



**PAGELAB**

# User Manual



PageLab User Manual  
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# 1. OVERVIEW

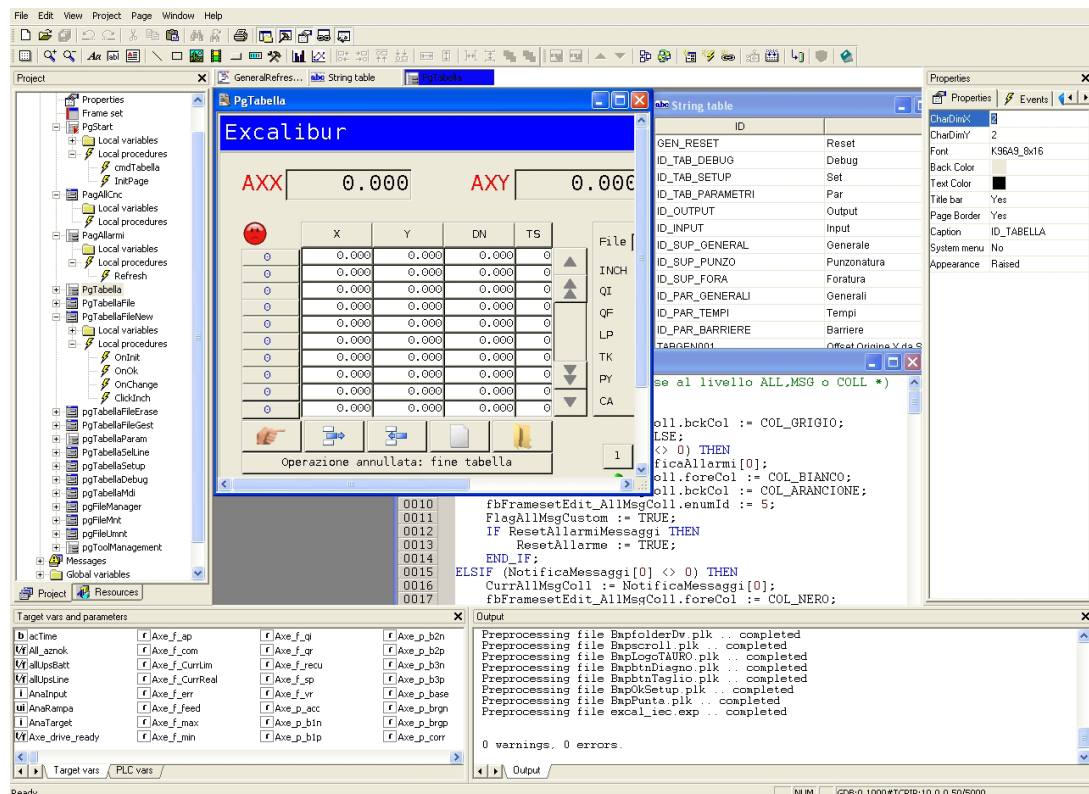
PageLab is a software application that allows the developer to create user interfaces for embedded systems based on HMI runtime.

PageLab is an easy to learn and use software, which allows the user to implement graphical interfaces in a visual way. The realized pages are viewed in PageLab as they will appear on the final target.

Thanks to its multi-pages structure, PageLab can support HMI (Human Machine Interface) applications with an arbitrary number of pages.

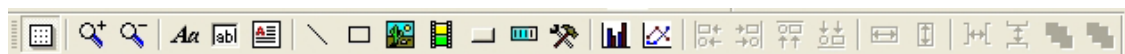
It is equipped with a considerable number of tools to realize even complex applications and it interfaces directly to the PLC IEC1131 LogicLab compiler for managing the variables which are defined in the target PLC application.

The following paragraphs show you the main features of this product.



## 1.1 MAIN ELEMENTS

### Set of controls



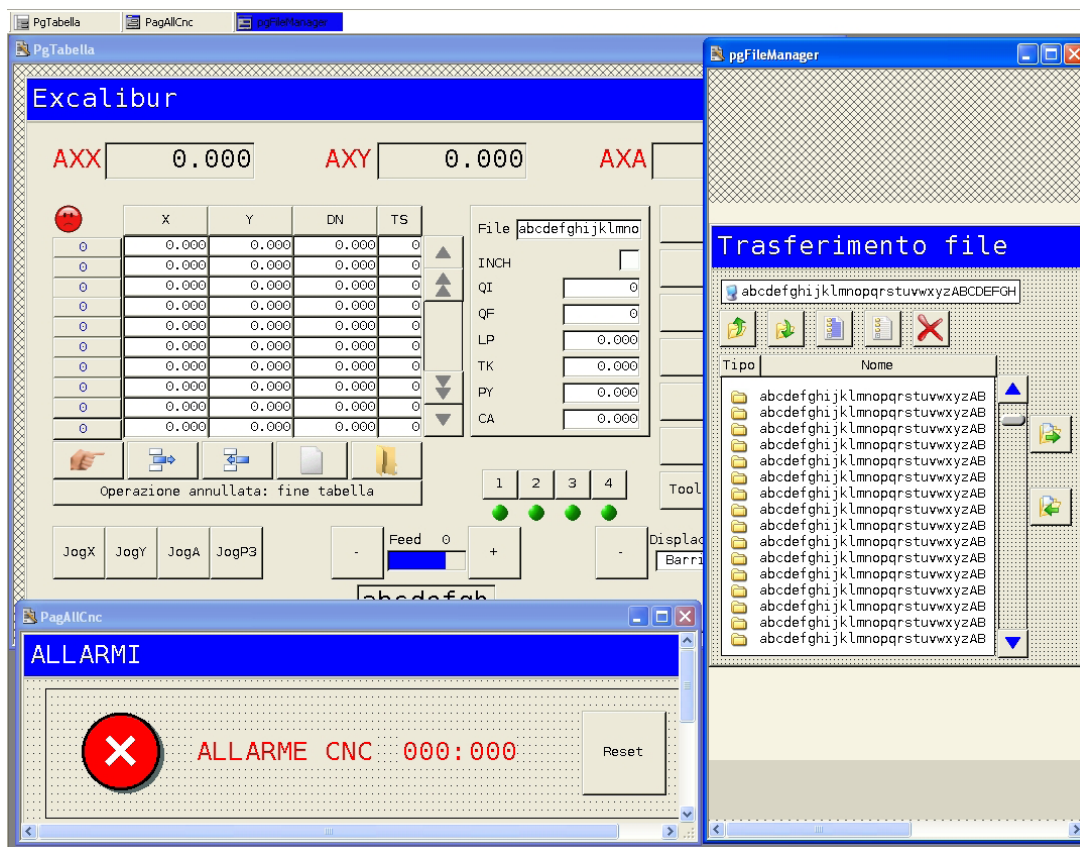
Each page may contain an arbitrary number of defined graphic controls. There are two classes of graphic controls:

- Static controls: drawing tools such as lines, rectangles, and figures.
- Dynamic controls: multilayered objects, which enable data and images display and user interaction (strings, editboxes, textboxes, buttons, progress, charts and trends, custom controls).

PageLab is an open system, allowing the implementation of custom controls which may be included in the target system.

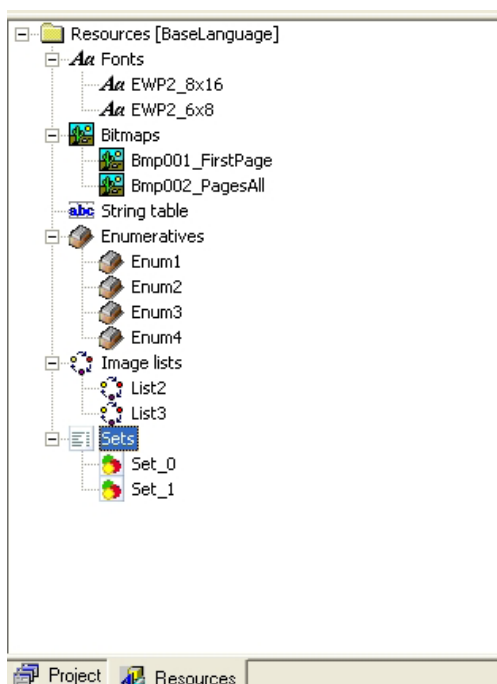


## Multi-pages structure



PageLab supports the definition of an arbitrary number of pages (full-screen or pop-up). Each page may contain links to other pages, so that the whole project takes a tree structure.

## Resources management



The controls' properties in the page are not statically defined in the project code, but they can be managed separately as resources.

Resources include fonts for characters display, images, string table, enumerated data types, and elements sets.

Specifically regarding the images, PageLab allows to import bitmap files directly from the Windows-formatted file (.bmp, .gif, .emf, .jpg, .ico etc.).

## Languages management

| ID               | Caption                  |
|------------------|--------------------------|
| IDW_DIAGNOSTICA  | Diagnostica v1.00        |
| IDS_MEMO         | Memoria                  |
| IDS_SERIALE      | Connessione seriale      |
| IDS_TEMPI        | Tempi di esecuzione (ms) |
| IDS_LINGUA       | Lingua                   |
| IDS_SERBAUD      | Baud rate                |
| IDS_GDBRXPCCK    | Pacchetti RX             |
| IDS_GDBTXPCCK    | Pacchetti TX             |
| IDS_GDBRXNAK     | Pacchetti RX errati      |
| IDS_GDBTXNAK     | Pacchetti TX errati      |
| IDW_DEBUG        | Debug di sistema         |
| IDW_TESTVIDEO    | Test touch screen        |
| IDW_VIDEO        | Video e touch screen     |
| IDS_LCDCONTRASTO | Luminosità LCD           |
| IDS_STATOPLC     | Stato PLC                |
| IDS_TEMPIFAST    | Ciclo fast (2 ms)        |
| IDS_TEMPIINOUT   | Ciclo in/out             |
| IDS_MEMODISK     | Spazio su disco (byte)   |

| ID               | Caption              |
|------------------|----------------------|
| IDW_DIAGNOSTICA  | Diagnostics          |
| IDS_MEMO         | Memory               |
| IDS_SERIALE      | Serial connection    |
| IDS_TEMPI        | Execution time       |
| IDS_LINGUA       | Language             |
| IDS_SERBAUD      | Baud rate            |
| IDS_GDBRXPCCK    | RX packets           |
| IDS_GDBTXPCCK    | TX packets           |
| IDS_GDBRXNAK     | Bad RX packets       |
| IDS_GDBTXNAK     | Bad TX packets       |
| IDW_DEBUG        | System debug         |
| IDW_TESTVIDEO    | Test touch screen    |
| IDW_VIDEO        | Video e touch screen |
| IDS_LCDCONTRASTO | LCD contrast         |
| IDS_STATOPLC     | PLC status           |
| IDS_TEMPIFAST    | Fast cycle (2ms)     |
| IDS_TEMPIINOUT   | In/out cycle         |
| IDS_MEMODISK     | Disk space (byte)    |

Strings and enumerated data types are structured as to ease the multilingual device; moreover PageLab provides a function to export/import the above mentioned elements to/from a text file, in order to simplify the translation from a language to another.

## Variables and procedures

| Name     | Type | Array | Init value | Description |
|----------|------|-------|------------|-------------|
| xll      | UINT | No    | 0          |             |
| xlr      | UINT | No    | 0          |             |
| xhl      | UINT |       |            |             |
| yll      | UINT |       |            |             |
| ylr      | UINT |       |            |             |
| ylh      | UINT |       |            |             |
| showLL   | BOOL |       |            |             |
| showLR   | BOOL |       |            |             |
| showHL   | BOOL |       |            |             |
| go       | BOOL |       |            |             |
| iniX     | UINT |       |            |             |
| iniY     | UINT |       |            |             |
| lnkToSet | BOOL |       |            |             |

```

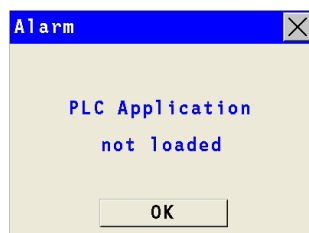
0001
0002  (* Non scrivo sopra la title bar *)
0003  IF sysTCHPixY > 48 THEN
0004
0005      (* Croce nella posizione del touchscreen *)
0006      sysVoid := Video_Line( sysTCHPixX,
0007                             sysTCHPixY - 1,
0008                             sysTCHPixX,
0009                             sysTCHPixY + 1,
0010                             1,
0011                             0 );
0012
0013      sysVoid := Video_Line( sysTCHPixX - 1,
0014                             sysTCHPixY,
0015                             sysTCHPixX + 1,
0016                             sysTCHPixY,
  
```

PageLab enables the implementation of procedures which may be as complex as you want in the ST language. Through these procedures, the user can interact with the PageLab application, the PLC application or the target system variables to customize the interface's behaviour or the whole CNC.



## 1.2 RUN-TIME FUNCTIONALITIES

### Asynchronous messages management

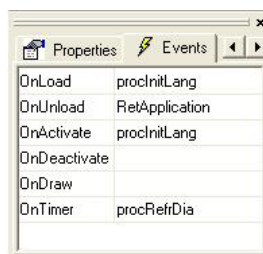


PageLab supports the issue of asynchronous messages whatever their complexity. You can entirely customize the issue messages management by typing a simple ST procedure.

### Multilingual support

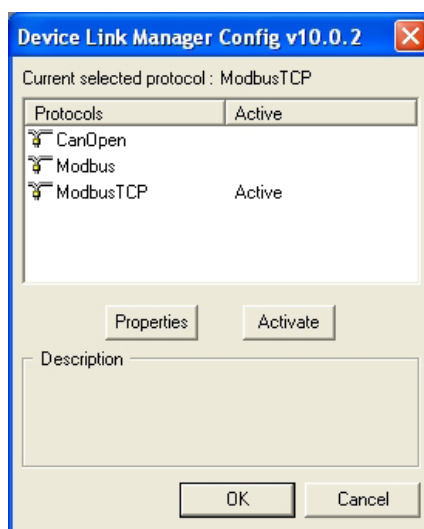
PageLab allows you to change strings, resources, and enumerations language without recompiling nor reloading the application.

### Events management



PageLab applications are structured in events; the user may seize the available events and manage them through ST-coded procedures.

## 1.3 COMMUNICATING WITH THE TARGET



You can establish the communication with the target device through the PC communication drivers, thus using one of the available custom protocols (which can be easily implemented thanks to the modular structure of the communication system).

## 2. CREATING A SIMPLE PAGELAB PROJECT

### 2.1 PURPOSE OF THIS CHAPTER

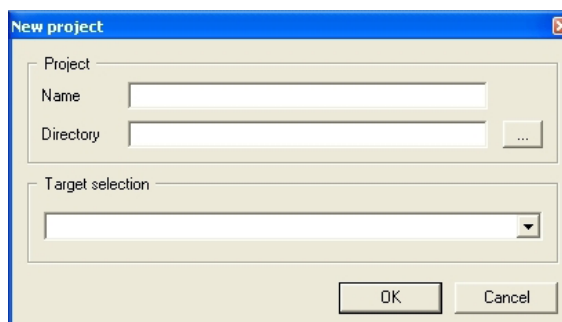
This chapter aims to lead the user to realize a simple HMI project with PageLab, through a sequence of easy steps.

Here below you can find the list of this chapter's topics.

- Creating a new project: starting at zero the realization of a HMI project.
- Inserting the first page in the project.
- Inserting a secondary page.
- Inserting static controls: how to insert simple objects (lines, rectangles, etc.) in a page.
- Inserting static images: how to insert an image in a page, starting at a *.bmp* file.
- Inserting strings: how to insert a text label.
- Inserting edit boxes: how to access the data of the system and the control PLC, how to declare new variables, how to insert text frames to view/edit these data.
- Inserting buttons: learning to use an essential control for the interaction between the user and the system.
- Compiling and downloading the project.

### 2.2 CREATING A NEW PROJECT

Launch PageLab, then select the *New Project* command from the *File* menu. The following dialog box appears.



Type the name you want to assign to the project in the *Name* field, and in the *Directory* field specify the directory where you want to create the project folder.

Select the target which will execute the HMI from the *Target selection* menu. The contents of this menu can be customized: if the desired target does not appear in the list, refer to your hardware provider.

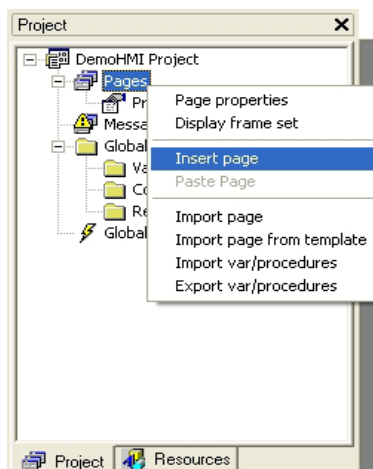
Confirm your choice by pressing *OK*. PageLab automatically creates the folder *I:\Demo manuale\Demo HMI* as specified in *Directory*.



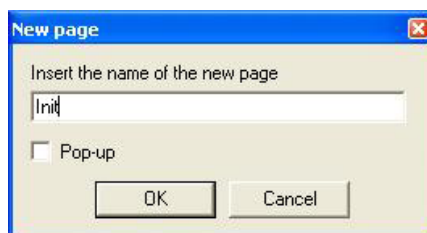
## 2.3 INSERTING THE FIRST AGE IN THE PROJECT

### 2.3.1 CREATING A NEW PAGE

To insert a new page in the project, right-click on the *Pages* item of the project tree.

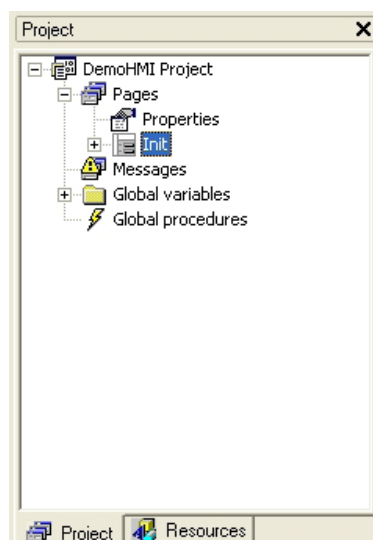


Select the *Insert page* option from the menu which has just shown up. This causes a dialog box to appear where you have to specify the page name and whether the page is a pop-up one or not.

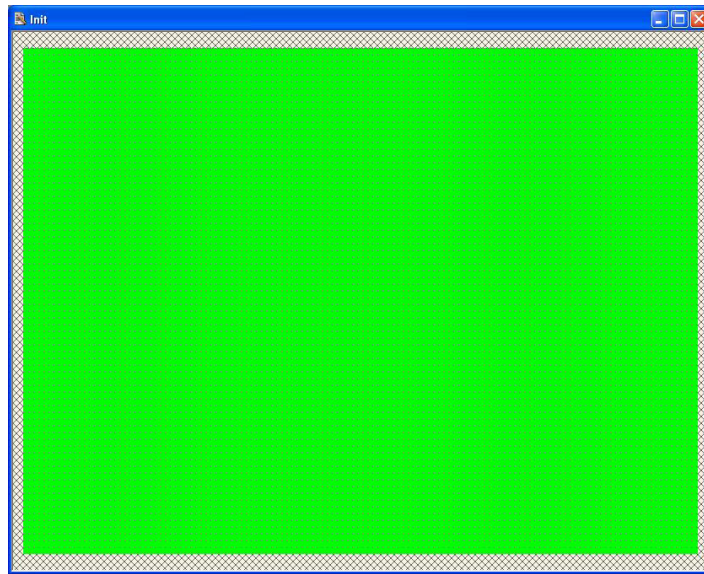


If you do not select the *Pop-up* property when creating it, the page is called *Child Page*. Its main feature is that it fits the whole video area. Consequently the user cannot define position and size of a child page because they are automatically set depending on the video area and on an eventual frame set (see 4.2).

Choose to create a child page and call it *Init*: type the name *Init* in the apposite field and press *OK* to confirm your choice. A new node appears in the pages folder of the project tree.



Double-click on the *Init* item to open the document with this page preview, which is blank at the moment.

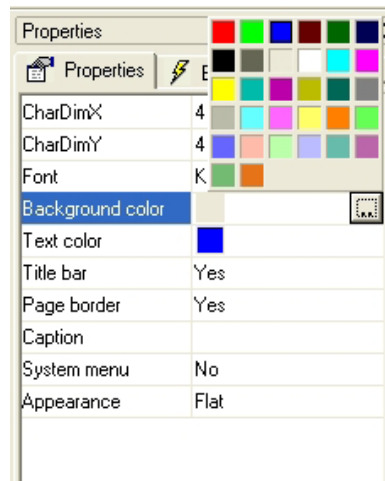


### 2.3.2 EDITING THE COLORS OF THE PAGE

You can edit the background color of the page and the foreground default text color through the page properties: double-click in the *Background Color* field. A little button appears.



