, 2000, XP
- 10MB of free space on the hard disk
- SVGA graphic board
- CD-ROM reader
- RS232 serial communication port
- keyboard and mouse

Suggested configuration:

- IBM PC compatible with Pentium III processor
- O.S. Microsoft Windows® 98, ME™, NT™ 4.0, 2000, XP
- 100MB of free space on the hard disk
- SVGA graphic board
- CD-ROM reader
- RS232 serial communication port
- keyboard and mouse

To install **TrueGraph** on the hard disk, follow the procedure below:

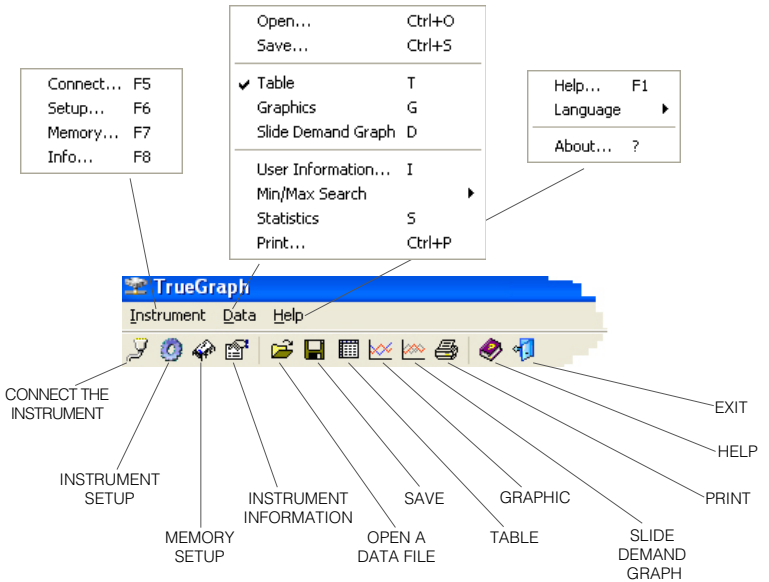
1. switch ON the PC and wait until Microsoft Windows® environment has been loaded
2. insert the provided CD in your system's CD reader
3. the automatic system starts the installation, otherwise select **Run** from the Windows **Start** button
4. type **X: \ SETUP** and press <ENTER> (**X** identifies the PC CD-ROM drive letter). The software installation will be carried out
5. at the end of the installation, a **TrueGraph** file group appears
6. to run the program, double-click on the **TrueGraph** icon

TOOLBAR AND MENU

Here below, a graphic description of **TrueGraph** keys and relative menu. The keys correspond to the main items available in the menus, therefore, it is possible to carry out a function using menu or pressing the relevant key.

NOTE: The displayed windows, described in this manual, depends on the connected instrument version. The manual refers to NDL8003-VAC instrument.

NOTE: The keys are enabled according to the **TrueGraph** functions availability.



STATUS BAR

The Status bar is displayed at the bottom of **TrueGraph** window. The left area of status bar shows the serial number of the connected instrument, the used communication port and the set communication speed (if no Data Logger is connected, the message **Not connected to an instrument** will be displayed); the current data file name is displayed in the right area.

INSTRUMENT MENU

The instrument menu allows to set the instrument. The next pages describe the following menu items:

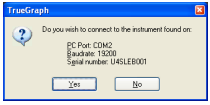
- Connect
- Setup
- Memory
- Info

CONNECTION

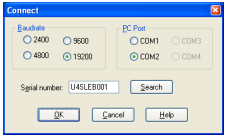
NOTE: All instrument recordings are automatically stopped at the connection to **TrueGraph**. Therefore, stop all recordings, before connecting to the software.

NOTE: Before connecting the instrument to a PC, wait until the instrument has reached the operating temperature.

Once **TrueGraph** has been started, automatically it searches for the available serial ports in the PC; if a connected Data Logger is found, a confirmation window is displayed for the connection of the instrument.



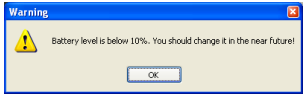
If the instrument is connected after **TrueGraph** running, it is necessary to use the **Connect** function. The following window is displayed.



