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1 Introduction

Gate Builder allows to configure the variables (named "*Gates*") involved in the supervision of a process. The configuration is done according to the type of gate considered; there are five classes of them:

Numerical: all the gates that can have signed integer or floating point values

Digital: gates that can have only binary values 0 and 1

String: gates relating to variables which are sequences of characters

Compound: gates whose value is not sampled, but it is the result of mathematical operations between two different ports

Event/Alarm: gates used to define alarms and events according to conditions on other gates

2 Program start

Gate Builder is automatically started by the *Project Manager* by double clicking the icon for the type of gates you want to define or modify.

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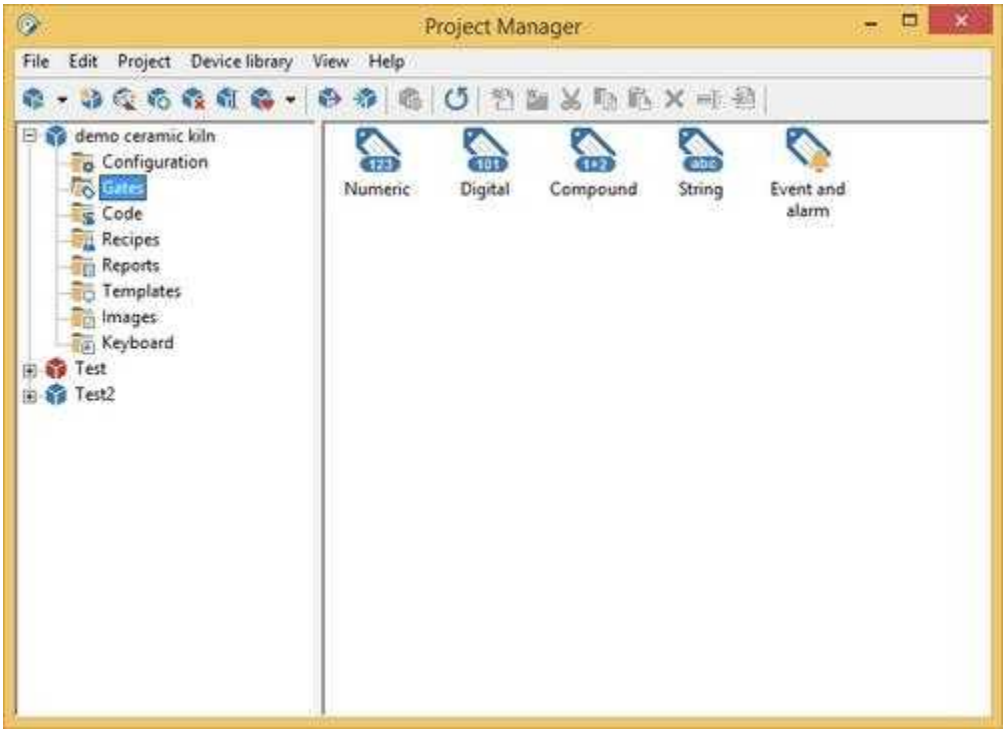

In *Gate Builder* it will always be possible to load gates of any of the five types through the menu item *File* | *Load Port ,* specifying the desired type of port.

In the program the loaded gates will be displayed in a table.

At the left bottom of the main window (as in following figure) it is shown the type of gates presently displayed.

To simplify the use of the program, the most common functions can be invoked using a toolbar under the main menu, or by selecting the desired action from the popup menu that appears with the right click of the mouse anywhere over the table.

Once a type of gates has been loaded in memory, it is possible to begin to operate on them in order to get the desired results. In particular it will be possible to add, delete, modify and save on disk the data of the loaded gates and print a table containing all or some of them.

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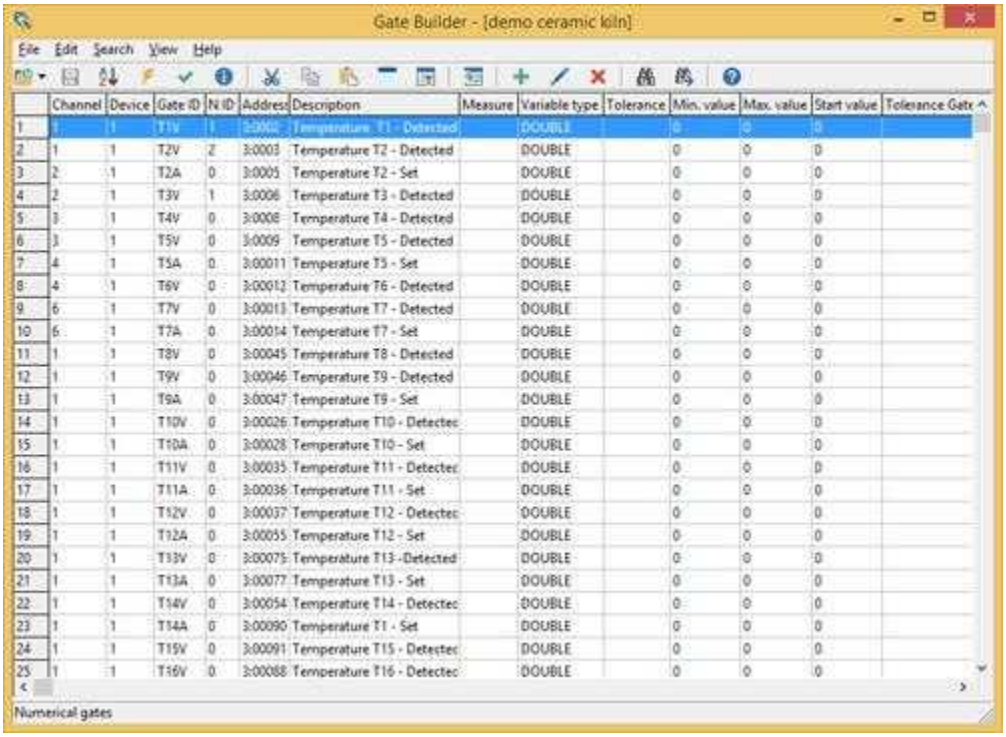

	Channel	Device	Gate ID	N.ID	Address	Description	Measure	Variable type	Tolerance	Min. value	Max. value	Start value	Tolerance Gate
1	1	1	T1V	1	3:0002	Temperature T1 - Detected		DOUBLE		0	0	0	
2	1	1	T2V	2	3:0003	Temperature T2 - Detected		DOUBLE		0	0	0	
3	2	1	T2A	0	3:0005	Temperature T2 - Set		DOUBLE		0	0	0	
4	2	1	T3V	1	3:0006	Temperature T3 - Detected		DOUBLE		0	0	0	
5	3	1	T4V	0	3:0008	Temperature T4 - Detected		DOUBLE		0	0	0	
6	3	1	T5V	0	3:0009	Temperature T5 - Detected		DOUBLE		0	0	0	
7	4	1	T5A	0	3:00011	Temperature T5 - Set		DOUBLE		0	0	0	
8	4	1	T6V	0	3:00012	Temperature T6 - Detected		DOUBLE		0	0	0	
9	6	1	T7V	0	3:00013	Temperature T7 - Detected		DOUBLE		0	0	0	
10	6	1	T7A	0	3:00014	Temperature T7 - Set		DOUBLE		0	0	0	
11	1	1	T8V	0	3:00045	Temperature T8 - Detected		DOUBLE		0	0	0	
12	1	1	T9V	0	3:00046	Temperature T9 - Detected		DOUBLE		0	0	0	
13	1	1	T9A	0	3:00047	Temperature T9 - Set		DOUBLE		0	0	0	
14	1	1	T10V	0	3:00026	Temperature T10 - Detectec		DOUBLE		0	0	0	
15	1	1	T10A	0	3:00028	Temperature T10 - Set		DOUBLE		0	0	0	
16	1	1	T11V	0	3:00035	Temperature T11 - Detectec		DOUBLE		0	0	0	
17	1	1	T11A	0	3:00036	Temperature T11 - Set		DOUBLE		0	0	0	
18	1	1	T12V	0	3:00037	Temperature T12 - Detectec		DOUBLE		0	0	0	
19	1	1	T12A	0	3:00055	Temperature T12 - Set		DOUBLE		0	0	0	
20	1	1	T13V	0	3:00075	Temperature T13 -Detected		DOUBLE		0	0	0	
21	1	1	T13A	0	3:00077	Temperature T13 - Set		DOUBLE		0	0	0	
22	1	1	T14V	0	3:00054	Temperature T14 - Detectec		DOUBLE		0	0	0	
23	1	1	T14A	0	3:00090	Temperature T1 - Set		DOUBLE		0	0	0	
24	1	1	T15V	0	3:00091	Temperature T15 - Detectec		DOUBLE		0	0	0	
25	1	1	T16V	0	3:00068	Temperature T16 - Detectec		DOUBLE		0	0	0	

3 How to define the gates

To modify the parameters of a gate, you just need to double click on the row containing the gate itself, or select the row and press RETURN. To add a new gate you have to do almost the same: double click or press RETURN while you are on the last row (empty). It is possible to insert a new gate in any position of the table by selecting the desired line and use the command *Edit* | *Insert*: the new gate will be inserted in the next line after the selected one.

When you modify or add a new port, on the screen there will be a window showing in a detailed way all the parameters of the gate, allowing therefore the insertion of the typical values of that gate. The required data depend on the type of gate considered, and will be dealt with later on.

Once you have inserted in the window the necessary fields, you will be able to confirm the data by pressing *Ok*: as a consequence, in the gates table a new row will be added (that is to say a new gate) if you have chosen to add a new gate, or, the selected row will be modified if you have chosen to modify the data of the selected gate. If you press *Cancel*, the data inserted in the window won't be taken into consideration, and there won't be any changes in the gates table.

Before the new data of the gate are inserted in the table, *Gate Builder* checks if they are correct, and informs the user of any error (for example if you insert a number with decimals where you should have put an integer number), urging him to correct it.

Now we are going to describe the various windows in which to insert the fields of a gate, indicating the function of every single parameter.

4 Gates management

Using *Gate Builder* it is possible, apart from defining new gates in the above-mentioned way, to modify the created gates, delete, copy and move them.

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To specify which gates will be operated on, you need to select the corresponding rows of the table. If you want to select only one gate, you just need to place your selection on the row with that gate using the cursor keys, or clicking on the row. If you want to select more than one gate (placed on adjoining rows of the table), you just need to place your selection on the first row of the group and select the other rows using the cursor keys in combination with SHIFT, or pressing the mouse left button on the first row of the selection, and dragging the cursor as far as the last row of the selection. To fast select the entire set of gates, use the function *Edit* | *Select all*.

Sometimes there is the necessity to modify properties for a set of gates: to do this operation quickly, simply select the desired gates and use the function *Edit* | *Edit selected gates*. A dialog box will appear. This window contains only the properties that are equal to all the selected gates. Properties that are different in the set of selected gates are left blank. If a property is modified, the property will be set to the new value in all the selected gates.

To delete a gate you just need to select the gate (or the gates) to delete and press the DEL key.

With *Gate Builder* it is possible to copy some gates in the *Windows* clipboard and then paste them. To do this, select the rows to copy, press CTRL-C (or select *Edit* | *Copy*) to copy the gates in the clipboard or press CTRL-X (or select *Edit* | *Cut*) to cut the gates (copy in the clipboard and delete from the table), select the position in which you want to insert the gates, and press CTRL-V (or select *Edit* | *Paste*). The pasted gates will be inserted in table immediately after the selected row.

Note that, when you paste gates from the clipboard, *Gate Builder* verifies that there are no other gates with the same ID and NID. If in the table there is a gate with the same ID and NID of the gate that is about to be pasted, the user is asked whether he wants to insert the gate with the NID augmented. There are four different options:

Yes: the next gate of the clipboard is inserted in the table with the NID field equal to the first available value among the gates that have the same ID.

Yes all: all the remaining gates of the clipboard that will conflict, will be inserted in the table with the NID field equal to the first avalaible value among the gates that have the same ID.

No: the next gate of the clipboard is not inserted in the table.

No all: only the gates that don't conflict will be inserted in the table.

Undo: no other gate will be copied from the clipboard to the table.

Apart from pasting in the table gates from the *Windows* clipboard, you can insert gates reading them from the databases: this way it is possible to copy gates from an application to another. You can access this function through *Edit* | *Paste from file*: you will be asked to specify the position of the file from which to read the gates (only files with gates of same type as those loaded in memory will be accepted) and, once you have indicated the file, the gates will be pasted in the table, always checking that there are no gates with the same ID and NID. If during the copy, gates having the same ID and NID are found, you will be asked how you want to get on, as you have been for the paste function.

5 Speedbar

The speedbar (figure below) has speed buttons for functions frequently called up from the menus.

By placing the mouse pointer on one of these buttons, a brief explanation of the function will be displayed.

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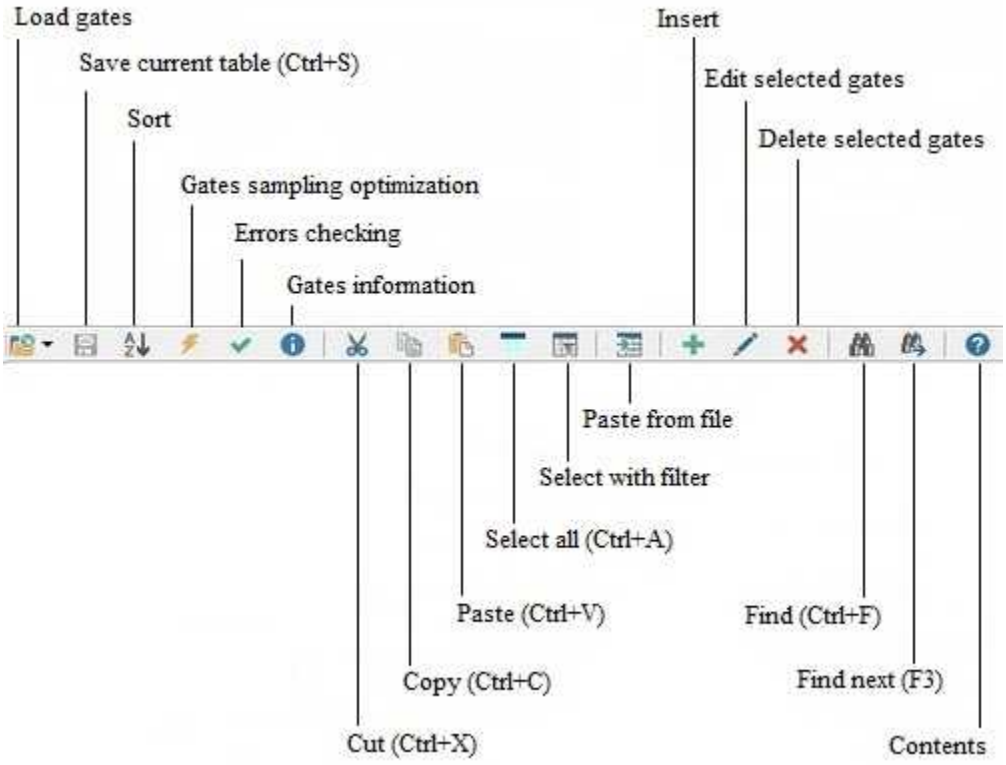

6 Advanced use of the keyboard

Via the keyboard, you can access various functions provided by the menu or select, deselect groups of gates on which to operate.
Here is the list of available keys and their functions:

Keys	Function	Available with keystrokes	Available in the menù
CTRL + S	saves the currently open file	YES	YES
CTRL + P	call the printing dialog	YES	YES
CTRL + X	deletes the selected gates	YES	YES
CTRL + C	copy in the clipboard the selected gates	YES	YES
CTRL + V	paste from clipboard at the cursor position	YES	YES
CTRL + A	selects all gates	YES	YES
CTRL + F	search through gates	YES	YES

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F3	repeats last search	YES	YES
INS	insert a gate after the one indicated	YES	NO
DEL	delete the selected gates	YES	NO
UP	moves the cursor to the previous gate	YES	NO
DOWN	moves the cursor to the next port	YES	NO
PG UP	moves the cursor to the previous page	YES	NO
PG DOWN	moves the cursor to the next page	YES	NO
HOME	moves the cursor to the beginning of the gates list	YES	NO
END	moves the cursor to the end of the gates list	YES	NO
SHIFT + UP	select / deselect the currently pointed gate and moves the cursor to the previous gate	YES	NO
SHIFT + DOWN	select / deselect the currently pointed gate and moves the cursor to the next gate	YES	NO
SHIFT + PG UP	moves the cursor to the previous page by selecting / deselecting all gates included between the previous and the current pointer	YES	NO
SHIFT + PG DOWN	moves the cursor to the next page by selecting / deselecting all gates included between the previous and the current pointer	YES	NO
SHIFT + HOME	moves the cursor to the beginning of the gates list by selecting / deselecting all gates included between the previous and the current pointer	YES	NO
SHIFT + END	moves the cursor to the end of the gate list by selecting / deselecting all gates included between the previous and the current pointer	YES	NO

7 Use of the mouse

By using the mouse you can quickly call up a menu item or select one or more gates.

Operations on the gates grid list:

Click on a gate: the blue cursor bar is moved on the gate clicked and deselects all previously selected gates.

Dragging the mouse with left button pressed: multiple selection of contiguous gates.