Pressing it, the colors palette appears. Then you can select the desired color.



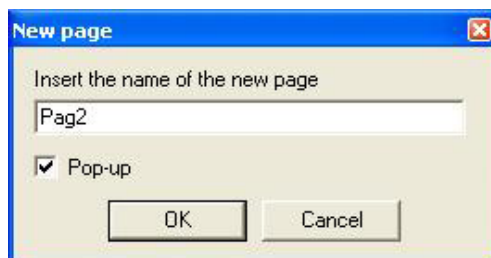
Choose grey as background color and black as default text color.



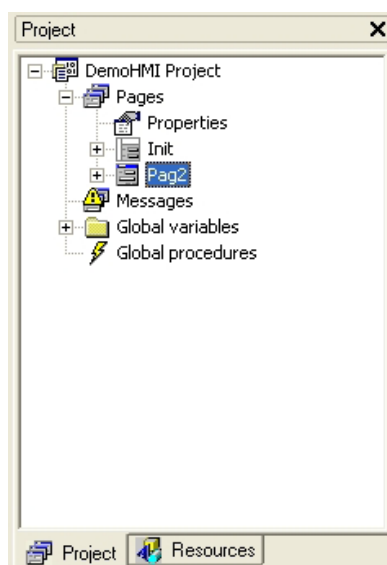
## 2.4 INSERTING A SECONDARY PAGE

### 2.4.1 CREATING A SECONDARY PAGE

Let us assume that you want to create a secondary page: right-click on the *Pages* item of the project tree and choose the *Insert page* option from the contextual menu. Type the name *Pag2* in the dialog box which appears and select the pop-up property.



Consequently a new item appears in the *Pages* folder of the project tree.

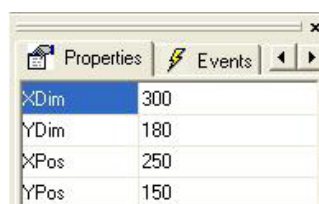


### 2.4.2 DIMENSIONING AND SETTING THE SECONDARY PAGE

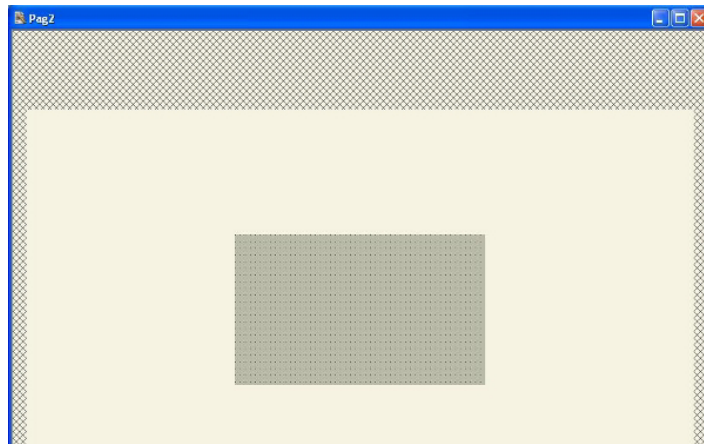
Note that the icon of the *Init* page different from the new *Pag2* one. In fact, the last one has been created as pop-up page, whereas the first one has been created as child page.

Pop-up pages are not subjected to any restriction from the frame set (see 4.2): their dimensions and positions can be chosen by the user.

Assign to the secondary window the dimensions 300x180 pixel and set it (x, y) = (250, 150) because these are the top left-hand corner's coordinates of the window. Double-click on the *Pag2* item of the project tree. In this way you open the corresponding document. Assign dimensions and position.



After editing the colors, too, the new window will look like the picture below.



The grey area in the centre is the active area of the *Pag2* page, whereas the clearer area which surrounds it represents the video area of the target system. In this way you obtain a clear vision of the new page placement.

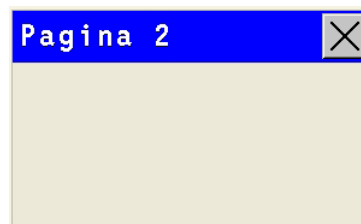
### 2.4.3 VIEWING THE TITLE BAR AND THE SYSTEM BUTTON

PageLab enables the automatic creation of a title bar (*Title bar* properties = *Yes*) and of a button to close the page (*System menu* properties = *Yes*), besides the print of a text string as title (*Caption* properties).

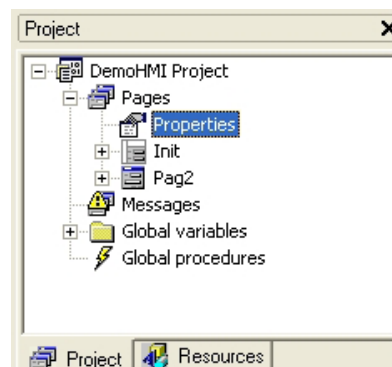
Let us assume that you want to activate the title bar and the close button, and to print the *Pagina 2* string as title.

|             |          |
|-------------|----------|
| Title bar   | Yes      |
| Page border | Yes      |
| Caption     | Pagina 2 |
| System menu | No       |
| Appearance  | Flat     |

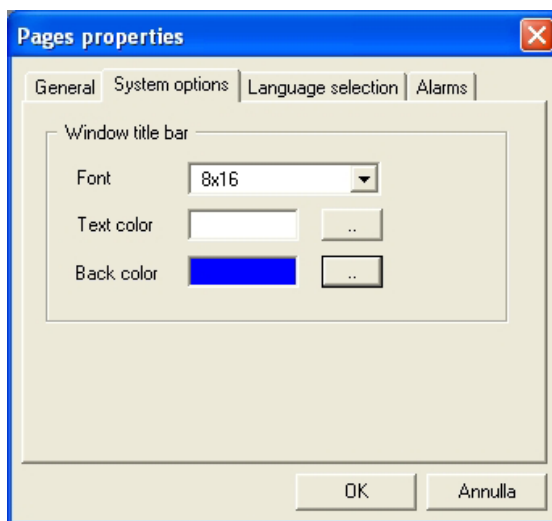
Then the secondary page looks like the following picture.



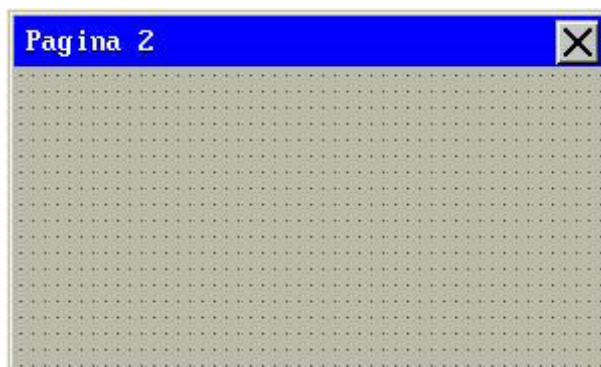
The text and the background color and the used font are the same for all the pages of the project, so you will not find them in this specific page properties. In order to customize these features, double-click on the *Properties* item of the project tree.



A multi-tabs window opens. In *System options* assign the font (in this case 8x16), the text color and the background color (in this case respectively white and blue).



Then the secondary page looks like the following figure.

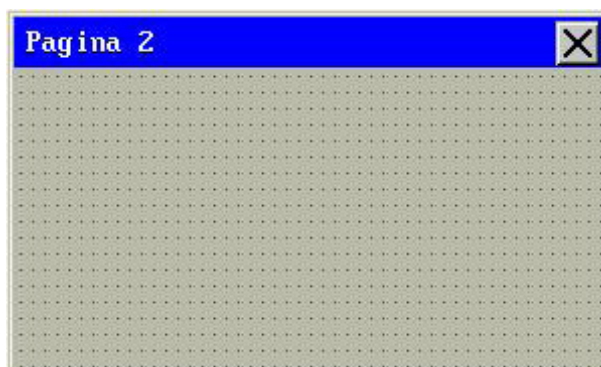


#### 2.4.4 ASSIGNING A STYLE TO THE WINDOW

PageLab supports three styles for the windows, which you can select through the *Appearance* property: *Flat* (the default style when you create a window), *Sunken* and *Raised*. Choose the last one.

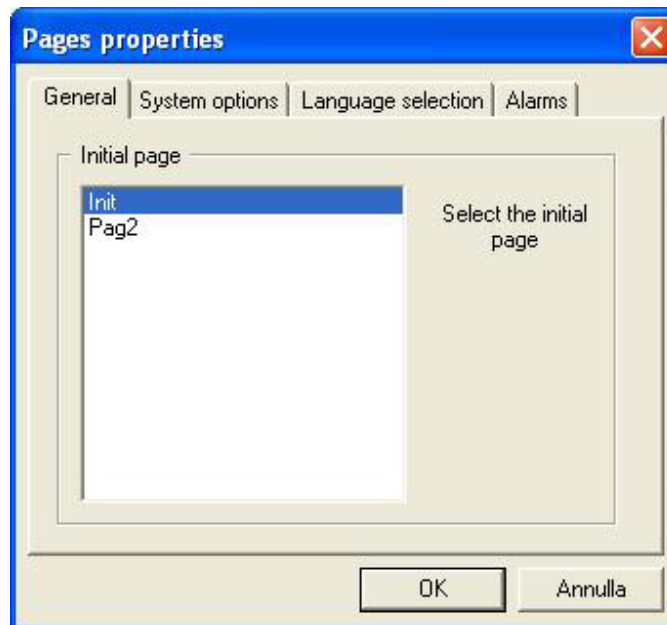


The window looks like the picture below.



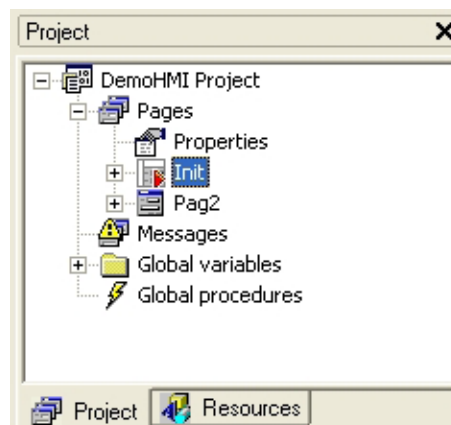
## 2.4.5 CHOOSING THE START WINDOW

The user has to indicate the start window of the whole HMI project. The start window will open at the HMI application start. If the project consists in one single page, the system will take this one as start page. You can indicate the start page in the project properties window, which you can open by double-clicking on the *Properties* item of the project tree. The *General* window is used for this purpose.



In order to indicate the start page, select the desired one from the list. Then confirm your choice by clicking *OK*.

The start page is marked in the project tree by a red triangle.



## 2.5 INSERTING STATIC CONTROLS

The two pages which you have just created are blank yet. Go back to the first page (*Init*) and start inserting some controls.

Static controls are objects which are drawn once, when opening the page, and they do not change until the page is active.



## 2.5.1 INSERTING A LINE

Insert a line by clicking the corresponding button in the *Page toolbar*.

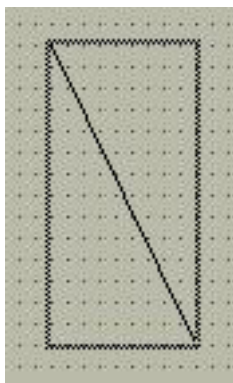


Move the mouse to the active area of the page. A cross + appears. The object will be inserted in the grid near to the mouse cursor.

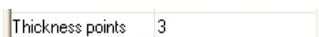
Confirm the insertion point by left-clicking. A new *Line* control appears. It has a default size and horizontal alignment.



You can resize it by dragging one of the two ends of the line.



You can edit the line thickness through the *Thickness points* property of the control. For example, assign a 3 pixel thickness.



In the page preview you can see how the line looks like.



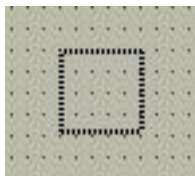
## 2.5.2 INSERTING A RECTANGLE IN THE PAGE

Press the corresponding button in the *Page toolbar*.

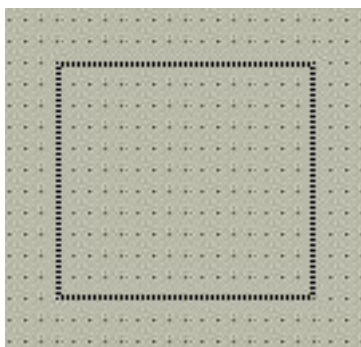


Move the mouse to the active area of the page. A cross + appears. The object will be inserted in the grid near to the mouse cursor.

Confirm the insertion point by left-clicking. A new *Rectangle* control appears. It has a default size.



You can edit both the dimensions dragging one of the rectangle vertexes, or one dimension at a time dragging one of the rectangle's sides.



You can customize the border and the background color and the transparency through the control properties. For example, make the rectangle white and opaque with white border and thickness set to 1.

|                  |                      |
|------------------|----------------------|
| Border points    | 1                    |
| Border color     | <input type="text"/> |
| Background color | <input type="text"/> |
| Transparent      | TRUE                 |

In the page preview you can see how the rectangle looks like.

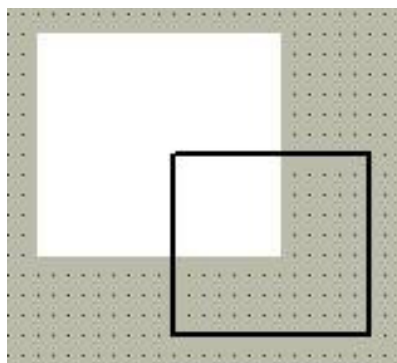


Now superimpose another rectangle to the first one. Let us assume that you want the new rectangle to be transparent with black borders, and thickness set to 2.

|                  |                      |
|------------------|----------------------|
| Border points    | 2                    |
| Border color     | <input type="text"/> |
| Background color | <input type="text"/> |
| Transparent      | TRUE                 |

In the page preview you will see the following image.





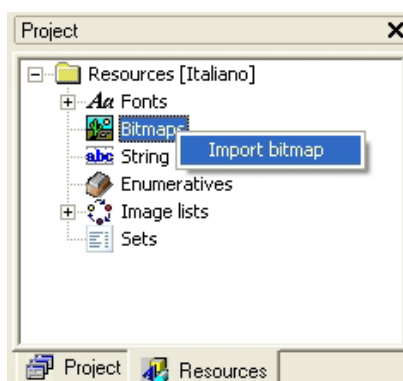
## 2.6 INSERTING STATIC IMAGES

The following paragraph shows you how to insert static images in the page. Static images are different from animations (images which may change dynamically, even though they have fixed position and dimensions) and from floating images (images which move in the page).

### 2.6.1 IMPORTING A BITMAP IN THE PROJECT

Image that has to be visualized must be available on PC as a basic Windows image file (.bmp, .dib, .emf, .gif, .ico, .jpg, .wmf ...). If this pre-condition holds, you can start the importing procedure.

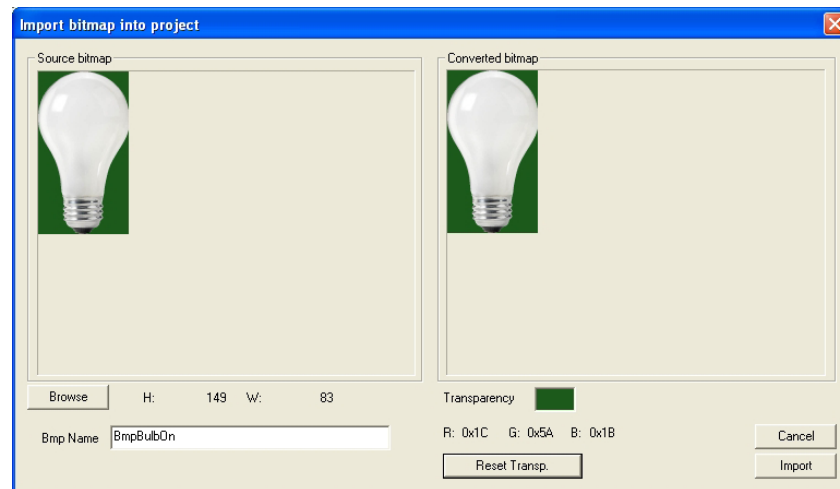
Right-click the *Bitmaps* item in the resources tree and select the *Import bitmap* command in the contextual menu which appears.



A dialog window opens.



Pressing the *Browse* button, you can navigate in the computer resources and select the source file. In this case, the source file is *BulbOn.jpg*, which represents a lighted bulb.



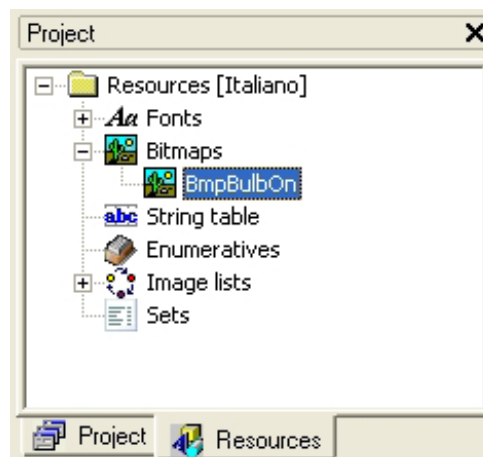
In the *Bitmap Name* field, you can assign the bitmap name which will appear in the resources tree; the default name is the file name without extension and preceded by the *Bmp* prefix.

The *Transparency color* field lets you specify the transparency color, that is a color which will not be really drawn but will let the elements appear through the bitmap background.

You can customize the transparency color by taking the desired one with the mouse from the *Converted bitmap* window.

*RGB* indicate the transparency color components. If the values are *n/a* it means that no transparency color has been selected. The *Reset Transp.* button lets to cancel the last selected transparency color.

At last you can confirm the operation by clicking the *Import* button. The imported bitmap appears as a new item in the resources tree.



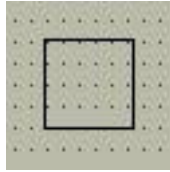
## 2.6.2 ASSOCIATING AN IMPORTED BITMAP WITH AN IMAGE CONTROL

The control which is aimed to display the static images is called *Image*: press the corresponding button in the *Page toolbar*.



Move the mouse to the active area of the page. A cross + appears. The object will be inserted in the grid near to the mouse cursor.

Confirm the insertion point by left-clicking. A new blank frame appears.



Trough the *Bitmap* property specify the image which this *Image* control must display.

Choose the desired bitmap from the list; in this case, you can see and select the only bitmap which you have imported: *BmpBulbOn*.



The control changes its size to be compatible with the assigned bitmap measures. The image in the page preview looks like the following picture.



## 2.7 TEXT STRINGS

Text strings are not part of static controls because they have some properties which let them change in a page through time. Visibility, selection, and refresh may be assigned to variables, which may change their value at any time.

### 2.7.1 INSERTING A TEXT STRING

Click the corresponding button in the *Page toolbar*.

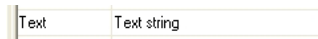


Move the mouse to the active area of the page. A cross + appears. The object will be inserted in the grid near to the mouse cursor.

Confirm the insertion point by left clicking. A new *Static* (that is string) control with the default text *str* appears.



You can edit the contents of the string through the *Text* property of the control. For example, *Text string*.



The page preview looks like the image below.



This is the basic use of the string. Alternatively you can assign strings by taking them from the resources (see 4.9.3).

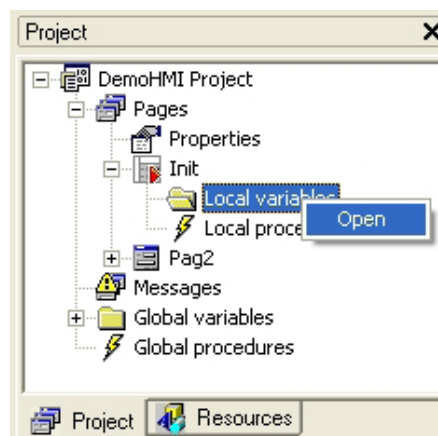
## 2.8 DATA MANAGEMENT IN PAGELAB

This paragraph shows you the variables management in PageLab. It is possible to distinguish the data in local variables (visible in the page scope only) and global variables (visible from every page). For some controls it is possible to use parameters and sets.