Baudrate	communication speed: 2400, 4800, 9600, 19200 bps
PC Port	PC communication port where the instrument is connected
Serial number	instrument serial number
Search key	start the instrument search considering the parameters set in this window (serial number not considered)
OK key	confirm the settings and search the instrument considering the typed serial number
Cancel key	cancel the carried out settings and come back to the main window
Help key	provide assistance for this window

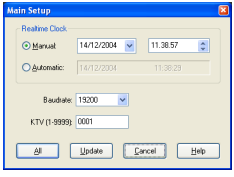
NOTE: During the instrument manual research with **Search** key, **TrueGraph** looks for baudrate, starting from the selected value up to the lower value.

NOTE: After instrument connection, if the battery is lower than 10%, **TrueGraph** will display a warning message.



SETUP

This function allows to set the parameters on the connected instrument. The following window is displayed.

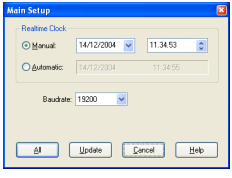


Realtime Clock Mode:
- Manual: allow to set date and time manually
- Automatic: set PC date and time in the instrument

Baudrate set the communication speed (bps) of the connected instrument
KTV (1-9999) set the voltage transformer multiplier (see Note)
All key update all the parameters of this window, in the instrument
Update key update only the modified parameters of this window, in the instrument
Cancel key cancel the carried out settings and come back to the main window
Help key provide assistance for this window

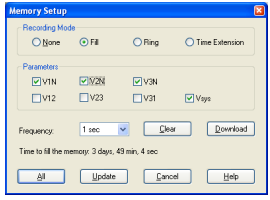
NOTE: The KTV parameter is available only if either the NDL8001-VAC or NDL8003-VAC model are connected.

NOTE: Connecting to NDL8001-AAC or NDL8003-AAC model, the following window is displayed.



MEMORY

This function allows to set the instrument recording. The following window is displayed.

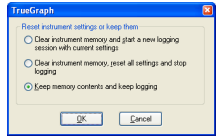


Recording Mode	**None**: no recording set **Fill**: stop the recording when all the available memory is filled **Ring**: when the available memory is completely filled, recorded data are partially overwritten, mantaining the set recording rate **Time Ext.**: when the available memory is completely filled, recorded data are partially overwritten, slowing the set recording rate (next value rate is set automatically)
Parameters	selectable parameters for recording (see Note)
Frequency	recording frequency
Clear key	reset instrument data; a confirmation message is displayed: to clear data press **Yes**
Download key	download recorded data
Time to fill the..	recording time extimation based on to the selected parameters and the set rate
All key	update all the parameters of this window, in the instrument
Update key	update only the modified parameters of this window, in the instrument
Cancel key	cancel the carried out settings and come back to the main window
Help key	provide assistance for this window

NOTE: Parameter fields may differ according to the instrument version/model.

DATA DOWNLOADING

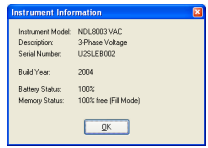
After data downloading, a window is displayed for file saving; after this operation, another window appears for the selection of the desired option; to confirm, press **OK** key.



Clear instrument memory and start.. retain the settings but memory is cleared
Clear instrument memory, reset.. clear data memory and settings
Keep memory contents and.. retain the recording, without changing the settings

INFO

This function allows to display information about the connected instrument. The following window is displayed.



Instrument Model instrument model name
Description instrument brief description
Serial Number instrument serial number
Build Year instrument manufacturing year
Battery Status battery status (100%=charge; 0%=discharge)
Memory Status memory size
OK key close the window

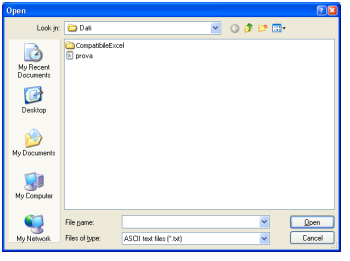
DATA MENU

The Data menu allows to manage, in different ways, downloaded and/or previously stored data. The next pages describe the following menu items:

- Open
- Save data
- Close
- Table
- Graphic
- Slide Demand Graph
- User Information
- Min/Max Search
- Statistics
- Print

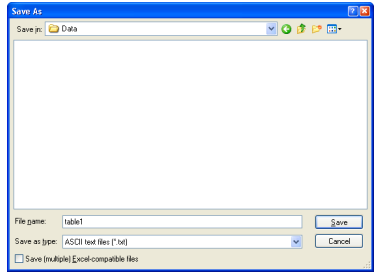
OPEN

This function allows to open a recorded data file previously saved on the hard disk. The following window is displayed. Select the desired file and press **Open**.