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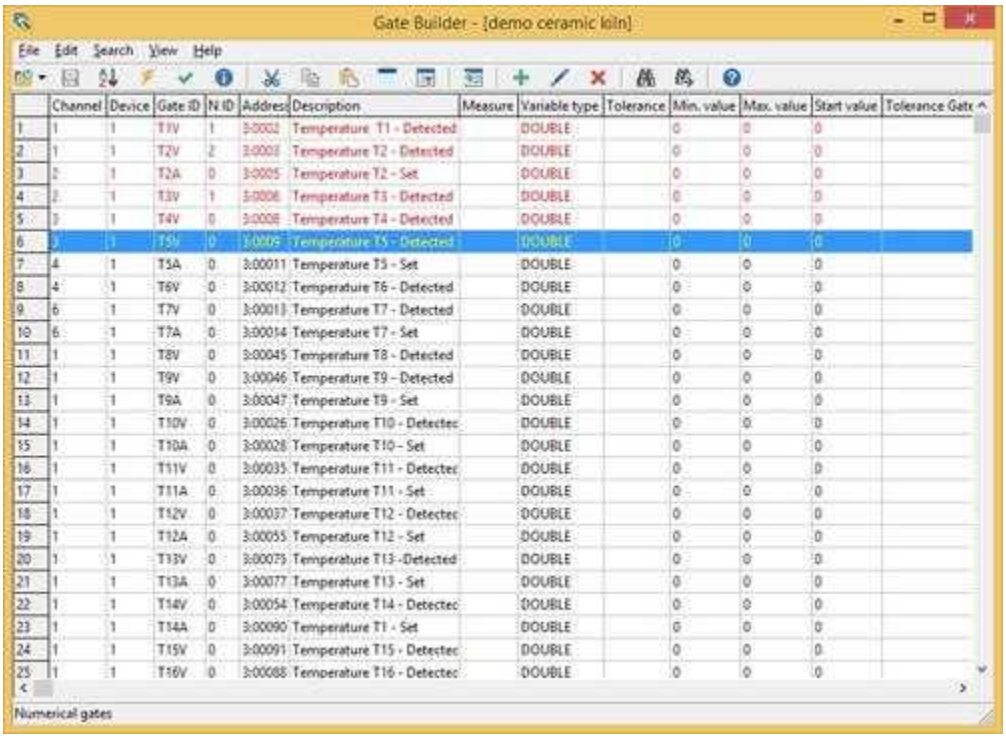
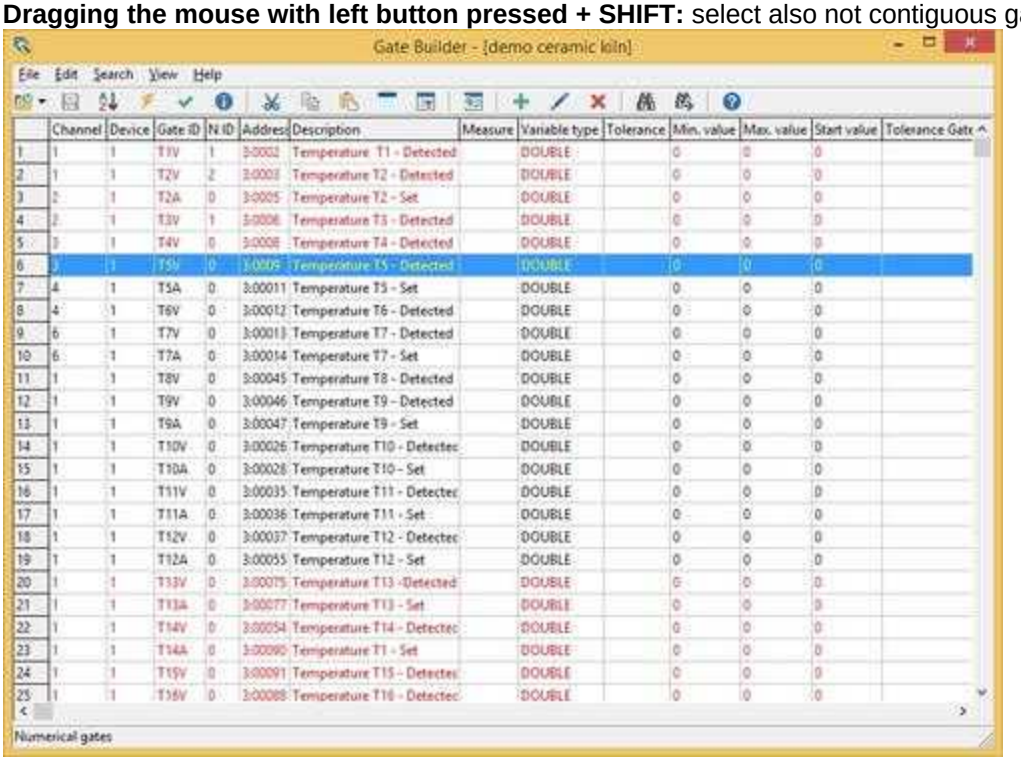


Dragging the mouse with left button pressed + SHIFT: select also not contiguous gates.



Mouse left button click + SHIFT : inverts the selection of the single gate.

Pressing the right mouse button: a popup menu with the main functions will appear.

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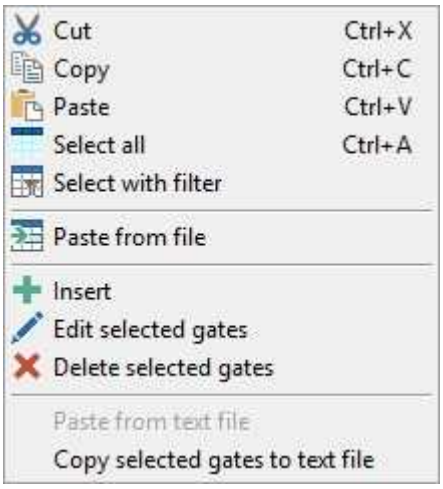
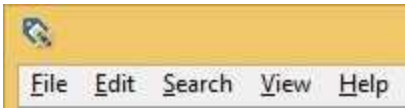


8 Menus

8.1 Introduction

Now we are going to see in detail the functions provided by the menus.



While you are working, there are two ways to access the menus: the first is to use the mouse, the second is to use the ALT key in combination with the underlined letter of the menu.

8.2 Files

8.2.1 Introduction

The File menu contains all the functions that deal with the load, save, export, import and printing of gates list.

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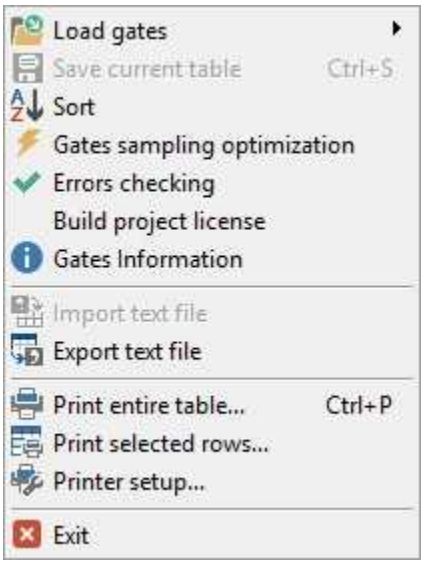
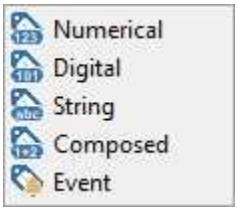


8.2.2 Load gates

Loads the selected gates from the following submenu:

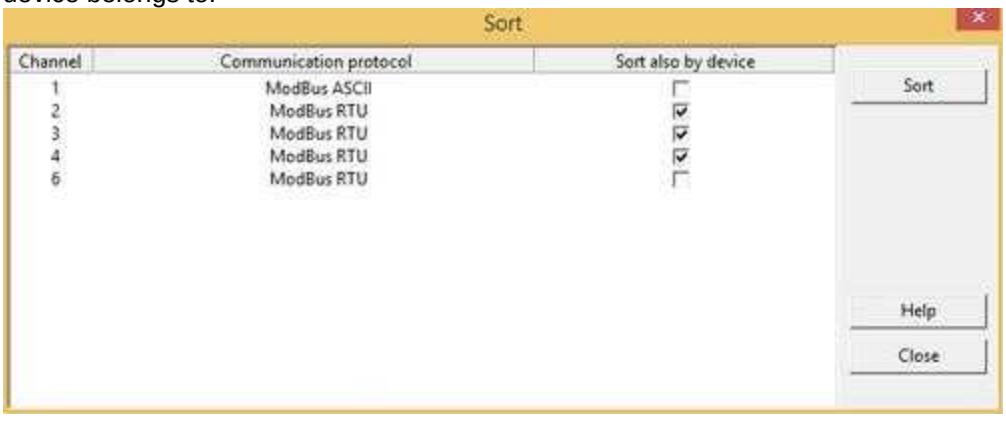


8.2.3 Save current table

Save the gates list currently loaded.

8.2.4 Sort

With this function you can sort numeric, digital and string gates according to the channel and the device belongs to.



The sort order for the channel is always applied to all the channels defined in the application, while the sort order for the device can be specified channel by channel by activating the corresponding

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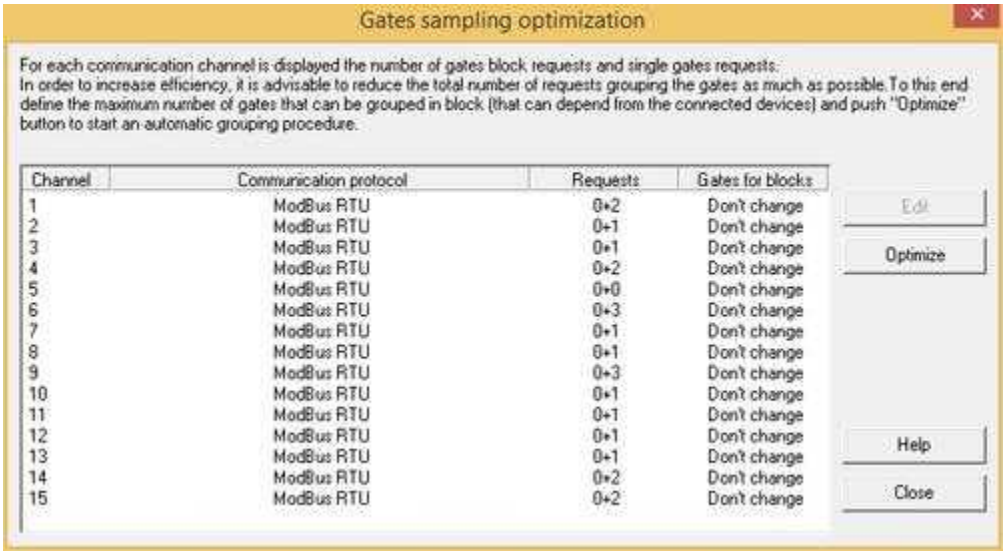
checkbox.

Sorting is performed in ascending order from channel 0 to 15.
Similarly, within each channel, the devices are also ranked in ascending order.

8.2.5 Gates sampling optimization

The function *File* | *Gates sampling optimization* can be used to speed up communication between the software and external devices. In the window below, for each communication channel is displayed the number of gates block requests and single gates requests. In order to increase efficiency, it is advisable to reduce the total number of requests by grouping the gates as much as possible.To this end, define the maximum number of gates that can be grouped in block (that can depend from the connected devices) and push "*Optimize*" button to start an automatic grouping procedure.



Columns descriptions:
Channel : channel number.
Communication protocol : protocol selected on the channel.
Requests : number of gates block requests + number of single gates requests.
Gates for blocks : are possible the following cases:

- *"Don't change"* : the automatic procedure will skip grouping on this channel.
- *"Maximum"* : the automatic procedure will group the gates using the maximum size allowed by the protocol.
- *nn (number*) : the automatic procedure will group the gates using nn as maximum size.

Buttons descriptions:
Edit : define the maximum number of gates that can be grouped in a single block.
Optimize : start the automatic grouping procedure.

The following window allow to change the "Gates for block" limit.

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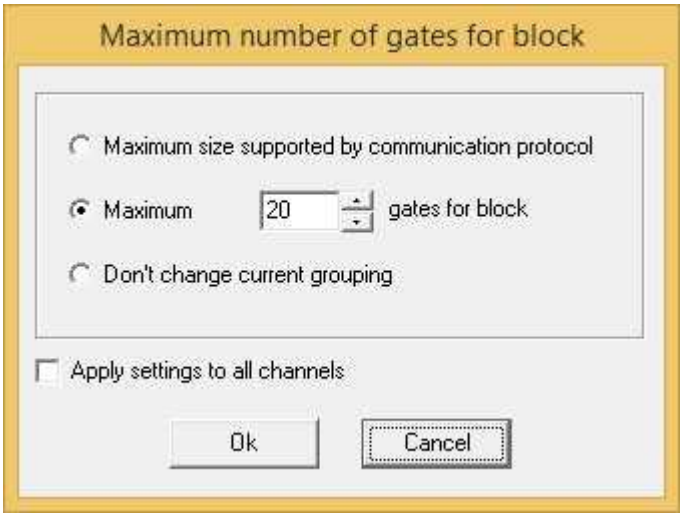

Maximum size supported by communication protocol : if "Maximum" option is selected, will be created blocks with a number of gates equal to the maximum number of gates for block allowed for the specific communication protocol.
Maximum nn gates for block : some devices may not support block with a lot of gates, so in this case you should reduce the maximum number of gates for blocks.
Don't change current grouping : the automatic grouping procedure will skip the channel.

Apply settings to all channels : the current settings will be applied to all defined channels.

8.2.6 Errors checking

To find the errors in the gates property and gates references you can use the function *File* | *Errors checking*:

More in details:

1) Check if sampled gates have a communication protocol associated to them.
2) Check if the address of each sampled gate is formally corretc in relation to the protocol selected on the channel associated to the gate.

3) Check if there are some sampled gates on channel 0 or device 0 (two conditions that are not allowed).

4) Check if block of sampled gates are formally correct in ralation to the protocol selected on the channel associated to the gates of each block.

5) Check for database integrity.

Since in the properties of some type of gates (numerical, composed and event) it is possible to refer to other gates (tolerance gate for the numerical gates, gates forming the composed gate for the composed gates, reference gate for the event gates), it is fundamental that the gates to which you refer to are really part of the set of gates of the application. However it can happen that working on the gates loaded in memory, you delete a gate to which you had referred in some other gate: in these situations the whole set of gates won't be able to perform properly the task for which it had been designed.

If there is a gate referring to a gate not existing anymore (for example a composed gate formed by numerical gates that have been removed) the user is informed about the problem, and is asked to correct it through a window where the gate causing problems and the gate to which it refers, are both

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indicated.

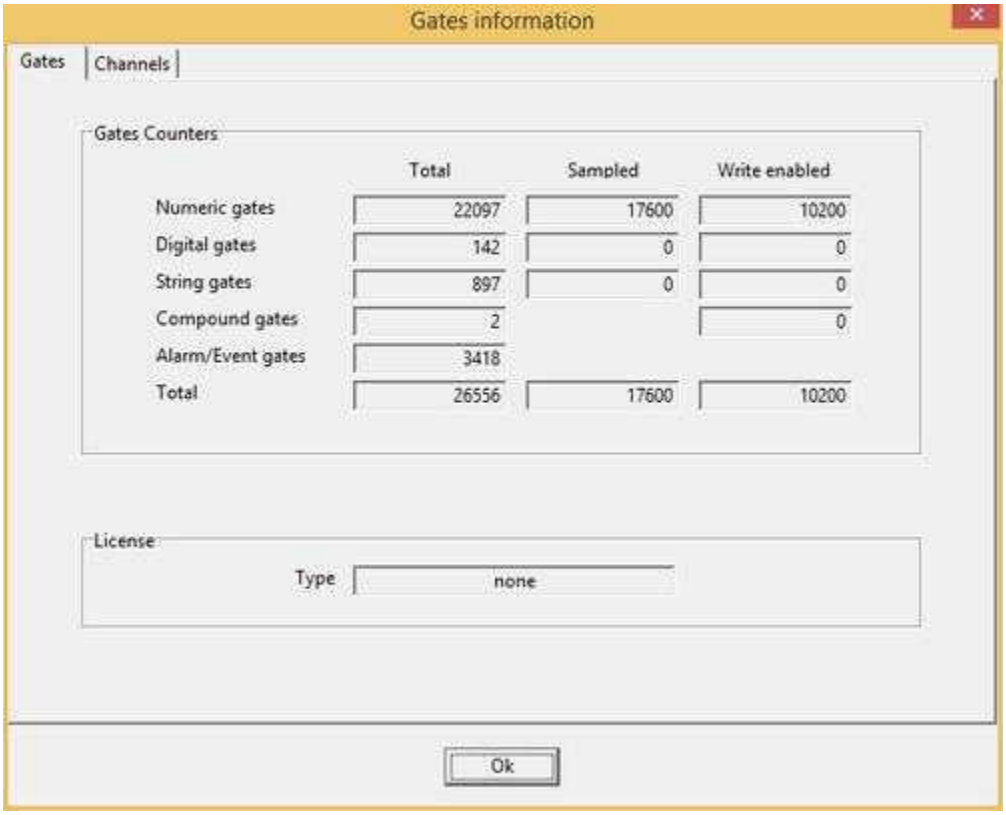
8.2.7 Build project license

Validates the project in relation to the type of license currently inserted.
This is done automatically when saving gates.
A project validated can be run with full functionality.
A project not validated will run but will not be able to communicate with the associated devices.

Example:
Suppose you have a development license that allows you to create applications up to 256 sampled gates and have the need to create an application with a maximum of 250 sampled gates.
During saving numeric, digital or string gates list, the project will be automatically validated because the development license currently in use allows to create applications with a number of sampled gates greater than those included in our application.
At this point, if we execute the application we will note that it is able to communicate with the associated devices.
Now suppose we want to add 10 more sampled gates, bringing then our application from 250 to 260 sampled gates: if we still use the development license with a limit of 256 sampled gates, the our project will not be validated and hence will no longer be able to communicate with devices.
Consequently we will have to buy an higher level development license, ie 512 sampled gates, insert it into our computer, open the numeric, digital or string gates list and execute the menu item "*File - Build project license*". After this operation, the application will be properly licensed and will be again able to communicate with the associated devices.

8.2.8 Gates information

This function displays the information relating to the gates of the application.



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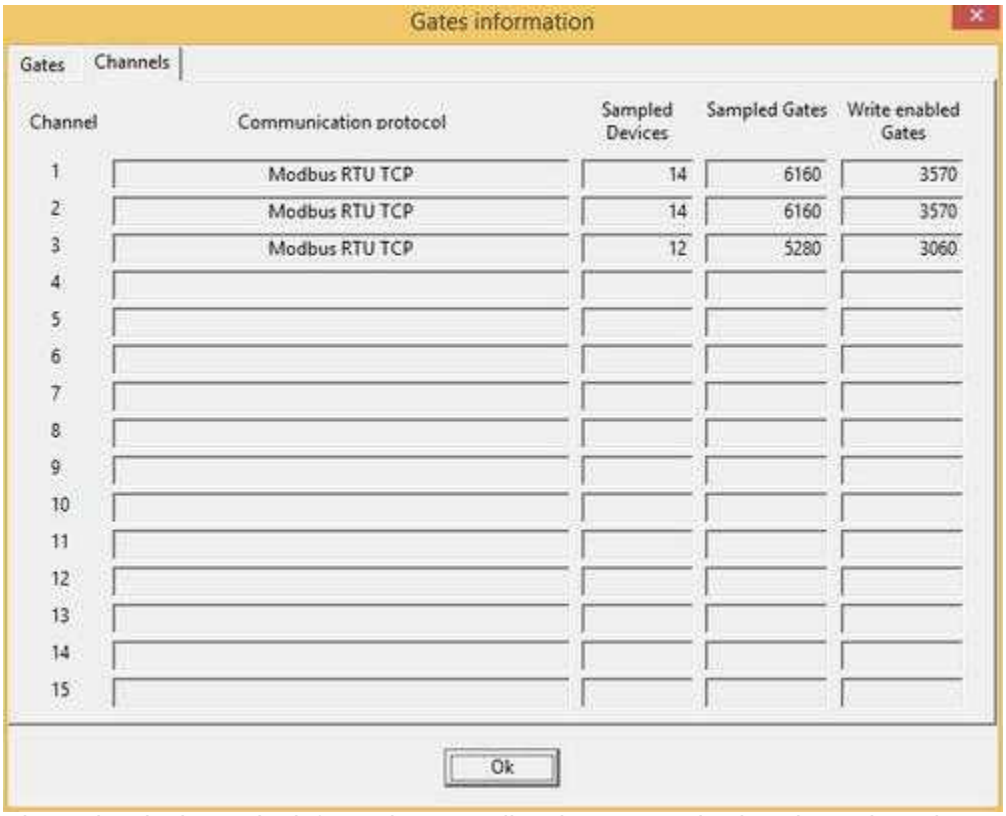
Gates tab displays for each gate type, the number of defined, sampled and write enabled gates.
The last line show the total number of defined, sampled and write enabled gates.
The total number of sampled gates also represents the value referenced by the license currently inserted: if the number of sampled gates is greater than that allowed by the license, the project will be not validated and then it will not be able to communicate at runtime.