### 2.8.1 DECLARING A LOCAL VARIABLE

First of all declare a local variable, which you can use just in the specific page where the declaration takes place.

In the pages tree, under the *Init* page item, right-click on the *Local variables* item and select *Open* in the contextual menu which appears.

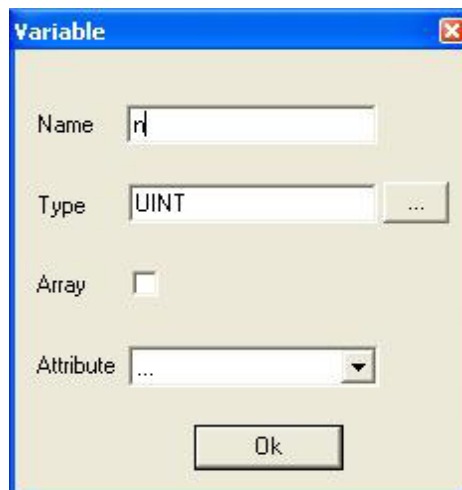


The local variables editor window opens. It is blank at present. Click the *New record* button in the *Project toolbar*.



A dialog window opens requesting to specify the new variable's basic features. We can declare *n* as a new 16 bit unsigned integer variable.





The 'Variable' dialog box is shown with the following fields:

- Name:
- Type:  ...
- Array: ☐
- Attribute:  ▾
- Ok button

Confirm the operation by clicking *Ok*. The new corresponding record is added to the variables editor.

|   | Name | Type | Array | Init value | Description |
|---|------|------|-------|------------|-------------|
| 1 | n    | UINT | No    | 0          |             |

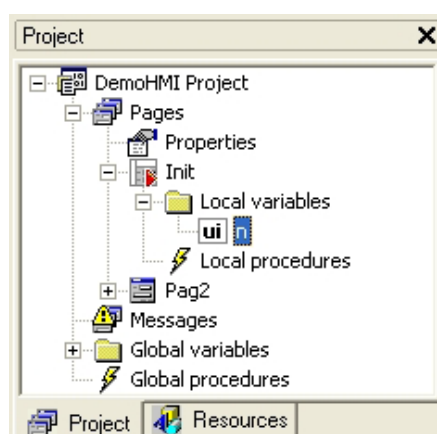
You can change this new variable's features editing the fields of the record which you have just created. For example, you may assign an initial value different from null and a comment.

|   | Name | Type | Array | Init value | Description         |
|---|------|------|-------|------------|---------------------|
| 1 | n    | UINT | No    | 100        | Variabile contatore |

When you save the project by clicking the apposite button



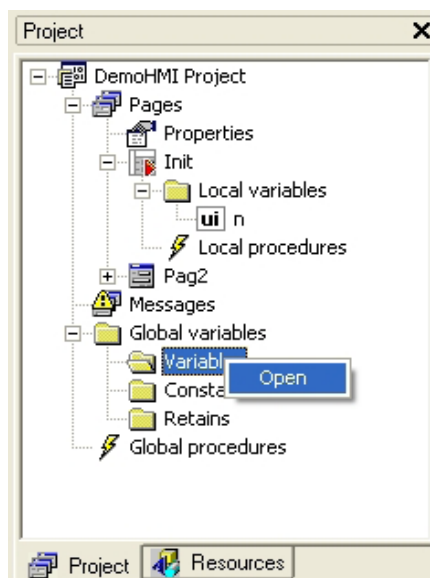
or when you close the variables editor, PageLab adds a new item in the pages tree. It corresponds to the local variable which you have just declared.



## 2.8.2 DECLARING A GLOBAL VARIABLE

Let us assume that you want to declare a floating point global variable *t*: right-click on the *Variables* item under the *Global variables* node of the resources tree and select the *Open* command in the contextual menu which appears.





Follow the steps as shown in paragraph 2.8.1, until the new global variable appears as a new item in the pages tree.

### 2.8.3 IMPORTING THE PLC VARIABLES IN THE PAGELAB PROJECT

Usually an HMI project is not a stand-alone one, but is an interface for a PLC. More precisely, if the PLC project has been carried out with LogicLab, you can easily publish some variables to PageLab.

A variable of the LogicLab project can be exported to PageLab if it has been allocated on a datablock (it is not an automatic variable). If this pre-condition holds, when compiling the PLC, the program automatically creates an *.exp* file, which contains a list of the exported variables with their location in the datablocks, which the PageLab program can work out.

In order to import in PageLab the variables which have been exported from the PLC LogicLab project, you have to select the *Link PLC variables file...* from the *Project* menu.

A window opens and lets you select the file which contains the exported variables.

If you confirm to include the *.exp* file in the PageLab project, a new table called *PLC vars* appears in the libraries window. It contains the list of the exported variables.



When you need to update the list of the exported variables, if the *.exp* file has not been moved to another directory, it is not necessary to repeat the above mentioned procedure. It is enough to launch the *Refresh PLC variables* command from the *Project* menu.



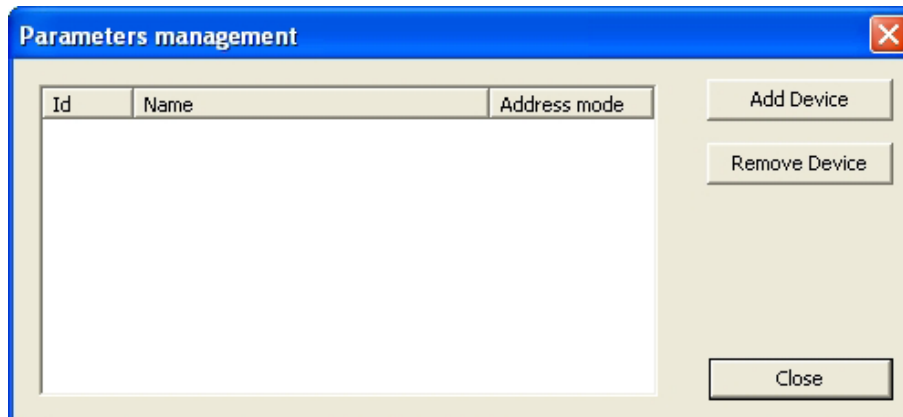
## 2.8.4 INSERTING FIELD PARAMETERS

Target system usually has internal variables and is connected on a fieldbus, so it needs to show some variables of the different devices which are connected on the net.

For this reason, PageLab lets you link a specific file which contains the variables definition on the bus. Click the apposite button in the toolbar.

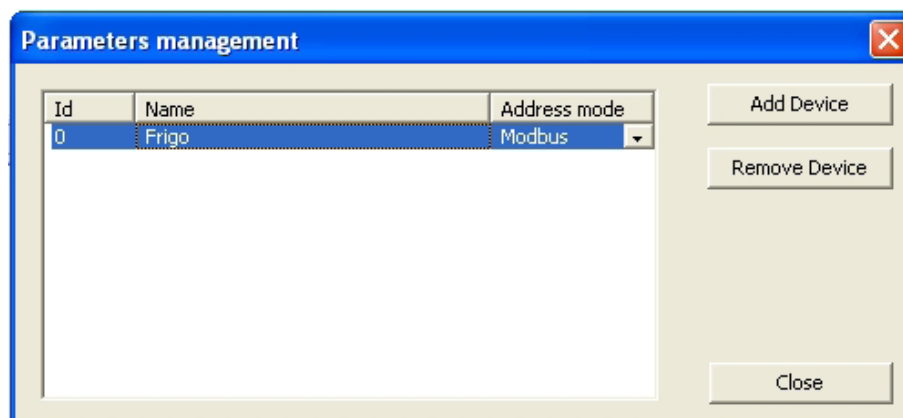


The parameters management window appears.



Through the *Add Device* button you can add a new object linked to the target on the fieldbus.

The selection window appears. Then you have to take from your PC a *.parx* file (see chapter 7). After inserting this file, the parameters management window will look like the image below.



A device called *Frigo* has been inserted. In order to see the relevant parameters, click the *Close* button.

In the *Window target vars and parameters* you will see the device and its parameters.

| Target vars and parameters |      |                |     |       |      |                             |
|----------------------------|------|----------------|-----|-------|------|-----------------------------|
| Name                       | Type | Address        | Min | Max   | Um   | Description                 |
| Par_TAB                    | UINT | Modbus:15716:0 | 0   | 65535 | num  | Tab (map code)              |
| Par_POLI                   | UINT | Modbus:15717:0 | 0   | 65535 | num  | Polycarbonate code          |
| Par_PARMOD                 | BOOL | Modbus:15719:0 | 0   | 1     | flag | Parameter modified          |
| Gain_Ntc_AI1               | UINT | Modbus:15616:0 | 0   | 65535 | num  | NTC calibration gain AI1    |
| Gain_Ntc_AI2               | UINT | Modbus:15617:0 | 0   | 65535 | num  | NTC calibration gain AI2    |
| Gain_Ntc_AI3               | UINT | Modbus:15618:0 | 0   | 65535 | num  | NTC calibration gain AI3    |
| Gain_PT1000_AI3            | UINT | Modbus:15619:0 | 0   | 65535 | num  | PT1000 calibration gain AI3 |
| Gain_5V_AI3                | UINT | Modbus:15620:0 | 0   | 65535 | num  | 0-5V calibration gain AI3   |
| Gain_10V_AI3               | UINT | Modbus:15621:0 | 0   | 65535 | num  | 0-10V calibration gain AI3  |
| Gain_mA_AI3                | UINT | Modbus:15622:0 | 0   | 65535 | num  | 4-20mA calibration gain AI3 |
| Gain_Ntc_AI4               | UINT | Modbus:15623:0 | 0   | 65535 | num  | NTC calibration gain AI4    |
| Gain_PT1000_AI4            | UINT | Modbus:15624:0 | 0   | 65535 | num  | PT1000 calibration gain AI4 |
| Gain_5V_AI4                | UINT | Modbus:15625:0 | 0   | 65535 | num  | 0-5V calibration gain AI4   |
| Gain_10V_AI4               | UINT | Modbus:15626:0 | 0   | 65535 | num  | 0-10V calibration gain AI4  |
| Gain_mA_AI4                | UINT | Modbus:15627:0 | 0   | 65535 | num  | 4-20mA calibration gain AI4 |
| Gain_Ntc_AI5               | UINT | Modbus:15628:0 | 0   | 65535 | num  | NTC calibration gain AI5    |
| Gain_PT1000_AI5            | UINT | Modbus:15629:0 | 0   | 65535 | num  | PT1000 calibration gain AI5 |
| Gain_5V_AI5                | UINT | Modbus:15630:0 | 0   | 65535 | num  | 0-5V calibration gain AI5   |

When you need to update the list of parameters, if the `.parx` file has not been moved to another directory, it is not necessary to repeat the above mentioned procedure, but it is enough to press the button



## 2.9 INSERTING EDIT BOX

An edit box is a text frame which lets you display and eventually edit an associated variable or parameter.

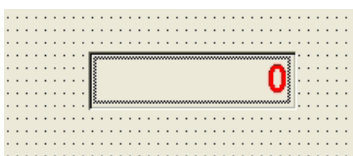
### 2.9.1 INSERTING AN EDIT BOX IN THE PAGE

Insert an *Edit box* control in the page by pressing the corresponding button in the *Page toolbar*.



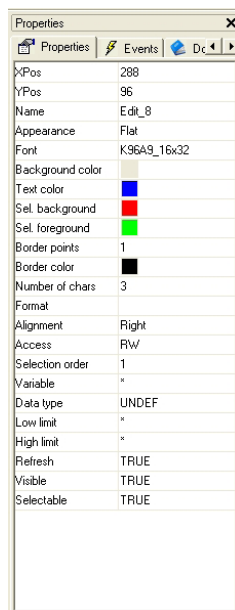
Move the mouse to the active area of the page. A cross + appears. The object will be inserted in the grid near to the mouse cursor.

Confirm the insertion point by left-clicking. A new text frame appears. It consists by default in a certain number of characters and its font is specified in the *Font* property of the page.



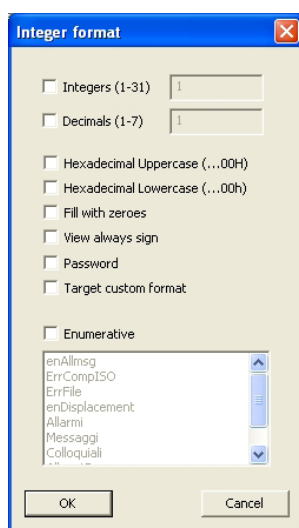
Edit this control's properties as you can see below.



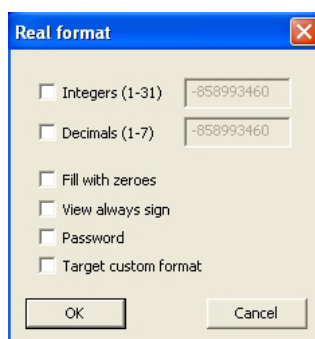


In the following list you can find all the changes which may be carried out:

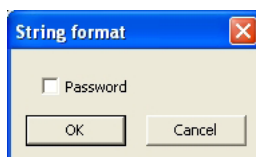
- *Appearance*: you can make the edit box appearance "sunken" by assigning the *Sunken* property.
- *Font*: you can customize font by choosing, for example, a 16x32 font instead of the default 8x16 font.
- *Select background* and *Select Foreground*: respectively text and background colors when the edit box is selected.
- *Number of Chars*: maximum number of characters which can be displayed.
- *Access*: in order to set the read-only mode, replace *RW* (read-write) with *RO* (read-only).
- *Refresh*: in order to constantly update the contents of the edit box, select the *TRUE* option. Otherwise, the contents are refreshed just when drawing the page for the first time.
- *Format*: it represents the display format of the associated variable's value. The format value can be inserted only if a variable is just available. It opens a dialog window with these settings according to the type of variable (integer, real, string).



- *Integers*: number of digit before comma
- *Decimals*: number of digit after comma
- *Hexadecimal Uppercase*: the number is shown as 0...0H representation with uppercase H letter
- *Hexadecimal Lowercase*: the number is shown as 0...0h representation with lowercase h letter
- *Fill with zeros*: fill the entire editbox controls with 0 where there are not numbers
- *View always sign*: show the +/- symbol in editbox
- *Password*: show only \* symbols
- *Target custom format*: the target can define custom format to show the data in a particular way. In that case there is a variable on the target with the value of the corresponding user mode.
- *Enumerative*: this representation allows to select a string value corresponding to numeric value defined in *Resources*, under *Enumeratives*.



- *Integers*: number of digit before comma
- *Decimals*: number of digit after comma
- *Fill with zeros*: fill the entire editbox controls with 0 where there are not numbers
- *View always sign*: show the +/- symbol in editbox
- *Password*: show only \* symbols
- *Target custom format*: the target can define custom format to show the data in a particular way. In that case there is a variable on the target with the value of the corresponding user mode.



- *Password*: show only \* symbols.

The *Target custom format* is a special feature which enables a particular custom format implemented on the target.

The format is specified according with language *printf* syntax (see 5.7.2).

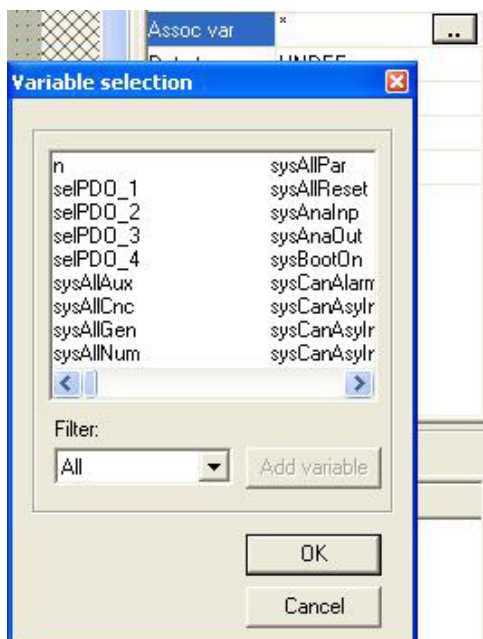
## 2.9.2 EDIT BOX AND PAGELAB LOCAL VARIABLE ASSOCIATION

The edit box which you have just inserted lacks an essential element: the associated variable to take the values to display from. Let us assume that you want to link the edit box to a local variable (in order to get information on how to declare a local variable, see 2.8.1).

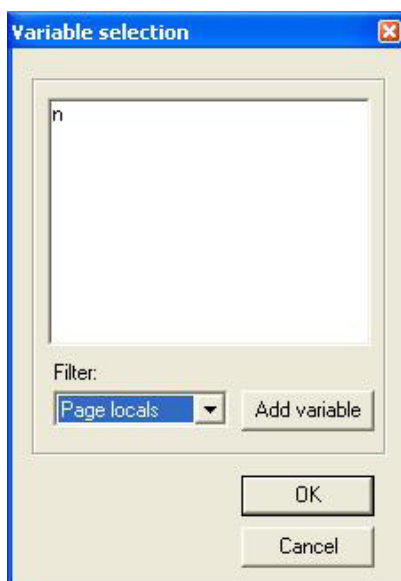


Select the edit box by clicking it once and select the *Variable* property.

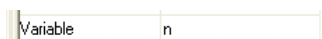
You can either type the name of the variable or click on the field and open the dialog window by clicking on the apposite button.



You can restrict the research just to the local variables of the *Init* page (consequently only the *n* variable) by using the *Filter* tool.



Select the local variable. The *Variable* field in the table properties refreshes accordantly.

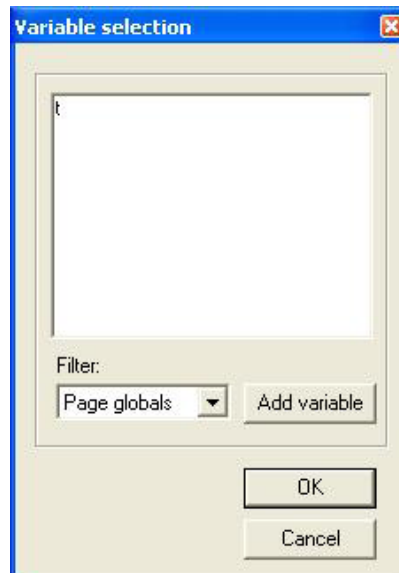


Then the *Edit box* control shows the *n* local variable's value constantly refreshed.

### 2.9.3 EDIT BOX AND PAGELAB GLOBAL VARIABLE ASSOCIATION

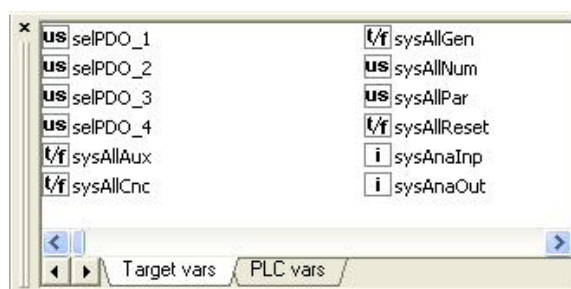
The principle to associate the *Edit box* control with a global variable is similar to the one to associate the *Edit box* control with a local variable. The difference consists in the variable declaration (in order to get information on how to declare a global variable, see § 2.8.2).

You can associate the Edit box with the global variable through the dialog window which was introduced in the preceding paragraph, but in this case it is necessary to use a different filter in the *Filter* field.



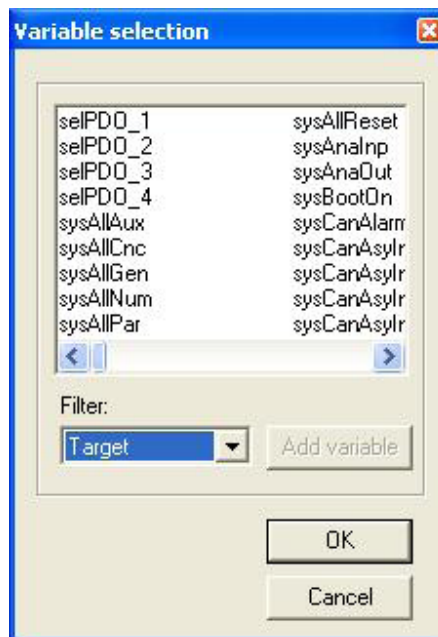
### 2.9.4 LINKING AN EDIT BOX WITH A TARGET (OR SYSTEM) VARIABLE

The target system executing PLC and HMI often publishes some variables which allow the interaction between user interface and system. In PageLab, such variables are called target variables. You can view them in the *Target vars* table of the *Target Vars and Parameters* window.