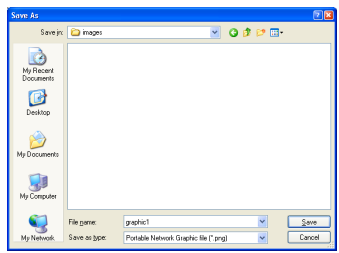
SAVE DATA

This function allows to save data in Table or in Graphic mode. In Table mode, by this window, data are saved in **Data** directory in ASCII format.



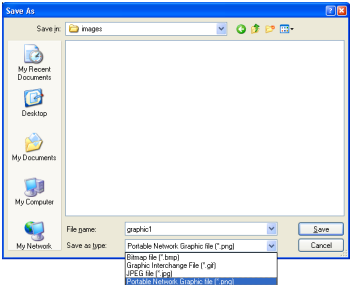
Save (multiple) Excel-compatible files option, if available, allows to divide data, saving them in a number of Excel compatible files. This option is very useful since Excel is able to manage a data file with 65536 lines max, while **TrueGraph** data file can have more than 65536 lines; therefore, if this option is selected, the management of all data is granted, also in Excel program.

In Graphic or Slide Demand Graph modes, the following window is displayed, to save data in **images** directory in a selectable graphic format.



In **Save as type** field, click on the specific key to display the list with the available file format:

- Bitmap file (*.bmp)
- Graphic Interchange file (*.gif)
- JPEG file (*.jpg)
- Portable Network Graphic file (*.png)



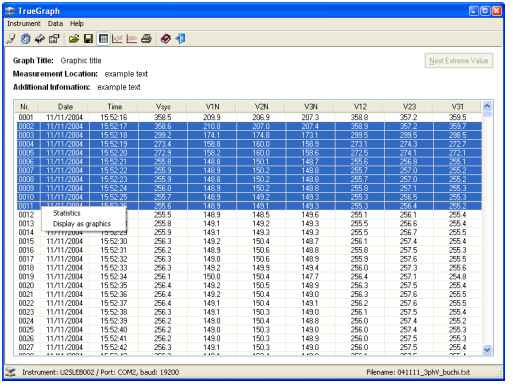
After the graphic format selection, insert the name in the field name and press **Save** key.

CLOSE

This function allows to close the current data file.

TABLE

This function allows to display data in table mode.



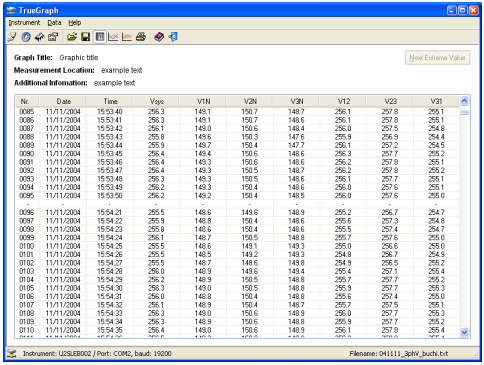
Identification data this area includes the programmable recording data: Title, Measurement Location, Additional Information

TrueGraph arranges data chronologically. To analyze only a part of data, follow the procedure below:

1. to select, click on the first line of the desired area
2. keep **SHIFT** key pressed and select the last line of the list; the desired area will be highlighted
3. to display other table functions, click the right key of the mouse
4. a short menu, containing two items, will be displayed:
   - **Statistics ➡** open a window with minimum, average, maximum values of all data or the selected one (see section Statistics)
   - **Display as graphics ➡** display all data or the selected one in Graphic mode (see section Graphic)

NOTE: It is suggested to analyze in Table mode the recordings with more than 60 samplings. Otherwise, a lower value has no sense and it can cause the ending of the program.

When the recording is stopped and then started again, **TrueGraph** shows this event displaying a line without values; this is very useful for a prompt identification of a temporary interruption of the recording.



GRAPHIC

This function allows to display data in graphic mode.