Channels tab shows the information regarding the communication channels and more precisely: the communication protocol, the number of sampled devices, the number of sampled gates and the number of gates enabled for writing.

8.2.9 Import from clipboard

Via *File* | *Import from clipboard* you can import a list of gates from the clipboard, where it had been previously saved as a formatted text file arranged in rows and columns, each row representing a gate, while each column representing a gate property.
The file can contain even some gate properties: those recognized will be automatically imported.

The file can contain even some gate properties: those recognized will be automatically imported, while all those unspecified will be initialized with their default values. If the ***Gate ID*** field is not specified, it is automatically initialized with "*Numeric*" for numeric gates, "*Digital*" for digital, "*String*" for string gates, "*Compound*" for compound gates and "*Event*" for events/alarms gates.

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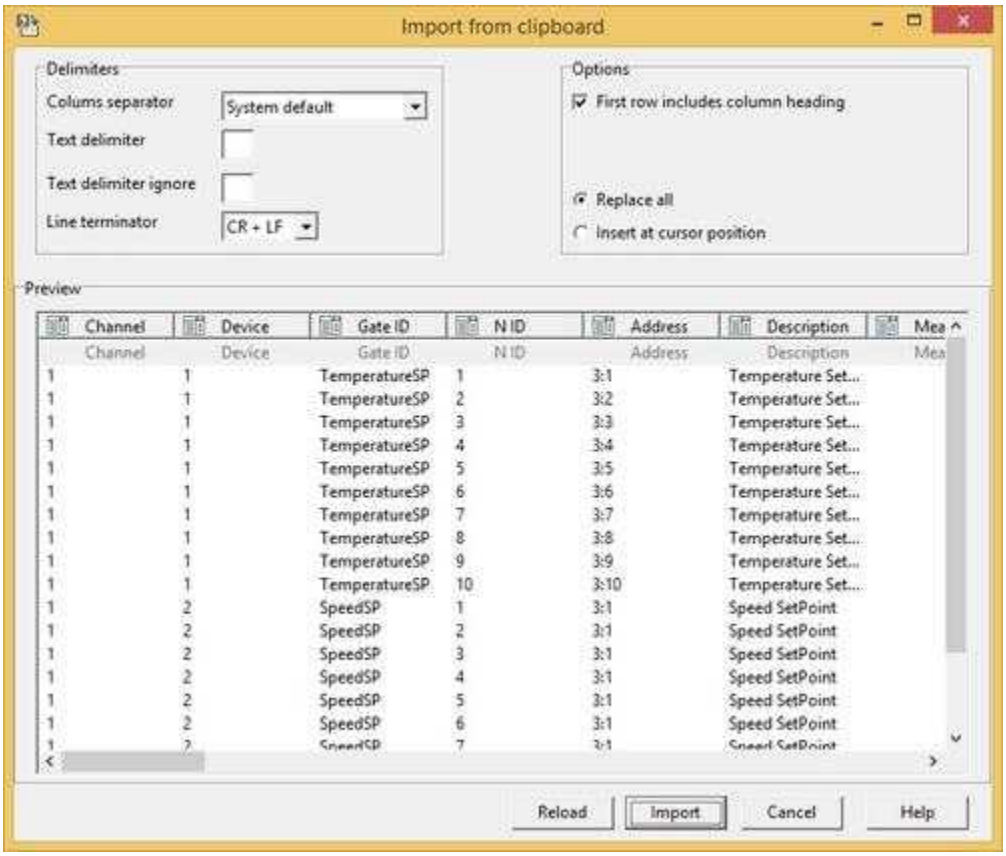
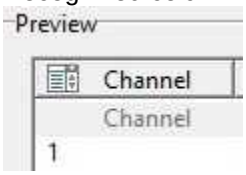


In details:

Delimiters : The Delimiters section is of crucial importance for the correct interpretation of the file to be imported; it is enough in fact to change, for example, the ***Columns separator*** to note in the ***Preview*** a correct interpretation of the columns or a set of seemingly meaningless characters.
For more details on the section delimiters refer to Export text file.

Options - First row includes column headings : if this option is enabled, will be analyzed the first line of the file to perform automatic recognition of the columns, comparing the contents of each of them with the column header in *GateBuilder*: If the column is recognized then it will also appear in the ***Preview*** header column, otherwise it will be left blank; your task will be to manually select the correspondence of the column with the *GateBuilder* column by clicking on its header.

Recognized column:



Unrecognized column:

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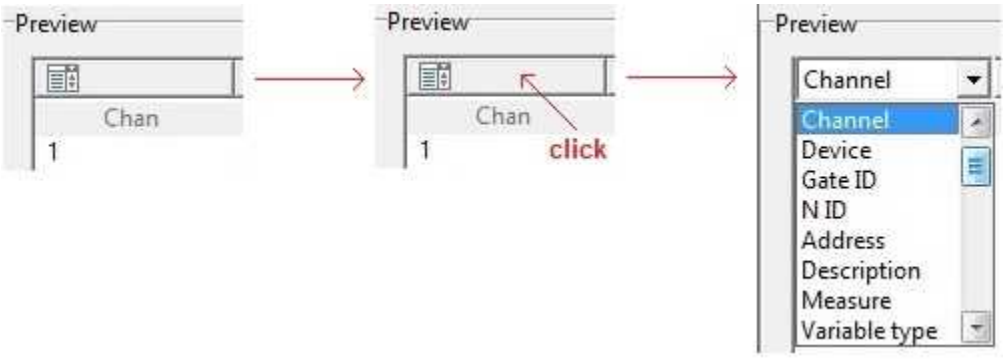

If ***Options - First row includes column headings*** is not enabled, the column headings must be manually specified as in the previous case of unrecognized column.

Options - Replace all: if this option is selected, the gates currently loaded into *GateBuilder* will be deleted and replaced with the imported ones.
Options - Insert at the cursor position: if this option is selected the gates will be inserted at the current cursor position.

Reload button: reads the source file.
Import button: proceed with importing the file, and is enabled if at least one column in the file is defined, that is associated with one of the gate properties.
Cancel button: cancels the operation.
Help button: displays this page.

8.2.10 Import text file

Through *File* | *Import text file* you can import a list of gates from a text file.
Via File | Import Text File You can import a list of ports to a formatted text file.
After selecting the file to be imported, the procedure appears to be the same as that used by the *Import from clipboard*.

8.2.11 Export text file

Via *File* | *Export text file,* the gates list can be exported to a text file or copied to clipboard.

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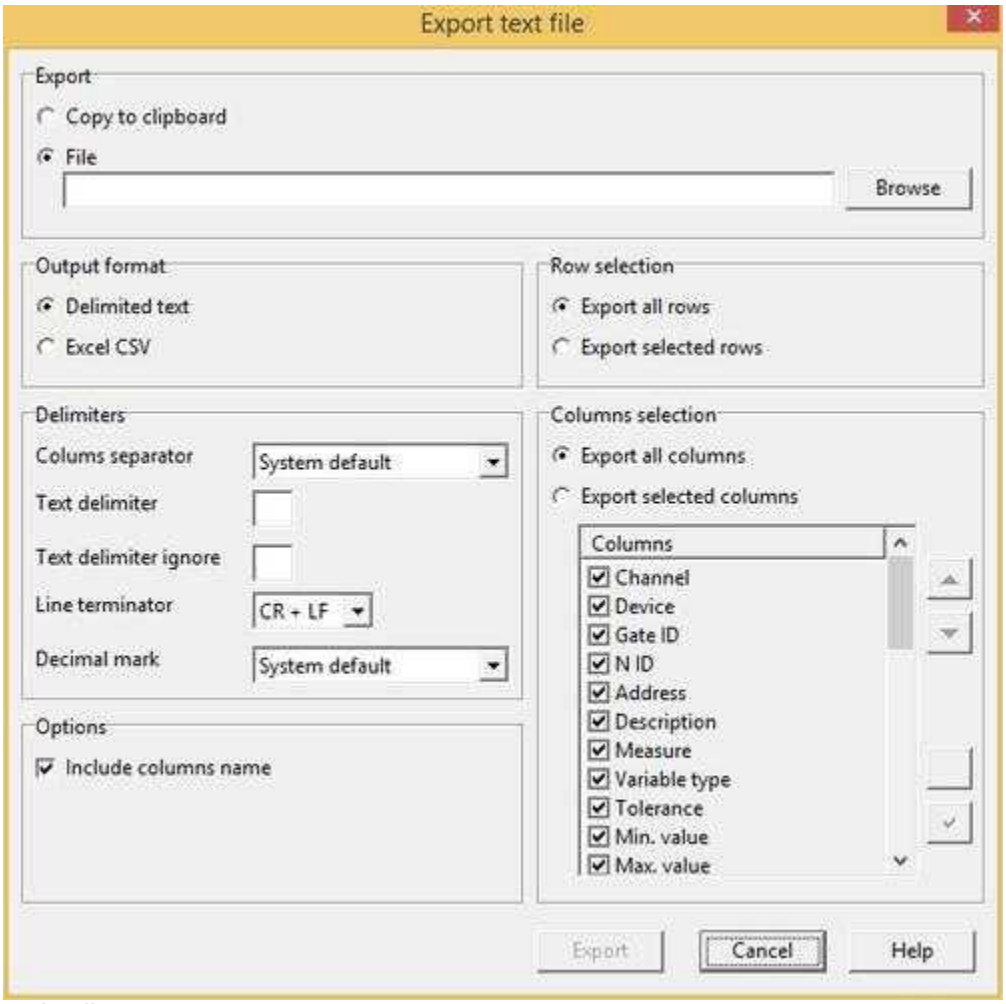

In details:

Export - Copy to clipboard : copy to clipboard the gates list.
Export - File : copy the gates list on the specified file.

Output format - Delimited text : the file will be produced using delimiters as those specified in section ***Delimiters***.
Output format - Excel CSV : the file will be produced using delimiters as those used by default by Microsoft Excel for CSV files.

Delimiters - Columns separator : specifies the character to use as column separator and can be one of the following: Tab, Space, Comma and Semicolon. If "*System Default*" is selected then the produced file will use the character defined as column separator in the operating system.

Delimiters - Text delimiter : specifies any character to use as text delimiter for columns: this prevents a possible misinterpretation if the text in a column contain a character equal to the separator column. Suppose for example that you have defined as Columns separator the Comma, and now let's assume that the content of a column is **Hello, world**: if we save the file without specifying any text delimiter there is the risk that the program that will import the product file, misinterprets **Hello, world** as two columns.
If we specify as text delimiter character **"**(quotation marks) then the contents of our column will be

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saved enclosed in quotation marks (**"Hello, world"**) allowing any program that will load our file to interpret **Hello, world** as a single column as it should be.

Delimiters - Text delimiter ignore : specifies any character to be used to indicate to skip the next delimiter. Referring to the example about ***Text delimiter*** (above), suppose now that we want to save in a single column the text **Hello, "world** (ie with a quotation mark just before **world**; since the quote was also used as a ***Text delimiter*** , the text would be saved on the file as **"Hello,"world"** that would cause a misinterpretation of the column in a possible subsequent import. If we specify as ***Text delimiter ignore*** the " (quotation marks), the saved text in the file will be as follows **"Hello,""world"** : the doubling of the quote indicates not to consider the character as a delimiter text, but only as a simple character.

Delimiters - Line terminator : specifies if to use as line terminator the CR (carriage return) or CR+LF (Carriage Return + Line Feed).

Delimiters - Decimal mark : specifies if to use as decimal point a full stop or a comma. Selecting " *System default*" will cause the use of default decimal separator defined in the operating system.

Options - Include columns name : if this option is enabled, then the first line of the file will contain the column headings as it appears in GateBuilder.

Row selection - Export all rows : will be saved all the gates that are currently loaded into GateBuilder.
Row selection . Export selected rows : will be saved only the selected gates.

Columns selection - Export all columns : will be saved all the gates properties.
Columns selection - Export selected columns : will be saved only gates properties specified in the ***Columns*** section.
Columns selection - Columns : if you have selected the ***Export selected columns***, in this section you can choose which columns to export in the file simply by turning on the CheckBox relative to each column. It is also possible to define the order in which the columns will be exported through the use of the following keys:

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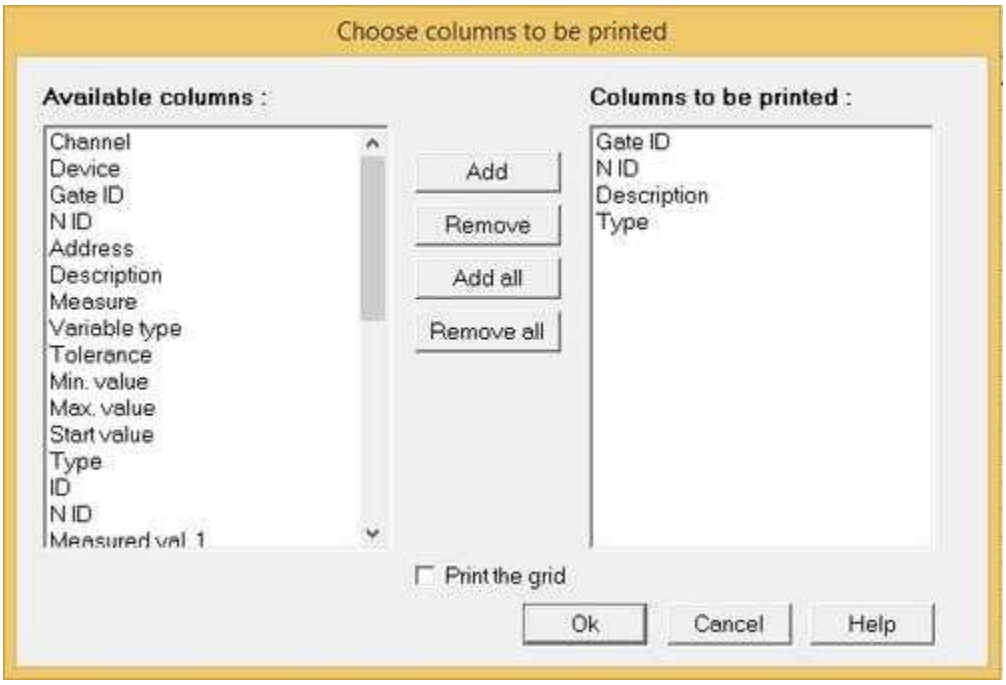
8.2.12 Print entire table



Gate Builder allows to print the gates data, so as to have a handy reference to them during the application development. You will be able to print all the gates presently loaded in memory (*Table* | *Print entire table…command*), or print only the selected gates (*Table* | *Print selected rows…command*).

Once you have entered the desired print command, it will appear a dialog box in which to specify the columns (gate properties) to print (figure below). In the left list there are all the fields of a gate. Using the buttons in the middle it is possible to fill out the right list in the desired manner, specifying which fields of the gate will be printed. In the box at the bottom of the window marked by *"Print the grid*", it is possible to indicate whether the grid of the table will be printed.

Given the fact that usually a list of gates can't be printed on just one page, *Gate Builder* will print the indicated gates in blocks, one after another. For each block all the indicated columns will be printed (if necessary, on more than one page), then the next block will be printed.