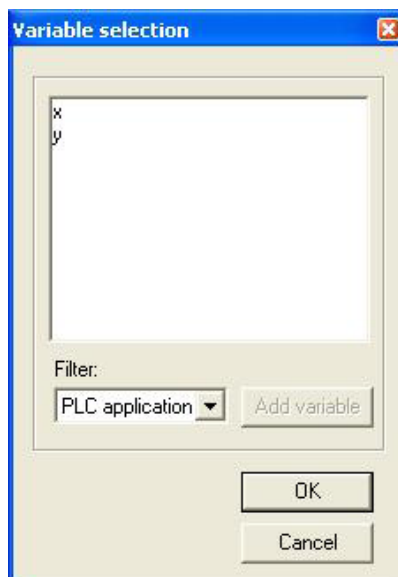
You can associate an Edit box with a target variable through the dialog window which opens from the *Variable* field, but in this case it is necessary to use a different filter in the *Filter* field.





### 2.9.5 LINKING AN EDIT BOX WITH A PLC LOGICLAB VARIABLE

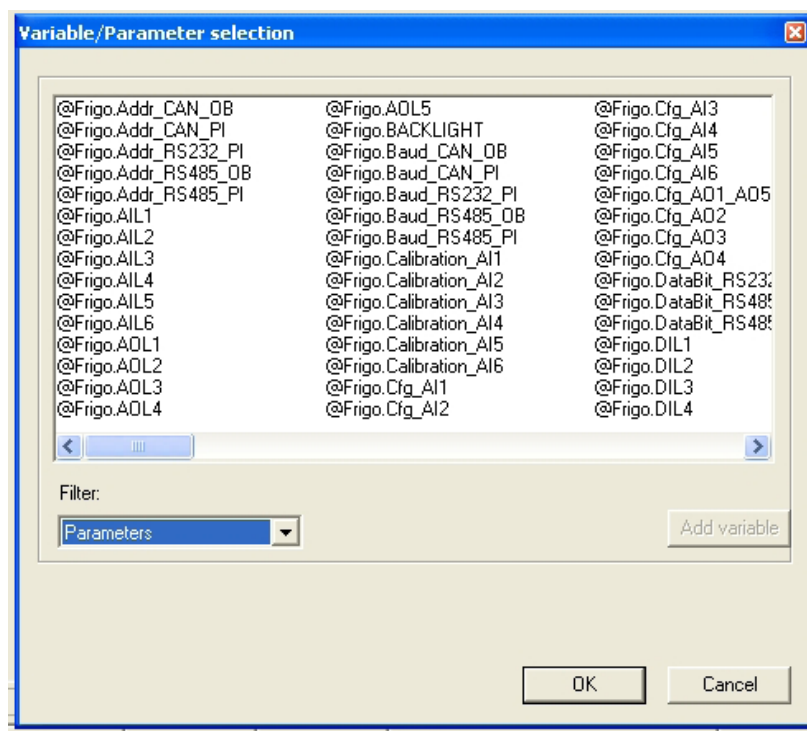
You can associate an Edit box with a PLC LogicLab variable through the dialog window which opens from the *Assoc var* field (see 2.9.2), but in this case it is necessary to use a different filter in the *Filter* field.



### 2.9.6 LINKING AN EDIT BOX TO A PARAMETER

You can associate an Edit box with a parameter through the dialog window which opens from the *Variable* field (see 2.9.2), but in this case it is necessary to use a different filter in the *Filter* field.





The name of parameters is composed of *@device.variable name*, differently from variables which show just their name.

The parameter may be inserted in the apposite controls property in the following forms:

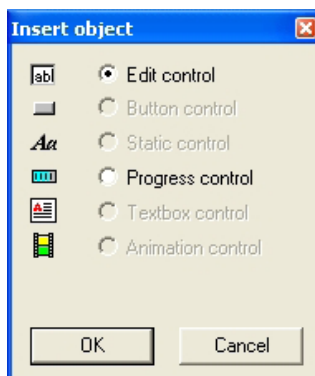
- explicit form = *@d.oi.os:type*: *d* = numerical ID of the device, *oi* = object index, *os* = object subindex type= PLC type (e. g. *@1.2010.0:UINT*);
- implicit form = *@dev.name*: *dev* = symbolic identifier of the device, *name* = symbolic name of the parameter (e. g. *Frigo.AIL1*).

The *d* (ID) field of the device is a numerical or symbolic identifier (to be defined at project creation). It refers to a specific device which may be local (the device which executes the pages itself) or on the fieldbus.

The *dev* field is a symbolic identifier of a device whose numerical ID can be retrieved by PageLab.

## 2.9.7 LINKING AN EDIT BOX TO A VARIABLE BY DRAGGING AND DROPPING

You may add variables and parameters to the *Target vars and parameters* window by dragging and dropping them in the page. PageLab will request to define the type of control to insert, to associate it with the variable.



## 2.10 INSERTING BUTTONS

Buttons are very versatile controls which play an essential role in the interaction between user and system, particularly in case of touchscreen systems without keyboard.

This chapter's aim is to show four kinds of use of the button control:

- LED-button to view the state of a boolean variable;
- command button of a boolean variable's state;
- opening button of a secondary page;
- activation button to start the execution of a customized procedure.

### 2.10.1 INSERTING A LED-BUTTON

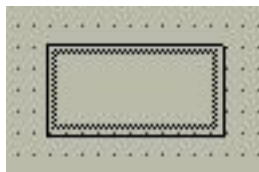
The following paragraph teaches you how to use a button which shows an associated boolean variable's state.

Insert a new button in the page by pressing the corresponding button in the *Page toolbar*.

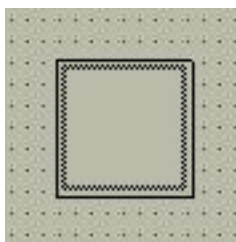


Move the mouse in the active area of the page; a cross + appears. The object will be inserted in the grid near to the mouse cursor.

Confirm the insertion point by left-clicking. A new *Button* control appears. It has a default size.



You may edit both the dimensions by dragging one of the button's vertexes or one dimension at a time by dragging one of the button's sides.



The *Border color* and the *Background Color* properties determine the border and the background color when the button is inactive, whereas the *Selection Border* and *Selection Background* properties define the border and the background color when the button is selected.

|                  |  |
|------------------|--|
| Border color     |  |
| Background color |  |
| Selection border |  |
| Sel. background  |  |

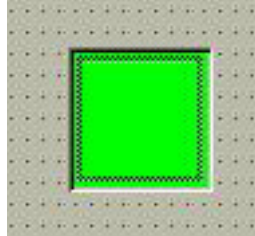
The *Selection variable* property determines the state of the button and, consequently, the couple of colors related to the control. This property may be associated either with a constant value (*FALSE* = the control is always inactive, *TRUE* = the control is always selected) or with a boolean variable whose value determines dynamically the selection state.



Declare a boolean global variable *b* and associate it with the control button as selection variable.

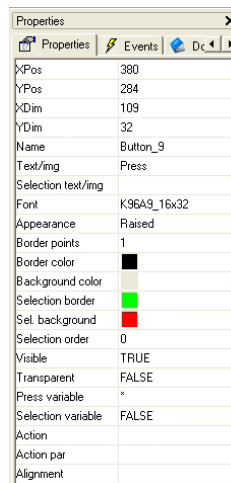
Transparent FALSE

You may customize the button appearance through the *Appearance* property. For example, choose the *Sunken* option.



## 2.10.2 INSERTING A BOOLEAN VARIABLE COMMAND BUTTON

Insert a new button in the page by following the aforesaid instructions (see 2.10.1). Set it beside the LED button and let a text string show on it by means of the *Text* property.

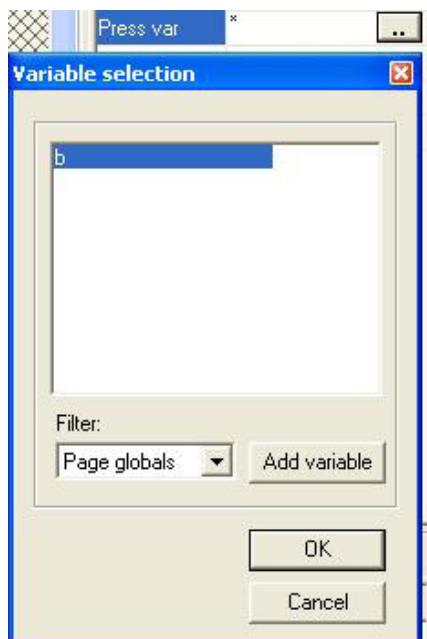


The preview looks like as follows.



The *Press variable* property allows the user to associate a boolean variable with a button control. The boolean variable's value corresponds to the pressure state of the button. For example, associate the button which you have just created with the global variable *b* which has been created paragraph 2.10.1.





At runtime, the LED-button (see 2.10.1) will be red when pressing the *Press* button. Otherwise it will be green.

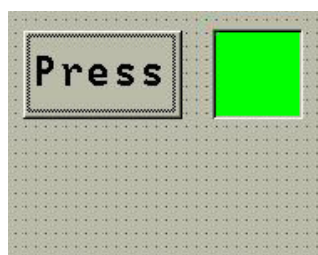
### 2.10.3 INSERTING A BUTTON TO OPEN A CHILD PAGE

Paragraph 2.4.1 showed you how to create a pop-up page.

The following paragraph explains how to invoke the *Pag2* page from the *Init* page by pressing a button.

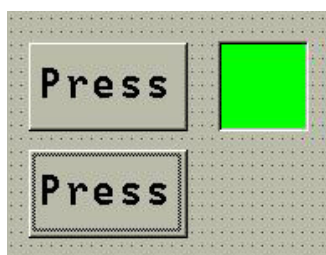
First of all insert a new button in *Init* and set it under the previously created *Press* button (see 2.10.2). As it should be exactly alike the previous one except the text string and the function, you can copy and paste the *Press* button and afterwards customize its properties.

Select the *Press* button by clicking once: the selection rectangle appears inside the control.

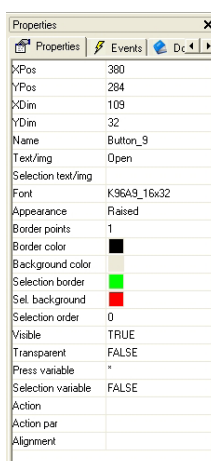


Press successively *Ctrl+C* and *Ctrl+V*. A cross + appears. The object will be inserted in the grid near the mouse pointer.

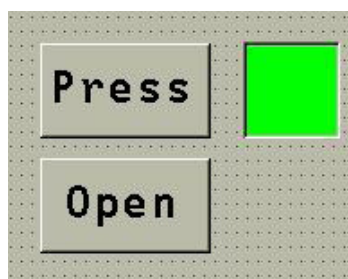
Confirm the insertion point by clicking under *Press*. A copy of the control appears; it is the same as the source button except its position and name.



You can access this new control's properties and customize them according to the relative purpose.

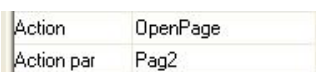


The preview looks like this.



The button control has got a very important attribute, which has not been represented in the properties grid above: the *Action* attribute allows the user to associate an action with the button pressure. Some actions require an additional parameter which you may specify in the *Action par* field.

In this case let us assume that you want that the pressure of the *Open* button opens the *Pag2* page. To obtain this select the *OpenPage* action in the *Action* field; then type the name of the child page *Pag2* in the *Action par* field.



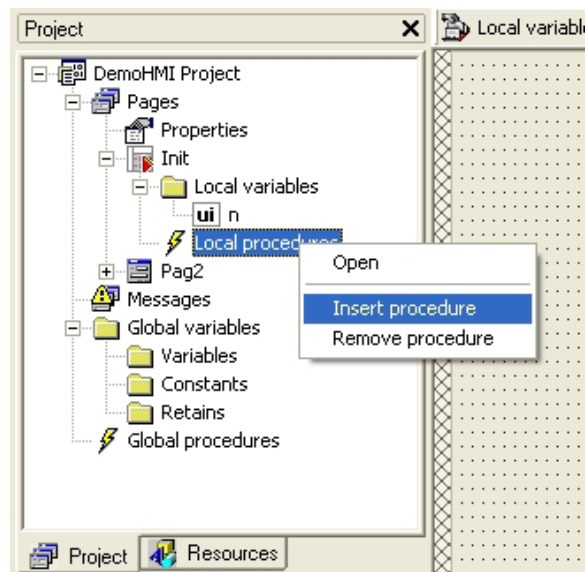
## 2.10.4 INSERTING A BUTTON AIMED AT LAUNCHING A PROCEDURE OF THE USER

PageLab enables the user to implement some procedures (see 4.8.4) through which it is possible to customize the HMI behaviour: this feature makes PageLab projects very versatile.

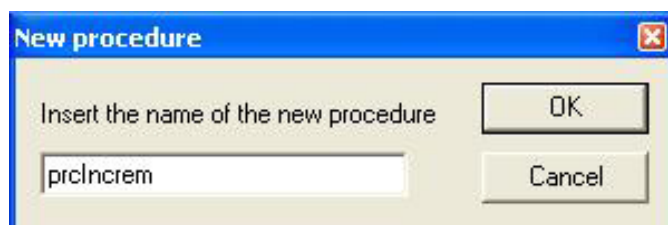
Let us suppose that you want to create a procedure to increment the local variable *n* of the *Init* page. As this procedure applies on a local variable, it will be local in the *Init* page, too.

First of all create the procedure: expand the *Init* page tree, right-click on the *Local procedures* item and select the *Insert procedure* command in the contextual menu which appears.

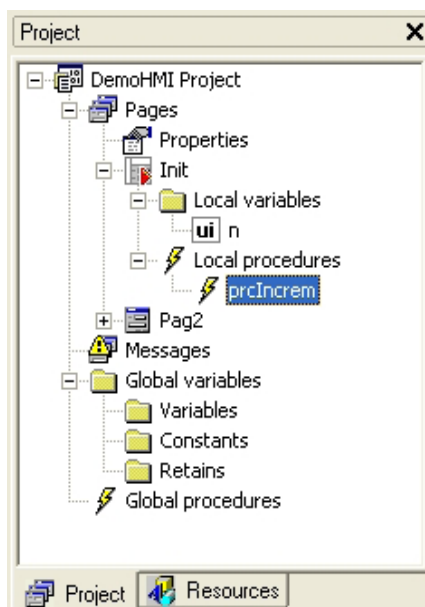




A little dialog window opens. The user is then required to type the new procedure's name. In this case, it may be *prcIncrement*.



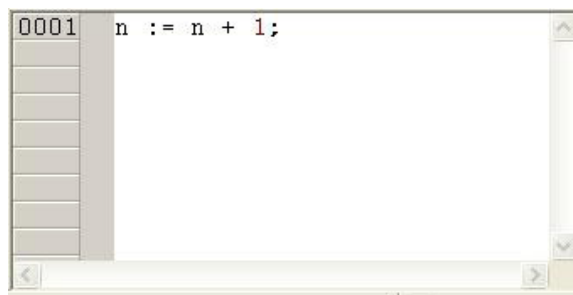
Press the *OK* button. Then PageLab adds a new item in the page tree: it corresponds to the local variable which has been just declared.



Double-click on the above mentioned new item: the ST language editor opens and lets you either implement or edit the selected procedure's code.

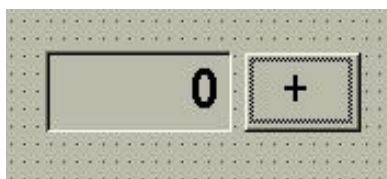
Write a procedure that applies a unit increment to the *n* variable.





Then close the document.

Insert a new button beside the edit box associated with the  $n$  variable and type the character + in the *Text* property.



Let us suppose that you want to execute the *prcIncram* procedure by clicking the + button: select the *Call* action in the *Action* field and type the procedure's name in the *Action par* field.



Every time the user will press the + button when executing the HMI,  $n$  will increase by one and the edit box will show the up-to-date value.

## 2.11 VISIBILITY AND UPDATING OF CONTROLS

As stated in the previous paragraphs, each control has its own properties which the user may customize through the properties table fields.

Some of these features are specifically related to a single type of control. Others may be included in the properties set of different objects. The following paragraphs concern two important properties which are common to some kinds of control.

### 2.11.1 THE VISIBILITY PROPERTY

Almost all of controls are endowed with the *Visibility* property, which determines whether the object is visible or not. This property can be associated either with a constant value (*FALSE* = the control is always hidden, *TRUE* = the control is always shown) or a boolean variable, whose value dynamically establishes the visibility state.

By following the instructions in paragraph 2.7.1 you have inserted the string: *Stringa di testo* in the *Init* page. At present this string is always visible, as you can deduce from the assigned value to its *Visibility* property.

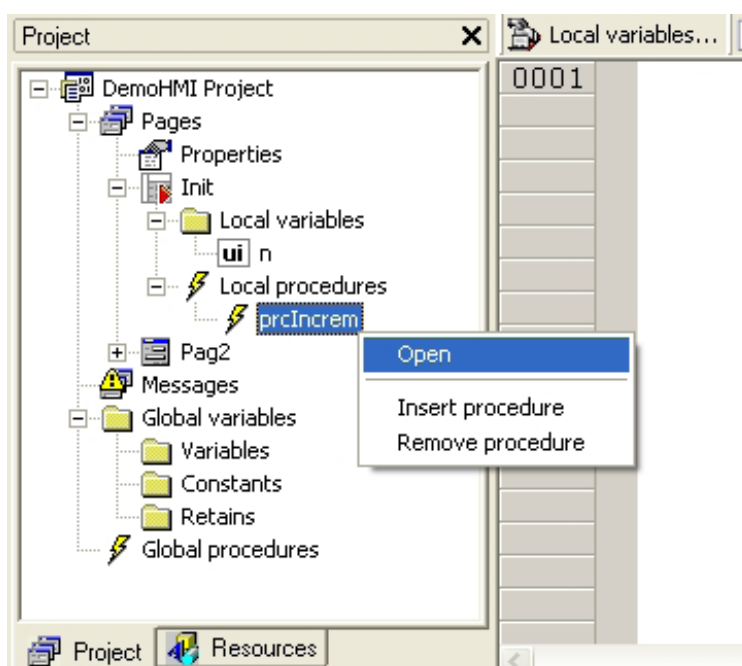


Let us assume that you want to assign this control's visibility to the local variable *n*, which is displayed in the edit box created in paragraph 2.9.2 and managed by the *prcIncrement* procedure, which was implemented in paragraph 2.10.4 and started up by the + button. More precisely, let us suppose that you want the text string visible when *n* is even, whereas hidden when *n* is odd.

To this purpose, it is necessary to declare a new boolean local variable which indicates whether at present *n* is even.

|   | Name | Type | Array | Init value | Description               |
|---|------|------|-------|------------|---------------------------|
| 1 | n    | UINT | No    | 100        | Variabile contatore       |
| 2 | even | BOOL | No    | TRUE       | Variabile locale n è pari |

Then it is necessary to edit the *prcIncrement* procedure so that, when it refreshes the *n* value, it evaluates again whether it is even or odd. In order to access the *prcIncrement* source code, select the corresponding item in the project tree by right-clicking. Afterwards, choose *Open* from the contextual menu which appears.



The ST language editor opens and the procedure's code may be extended as follows.

```

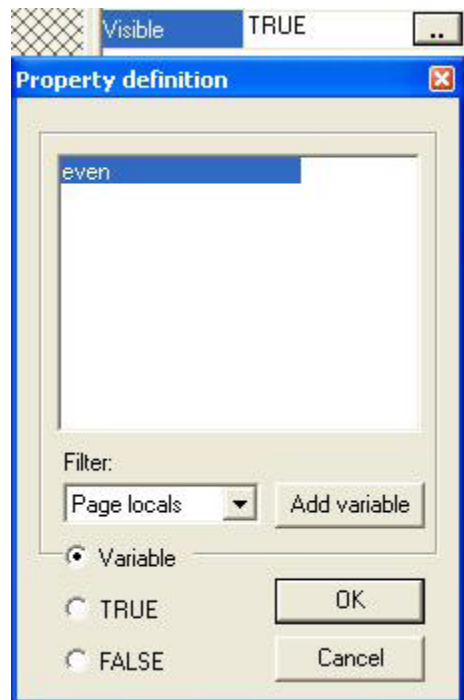
0001 n := n + 1;
0002
0003 even := (n MOD 2) = 0;
0004
0005

```

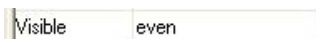
In order to associate the string's visibility state with the *even* boolean variable, select the text string and click the *Visibility* field: a button appears.