AutoScale key — enable/disable the automatic function for scale values setup. When the top and the bottom values of scale are not highlighted (disabled autoscale), it is possible to set those of the vertical axis manually

Zoom all key — display the entired graphic

Statistics key — open a window with minimum, average, maximum values for all the available parameters of the displayed or selected graphic (see section Statistics)

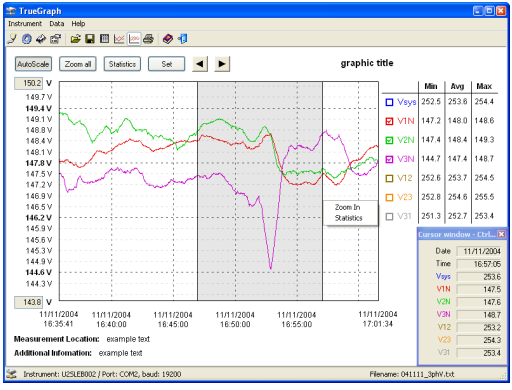
Arrow keys — allow to drag the graphic (left or right) to display the details (PAN function)

Identification data — this area includes the programmable recording data: Title, Measurement Location, Additional Information

When the recording is stopped and then started again, **TrueGraph** shows this event displaying an interruption in the graphic, identified by a yellow zone; this is very useful for a prompt identification of a temporary interruption of the recording.

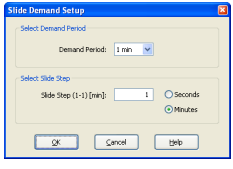
SLIDE DEMAND GRAPH

This function allows to display data in Slide Demand Graph mode. The values used for the graphic are the result of an average values calculation on a programmable integration time.



In comparison with the Graphic window previously described, there is a further function carried out pressing **Set** key. All the other functions are the same of the Graphic mode.

Set key open the window for the slide demand setup



Demand period: integration time value for the demand value calculation
Slide step: slide step value (in minutes o seconds)

OTHER GRAPHIC FUNCTIONS

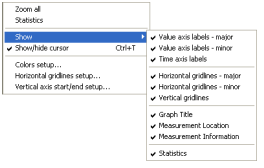
The available graphic parameters are displayed at the right of the graphic. Each parameter color corresponds to the graphic line with the same color. To display the desired parameters in the graphic, select ☑ next to the parameters.

To carry out operations only in a desired part of the graphic, follow the procedure below:

1. move the cursor on the desired graphic area
2. with the mouse, keep left key pressed, and drag the cursor until all the desired area is selected
3. after releasing the key, a short menu, containing two items, will be displayed:
   - **Zoom in ➡** magnify the selected graphic area
   - **Statistics ➡** open a window with minimum, average, maximum values for all the available parameters of the displayed or selected graphic (see section Statistics)

To carry out functions and operations on the graphic:

1. when the cursor is on the graphic, click on right key of the mouse
2. the following menu is displayed:



Zoom all display the entired graphic

Statistics open a window with minimum, average, maximum values for all the available parameters of the displayed graphic (see section Statistics)

Show display a function list

Values axis labels-major: enable/disable main values on the vertical axis

Values axis labels-minor: enable/disable secondary values on the vertical axis

Time axis labels: enable/disable time values on the axis

Horizontal gridlines-major: enable/disable the main horizontal gridlines

Horizontal gridlines-minor: enable/disable the secondary horizontal gridlines

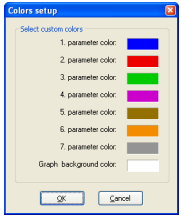
Vertical gridlines: enable/disable vertical gridlines

Graph Title: enable/disable graphic title

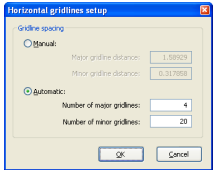
Measurement Location: enable/disable measurement location
Measurement Information: enable/disable measurement information
Statistics: enable/disable Statistics table next to the graphic

Show cursor enable/disable the cursor in the graphic and the window with cursor data (Ctrl+T)

Colors setup parameters color setup

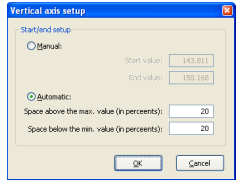


H.Gridlines setup horizontal gridlines setup



Manual: manual setup of horizontal gridlines
Automatic: automatic setup of horizontal gridlines

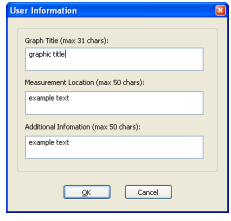
V.axis s/e setup vertical axis start/end setup



Manual: manual setup of absolute values
Automatic: automatic setup with percentage values

USER INFORMATION

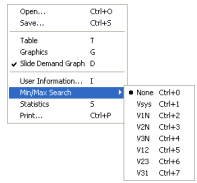
This function allows to set the user identification data (Title, Measurement Location, Additional Information). The following window will be displayed.