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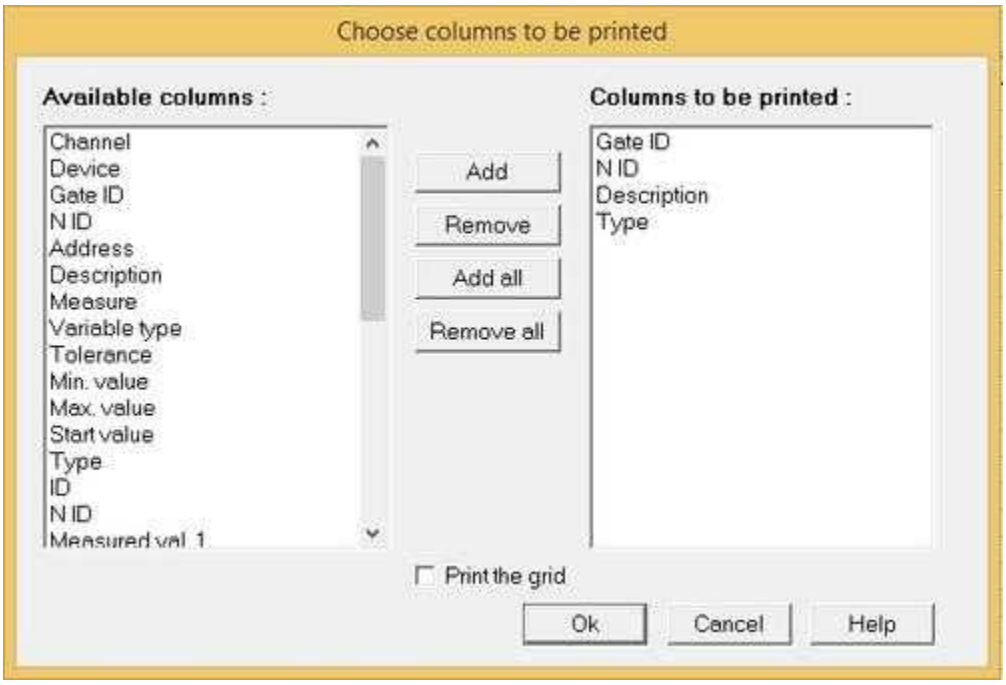
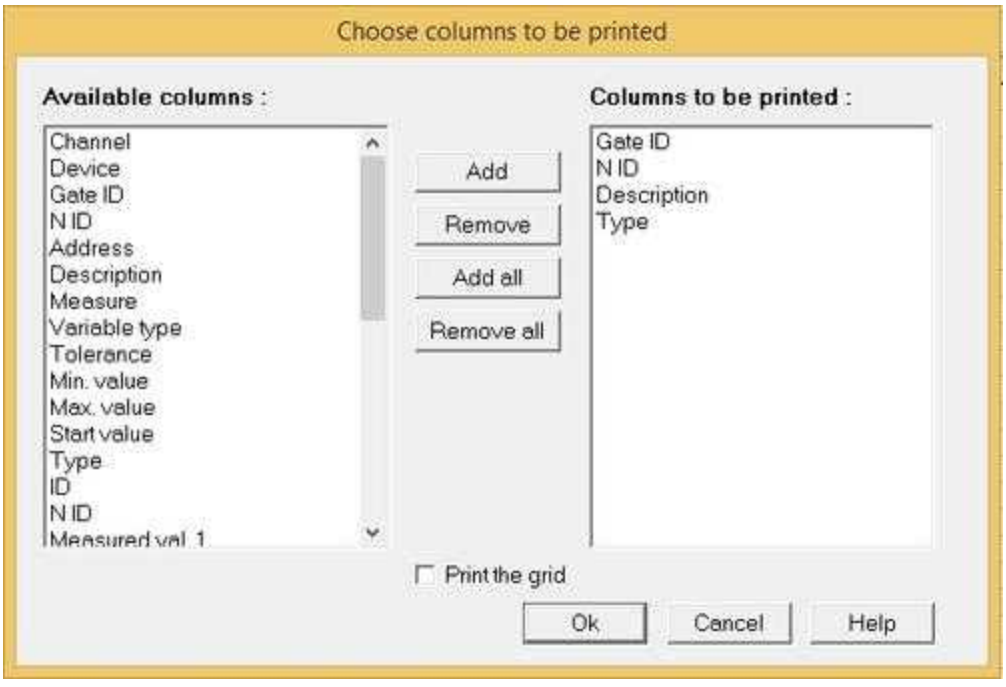


8.2.13 Print selected rows



Gate Builder allows to print the gates data, so as to have a handy reference to them during the application development. You will be able to print all the gates presently loaded in memory (*Table* | *Print entire table…command*), or print only the selected gates (*Table* | *Print selected rows…command*).

Once you have entered the desired print command, it will appear a dialog box in which to specify the columns (gate properties) to print (figure below). In the left list there are all the fields of a gate. Using

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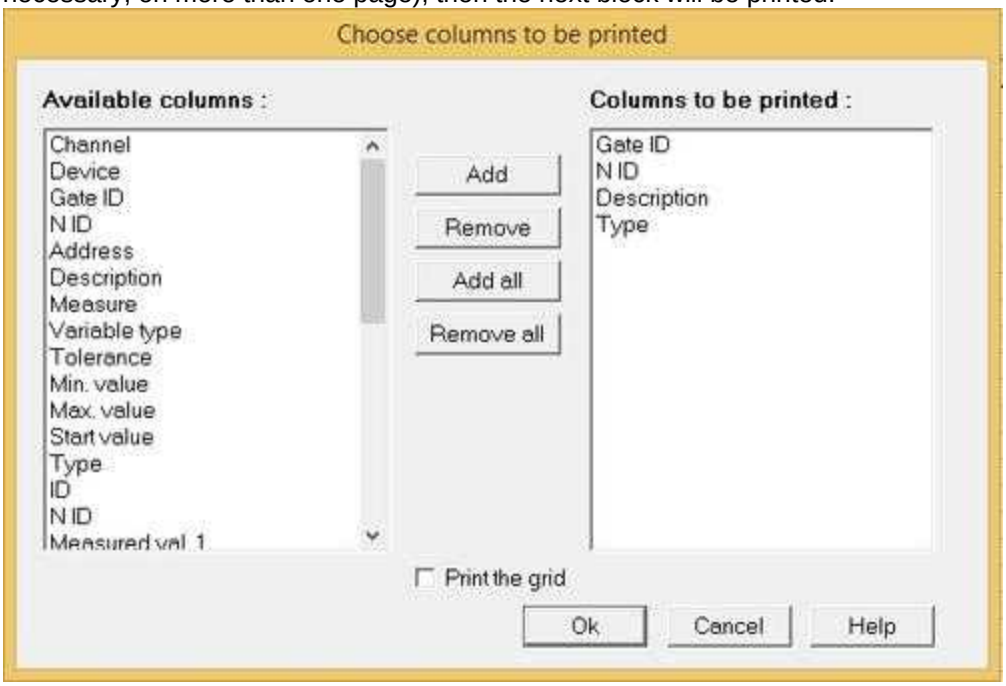
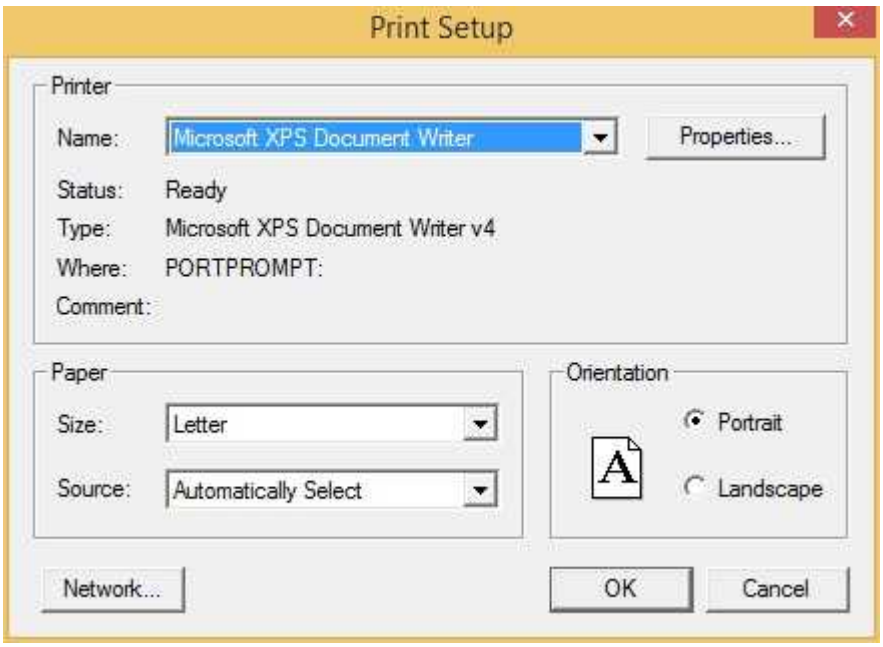
the buttons in the middle it is possible to fill out the right list in the desired manner, specifying which fields of the gate will be printed. In the box at the bottom of the window marked by *"Print the grid*", it is possible to indicate whether the grid of the table will be printed.

Given the fact that usually a list of gates can't be printed on just one page, *Gate Builder* will print the indicated gates in blocks, one after another. For each block all the indicated columns will be printed (if necessary, on more than one page), then the next block will be printed.



8.2.14 Printer setup

It configures the print options.



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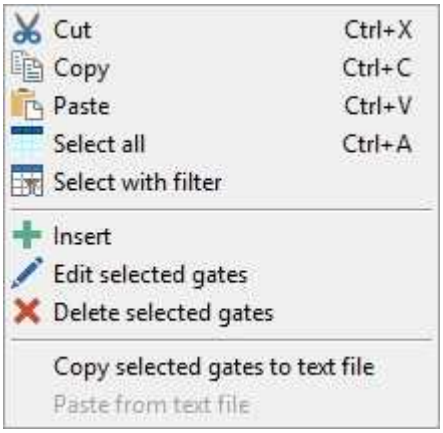
8.2.15 Exit

Close GBuilder and current work session.

8.3 Edit

8.3.1 Introduction

The *edit* menu contains the functions necessary for the creation, modification, deletion and multiple selection of gates.



8.3.2 Cut

Deletes the selected gates and copies them in a memory area (clipboard) from where they can be read later on.

8.3.3 Copy

Copies the selected gates in the clipboard.

8.3.4 Paste

If in the clipboard there is a list of gates of the same type as those currently loaded in the grid, then paste it in the current cursor position within the grid.

Note that, when you paste gates, *Gate Builder* verifies that there are no other gates with the same ID and NID. If in the table there is a gate with the same ID and NID of the gate that is about to be pasted, the user is asked whether he wants to insert the gate with the NID augmented. There are four different options:

Yes: the next gate of the clipboard is inserted in the table with the NID field equal to the first available value among the gates that have the same ID.

Yes all: all the remaining gates of the clipboard that will conflict, will be inserted in the table with the NID field equal to the first avalaible value among the gates that have the same ID.

No: the next gate of the clipboard is not inserted in the table.

No all: only the gates that don't conflict will be inserted in the table.

Undo: no other gate will be copied from the clipboard to the table.

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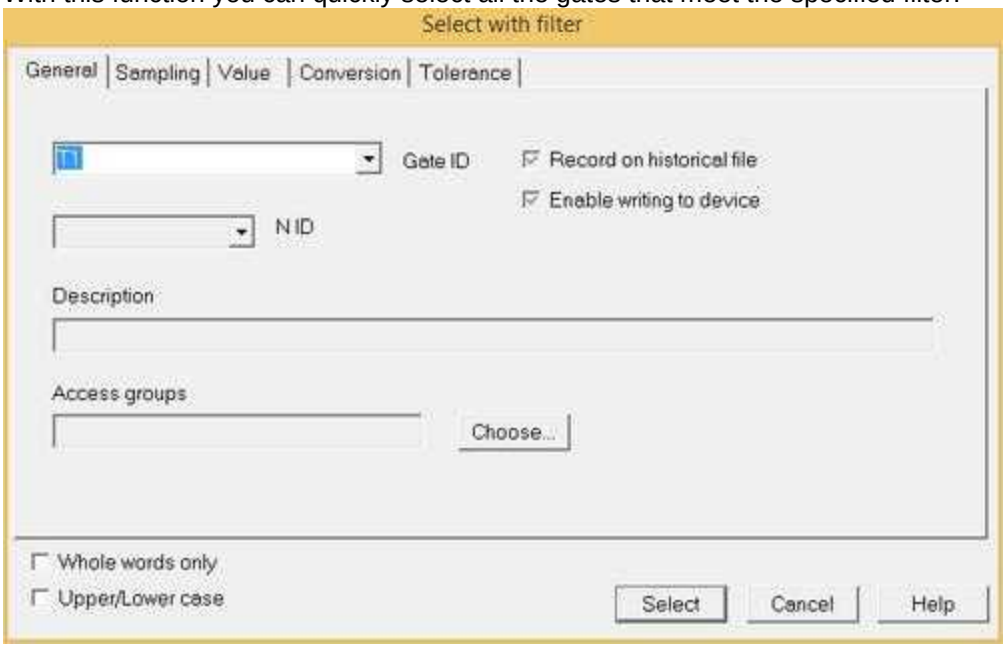
8.3.5 Select all

Select all gates of the current table.

8.3.6 Select with filter

With this function you can quickly select all the gates that meet the specified filter.



The filter is specified by inserting the search word in the specified field.
For example, if we enter in the *Gate ID* field the word "T1" and we press the "*Select*" button, then all the gates that have "T1" in the *Gate ID* field will be selected, regardless of whether it is case sensitive, and location.
If we enable the checkbox "*Upper / lower case*" then will be selected only the gates that have "T1" (with "T" capitalized) in the *Gate ID* field.
If we enable the checkbox "*Whole words only*" then will be selected only the gates that have "T1" as a single word and not as part of a word more complex. (For example "T1SP" will not be selected while "T1 SP" will be selected).

The "*Select with filter*" does not reset the previous selections.

More filter fields can be specified: in this case will be select only the gates that meet all specified filter field in the same time.

8.3.7 Insert

Inserts a new gate immediately before that selected by the cursor and a new gate definition window will be automatically opened.

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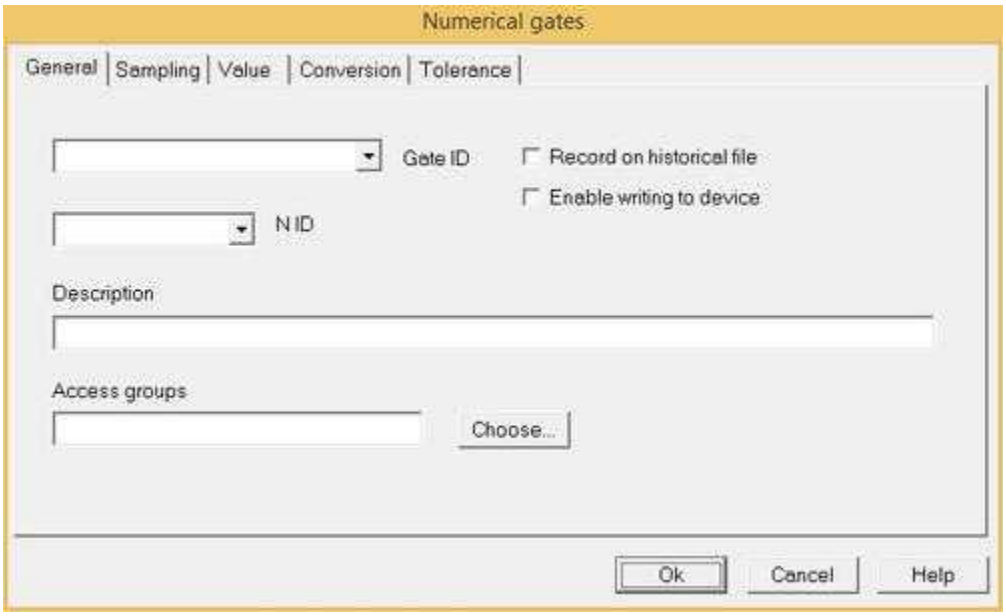
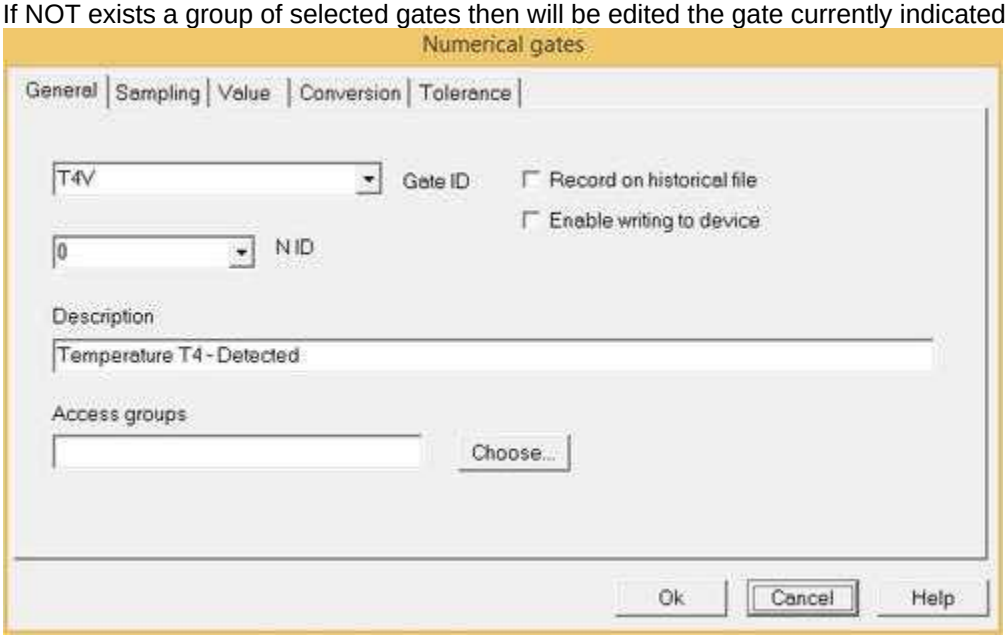


8.3.8 Edit selected gates

If NOT exists a group of selected gates then will be edited the gate currently indicated by the cursor.



If there is a group of selected gates, then the edit will affect the whole group.
In the editing window will be shown on a white background all fields common to the whole group, while on gray background who are different.

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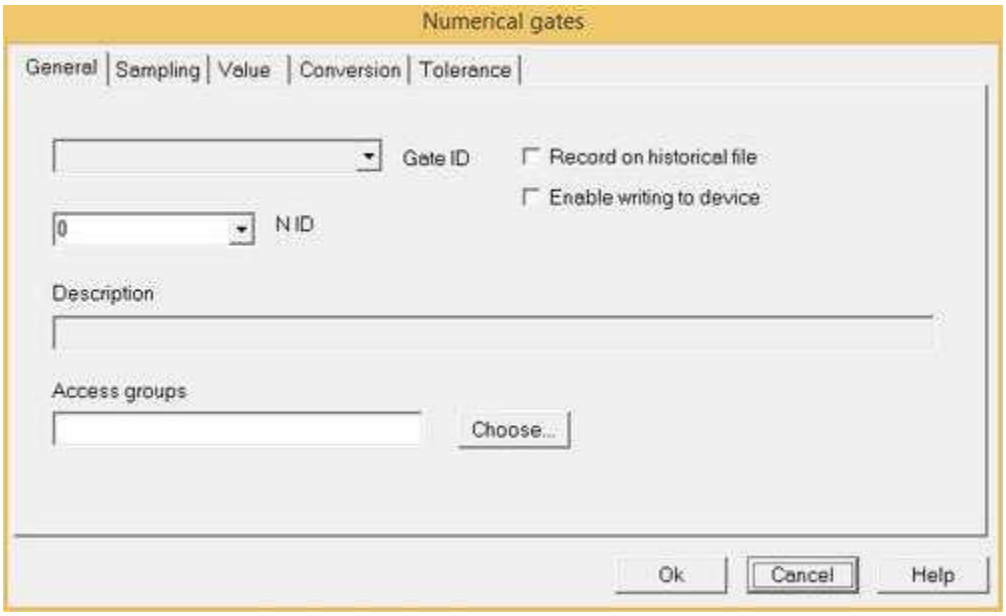


8.3.9 Delete selected gates

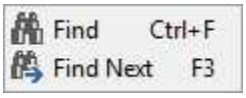
If NOT exists a group of selected gates then then the gate that is currently indicated by the cursor will be deleted.

If there is a group of gates selected, then the elimination will cover the whole group.

8.4 Search

8.4.1 Introduction

This menu contains functions for the search of the gates inside the table



8.4.2 Find

With this function you can quickly search all the gates that meet the specified filter.