After clicking it, a dialog box opens. Select the *radio button Variable*, which enables the overhead variables list; change the filter *Filter* into *Page locals* and select the only local boolean variable that is *even*.



Confirm your choice by clicking *OK*. The result is the following.



### 2.11.2 THE REFRESH PROPERTY

When available, the *Refresh* property determines if the associated object has to be drawn once (when opening the page or coming back from a child page) or it needs to be constantly refreshed.

This property distinguishes, for example, the edit box and the text box.

With regard to the edit box, the refresh property has to be set when compiling and it cannot be edited at runtime. If you assign *Refresh* = *TRUE*, the associated variable's value is constantly read and refreshed, otherwise (*Refresh* = *FALSE*) the value is read and refreshed only when you open the page or when you come back from a child page.

There is another option about text boxes: you can associate a boolean variable that is used as trigger for refresh: when the trigger variable becomes *TRUE*, the control's contents are refreshed then it is automatically reset by PageLab to *FALSE*.

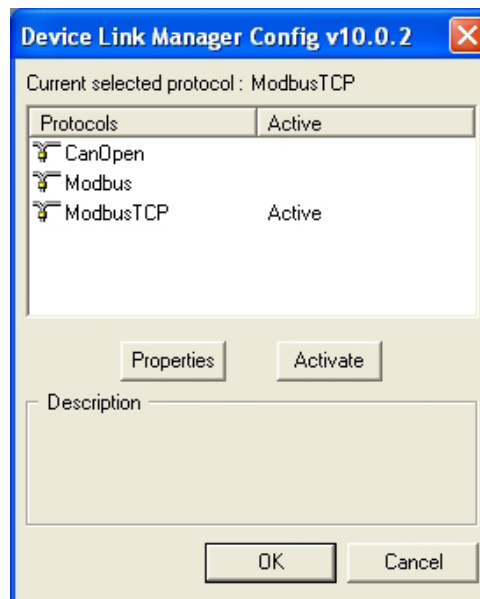
## 2.12 COMPILING AND DOWNLOADING THE PROJECT ON THE TARGET

The following paragraph shows you how to compile and download a HMI project on the target board that runs PageLab.



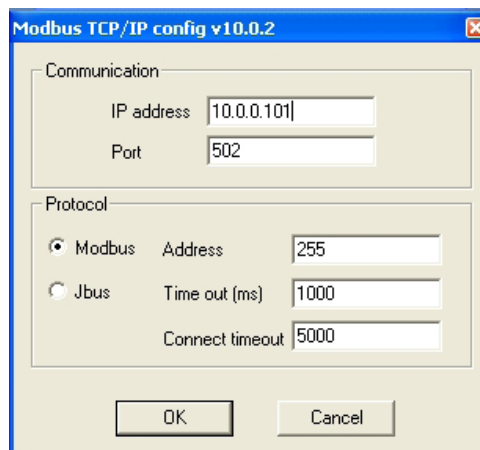
### 2.12.1 CONNECTING TO THE TARGET

Launch the *Communication settings* command from the *Project* menu. This causes the following dialog window to open.



The user is required to select a suitable communication protocol from the left column and to activate it by pressing the *Activate* button.

Then the *Properties* button becomes active: by clicking it the user accesses another dialog window which is different in accordance with the specific selected control and lets set the protocol's parameters. Let us consider the following example.

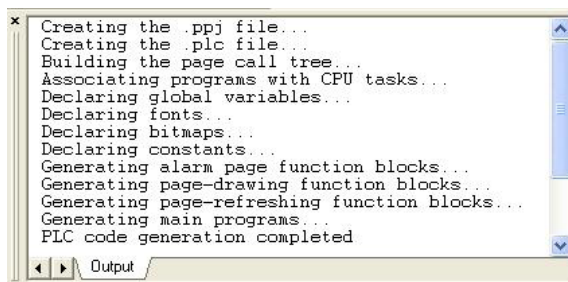


### 2.12.2 COMPILING PAGES FOR THE TARGET

You can start compiling the HMI project by clicking the corresponding button in the PageLab's *Project toolbar*.



Compilation is composed of two phases: the first one consists in the PLC code generation which realizes the pages as they have been planned in PageLab. The program shows in the *Output window* the progress level of the compilation and displays eventual errors.



The second one consists in the compilation of the PLC code which has been generated during the first phase. It can be started only if the first phase has been accomplished without any error.

This process is carried out by an external tool: the PLC command-line compiler *11c*, which PageLab automatically invokes with the suitable parameters.

### 2.12.3 DOWNLOADING AND EXECUTING THE COMPILED PAGES ON THE TARGET

At the end of the compilation, if all the phases have been successfully accomplished, you will see the downloading button become active in the *Project toolbar*



Clicking it, you activate again the PLC command-line compiler *11c*, which this time just downloads the compiled code in the target.

The downloading permission management depends on the implementation of the on board firmware. Consequently it changes according to the destination target of the download.

### 2.12.4 SIMULATION

Depending on the target device you are interfacing with, you may be able to simulate the execution of the HMI application with PageLab's integrated simulation environment: SimuLab.

In order to start the simulation, just click on the appropriate item on the Project toolbar.



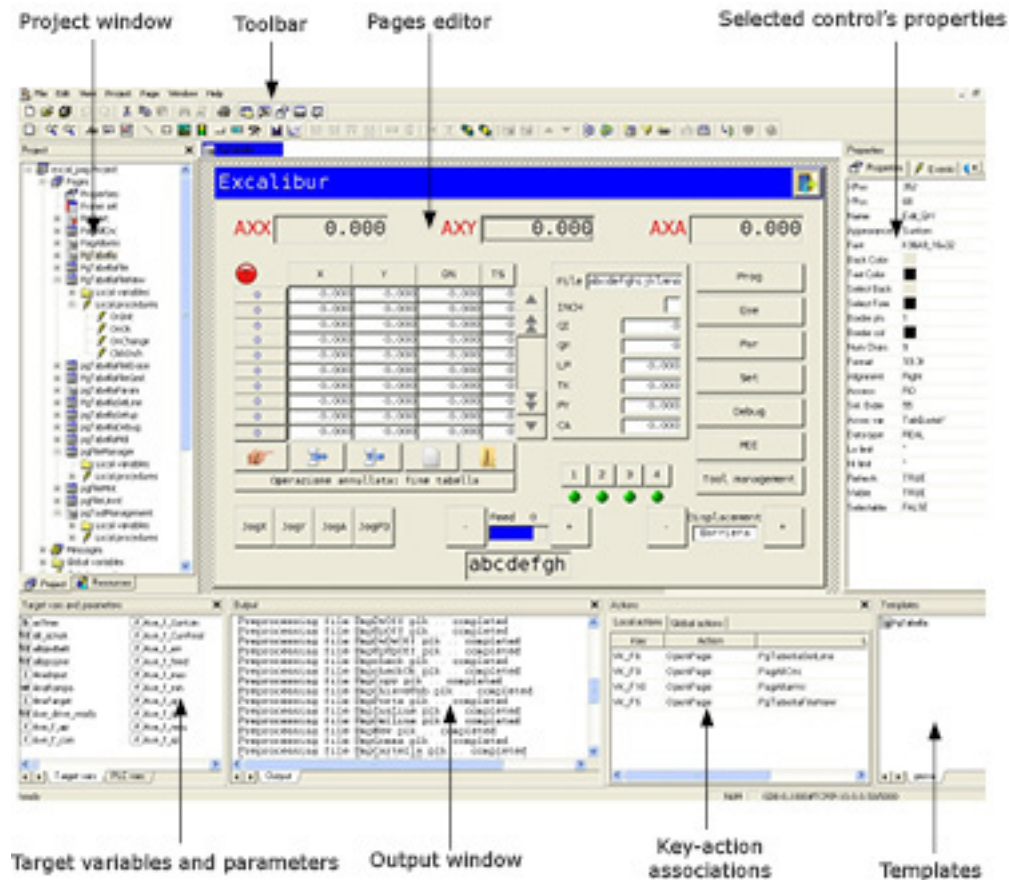
Refer to SimuLab's manual to gain information on how to control the simulation.





### 3. PAGELAB LAYOUT

The following picture shows you the layout and the essential elements of PageLab.



#### 3.1 PROJECT WINDOW

This window includes two pages which are alternatively selectable by pressing the corresponding tab:

- **Project:** it shows the project tree and all the objects the project is composed of, hierarchically arranged. The pages node contains the project properties and the single pages. Each page contains the list of the local variables (visible and usable only in the page where they are declared) and the local procedures, which can be invoked only from the page where they are implemented. Moreover there is the node of the asynchronous messages, the node of the global variables (visible and usable from whatever page) and the node of the global procedures which you can invoke from whatever page.
- **Resources:** it shows the project resources, that is fonts, bitmaps, strings table, enumerated data types, images lists, and sets.

#### 3.2 EMBEDDED EDITORS

PageLab is endowed with three types of editor:

- **Pages editor:** in order to open this editor, double-click the name of the desired page in the project tree (see 3.1). This tool shows you a page preview and lets you edit it: you may either add or remove controls (see 4.4), customize properties, manage the events and the documentation.



- Variables editor: by double-clicking on a local or global variable in the project tree, you can see respectively the declaration table of the local variables or the global variable table.
- Procedures editor: it allows the user in implementing procedures to be associated to the events which are defined for the various project's objects (pages and controls) or generated from the user himself (see 4.8).

### 3.3 PROPERTIES WINDOW

Each time you select an object in the pages editor, the properties window automatically refreshes and shows the selected object's properties and events.

This window is composed of many pages which you may select alternatively by pressing the corresponding tag above.

- Properties: it shows a table including the selected object's properties either it is a whole page or it is a page's control. The user is enabled to customize this values through the right-hand column of the table.
- Events: it shows a table including the typical events of the currently selected object. The user may associate either a local or variable procedure with each event by typing its name on the corresponding row of the event in the right-hand column.
- Doc: it displays a table which shows the *Description* field of the currently selected object. The user may describe the object and this description will be included in the automatic documentation management (see 4.10).

### 3.4 TOOLBARS

The user can give commands to PageLab through some useful toolbars. A toolbar can be defined as a collection of buttons which you may enable by left-clicking them and whose functions are intuitively represented by their icons.

The toolbars support tooltips, too. A tooltip is a small text frame containing a short description of the object which PageLab automatically displays when you hover with the mouse over a button.

PageLab is endowed with three essential toolbars:

- Main toolbar: it contains the commands to open and save the project, to cancel/restore the last changes, to print, to display or close other toolbars.
- Project toolbar: it allows you to add new elements to the project as variables, pages, events, actions, as well as to enable or prevent the simulation mode and to compile and download the whole project.
- Page toolbar: it allows you to choose a new type of control to be inserted in the active page, to align or equally space several controls, or to set the vertical order of the elements on the page.

### 3.5 THE OUTPUT WINDOW

PageLab prints in this window some messages which indicate the progress and the output of the requested processes: opening and compilation of a project, resources importing/exporting, etc..

### 3.6 TARGET VARIABLES AND PARAMETERS

This window shows the list of external variables, available for PageLab coding.

The window is composed of several pages which you may alternatively select by pressing the corresponding tab. One page contains the list of the available variables (file *.tgt*),



another page contains the list of the variables which have been exported from the PLC LogicLab (file *.exp*). Other pages are optional, as many as the number of devices with external parameters linked to the project.

### **3.7 TABLE OF KEYS-ACTIONS ASSOCIATIONS**

This table takes primary importance in case of traditional keyboards without touchscreen where the user interact with the system by pressing the relevant keys.

See in paragraph 4.8.5 the list of actions which may be associated to keys.





## 4. HMI PROJECT IN PAGELAB

PageLab manages the creation (development) of pages for a specific application as projects.

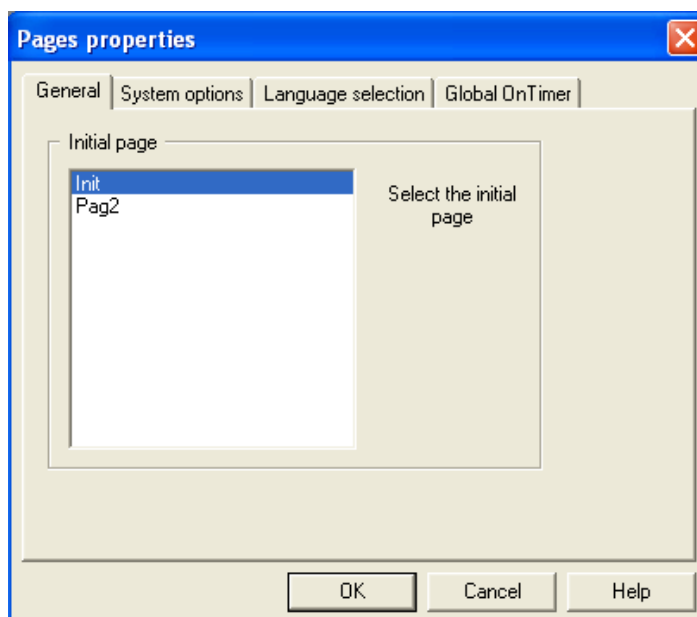
The PageLab project is composed of several pages where the user may arbitrarily arrange the controls.

In each PageLab project you have to specify the start page which will be displayed at the start of the system. Other pages will have at least a parent page from which they will be invoked and may have child page to invoke. The invoking/invoked relations implicitly give to the whole project a tree structure.

### 4.1 PROJECT PROPERTIES

In the project tree, click the *Pages* item and access the *Properties* item. By double-clicking the *Properties* item you open a dialog window which is composed of four pages. The following paragraphs show you the features of these pages.

#### 4.1.1 GENERAL

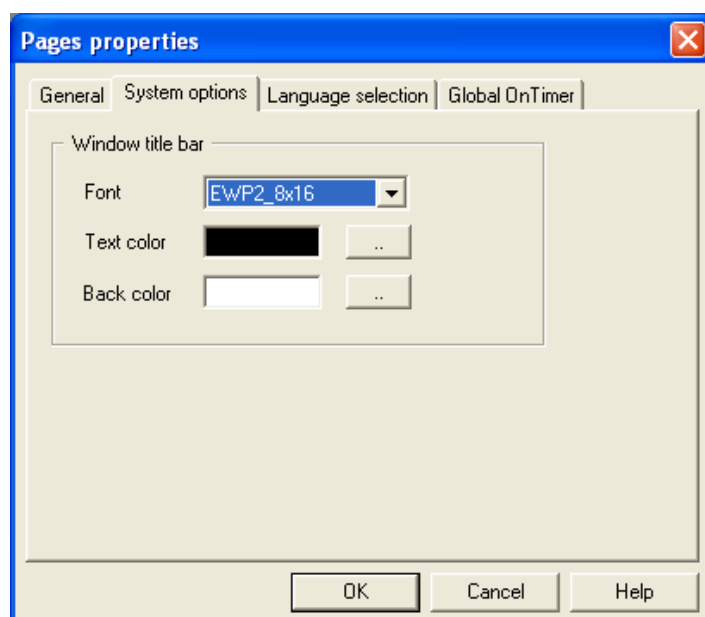


It allows to select the PageLab project's start page among the implemented pages.

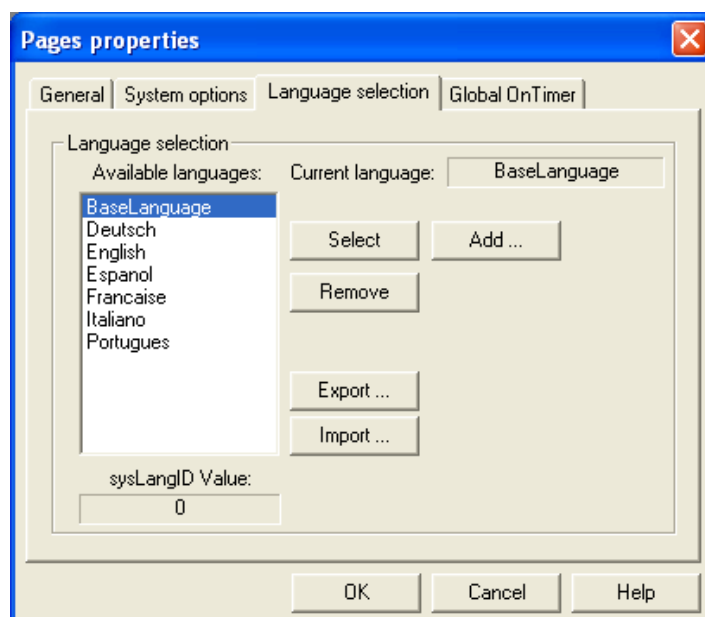


### 4.1.2 SYSTEM OPTIONS

It allows the user to customize the window's title bar features: the font, the text color and the background color.



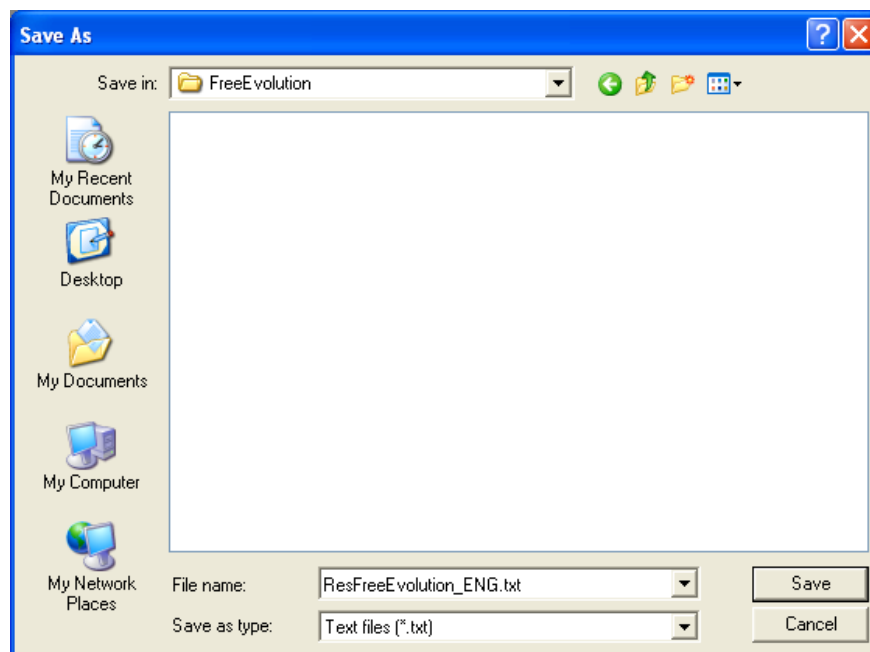
### 4.1.3 LANGUAGE SELECTION



It allows you to add, remove, export, import, and select the resources languages (see 4.9). The label: *sysLangID Value* indicates the value which the *sysLangID* target variables must take to display the pages in the selected language.

In order to add a language, apply the following procedure.

First of all export the language supported by the translator, choose Italian and press the *export...* button, which opens a window requiring the destination folder for the selected language file.