The information in this window is displayed in Table or Graphic mode; moreover, this information is shown at the next opening of the file, if it was previously saved.

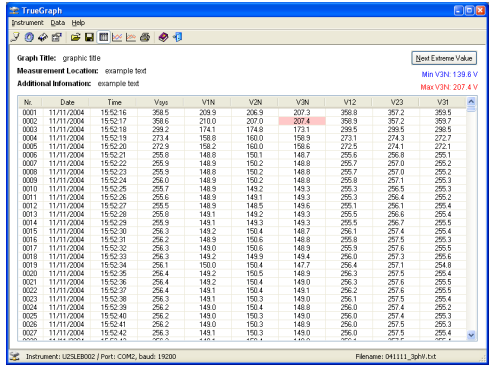
MIN/MAX SEARCH

This function allows to display the minimum and maximum value of a single parameter. Select **Min/Max Search** from Data menu, and a list of the available parameters will be displayed. To disable this function, select **None**.



Once the desired parameter has been selected, the minimum and maximum value will be identified in different way, depending on the data display mode (Table, Graphic, Slide Demand Graph).

In Table mode, it will be automatically displayed the area where the first extreme value is found (min or max). According to the type of value (min or max), the cell change the color; a blue cell identifies a minimum value, while a red cell identifies a maximum value. At the top of the table, next to the Identification data, the selected parameter and the type of extreme value will be displayed (min o max).

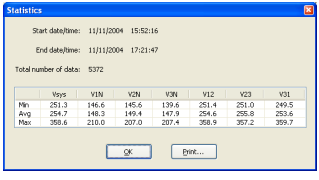


Next extreme value key allow to toggle between the minimum and maximum value

In Graphic mode, when **Min/Max Search** function is enabled, **TrueGraph** looks for the extreme values in the displayed graphic; the minimum value and the maximum values are identified by two yellow indicators which contain value, type of value, date and time.

STATISTICS

This function allows to calculate and display minimum, average and maximum values for all the available parameters of all data or the selected one. This window is opened when the Statistics function is selected in Table or Graphic mode. The following window is displayed.



OK key — close the window

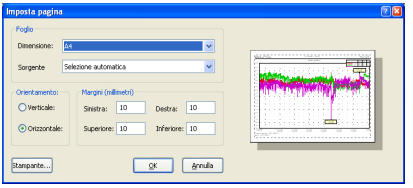
Print key — print the displayed values. Before printing, the Print Preview window is displayed (see section Print)

PRINT

This function allows to print data in Table or Graphic mode. The following Print Preview window will be displayed.

Page Setup key	open a window with the print parameters to set da impostare (see below)
Print key	print the page
Zoom in key	magnify a detail
Zoom out key	return, step by step, to the previous size
Arrow keys	display the other pages
Close key	close the Print Preview window

PAGE SETUP WINDOW



Paper	paper size and source
Orientation	print orientation
Margins (millimetres)	printer margins
Printer key	select the printer to use

HELP MENU

Help menu provides Technical Assistance for this application. The following menu items are displayed:

- Help
- Language
- Information

HELP

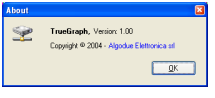
This function allows to display a window which provides Technical Assistance.

LANGUAGE

This function allows to set the language for the messages displayed by **TrueGraph**. Available languages are: english, italian.

INFORMATION

This function displays an information window containing the name and the version of the software.



SHORT CUTS

F1	help
F5	instrument connection
F6	instrument setup
F7	memory setup
F8	instrument information
Ctrl+O	open a data file
Ctrl+S	save data
Ctrl+P	print
Ctrl+T	enable/disable the cursor and the window with cursor data
T	table mode
G	graphic mode
D	slide demand graph mode
I	user information
S	statistics
?	software information
Alt+F4	exit

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