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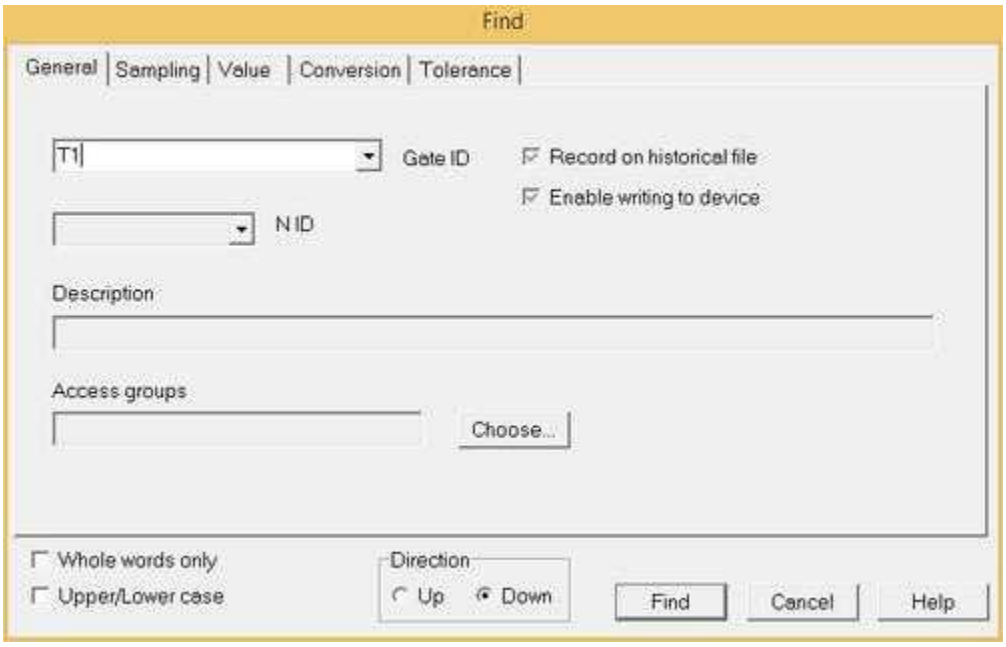

The filter is specified by inserting the search word in the specified field.
For example, if we enter in the *Gate ID* field the word "T1" and we press the "*Find*" button, then all the gates that have "T1" in the *Gate ID* field will be searched, regardless of whether it is case sensitive, and location.
If we enable the checkbox "*Upper / lower case*" then will be searched only the gates that have "T1" (with "T" capitalized) in the *Gate ID* field.
If we enable the checkbox "*Whole words only*" then will be searched only the gates that have "T1" as a single word and not as part of a word more complex. (For example "T1SP" will not be found while "T1 SP" will be found).

More filter fields can be specified: in this case will be found only the gates that meet all specified filter field in the same time.

Since the operation is carried out starting from the present position of the cursor, you can decide to search in up direction (*Up*) or search in down direction (*Down*) in the table.
To continue the search, simply select the menu item "Search | Find Next" or press the F3 key.

8.4.3 Find next

Continue the search by using the parameters previously set via the menu item "*Search* | *Find*".
This function can be activated also by pressing F3 key.

8.5 View

8.5.1 Introduction

This menu lets you set the display mode of the table.

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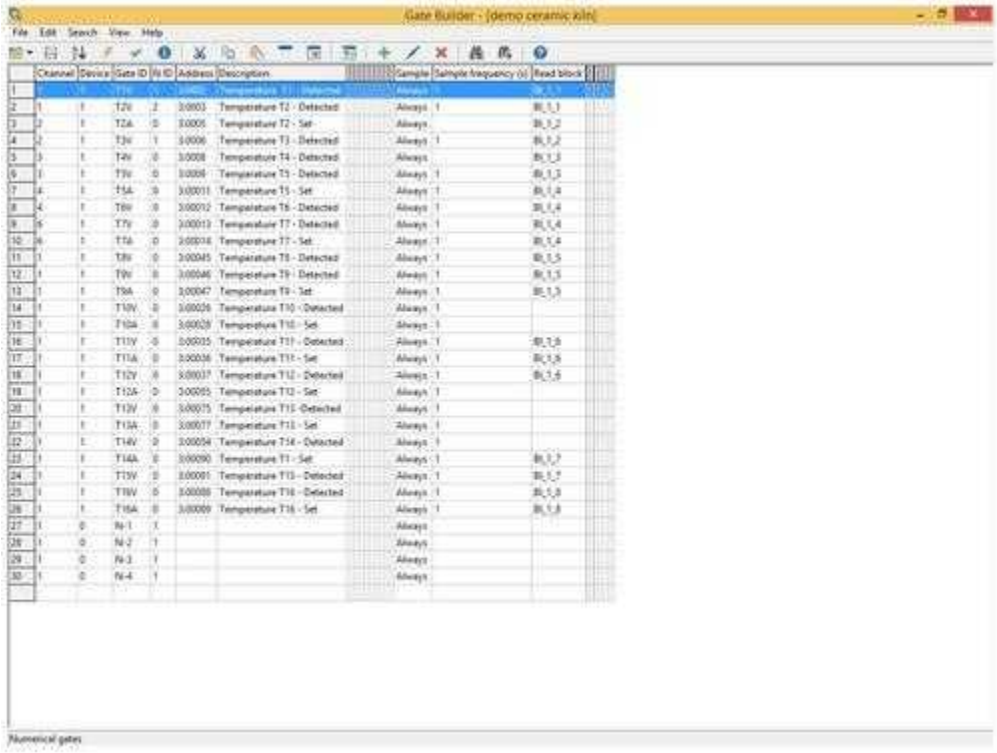
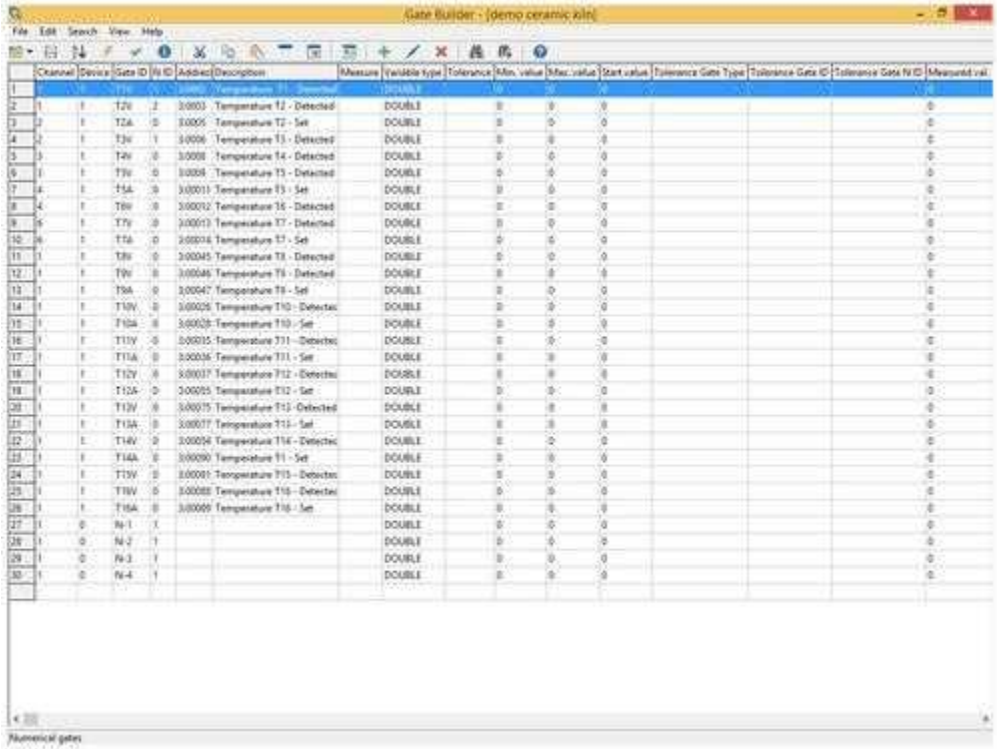
8.5.2 Highlights Read Blocks Column

With CheckBox **checked** will be shown only the necessary columns to highlight reading blocks.



With CheckBox **not checked**, all columns will be shown.



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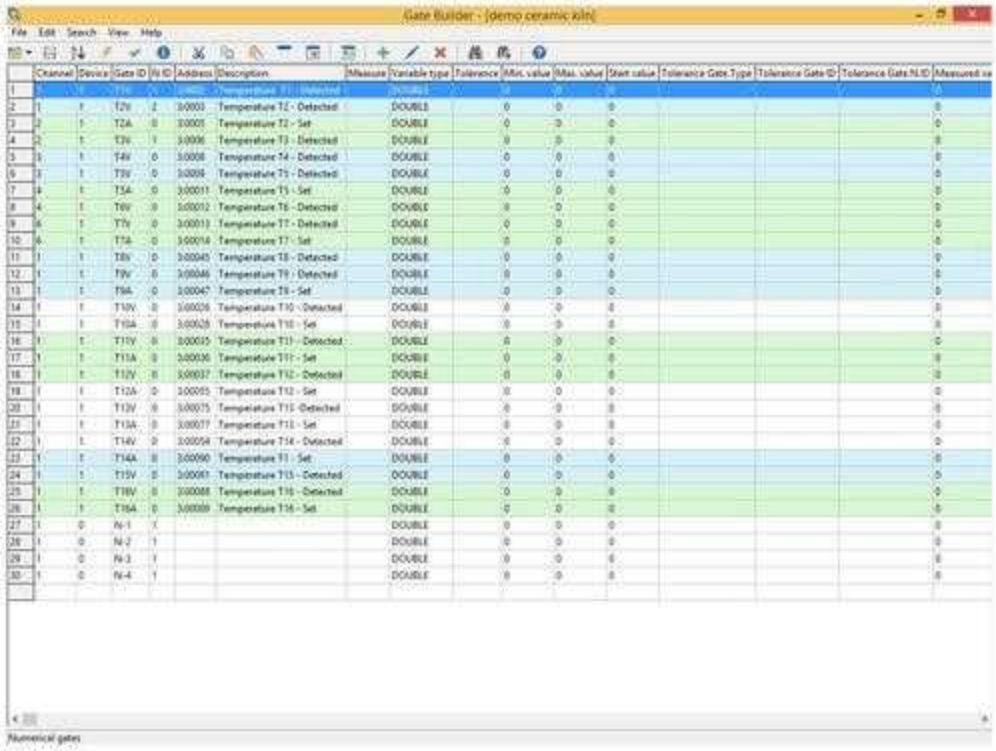
8.5.3 Highlights Read Blocks Colors

With CheckBox **checked** the reading blocks are highlighted by the alternate use of two particular colors.
Gates that do not belong to a read block are shown with a white background.



With CheckBox **not checked** reading blocks are not highlighted.

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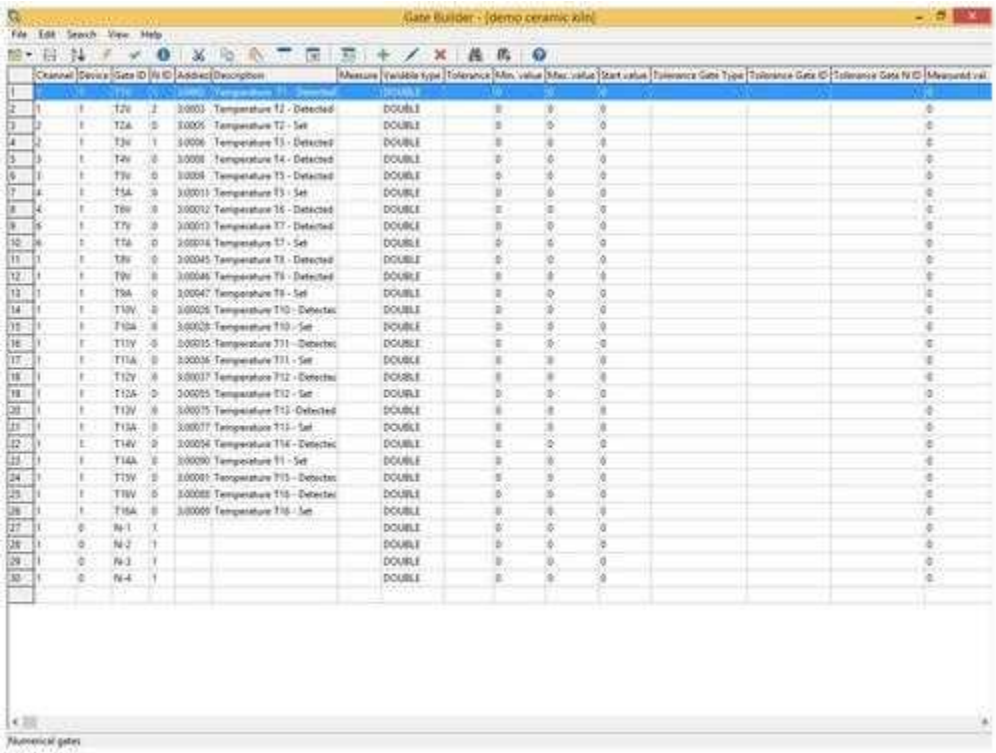

8.6 Help

8.6.1 Introduction

If necessary you should see the *Gate Builder* guide or *Communication protocols* guide.

8.6.2 Contents

Show you the tree contents of the guide.

8.6.3 Protocols

Show help communication protocols.

9 Numerical Gates

9.1 Numerical Gate

A numeric gate is a variable that can contain numeric values belonging to the following formats:

- Signed BYTE : integer on one byte signed [-128 .. +127]

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- Unsigned BYTE : integer on one byte unsigned [0 .. 255]
- Signed WORD : integer on two bytes signed [-32768 .. 32767]
- Unsigned WORD : integer on two bytes unsigned [0 .. 65535]
- Signed INT32 : integer on four bytes signed [-2147483648 .. 2147483647]
- Unsigned INT32 : integer on four bytes unsigned [0 .. 4294967295]
- FLOAT: floating point [3.4x10-38 .. 3.4x10+38]
- DOUBLE: floating point double precision [1.7x10-308 .. 1.7x10+308]
- BCD: Binary Coded Decimal on two bytes unsigned [0 .. 65535]

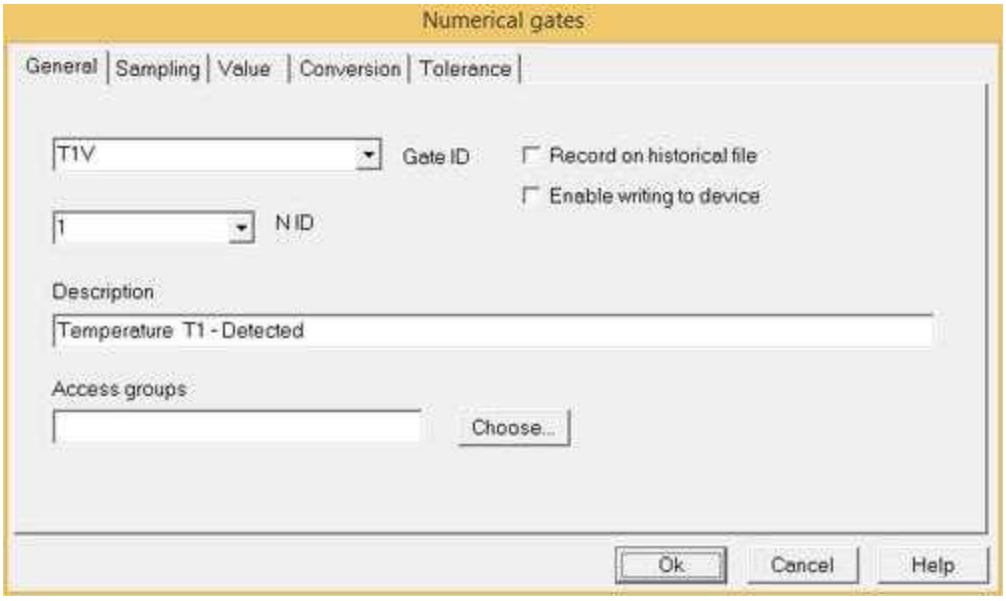
Its content can be sampled from external devices, set by the user or by an automatic procedure code.

It can be produced automatically a historic changes file with its content in order to be consulted later in the form of graphical and tabular.

The gate configuration is divided into four tabs:

General
Sampling
Value
Conversion
Tolerance

9.2 General



Gate ID and **N ID**: they identify the gate inside the project, and so they must be univocal. So it won't be possible to insert two gates of the same kind that have the same ID and N ID. The ID field will have to be a string of at most 20 characters, while the N ID field will have to be a number between 0 and 65535.

Record on historical file: if the option is activated, the value changes will be recorded on log files, thereby allowing later analysis.

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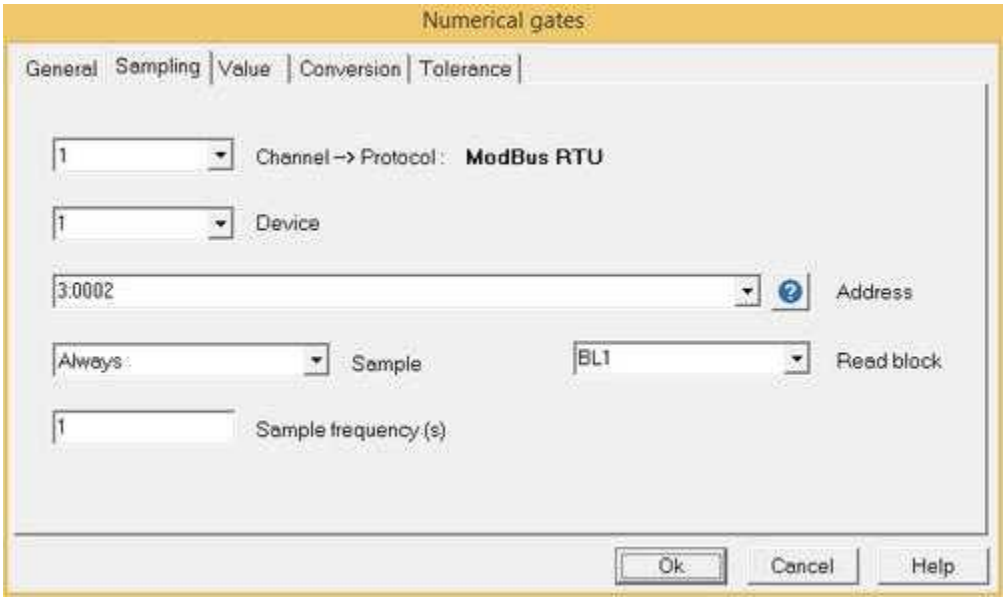
Enable writing to device:it indicates whether changes of the gate value should be transmitted to the connected device.

Description: in this field it is possible to insert a description of the gate (maximum 80 characters).