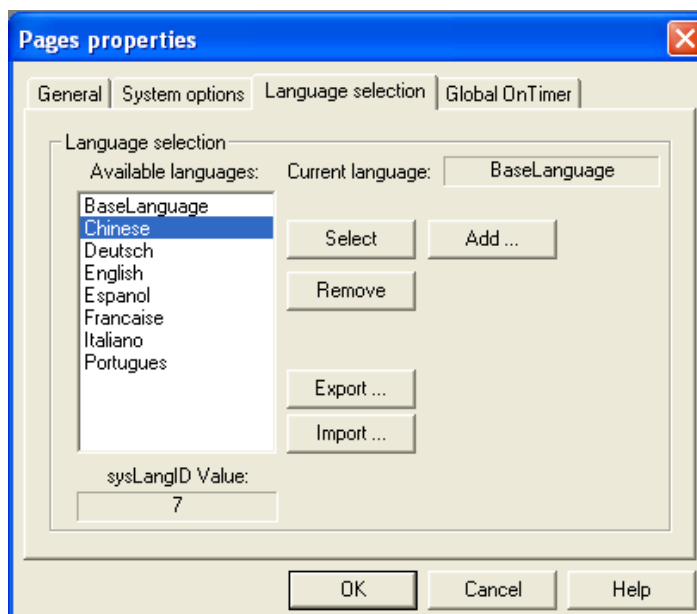


The program suggests a file name: *Res* + project title + '\_' + first three characters of the language + extension *.txt*. At the end of the exportation the file is composed of all the project's resources which have to be translated:

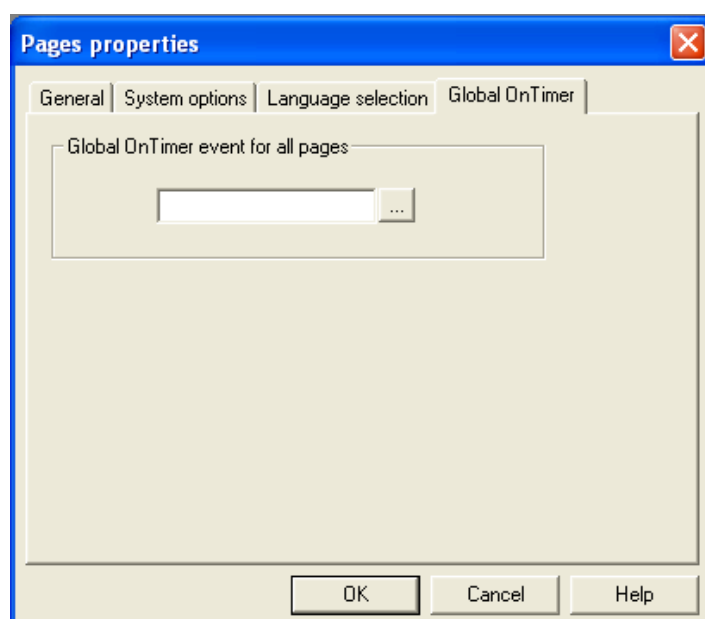
- strings
- enumeratives

Translate the file and replace the text under the *Language* tag with the one of the new language (for example, in this case change it into *Chinese*). In the *Language selection* panel choose the *Import...* button, then select the suitable file in the PC.

The new language appears in the list.

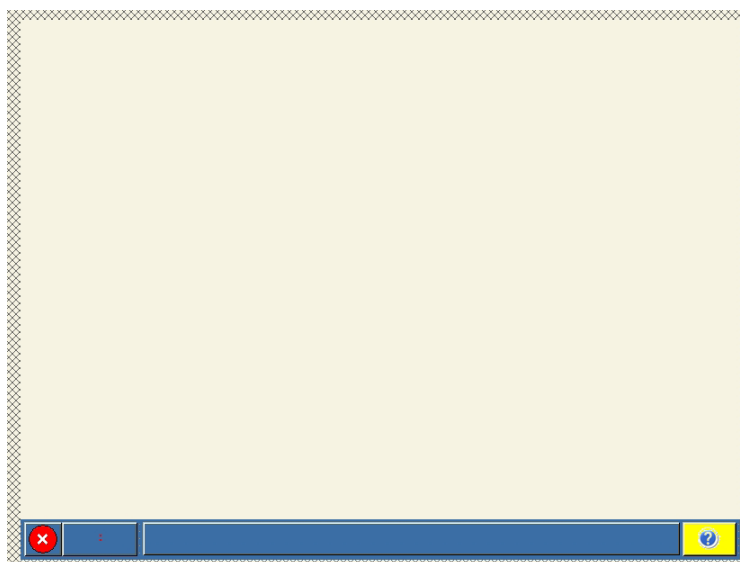


#### 4.1.4 GLOBAL PERIODIC PROCEDURE



Global on timer allows you to specify the name of a global procedure to be periodically and independently executed on the active page. Such a procedure may be effectively used to constantly test one or more PLC variables and to emit alarm messages, for example through asynchronous messages (see 4.3.4).

#### 4.2 FRAME SET



PageLab allows to define areas which are called frames and are placed on the sides of the screen and are always active.

The user may set these frames' dimensions and insert some controls which are active whatever the currently loaded page. Consequently frames are useful to host the objects which have to appear in the whole project. In this way the user does not need to duplicate them in each page.

As regards to the above, there are two exceptions: the pop-up pages (see 4.3.3) when the *Modal* property is set to *Yes* and all the asynchronous messages. When these pages are active, the controls of the frame set are automatically disabled.



## 4.3 PAGES

### 4.3.1 NAVIGATING BETWEEN PAGES

PageLab manages pages development for a specific application as projects.

PageLab project is composed of pages where the user can arbitrarily arrange controls.

In each PageLab project it is necessary to define a start page which will be viewed at system startup. Other pages must have at least a parent page from which they are invoked and may have child page to invoke. The invoking-invoked relations of the pages give the whole project, even though in an implicit way, a multi-node tree structure.

A child page may be invoked in two ways:

- Through an action associated to a key: associate an *OpenPage* action with a physical key (if there is a keyboard) or with a virtual key (whose pressure is an event raised by software);
- Through an action associated with a button: insert in the parent page a *Button* control (see 4.4.7) and specify in the *Action* property that by pressing it the child page opens.

### 4.3.2 CHILD PAGES

|        |       |        |       |        |       |        |       |
|--------|-------|--------|-------|--------|-------|--------|-------|
| Par041 | 0.000 | Par051 | 0.000 | Par061 | 0.000 | Par071 | 0.000 |
| Par042 | 0.000 | Par052 | 0.000 | Par062 | 0.000 | Par072 | 0.000 |
| Par043 | 0.000 | Par053 | 0.000 | Par063 | 0.000 | Par073 | 0.000 |
| Par044 | 0.000 | Par054 | 0.000 | Par064 | 0.000 | Par074 | 0.000 |
| Par045 | 0.000 | Par055 | 0.000 | Par065 | 0.000 | Par075 | 0.000 |
| Par046 | 0.000 | Par056 | 0.000 | Par066 | 0.000 | Par076 | 0.000 |
| Par047 | 0.000 | Par057 | 0.000 | Par067 | 0.000 | Par077 | 0.000 |
| Par048 | 0.000 | Par058 | 0.000 | Par068 | 0.000 | Par078 | 0.000 |
| Par049 | 0.000 | Par059 | 0.000 | Par069 | 0.000 | Par079 | 0.000 |
| Par050 | 0.000 | Par060 | 0.000 | Par070 | 0.000 | Par080 | 0.000 |

DIA UM NXT

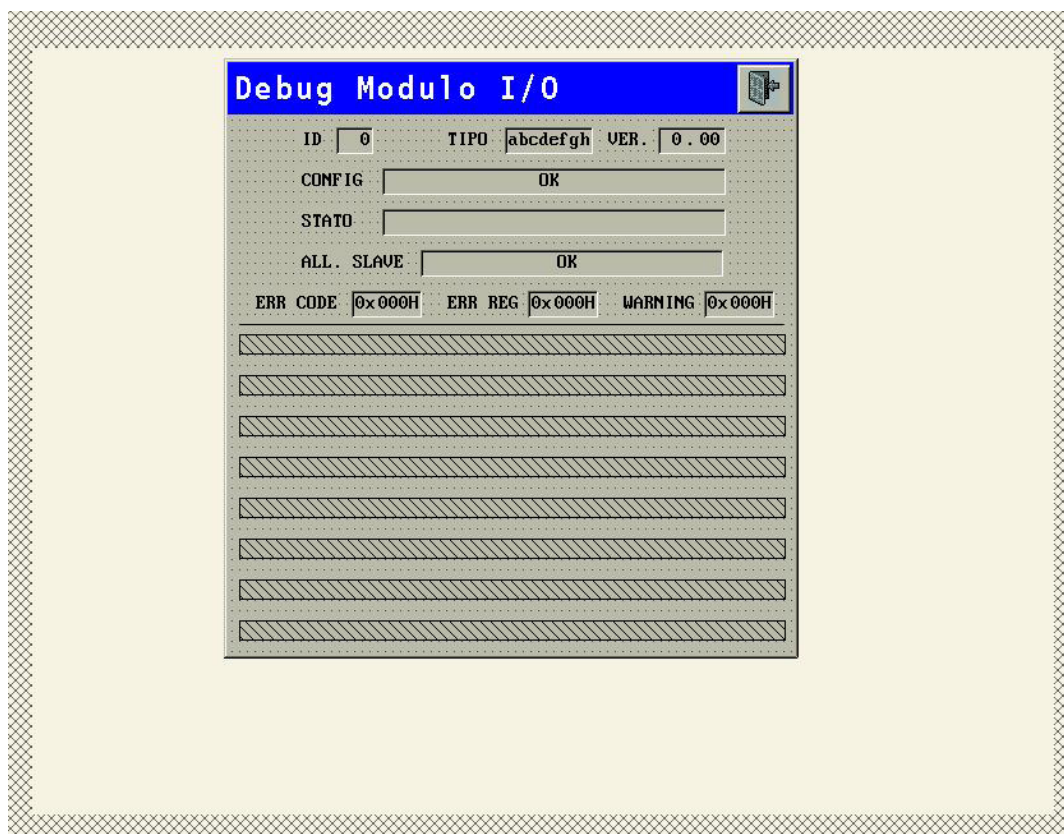
Let us assume that you want to add a page to a project.

PageLab displays a dialog window which requests to insert the name you intend to assign to the new page. This dialog window contains a checkbox with the label: *Pop-up*. If you do not select it, the new page will be a child one.



A child page fits the whole screen or, alternatively if there are defined frames (see 4.2), it fits the free remaining area. Consequently, the user cannot define position and dimensions of a child page as they are automatically set according to the screen and the frame set.

## 4.3.3 POP-UP PAGES



When creating a new page, if the user selects the aforesaid checkbox with the *Pop-up* label, the new page will be a pop-up one.

There are no restrictions about position and dimension. In fact the user may superimpose a pop-up page on the frames: when activating this page, if it is not modal (property: *Modal*), the controls superimposed on the open page will be disabled; otherwise, all the controls will be inactive.

## 4.3.4 ASYNCHRONOUS MESSAGES

Asynchronous messages are similar to standard pages, except the following features:

- They have an additional property, that is the identifier of the associated message (*Msg ID*).
- They cannot contain invocations to child pages.
- They have no defined parent page nor a tree structure (see Introduction 4.), but they can be invoked from any other standard page.

An asynchronous message cannot be explicitly invoked; the system displays it whatever the active page when it intercepts a message containing the corresponding *Msg ID*. This message may be launched either by the firmware or by a procedure through the *Video\_SendMessage* function (see 8.1.8) by using the following syntax:

```
Video_SendEvent( kWM_MSG, Msg ID );
```



## 4.4 CONTROLS

A control is a display element which is contained in a page. The following paragraphs shows you the controls which PageLab supports.

### 4.4.1 STATIC

It displays a fixed string, whose contents cannot be edited when executing. In fact, you should specify the text of the string directly or by the association of the ID of a string defined as resource to support multi language management. For project resources and multi language support see paragraph 4.9.

In order to insert a *Static* control, press the corresponding button in the *Page toolbar*.



Then click the point where you want to insert the control.

You can get information on properties and events of the *Static* control in paragraph 5.4.

### 4.4.2 GRAPHIC ELEMENT

It displays a static line or rectangle. This means that their properties cannot be edited when executing.

In order to insert a *Line* control, press the corresponding button in the *Page toolbar*.



Then click the point where you want to insert the control.

In order to insert a *Rectangle*, press the corresponding button in the *Page toolbar*.



Then click the point where you want to insert the control.

You can get information on properties and events of the *Line* and *Rectangle* controls in paragraphs 5.5-5.6.

### 4.4.3 EDIT BOX

It displays the contents of an associated variable.

In order to insert an *Edit box*, click the corresponding button in the *Page toolbar*.



Then either click the point where you want to insert the control or drag a variable from the project tree or from the library window.

You can get information on properties and events of the *Edit box* control in paragraph 5.7.



#### 4.4.4 TEXT BOX

It displays the contents of an associated string variable. It supports the formatting on several lines of the text which is contained in the string.

To insert a *Text box* control in the page, press the corresponding button in the *Page toolbar*.



Then either click the point where you want to insert the control or drag a variable from the project tree or the library window.

You can get information on properties and events of the *Text box* control in paragraph 5.8.

#### 4.4.5 IMAGE

It displays a bitmap image.

In order to insert an *Image* press the corresponding button in the *Page toolbar*



Then click the point where you want to insert the control.

You can get information on properties and events of the *Image* control in paragraph 5.9.

#### 4.4.6 ANIMATION

It displays a bitmap image which you select from a list of images depending on the value of an associated selection variable.

In order to insert an *Animation* press the corresponding button in the *Page toolbar*.



Then click the point where you want to insert the control.

You can get information on properties and events of the *Animation* control in paragraph 5.10.

#### 4.4.7 BUTTON

You may use the *Button* control either to check a boolean variable's state or (press= *TRUE*, release = *FALSE*) or to send a command to the system.

In order to insert a *Button* press the corresponding button in the *Page toolbar*.



Then either click the point where you want to insert the control or drag a boolean variable from the project tree or the library window.

You can get information on properties and events of the *Button* control in paragraph 5.11.

#### 4.4.8 CHART

Chart control draws the static diagram of one or more arrays of values associated. In order to insert a *Chart* control, click the corresponding button in the *Page toolbar*.



Then click the point where you want to place the control. You can get information on properties and events of the *Chart* control in paragraph 5.14.

#### 4.4.9 TREND

After assigning up to 8 numerical variables, the object will automatically and periodically (once every a defined time) acquire their values and will draw the corresponding graphic in a dynamic and automatic way.

In order to insert a *Trend* control press the corresponding button *Page toolbar*.



Then click the point where you want to insert the control. You can get information on properties and events of the *Trend* control in paragraph 5.15.

#### 4.4.10 PROGRESS BAR

It represents the progress of an operation by showing a stained bar in a horizontal or vertical rectangle. The length of the bar, related to the bar's length, shows the percentage of the completed operation.

In order to insert a *Progress bar* control press the corresponding button in the *Page toolbar*.



Then click the point where you want to place the control. You can get information on properties and events of the *Progress bar* control in paragraph 5.12.

#### 4.4.11 CUSTOM CONTROL

This control is implemented in the firmware. You can have several types of custom controls which are marked by the *Control ID* property and each type of control may have several instances.

In order to insert a *Custom control*, press the corresponding button in the *Page toolbar*.



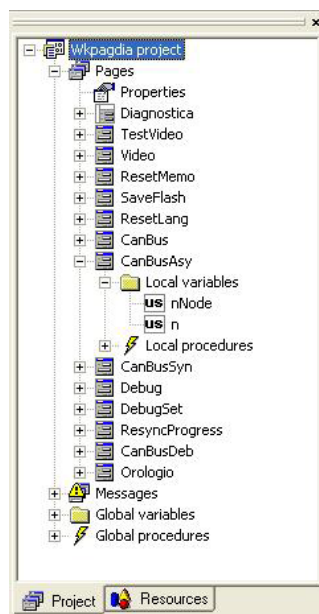
Then click the point where you want to insert the control. You can get information on properties and events of the *Custom control* in paragraph 5.13.



## 4.5 VARIABLES

In a PageLab project there are different classes of variables. The following paragraphs show you their features.

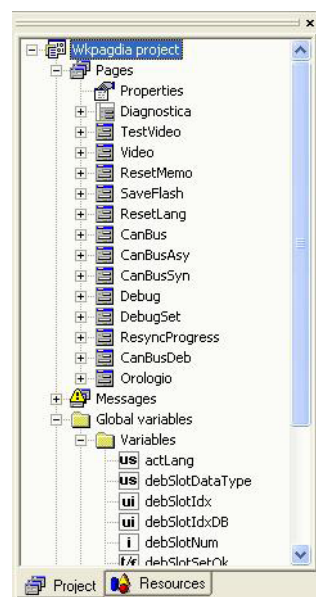
### 4.5.1 LOCAL VARIABLES



Local variables are variables of the PageLab project. You can access them only through the page they were declared from.

They are listed in the project tree, under the *Local variables* folder. Local variables can be used to carry out operations on PLC (for example to apply a different scale or to add an offset) or system variables or to implement local procedures.

### 4.5.2 GLOBAL VARIABLES



Global variables are declared in PageLab and they are accessible from every page of the project. Global variables are listed in the *Global variables* folder in the project tree. The function of the global variables is similar to the local variable's one but the different visibility scope makes them unusable for the implementation of global procedures or for the parameters passing between distinct pages.

### 4.5.3 VARIABLES IMPORTED FROM PLC



A compiled PageLab project consists in a PLC that, once downloaded on the target board, is executed by the actual PLC., which is implemented with LogicLab. Variables exported from the LogicLab PLC contained in the *.exp* file enable the interaction between these two distinct components. PLC variables which are not automatic, thus associated to a data-block are exported in the *.exp* file.

In order to include a *.exp* file in the PageLab project, press the *Link PLC variables file* option from the *Project* menu, then search for the file in the PC resources. After linking a *.exp* file to the PageLab project, you can get a list update of the exported variables by selecting the *Refresh PLC variables* option from the same menu.

### 4.5.4 SYSTEM VARIABLES



The interaction between PageLab and target is enabled by system variables which the software publishes outside in a *.tgt* file.

You may access system variables in read/write or in read-only mode; if you try to access a read-only variable in write mode, an error will occur when compiling.

## 4.6 MULTIPLE PAGES MANAGEMENT

These functions allow to construct pages with data of different kind that must be represented on distinct pages for space reasons.

Sets (see 4.9.6) can be used with edit boxes or progress bars. Sets are ensemble of variables even of different type. Set definition can be done from the resource tree, they are implemented using a table with a series of variables that are dynamically associated to the control basing on the current index assigned to the page.

Let us see how to use a set.

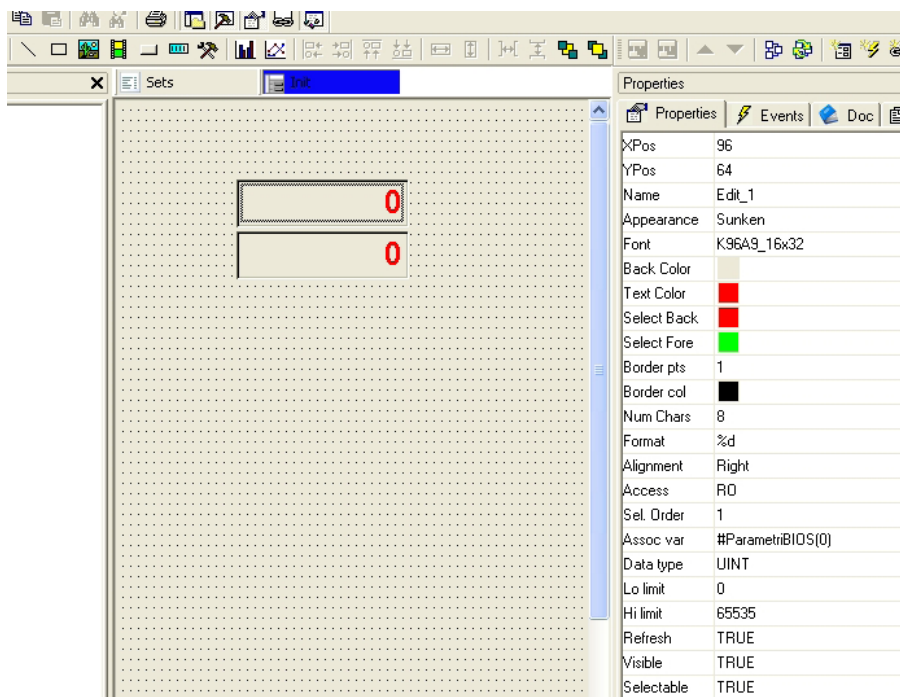
### 4.6.1 ASSOCIATION OF ELEMENTS OF A SET

Elements of a set can be associated to a control using the following syntax: character *#* first of all, then the name of the set followed by the index of the position of the element in the page, between round brackets.



Position index is used to indicate the order in which elements are shown in case of more than one element in the same page.

A page contains one or more controls based on one (or more) set. At runtime, the page is replied in order to show all the elements contained in the set. In the last page, if any control cannot be filled with element value, that control is hide.



We created before a set of five elements named *BIOSParameters*, now we can associate *#BIOSParameters(0)* to the first edit box and *#BIOSParameters(1)* to the second. So there are three pages: first page with the first two elements of the set, second page with elements 2 and 3 and third page showing the last element of the set. In the last page the second edit box is not visible.

## 4.6.2 NAVIGATION OF THE ELEMENTS OF A SET

Navigation of pages that represent a set of elements is automatically done using the *NextEdit* event of the last selectable control of the page and using *PrevEdit* event of the first selectable control of the page.