Access groups: using the corresponding button it is possible to indicate which users groups will be allowed to modify the parameters of the gate.

9.3 Gate - Sampling



Channel: it indicates the channel from which to do the sampling.

Device: it indicates the number of the device from which the value must be sampled.

Address: usually it indicates the type and the register number of the device. For more details refer to the documentation concerning the protocol used for the gate channel.

Sample: indicates how to sample. The following choices are possible:

Never: the gate is never sampled. Usually these gates are used as internal variables of the project for example to calculate some states to be displayed on the synoptic, but are not connected to any device.

Always: the gate value is continuously read from the device according to the set frequency.

In monitor and at startup: the gate value is read from the device when the program starts and subsequently with the set frequency only in the case in which the gate is present ("in monitor") in one of the synoptic currently active on video. By this option you can reduce data traffic between the supervisor and devices, sampling the gates only when they are displayed on the screen; however it is not recommended to sample "in monitor" gates that are linked to alarms: otherwise they will be checked only if the connected gate is part of the synoptic currently loaded in the video.

In monitor but not at startup: the gate value is read from the device with the set frequency only in the case in which it is present ("in monitor") in one of the synoptic currently active on the video. Not being sampled at startup, it is possible that the first time that it is shown in a synoptic, its value is in communication error until at least one sampling will be done.

Only at startup: the gate value is read at the start of supervision to synchronize with the current

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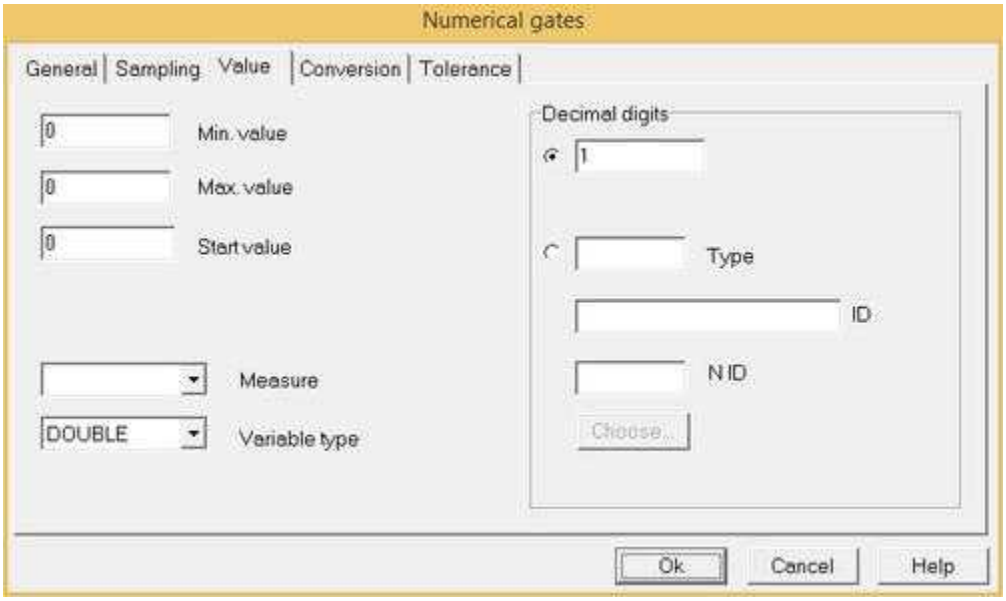
value in the device - this mode is particularly suitable for gates using particular protocols such as KNX where in some cases is the device that send to the supervisor the status variation.

Sample frequency (s): it indicates the time interval between a sampling and the next (in seconds).

Read block: it allows to define blocks of adjoining gates, giving every gate of the block the same string. So an entire block can be read by the peripheral in just one reading cycle.

9.4 Gate - Value



Min. value, Max. value: the limits to apply to the gate value (if both are 0, such limits are ignored).

Start value: the value to be given to the gate at the start of the application.

Measure: it allows to give a unit of measurement to the gate value. This is a datum purely indicative and doesn't influence the value.

Variable type: it specifies the gate value during the sampling phase. It can be:

- S_BYTE: integer on one byte signed [-128 .. +127]
- U_BYTE: integer on one byte unsigned [0 .. 255]
- S_WORD: integer on two bytes signed [-32768 .. 32767]
- U_WORD: integer on two bytes unsigned [0 .. 65535]
- S_INT32: integer on four bytes signed [-2147483648 .. 2147483647]
- U_INT32: integer on four bytes unsigned [0 .. 4294967295]
- FLOAT: floating point [3.4x10-38 .. 3.4x10+38]
- DOUBLE: floating point double precision [1.7x10-308 .. 1.7x10+308]
- BCD: Binary Coded Decimal on two bytes unsigned [0 .. 65535]

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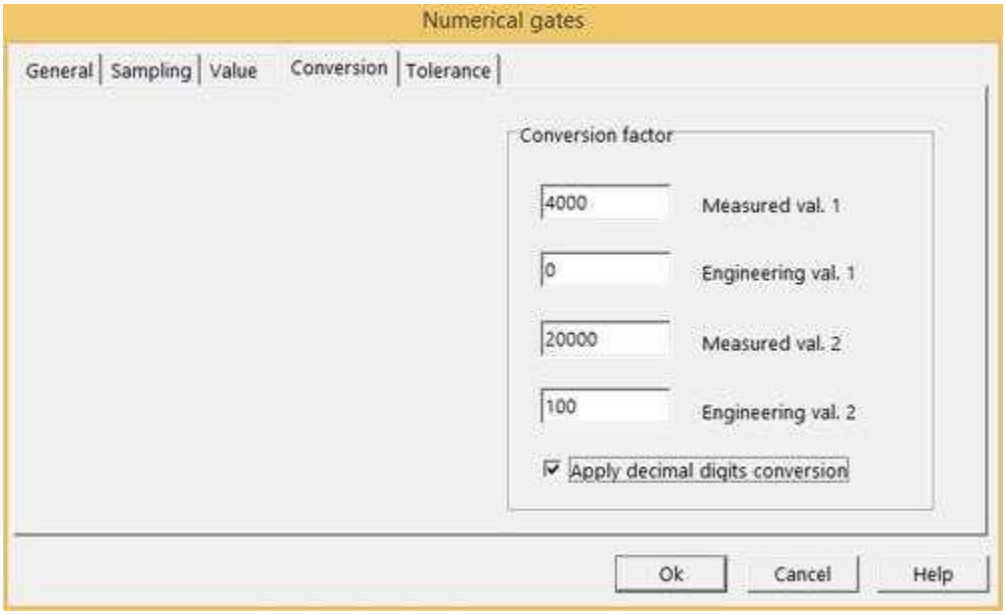
Decimal digits: the number of decimals that have to be rounded while converting from the measured value into the engineering value.It can be a constant value or a numeric or compound gate reference.

9.5 Conversion



Conversion factor: defines the conversion to be applied to the value read from the device. The conversion is calculated as the interpolation of two pairs of values (*Measured value - Engineering value*).
Measured value is the value read from the device.
Engineering value means the value converted by applying the conversion factor and represents the value actually assigned to the numeric gate.

Example:
Suppose we have a device for 4-20 mA sensors that returns the value 4000 in correspondence of 4 mA and 20000 of 20 mA correspondence and suppose to connect a pressure sensor that provides 4 mA at 0 mbar and 20 mA in correspondence of 100 mbar.
If you want to make sure that the engineering value of the numerical gate corresponds to the already converted value in mbar (0..100) you will have to set the conversion factor as follows:

Measured value 1 = **4000**
Engineering value 1 = **0**

Measured value 2 = **20000**
Value Engineering 2 = **100**

So if the pressure sensor will provide a value of 8 mA, the engineering value of the numerical gate will be 25 mbar.

Apply decimal digits conversion: if this checkbox is enabled, the engineering value resulting from the linearization calculation just seen, will be divided by 10 raised to the number of decimal places specified in the *Value* tab. (10 ^ Decimal).

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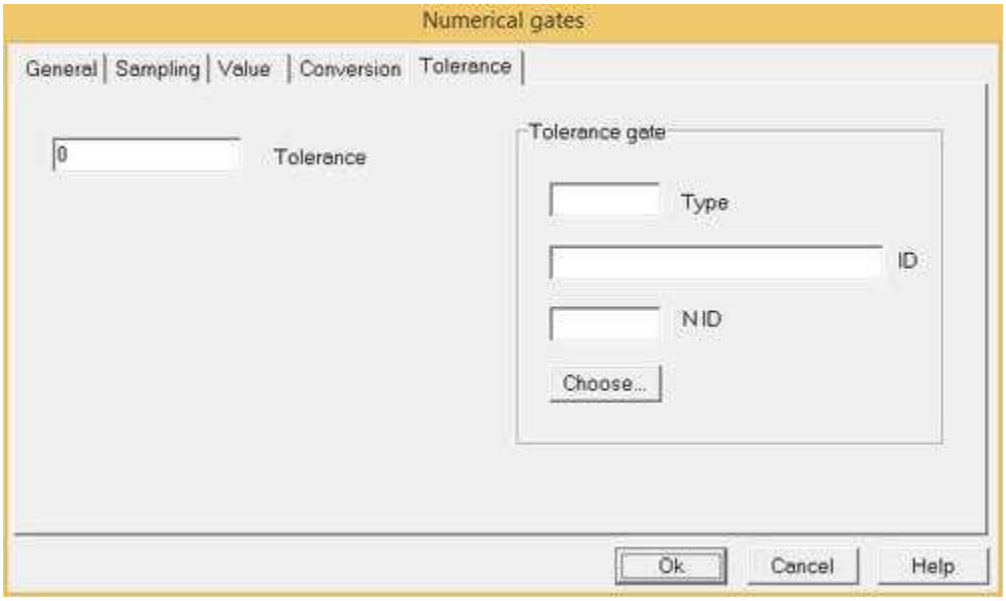
Example:
Returning to the example just mentioned, if you want to have the engineering value of the pressure expressed in bar instead of mbar, simply specify 3 as decimal digits and enable the checkbox "*Apply decimal digits conversion*": at this point, if the sensor pressure will provide a value of 8 mA, the engineering value of the numeric gate will be 0.025 bar.

When triggered, a write operation to the device, the conversion is applied in the reverse order, then starting from the engineering value contained in numeric gate and converting it into the corresponding measured value.

9.6 Tolerance



Tolerance: the tolerance value to apply to the numerical gate value. By specifying the tolerance of a gate it is possible to “filter” the data displayed on the supervision pages, avoiding to have values often changing in time, and making it possible not to save in the databases many values that have a slight difference between them. In fact, the gate value changes only if there are variations equal or greater than the tolerance value. Setting for example a tolerance value of 3, if the present gate value is 20 and the value read by the device is 22, the gate value won't change; it will change only if the value read by the device is equal or over 23.

Tolerance gate: coupled with a tolerance value, it allows not to apply the tolerance if the value read from the numerical gate is the same as the value of the tolerance gate. This characteristic is useful when you have a gate that defines the setpoint of a quantity, and a numerical gate that indicates the value of this quantity (read from the field). If the value read from the numerical gate differs from the setpoint of a value less than the tolerance value applied to the gate itself (for example when the setpoint is reached, figure below A), the numerical gate won't have the same value as the setpoint. To avoid this inconvenience, the tolerance gate is made equal to the setpoint gate (figure below B). If the setpoint is actually reached by the quantity (setpoint gate value = real quantity value), the numerical gate will actually have the value you read, that is to say the setpoint, without applying the tolerance.

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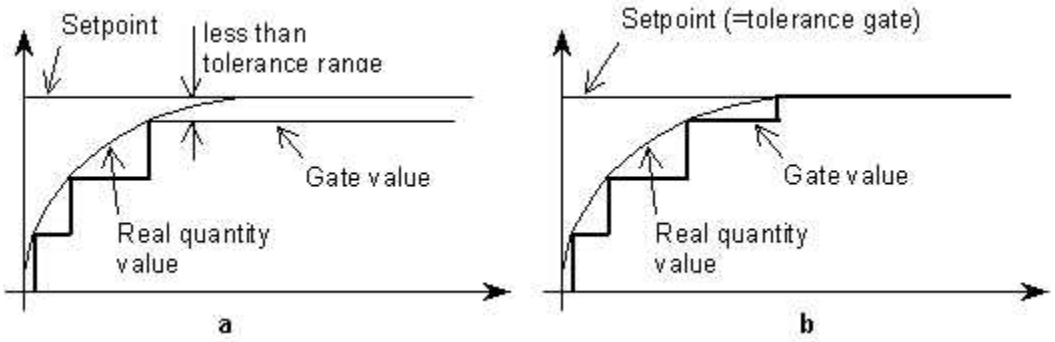

10 Digital gates

10.1 Digital Gate

A digital gate is a variable that can contain numeric values 0 and 1

Its content can be sampled from external devices, set by the user or by an automatic procedure code.

It can be produced automatically a historic changes file with its content in order to be consulted later in the form of graphical and tabular.

The gate configuration is divided into three tabs:

General
Sampling
Value

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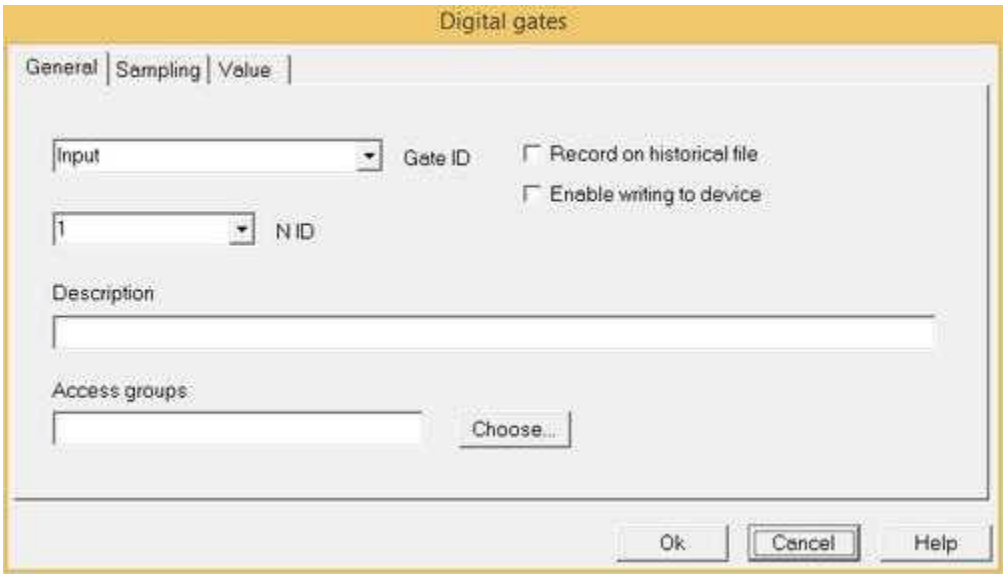
10.2 General



Gate ID and **N ID**: they identify the gate in the application, and so they must be univocal. Therefore it won't be possible to insert two gates of the same type that have the same ID and N ID. The ID field will have to be a string of at most 20 characters, while the N ID field will have to be a number between 0 and 65535.

Record on historical file: if the option is activated, the value changes will be recorded on log files, thereby allowing later analysis.

Enable writing to device: it indicates whether changes of the gate value should be transmitted to the connected device.

Description: in this field it is possible to describe the gate (maximum 80 characters).

Access groups: using the corresponding button it is possible to indicate which users groups will be allowed to modify the parameters of the gate.

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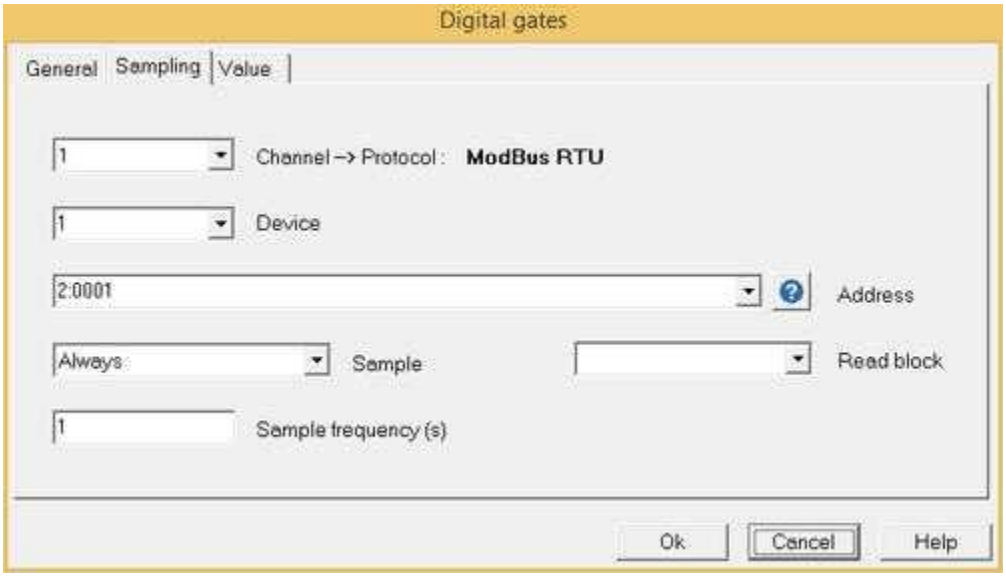
10.3 Sampling



Channel: it indicates the channel from which to do the sampling.

Device: it indicates the number of the device from which the value must be sampled.

Address: usually it indicates the type and the register number of the device. For more details refer to the documentation concerning the protocol used for the gate channel.

Sample: indicates how to sample. The following choices are possible:

Never: the gate is never sampled. Usually these gates are used as internal variables of the project for example to calculate some states to be displayed on the synoptic, but are not connected to any device.

Always: the gate value is continuously read from the device according to the set frequency.

In monitor and at startup: the gate value is read from the device when the program starts and subsequently with the set frequency only in the case in which the gate is present ("in monitor") in one of the synoptic currently active on video. By this option you can reduce data traffic between the supervisor and devices, sampling the gates only when they are displayed on the screen; however it is not recommended to sample "in monitor" gates that are linked to alarms: otherwise they will be checked only if the connected gate is part of the synoptic currently loaded in the video.

In monitor but not at startup: the gate value is read from the device with the set frequency only in the case in which it is present ("in monitor") in one of the synoptic currently active on the video. Not being sampled at startup, it is possible that the first time that it is shown in a synoptic, its value is in communication error until at least one sampling will be done.

Only at startup: the gate value is read at the start of supervision to synchronize with the current value in the device - this mode is particularly suitable for gates using particular protocols such as KNX where in some cases is the device that send to the supervisor the status variation.

Sample frequency (s): it indicates the time interval between a sampling and the next (in seconds).

Read block: it allows to define blocks of adjoining gates, giving every gate of the block the same

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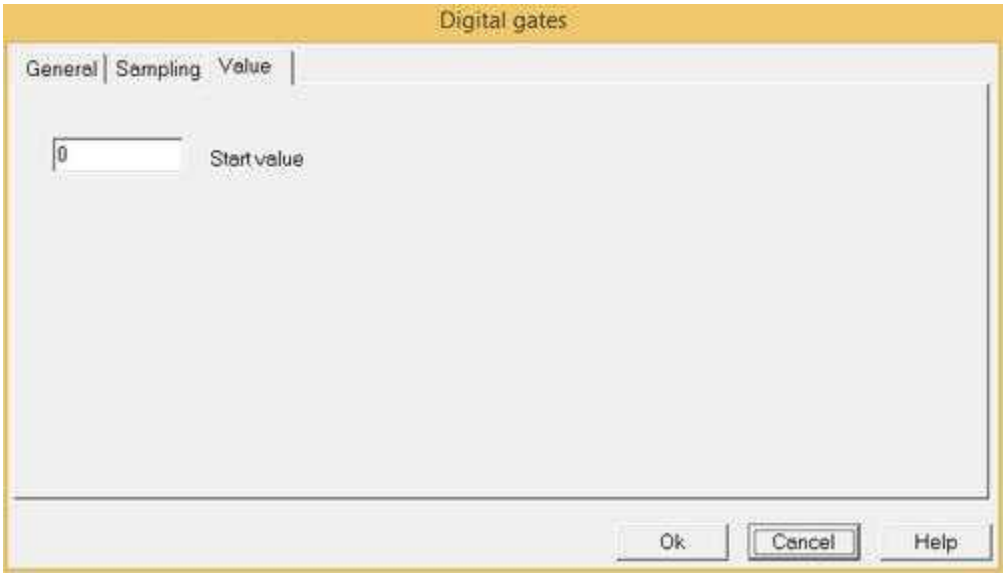
string. So an entire block can be read by the peripheral in just one reading cycle.

10.4 Value



As shown in figure, the page concerning the settings of the digital gate value contains only the setting of the initial value of the gate, because the other parameters concerning numerical gates are meaningless to digital gates.

Start value: the value to be given to the gate at the start of the application.

11 String Gates

11.1 String Gate

A string gate is a variable that can contain a sequence of characters (80 maximum)

Its content can be sampled from external devices, set by the user or by an automatic procedure code.

It can be produced automatically a historic changes file with its content in order to be consulted later in the form of tabular.

The gate configuration is divided into three tabs:

General
Sampling
Value

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11.2 General

Gate ID and **N ID**: they identify the gate inside the application, and so they must be univocal. Therefore it won't be possible to insert two gates of the same type that have the same ID and N ID. The ID field will have to be a string of at most 20 characters, while the N ID field will have to be a number between 0 and 65535.

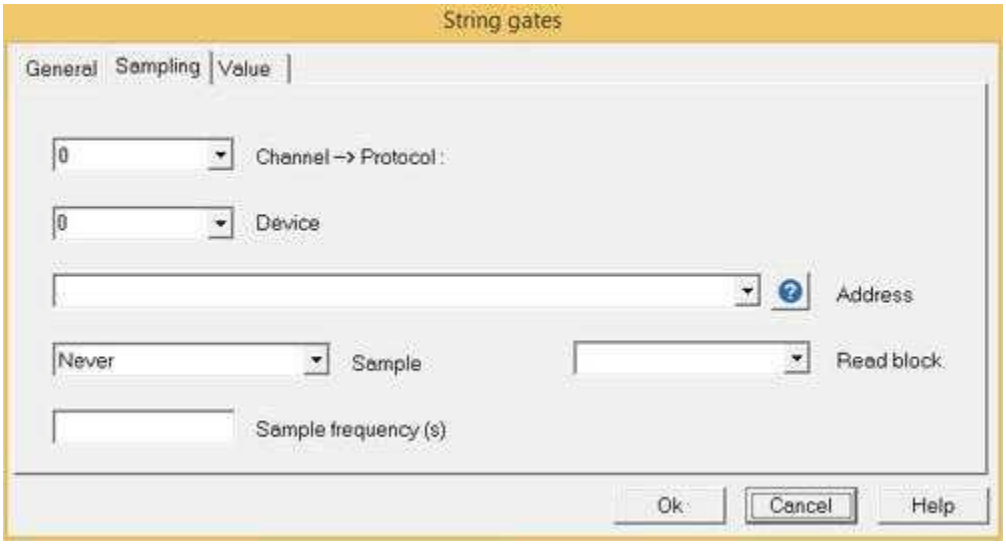
Record on historical file: if the option is activated, the value changes will be recorded on log files, thereby allowing later analysis.

Enable writing to device: it indicates whether changes of the gate value should be transmitted to the connected device.

Description: in this field it is possible to describe the gate (maximum 80 characters).

Access groups: using the corresponding button it is possible to indicate which users groups will be allowed to modify the parameters of the gate.

11.3 Sampling



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Channel: it indicates the channel from which to do the sampling.

Device: it indicates the number of the device from which the value must be sampled.

Address: usually it indicates the type and the register number of the device. For more details refer to the documentation concerning the protocol used for the gate channel.

Sample: indicates how to sample. The following choices are possible:

Never: the gate is never sampled. Usually these gates are used as internal variables of the project for example to calculate some states to be displayed on the synoptic, but are not connected to any device.

Always: the gate value is continuously read from the device according to the set frequency.

In monitor and at startup: the gate value is read from the device when the program starts and subsequently with the set frequency only in the case in which the gate is present ("in monitor") in one of the synoptic currently active on video. By this option you can reduce data traffic between the supervisor and devices, sampling the gates only when they are displayed on the screen; however it is not recommended to sample "in monitor" gates that are linked to alarms: otherwise they will be checked only if the connected gate is part of the synoptic currently loaded in the video.

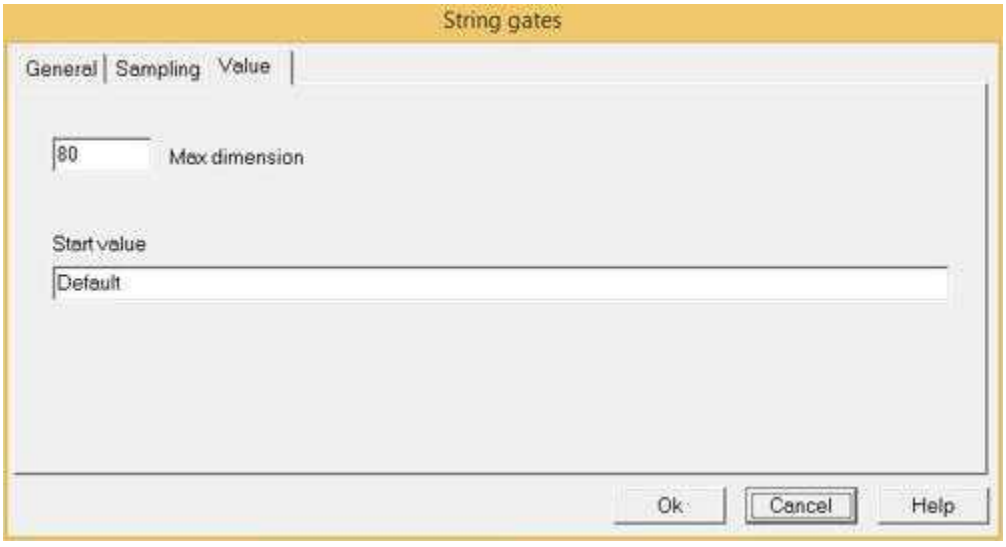
In monitor but not at startup: the gate value is read from the device with the set frequency only in the case in which it is present ("in monitor") in one of the synoptic currently active on the video. Not being sampled at startup, it is possible that the first time that it is shown in a synoptic, its value is in communication error until at least one sampling will be done.

Only at startup: the gate value is read at the start of supervision to synchronize with the current value in the device - this mode is particularly suitable for gates using particular protocols such as KNX where in some cases is the device that send to the supervisor the status variation.

Sample frequency (s): it indicates the time interval between a sampling and the next (in seconds).

Read block: it allows to define blocks of adjoining gates, giving every gate of the block the same string. So an entire block can be read by the peripheral in just one reading cycle.

11.4 Value



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Max dimension: the maximum length of the string of the gate (if 0, it is ignored). The software manages at most 80 characters.

Start value: the string to be given to the gate at the start of the application.

12 Composed Gates

12.1 Composed Gate

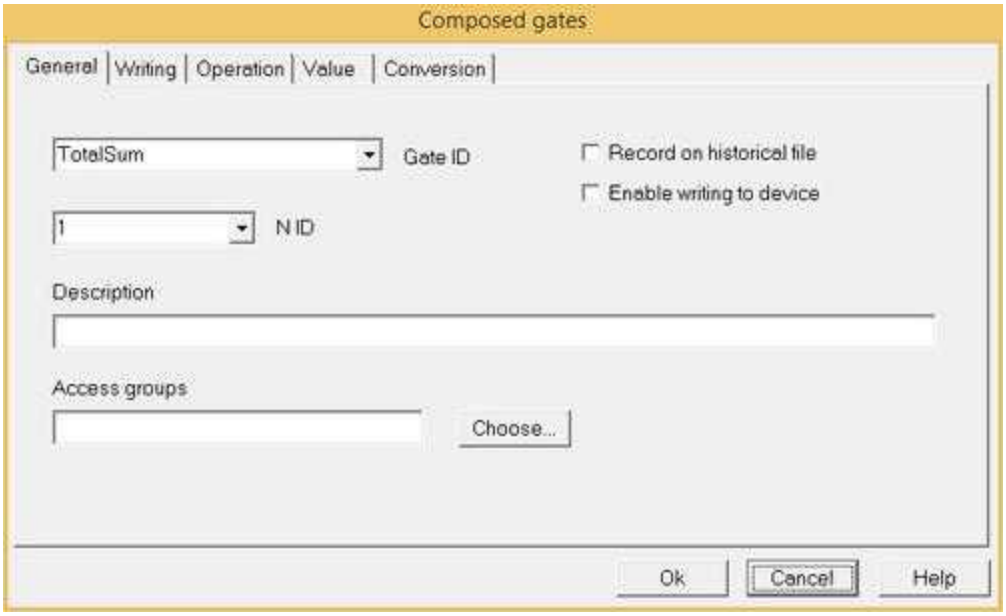
A composed gate is a variable that can contain numeric floating point double precision values (DOUBLE).

Its value is not sampled from a device or set directly by the operator, but is the result of a mathematical operation on the value of other gates (Numeric, Digital or Composed). For each composed gate you can also specify a memory address of a device on which to write automatically the value every time it changes.

The gate configuration is divided into four tabs:

General
Writing
Operation
Value
Conversion

12.2 General



Gate ID and **N ID**: they identify the gate inside the application, and so they must be univocal. Therefore

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it won't be possible to insert two gates of the same type that have the same ID and N ID. The ID field will have to be a string of at most 20 characters, while the N ID field will have to be a number between 0 and 65535.

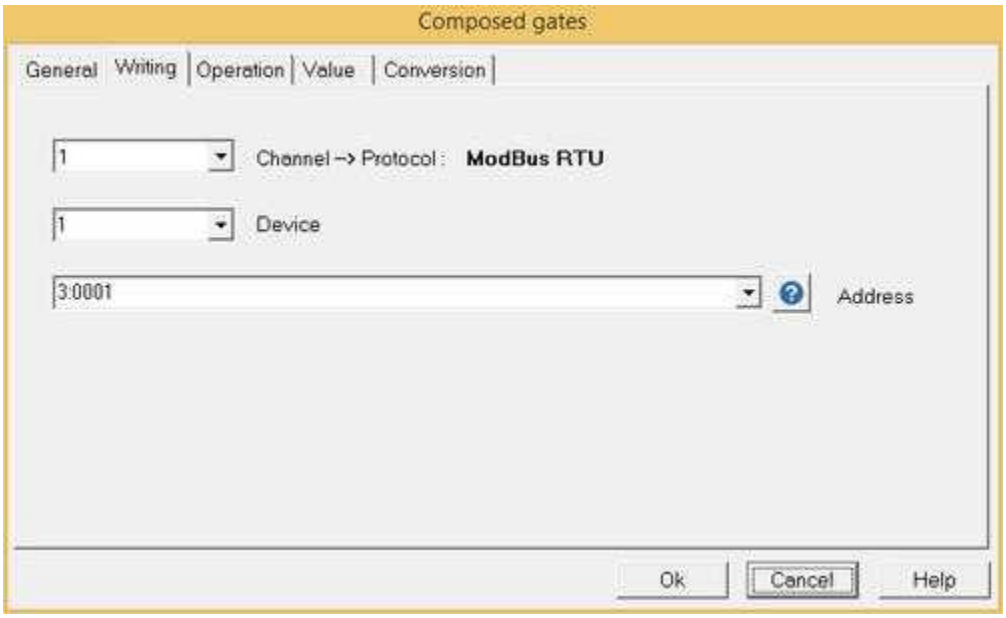
Record on historical file: if the option is activated, the value changes will be recorded on log files, thereby allowing later analysis.

Enable writing to device: it indicates whether changes of the gate value should be transmitted to the connected device.

Description: in this field it is possible to describe the gate (maximum 80 characters).

Access groups: using the corresponding button it is possible to indicate which users groups will be allowed to modify the parameters of the gate.

12.3 Writing



On the *writing* page it is possible to indicate the device and the register on which to write if the gate value is changing. It includes the following parameters:

Channel: it indicates the channel in which to write.

Device: it indicates the number of the device on which to write any variations.

Address: usually it indicates the type and the register number of the device that will have to be written. For more details refer to the documentation concerning the protocol used for the gate channel.

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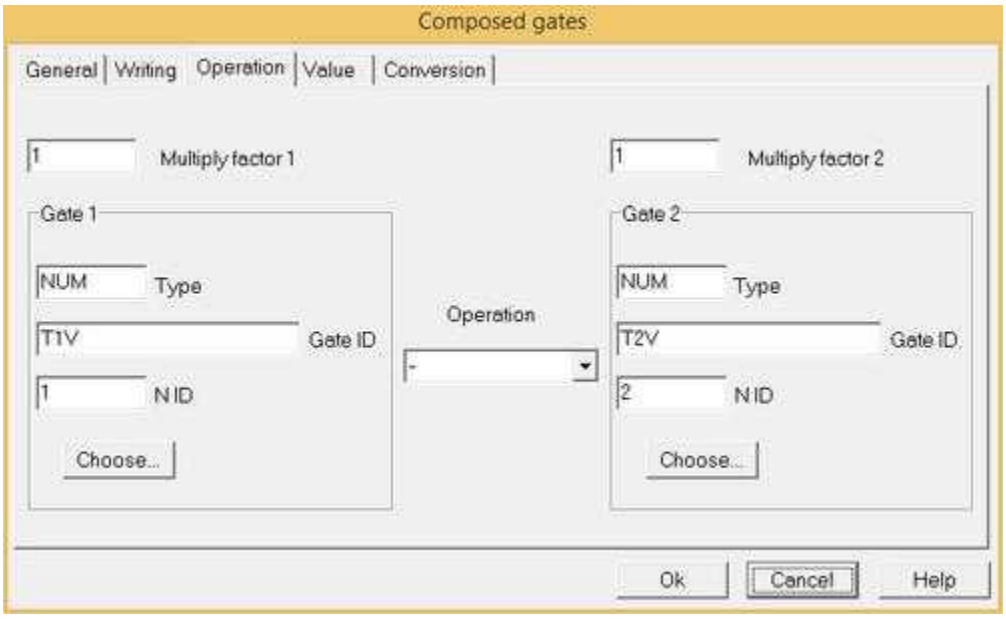
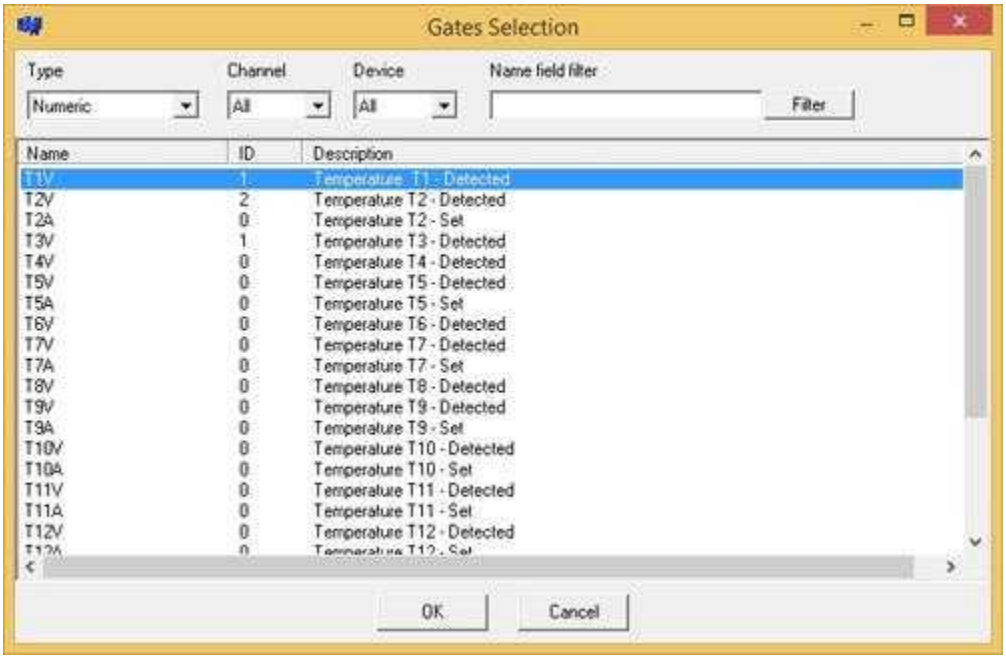
12.4 Operation



The page where to specify the gates that will contribute to form the value that will be provided by the composed gate is the *Operation* page (figure above).

Gate 1: it is the first gate involved in the formation of the value that will be assigned to the composed gate. If the composed gate is made up of only one gate, it must be indicated in the gate 1. To choose the gate you just need to press the corresponding button and will appear a dialog box, from which to choose the gate (figure below).



First of all, in the dialog box you have to choose the type of gate: Numerical, Digital, Composed (so as

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to create composed gates hierarchies) and Event gates. Once you have chosen the type, on the screen will appear the ID of the gate, its N ID and the description currently recorded on the gates database. You will just need to select one gate and confirm your choice. The data concerning that gate will be automatically inserted in the fields of the gate 1 in figure. If you want to undo your choice you just need to select *None* from the type of gate, and confirm your choice.