It is also possible to send special events to force the change of the page in this way:

```
Video_SendEvent( KEV_WM_CHANGESETPAGE, numpage );
```

Where *numpage* is the number of the page of the set.

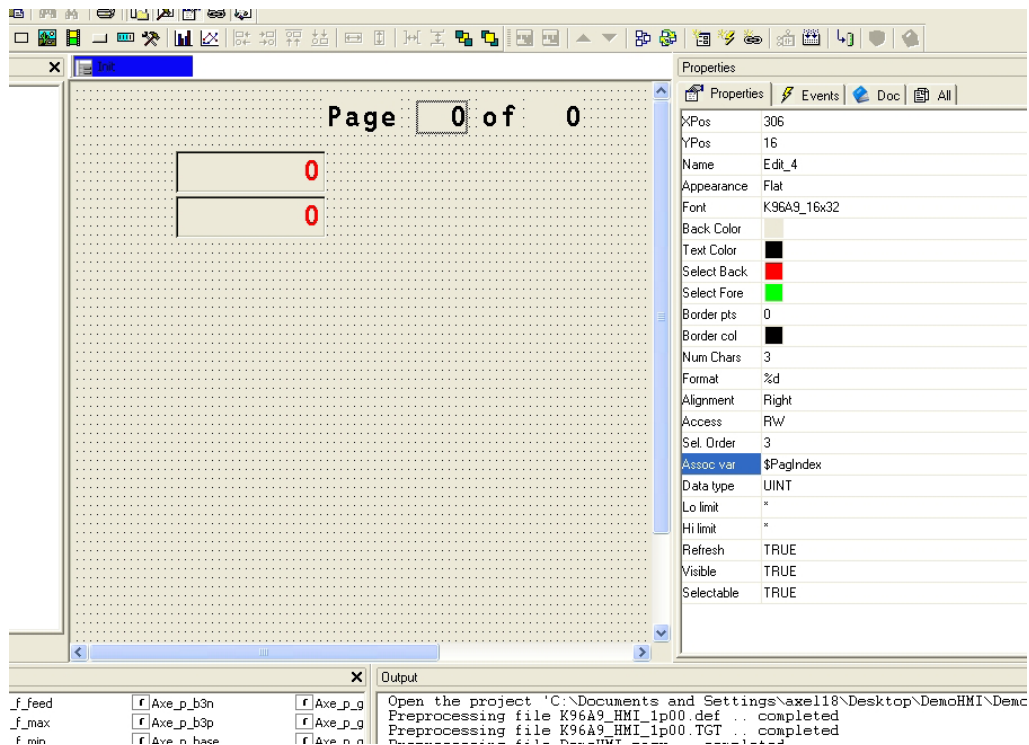
## 4.6.3 PAGES NUMBERING

PageLab defines two variables related to pages numbering:

- *\$PageIndex* = current index of the page containing controls based on a set;
- *\$PageNumber* = number of pages that complete the visualization of the whole elements of the set.



These variables can be used in the page to show the numeration of the pages. In fact they can be used as variables associated to edit box controls in this way:



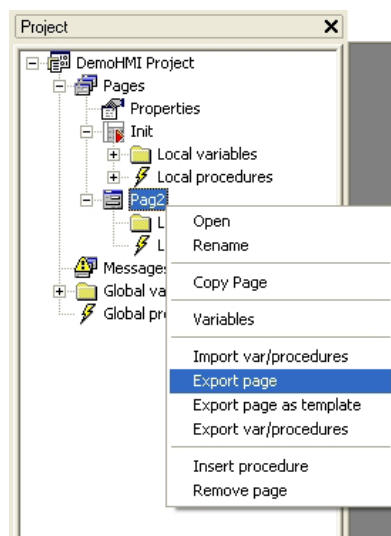
## 4.7 ADVANCED OPERATIONS ON PAGES

Advanced operations such as export/import, copy/paste and page based template management can be done with PageLab. Next paragraphs show these arguments in details.

### 4.7.1 EXPORT/IMPORT OF PAGES TO/FROM FILES

Each page, even if of a certain complexity, can be saved to be used later in other projects.

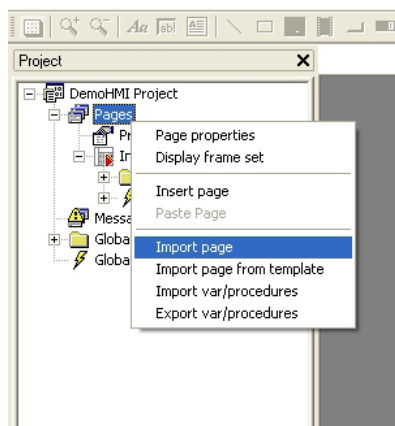
To do so click with the right button on the page node in the project window then select *Export page* from the menu:



Next, application asks user to insert the name of the file in which the page will be saved.



This file assumes a `.pex` extension. Export file contains page info and local procedures. Import operation is quite similar to the export operation. Select *Pages* node, click with right button and select *Import page* from the popup menu. User can then select the file of the page to import. Imported page takes the same name that it had when it was exported.

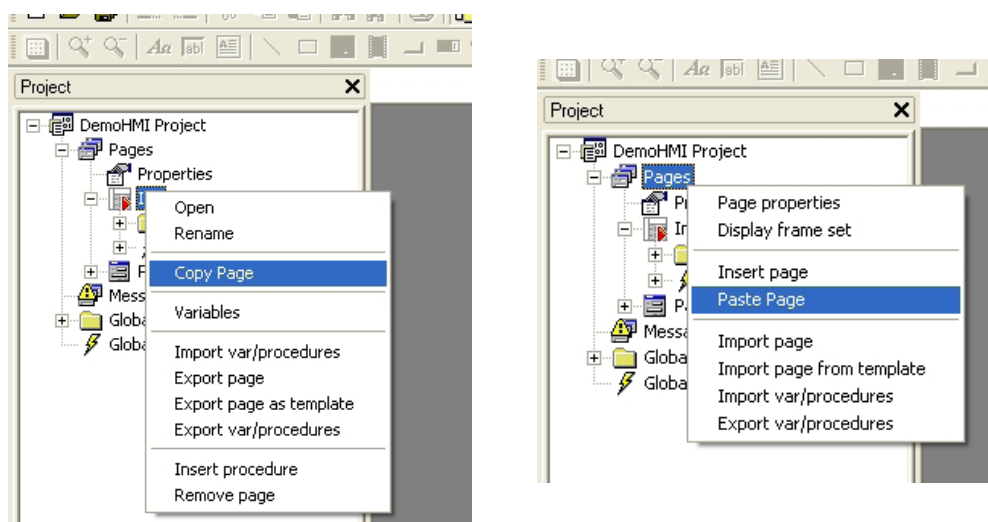


## 4.7.2 EXPORT/IMPORT PROCEDURES AND VARIABLES

It is also possible to export/import local or global variables and procedures using the menu commands *Export var/procedures* or *Import var/procedures*.

## 4.7.3 COPY/PASTE OF PAGES IN THE PROJECT

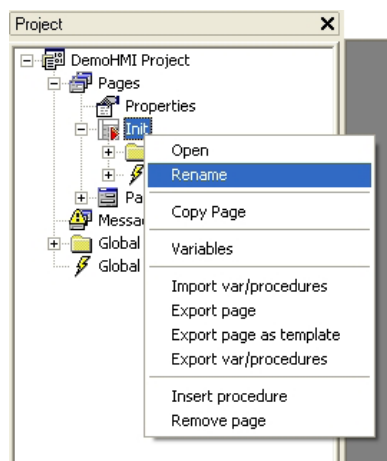
It is possible to copy and to paste a page inside the project. Select desired page, click with right button of the mouse and select *Copy Page* from the menu. Then, to paste page copied, select *Pages* node and select *Paste Page* from the menu.



## 4.7.4 RENAME PAGES

Select desired page from the project tree then click with the right mouse button and select *Rename* from the menu. This allows the user to change the name of the page.





N.B.: this operation changes only the name of the page, project references to the re-named page are not automatically updated.

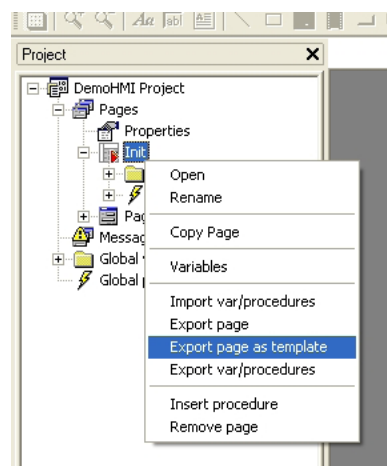
Templates of page management

## 4.7.5 TEMPLATES OF PAGE MANAGEMENT

Templates allow the user to save only the skeleton of the page and not the whole page. Templates can be described as pages without references to external variables. Templates can be grouped in libraries files (*.petx*) and can be linked into the project.

### 4.7.5.1 EXPORT PAGES INTO A TEMPLATE FILE

To export a page into a library of templates follow the procedure paragraph 4.7.1 initial steps then select *Export page as template* from the menu.



A library file with *.petx* extension (new or already existing) should be indicated. Template is appended to the existing templates and a name for the library is requested. If the template is already available in the library a message asks the user if he desires to rewrite the existing template or not.

Page is exported as template into the specified library with all its element but without any referenced variable.

Scripts and local variables are exported without changes. References to variables contained in the scripts are not modified.

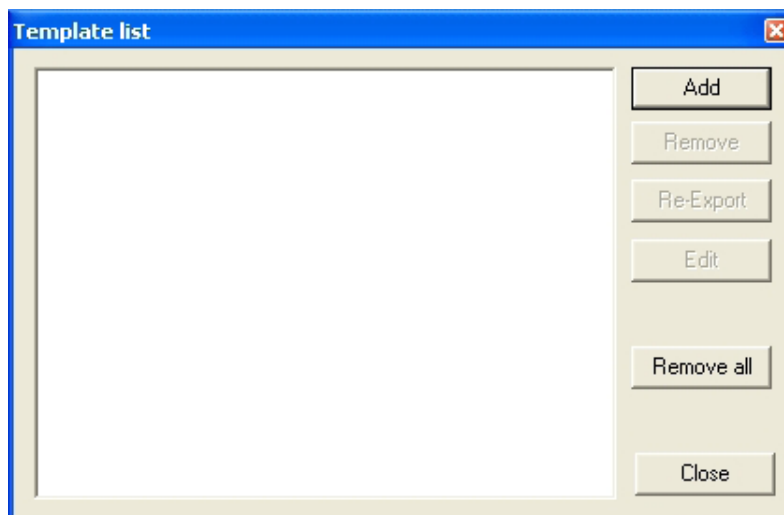
Child pages, popup and asynchronous messages can be treated as templates.



#### 4.7.5.2 USAGE OF THE TEMPLATE LIBRARY IN A PROJECT

It is possible to include a template library in a project in order to use templates when desired.

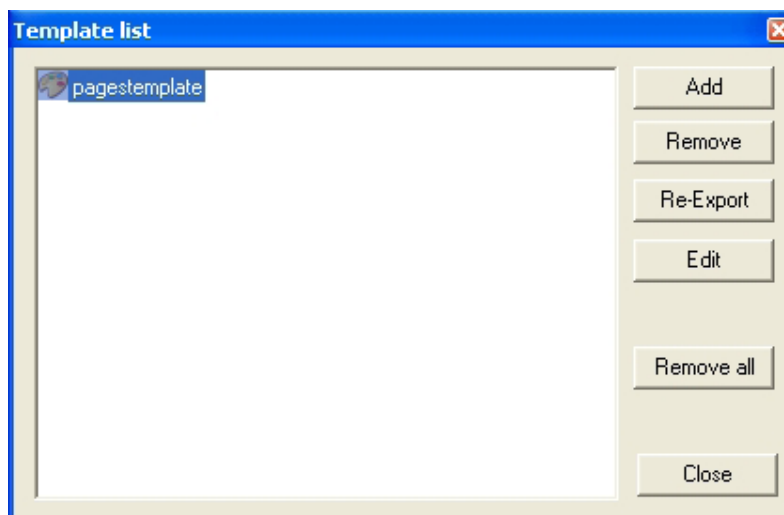
Select *Template Management* menu voice from *Project* menu. Following window will be shown:



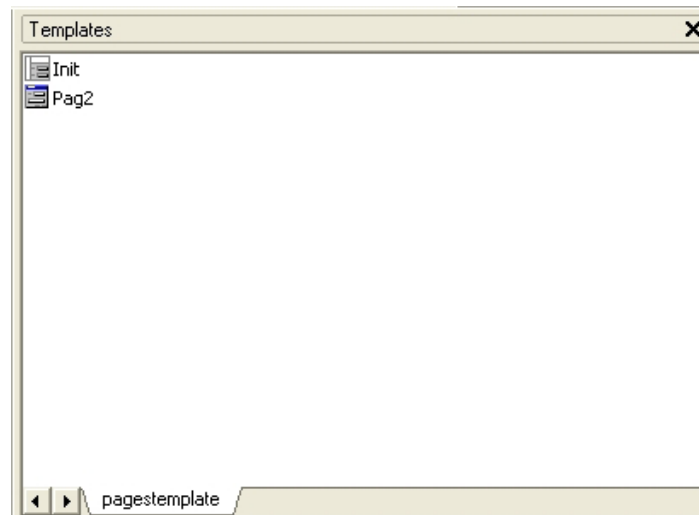
Available operations are listed here:

- Add: add a template library to the project. Including a library means that a reference to the library's *.petx* file is added to the current project, and that a local copy of the library is made.
- Remove: Remove template library from current project.
- Edit: To modify local copy of the template library removing no more used templates.
- Re-export: Export local copy of the template library into a new *.petx* library file.
- Remove All: Remove all template libraries from current project.

Now press the *Add* button to add a template library to the project. Once chosen one of the available libraries, *Template list* window appears as shown here.



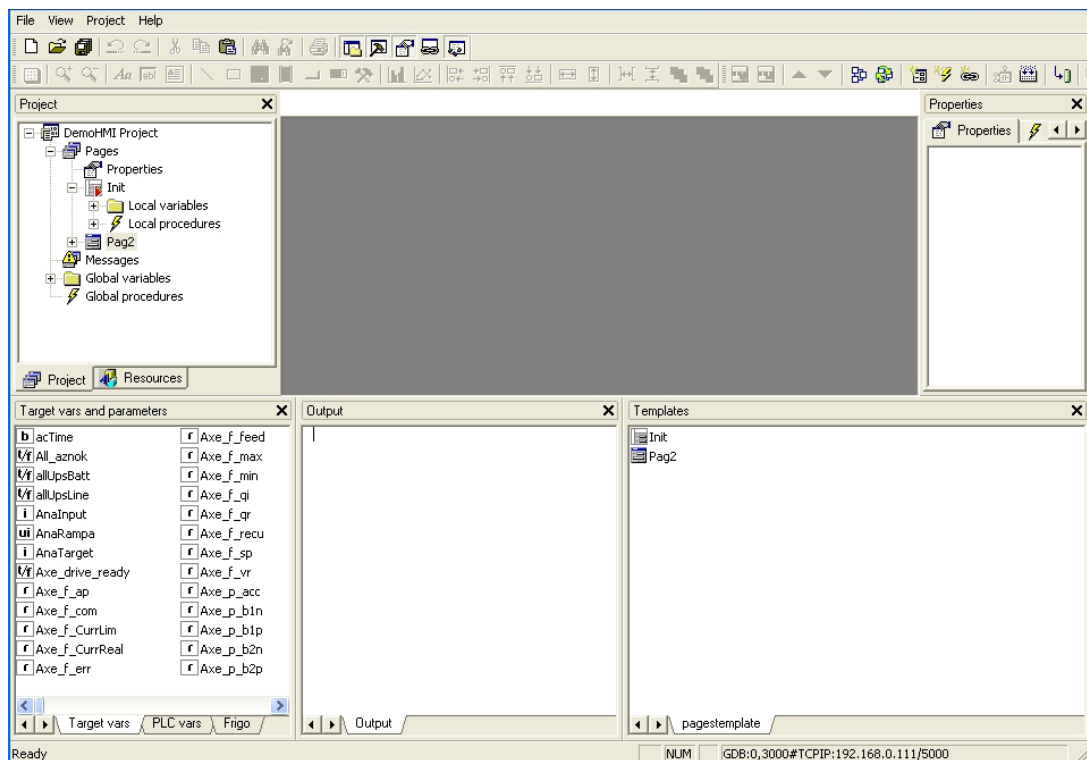
Template library has been included to the project. Press *Close* button, *Templates* window is shown: there is a tab for each library imported in current project.



Each tab shows the list of templates of the corresponding library.

#### 4.7.5.3 USING A TEMPLATE

Once a template library has been added it is possible to use its elements simply dragging the chosen one from the template window and dropping it on the project tree.

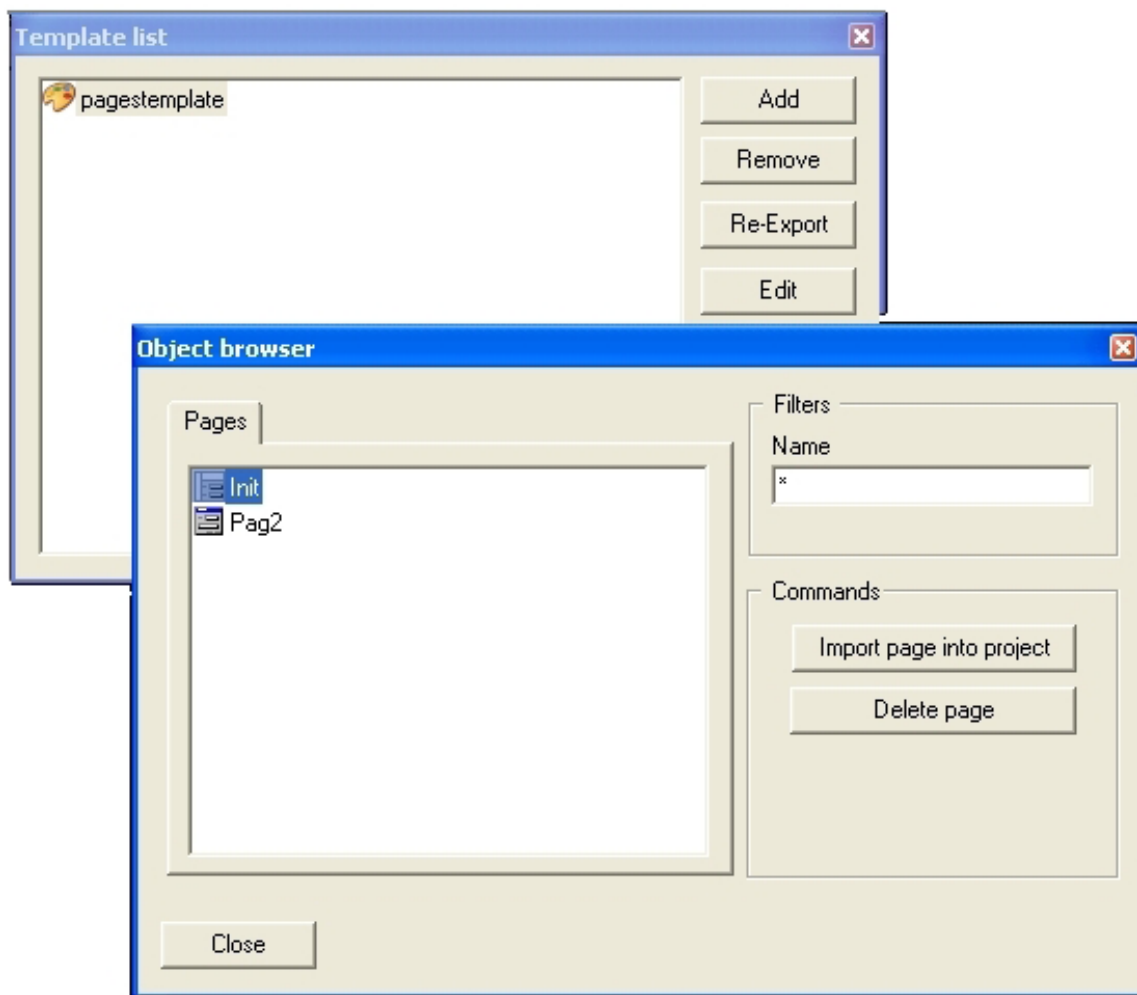


Once the item has been dropped application asks the user for the name of the new page created (based on the template).