Gate 2: it is the second gate involved in the formation of the value that will be assigned to the composed gate. The selection takes place exactly in the same way as for Gate 1. If you want to create the composed gate from only one gate, do not select any Gate 2.

Multiply factor 1: it indicates the factor by which to multiply the value read from gate 1. If nothing is inserted, it will be considered equal to 1.

Multiply factor 2: it indicates the factor by which to multiply the value read from gate 2. If nothing is inserted, it will be considered equal to 1.

Operation: it indicates the operation to carry out on the value of the two gates. The available operations are the following:

[**+**] Composed gate = Gate 1 **+** Gate 2

[**-**] Composed gate = Gate 1 **-** Gate 2

[*****] Composed gate = Gate 1 ***** Gate 2

[**/**] Composed gate = Gate 1 **/** Gate 2

[**DISCARD Hi**] If Gate 1 > Gate 2 then Composed gate value not calculated else Composed gate = Gate 1

[**DISCARD Lo**] If Gate 1< Gate 2 then Composed gate value not calculated else Composed gate = Gate 1

[**LIMIT Hi**] If Gate 1 > Gate 2 then Composed gate = Gate 2 else Composed gate = Gate 1

[**LIMIT Lo**] If Gate 1 < Gate 2 then Composed gate = Gate 2 else Composed gate = Gate 1

[**RESET IF=**] If Gate 1 = Gate 2 then Composed gate = 0 else Composed gate = Gate 1

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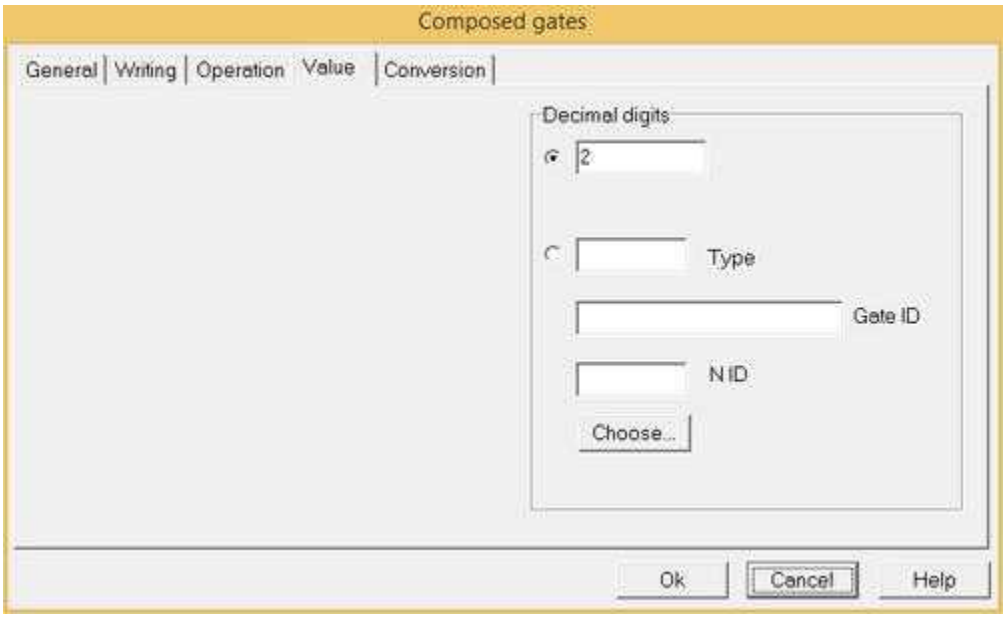
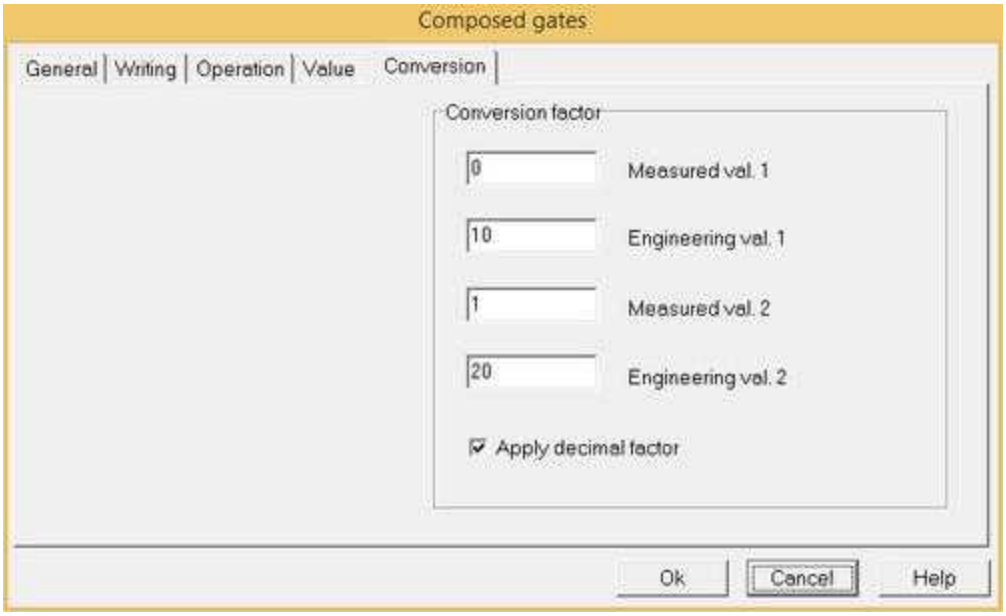
12.5 Value



Decimal digits: the number of decimals that have to be rounded.It can be a constant value or a numeric or compound gate reference.

12.6 Conversion



This page allows you to specify the conversion rule between *engineering value* and the *measured value* and is only effective if it enabled the "*Enable writing to device*": in which case the *engineering value* of the gate will be transformed into the corresponding *measured value* and sent to the device.

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Refer to the Numeric gate - Conversion guide for details.

13 Event and Alarm Gates

13.1 Event Gate

The "*Event and Alarm*" is a particular gate to which it is associated a message to display or record each time the condition associated with it is verified.

Simply by specifying the "*Alarm type*" in the "*General*" tab you can define whether the gate is kind of event or alarm. Regardless of whether it is of type event or alarm, management is almost similar: both you can specify a trigger condition, a time filter, a mode to withholding and file saving history. For both it is also possible to obtain the situation of events and alarms that are currently active through the use of the "*Alarms / Event View*" object of the *Template Builder* and view the historic via the "*Historical Alarms / Event View*" object.

The only difference is that when a gate defined as "*Alarm Type*" became active, its message will be shown on a red background in the status bar at the bottom of the screen to inform the operator as soon as possible, regardless from the page of supervising shown at that time.

Some examples of events can be: "Machine start", "Machine stop", "Start production", "End production", while some examples of alarms can be: "Overtemperature alarm", "Emergency", "Alarm inverter protection" , etc.

The gate configuration is divided into four tabs:

General
Condition
Message
Class

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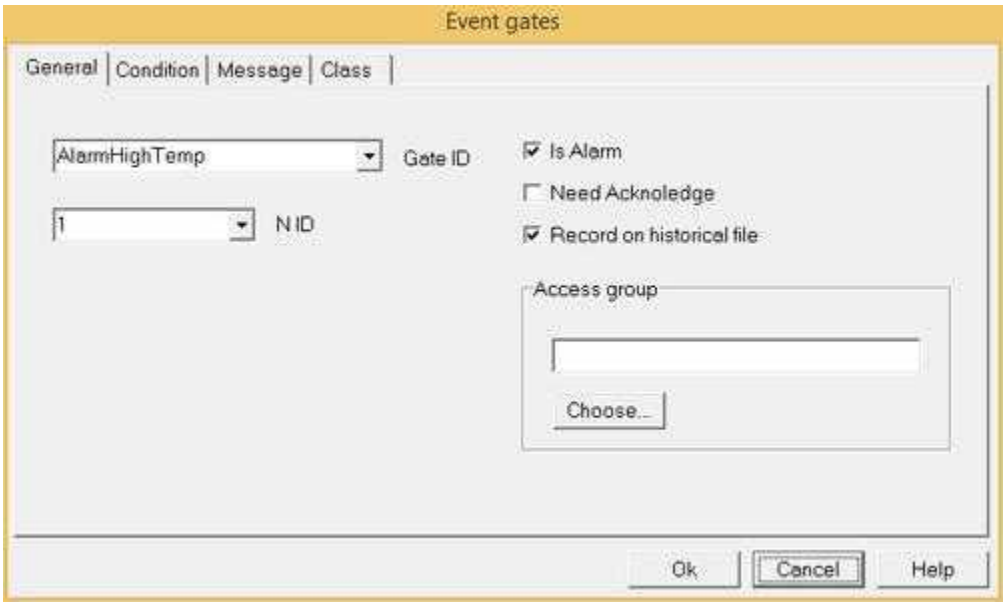
13.2 General



Let's see how to define the parameters of an event gate. In figure above you can see the window containing the generic data of these gates.

Gate ID and **N ID**: they identify the gate inside the application, and so they must be univocal. Therefore it won't be possible to insert two gates of the same type that have the same ID and N ID. The ID field will have to be a string of at most 20 characters, while the N ID field will have to be a number between 0 and 65535.

Is Alarm: if it selected, the event is considered as an alarm, so as to have an immediate outlook, during the supervision phase, of the active alarms.

Need Acknowledge: choosing this option, you keep an event in the active events table until it is confirmed by the operator, even when the condition triggering off the event is not active anymore. This way you make sure that the event is not overlooked.

Record on historical file: if this option is set, all the events created by the gate will be recorded on historical files, in order to allow a subsequent analysis.

Access group: using the corresponding button it is possible to indicate which users groups will be allowed to modify the parameters of the gate.

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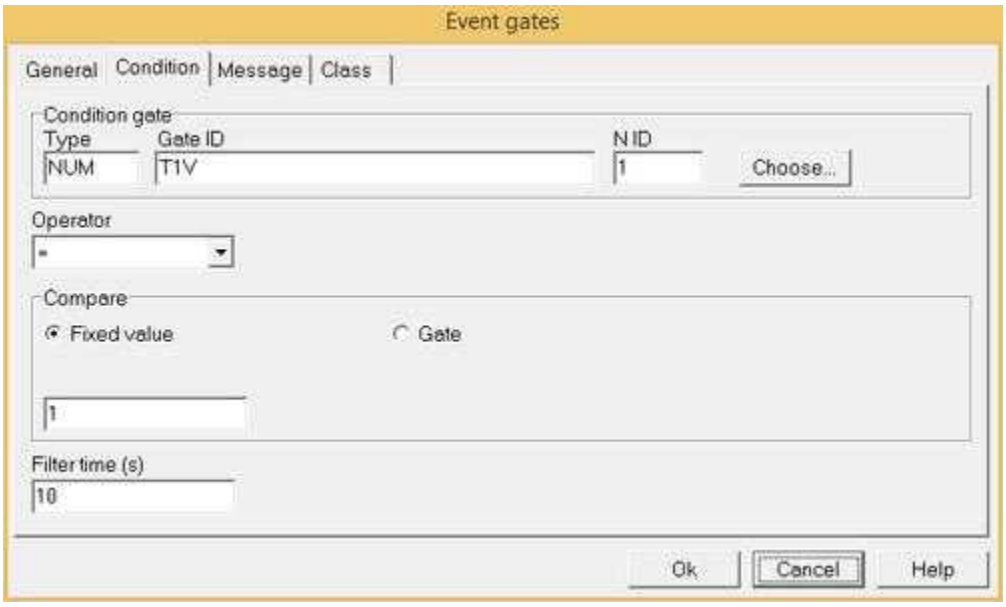
13.3 Condition



In figure it is shown the page for the insertion of the data concerning the condition to be verified in order to create the event.

Condition gate: it is the gate from which to read the value prompting the condition verification. By pressing the button will appear the dialog box (as for the composed gates) from which to choose the gate.

Operator: it shows the condition that must take place for the event to become active. The available conditions depend on the type of the reference gate that has been chosen.

For **Numeric** and **Compound** gates, the following conditions are available:

OPERATOR	DESCRIPTION

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=	The value of the condition gate must be equal to the value
<>	The value of the condition gate must different to the value
>	The value of the condition gate must be greater than the value
>=	The value of the condition gate must be greater than or equal to the value
<	The value of the condition gate must be less than the value
<=	The value of the condition gate must be less than or equal the value
Or	The bitwise OR of the value of the condition gate and the value must be different to zero
Bit # *i*	The bit i of the value of the condition gate must be equal to the value (0 or 1)
=	The value of the condition gate must be equal to the value
<>	The value of the condition gate must different to the value

For **Digital** gates, the following conditions are available:

OPERATOR	DESCRIPTION
=	The value of the condition gate must be equal to the value
<>	The value of the condition gate must different to the value
Variation	The value of the condition gate must change
--> 1	The value of the condition gate go from zero to one
--> 0	The value of the condition gate go from one to zero

Compare: a fixed value or a gate can be selected.

- In case of "**Fixed value**" selected,must be specified the value to which to compare the reference gate (depending on the condition chosen).
- In case of "**Gate**" selected, must be specified the gate that contains the value to which to compare the reference gate.

Filter time: it indicates the minimum time in which the condition must remain verified in order to create the event. By properly setting this value it is possible to make the software to ignore events too short to be important for the application.

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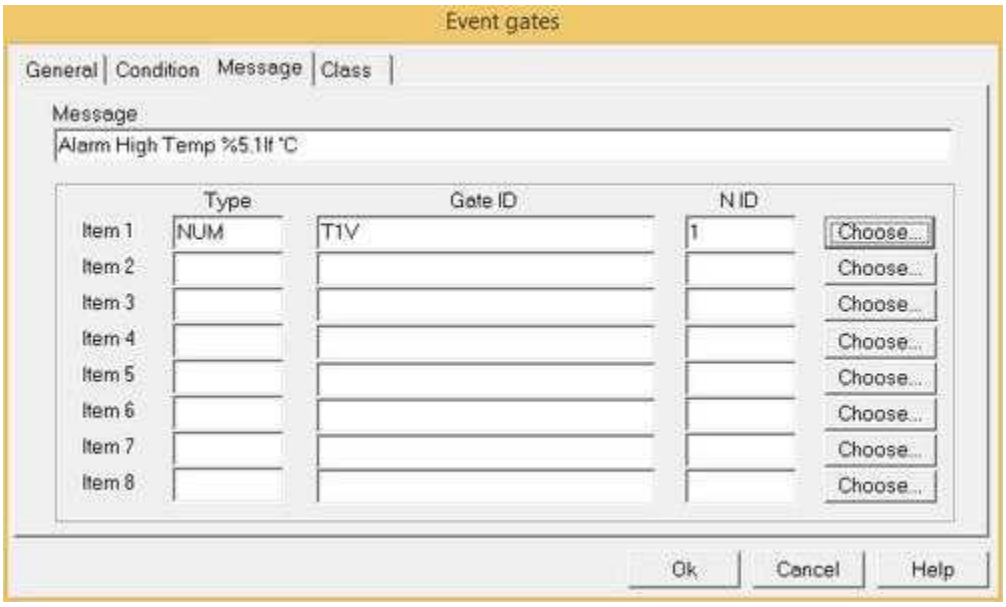
13.4 Message



Message: the message that will be displayed in the active events table and on the status bar of the software (if the event is an alarm). The maximum length is 80 characters.
It is possible to make a custom event message using values of different gates.
Insert the % symbol in the message to specify the insertion point of the gate value, then specify in the list below (pushing the choose button) the ordered gate list value.

%s it is used to insert a string gate value in the message
%lf it is used to insert a numeric gate value in the message

The %lf parameter can be used to indicate also the maximum number of digits and the number of decimals in this way:

%**x**.**y**lf

x It is the number of digits to show, all the available digits will be shown if this parameter is not specified. If a 0 preced the parameter the resulting number will be right padded with zeros until the specified length.
y It is an optional parameter that indicate the decimals.
If **y** is equal to "*****" then the number of decimal digits to show is the number of decimal digits defined for the gate specified in the **Item** field (this number it is defined using *Gate Builder*).Gate values are inserted in the message where there are % parameters and in the same order of the list.

Pay attention to not specify a parameter type that does not match the type of the associated gate value, for example a numerical parameter (%lf) must not be associated to a string gate.

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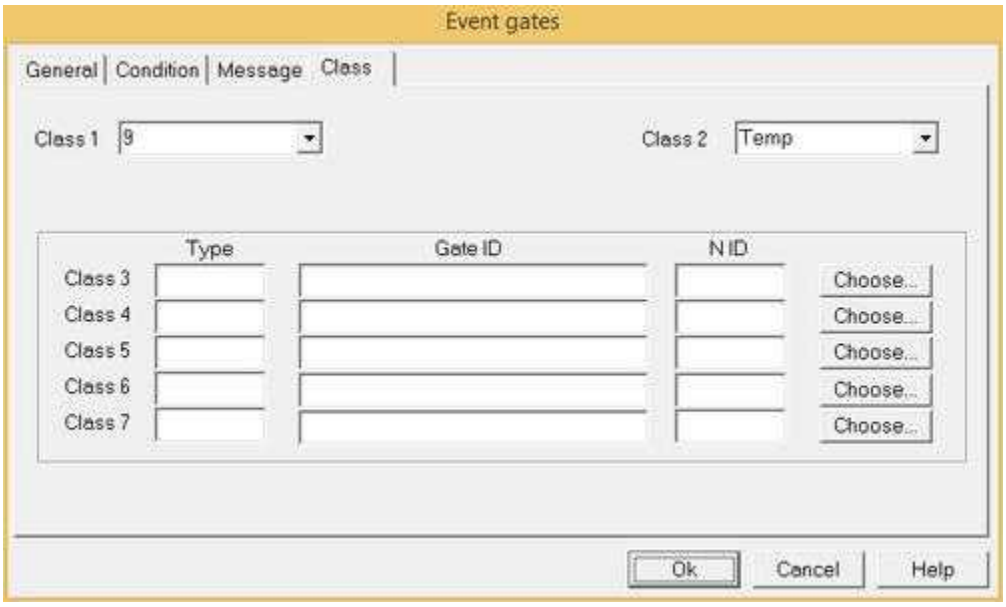
13.5 Class



Class 1: it is possible to specify a numerical value according to which you will be able to arrange the table of active events (during supervision).
Class 2: it is possible to specify an alphanumeric string according to which you will be able to sort the table of active events (during supervision). The classes can be used, for example, to group together the plant events per areas, or per priority.
Class 3-7: it is possible to bind gates to these classes. Whene the event is triggered these classes contain the value of the associated gates.

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