#### 4.7.5.4 PROJECT TEMPLATE UPDATE

It is possible to delete templates from the (local) template library using *Edit* command in the *Template management* window.

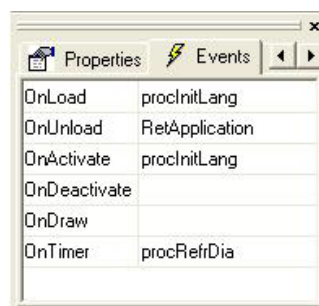




## 4.8 EVENTS

There are different classes of events.

### 4.8.1 PAGE OR CONTROL EVENTS



Each characteristic behaviour of a specific object can raise a specific event.

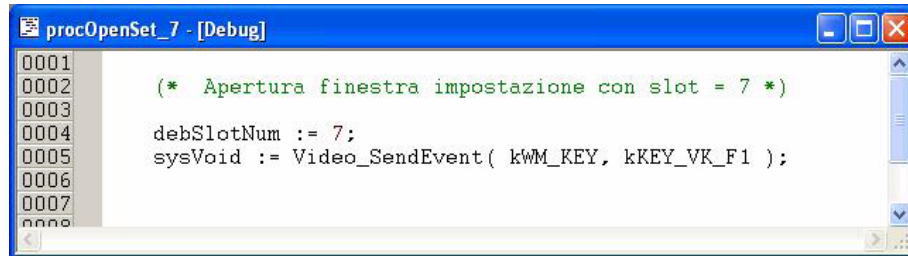
Each event can be associated to a procedure (see 4.8.4) that is executed each time the event takes place. The list of all available events for each PageLab object (page or control) is reported in Chapter 5.



## 4.8.2 KEY PRESSURE EVENTS

These events take place when a key is pressed, the raising of the event starts the execution of the associated action (see 4.8.5) if it is. The pressure of a key can be also simulated by software, see next paragraph.

## 4.8.3 EVENTS RAISED BY SOFTWARE



Programmer can raise events by software using the function *Video\_SendEvent* inside the target software or in the body of the procedure, using following syntax:

```
Video_SendEvent( event_id, param );
```

Where *event\_id* is the identifier of the type of the event and *param* is an integer 16 bit parameter.

PageLabsupports software events defined in this table:

| Event                | Parameter       | Description                                                                                                                                               |
|----------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| kWM_NULL             | Do not care     | No event.                                                                                                                                                 |
| kWM_KEY              | Key code        | Simulates the pressure of the key specified as parameter then cause the associated action if it is.                                                       |
| kWM_MSG              | Window ID       | Causes a system message that, once got by the system, causes the instant opening of the alarm page that has <i>Window ID</i> as identifier.               |
| kWM_SELECT           | Edit box handle | In touchscreen systems simulates the pressure on the edit box whose handle is passed as parameter, causing its selection or its transition to edit mode.  |
| kWM_PUSH             | Button handle   | In touchscreen systems simulates the pressure on the button whose handle is passed as parameter, causing the execution of the associated action if it is. |
| kEV_WM_CHANGESETPAGE | Page number     | Shows the page specified by the parameter (if the context is a page in which sets are used).                                                              |



#### 4.8.4 PROCEDURES THAT CAN BE ASSOCIATED TO EVENTS

A procedure is a program that is executed when the event that has been associated to it, takes place. Events have been deeply described in previous paragraphs (see 4.8).

There are two classes of procedures:

##### Local procedures

This kind of procedures can be called only within the scope of the page in which are declared. In particular, they can be associated to the events of the page itself and of all their controls. The same can be said for software events raised when the page they refer to is active. Procedure code can contains references to all the types of variables, with local variables of the page too.

##### Global procedures

This kind of procedures can be called from every page and can be also used as periodic asynchronous routine of alarm management. They cannot contain variables references.

Here follow the description of the syntax to get the properties of a control from a procedure; similarly to C language printf it is:

```
"fb%s%s.%s", page_name, ctrl_name, prop_name
```

Where:

- `page_name` is the name of the page that has the control;
- `ctrl_name` is the name of the control;
- `prop_name` is the name of the property of the control.

So if we want to get the property *Foreground color* of the *Static* named *String\_26* in *Main* page, we have to write:

```
fbMainString_26.foreCol
```

N.B.: the name of the property to use in the scripts of the procedures is the name of the functional block exported by the software of the target (see 8.2), not the name in the properties window (see 3.3).

#### 4.8.5 ACTIONS THAT CAN BE ASSOCIATED TO KEY PRESSURE

In common keyboard, not touchscreen systems, interaction between the user and the system is normally based on keys pressure.

PageLabshows the following table to the user.

| Local actions   Global actions |          |             |
|--------------------------------|----------|-------------|
| Key                            | Action   | Link        |
| VK_F1                          | OpenPage | ParAxeTipo1 |
| VK_F2                          | OpenPage | ParAxeTipo2 |
| VK_F4                          | OpenPage | ParAxeTipo4 |

This table permits to associate a code of a key, defined in the file `.def`, to one of the actions listed in the following table. In this way the pressure of that key causes the specified action.

Also the names of the actions can be personalized by editing `.def` file.



| Action           | Link           | Description                                                                                                                          |
|------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <i>Call</i>      | Procedure name | Causes the invocation of the local or global procedure whose name is indicated in the <i>Link</i> field.                             |
| <i>OpenPage</i>  | Page name      | Causes the opening of the page whose name is indicated in the <i>Link</i> field.                                                     |
| <i>Close</i>     | Do not care    | Causes the closure of the current page                                                                                               |
| <i>NextField</i> | Do not care    | Move the selection to the next edit box. If the system is not touchscreen moves selection to the buttons to allow their pressure.    |
| <i>PrevField</i> | Do not care    | Move the selection to the previous edit box.                                                                                         |
| <i>Edit</i>      | Do not care    | Access edit mode for the selected edit box. If the system is not touchscreen allows the user to simulate the pressure of the button. |

There are two types of associations key-action:

- Local actions: local associations, valid only for the page currently open in the editor of the pages.
- Global actions: global associations, valid in any point of the project.

If the system has the touchscreen feature, normal interaction with user is made by the pressure of sensible area on the screen. However this table does not loss its meaning because allows the user to define virtual keys and to control their pressure by software causing in this way the dynamic execution of specific actions.

N.B.: if the same action is defined both at local and at global level, system does not give errors nor warnings because local declaration precedes global one.

## 4.9 RESOURCES

A resource is an interface element. User can get informations from resources or can use them to do actions.

PageLab supports different categories of resources that are managed by *Tab Resources project* window. (see 3.1). Categories are explained in details in the following paragraphs.

### 4.9.1 FONTS

Fonts are the different types of characters supported for the output of text strings on the screen. In PageLab there are two types of fonts:

- fonts imported: fonts declared in a *.plb* file included in the project and downloaded into the target board together with the pages code;
- fonts embedded: fonts already available on target board that have not to be downloaded with the project; this kind of fonts should be published to PageLab in form of *.plf* file to let the application correctly draw the preview of the text strings in the page editor.

File with *.plf* extension defines one font; it has to be included in *.paj* project file with this syntax:

```
FONT = "font_name"
```



At project opening time, if PageLab finds this declaration, it searches in project folder for a file named `font_name.plf` and loads it in memory.

## 4.9.2 BITMAPS

Bitmaps are pictures to associate to image controls (see 4.4.5). Bitmaps had been managed by PageLab old versions as text files with `.plb` extension and structured with the same syntax of the initialization definition of an array variable in IEC. Now, images are saved and loaded in binary format to optimize loading time on images of big size.

Bitmap definition files have to be included in project `.paj` file using this syntax:

```
BITMAP = "bitmap_name.plk"
```

At project opening time, if PageLab finds this declaration, it searches in project folder for a file named `bitmap_name.plk` and loads it in memory.

PageLab provides a tool to convert bitmaps from Windows format to PageLab format.

To start this tool click on *Import resource > Bitmap* from *Project* menu, it is also possible to click on *Import bitmap* from context menu that can be shown by right click on *Bitmaps* node of resources tree.

This dialogue box will be shown as follows.



Click on *Browse* button to navigate computer resources to select desired source file.

In *Bmp Name* field user can personalize bitmap name that will be shown on resource tree; bitmap name is constituted by file name without extension and with *Bmp* prefix by default.

Transparency color field allows the user to specify transparency color, so a color that is not really drawn on the screen but a transparent color zone that does not cover elements previously drawn.

Transparency color can be personalized by choosing it by mouse from *Converted bitmap* window.

RGB indicates transparency color Red, Green, Blue components. *n/a* value indicates that no transparency color has been selected.

*Reset Transp.* button allows the user to undo last selected transparency color.

Once finished these operations it is possible to confirm bitmap importation by clicking on *Import* button.

### 4.9.3 STRINGS TABLE

In a PageLab project it is always possible to explicitly write the text to show on a text string or on a title of the page. It is also possible to refer to one of the strings of the resources specifying its ID.

In first case text will be always the same, in second case the text that correspond to the active language will be shown.

So, English language string table contains the following record.

|              |                |
|--------------|----------------|
| ID_GDB_RXNAK | Bad RX packets |
|--------------|----------------|

And Italian language string table contains the following record.

|              |                     |
|--------------|---------------------|
| ID_GDB_RXNAK | Pacchetti RX errati |
|--------------|---------------------|

If we refer to the identifier *ID\_GDB\_RXNAK* from a page control or from a page, if current active language is English *Bad RX packets* will be shown, if current active language is Italian *Pacchetti RX errati* will be shown instead.

### 4.9.4 ENUMERATIVES

An enumerative is a data type defined by user, it is a set of constants named by user. Each element of an enumerative is treated as a constant and can be translated in all available languages of the project.

e.g.: we defined *ImpostazTouch* enumerative that is shown on resource tree as follows.



Enumerative records are shown by double clicking on *ImpostazTouch* node.

| Value | Description                |
|-------|----------------------------|
| 0     | Attesa impostazione ...    |
| 1     | Memorizzazione in corso .. |
| 2     | Touch screen impostato     |

Now we introduce an *Edit box* control (see 4.4.3) and insert the name of the enumerative *ImpostazTouch* in its *Format property* field. Control will show the string associated to the value as it is in the table above, not the numeric value of the variable associated to the control.

If the numeric value of the variable does not match with any record of the enumerative table, an error string ##### is shown instead.

Even enumerative are supported by multi-language feature. In fact it is possible to personalize the name of the enumerative.



And its record values.

| Value | Description           |
|-------|-----------------------|
| 0     | Awaiting settings ... |
| 1     | Saving settings ...   |
| 2     | Touch screen set up   |



## 4.9.5 IMAGES LISTS

An images list is very similar to an enumerative but with the following differences:

- intervals of constants are supported, not only simple values;
- each value has an image associated;
- a list of images determines the content shown by an *Animation* control, while an enumerative can be associated to an Edit box.

e.g.: now we have an images list *ListBulbs* that is shown on the resource tree.



It is possible to see all the records of the list by double-clicking the node.

| Init Value | End Value | Bitmap   |
|------------|-----------|----------|
| -10        | 0         | BmpBulb5 |
| 0          | 5         | BmpBulb6 |
| 5          | 10        | BmpBulb7 |
| *          | *         | BmpClose |

If we introduce an *Animation* control (see 4.4.6) in the page, and we set its property *Image* list with the name of the enumerative *ListBulbs*, the control will show the image whose specified interval includes the value of a variable associated to the control.

If the numeric value of the associated variable does not match any record in the list a default image (with init and end value set to \*) will be shown if it is. If no default image is specified no image will be drawn.

## 4.9.6 SETS

As it is described above (see 4.6) sets are ensemble of global variable even of distinct type.

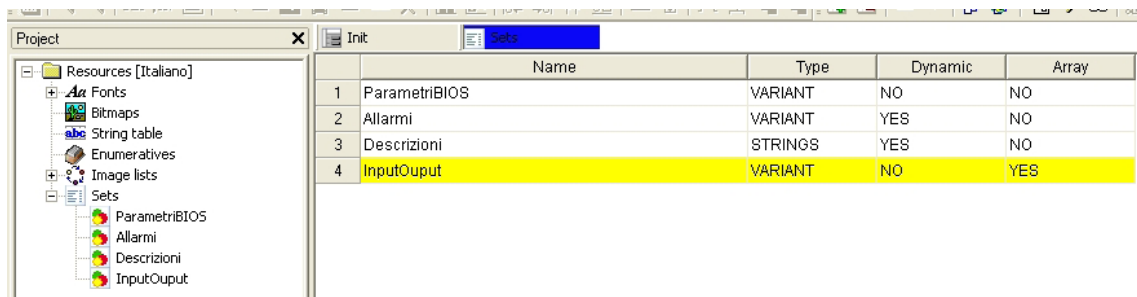
In particular there are two types of set:

- Variable/parameter sets even of not equal type (*VARIANT*);
- Strings sets (*STRINGS*).

The sets of the first type are defined indicating *VARIANT* as type. This kind of set has the following attributes:

- Dynamic: indicates that every n execution cycles target automatically reloads the elements of the set and hide those elements that have no visibility (boolean constant *FALSE* or associated visibility variable set to false at that moment).
- Array: indicates that the unique element of this set is a variable of type array.

N.B.: this kind of set can be assigned only to an edit-box control.

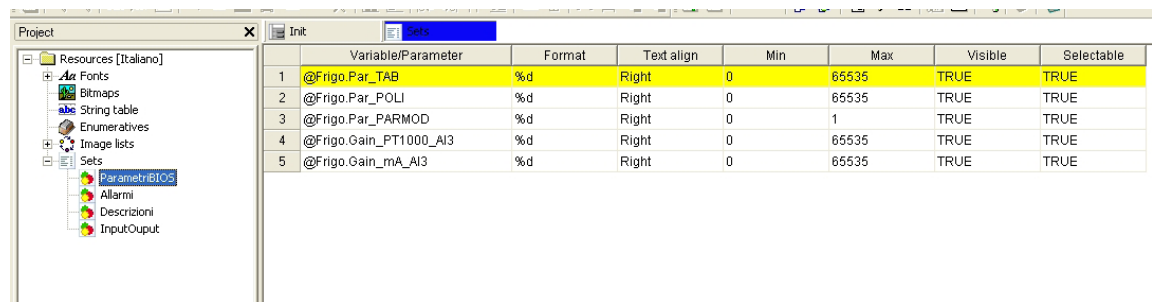


In this example four sets with different characteristics have been defined.

Once defined a set, each element of the set can be added via drag & drop from *Target vars* and *parameters* or can be manually inserted by user.



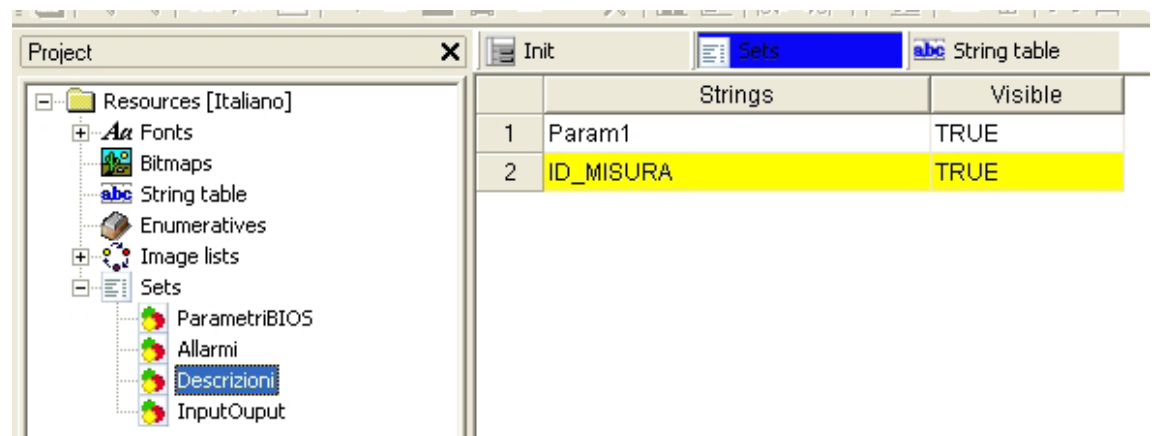
Lets see how to manage *ParametriBIOS* set.



Following attributes can be defined:

- Variable/Parameter = variable/parameter name.
- Format = indicates how to show associated variable value specifying a syntax analogous to C language printf (see paragraph 5.7.2).
- Text Align = the alignment of the text to show.
- Min/Max = minimum and maximum value for the element of the set.
- Visible = boolean variable or constant that defines the visibility of the element. If dynamic feature of the set is active the variable is periodically checked to hide or show the element.
- Selectable = indicates that the element can be selected. In this case a boolean variable or constant can be assigned too.

For a set of type STRING each element of the set is quite simple as it is shown in the next figure:



We have to define only two attributes, the string or the ID of a string resource (see 4.9.3) and the variable/constant of visibility. As we said an element not visible will not be shown on the screen.

N.B.: this kind of set can be used with Static control only.

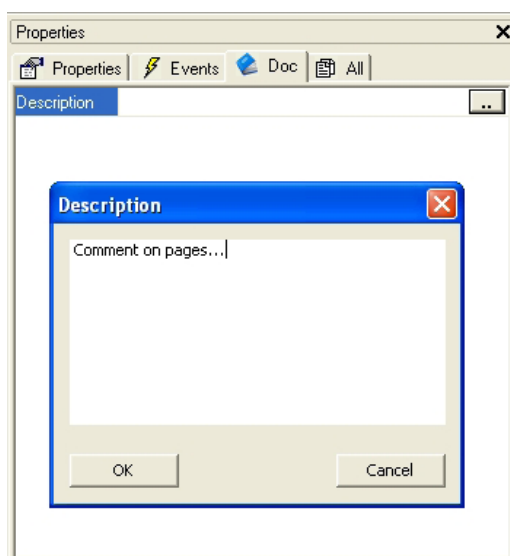
## 4.10 AUTOMATIC DOCUMENTATION

During project development it is usually necessary to write comments for each page in order to explain how the page works.

PageLab integrates into its development environment the automatic documentation feature that consists in the generation of a graphical report with all the previously inserted comments followed by the pages they refer to.



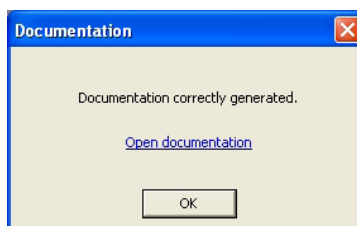
Comments related to controls and pages should be inserted in the *Doc* tab of the properties window.



Documentation is generated when the apposite button is pressed.



At the end of the process the following dialogue is shown. By clicking on the *Open documentation* link it is possible to view the generated report using the browser.



It is also possible to manually open the *.html* file generated. This file is created in the project folder and is named *project name.html*.

N.B.: documentation generation process requires the file *Documentation.xsl* to be in the project folder. This file can be personalized by user to redefine report style.

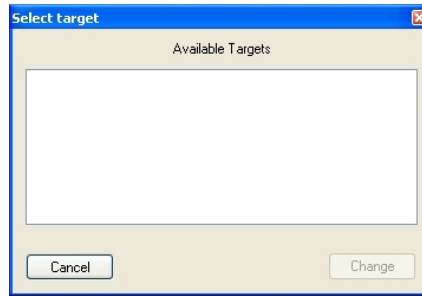
## 4.11 MANAGING PROJECTS

### 4.11.1 SELECTING THE TARGET DEVICE

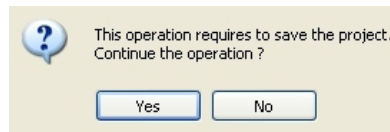
You may need to port a PLC application on a target device which differs from that you originally wrote the code for. Follow the instructions below to adapt your PageLab project to a new target device.

- 1) Click *Select target* in the *Project* menu of the PageLab main window. This causes the following dialog box to appear.





- 2) Select one of the target devices listed in the combo box.
- 3) Click *Change* to confirm your choice, *Cancel* to abort.
- 4) If you confirm, PageLab displays the following dialog box.



Press *Yes* to complete the conversion, *No* to quit.

If you press *Yes*, PageLab updates the project to work with the new target.

It also makes a backup copy of the project file(s) in a sub-directory inside the project directory, so that you can roll-back the operation by manually (i.e., using Windows Explorer) replacing the project file(s) with the backup copy.





## 5. APPENDIX I: PAGE PROPERTIES AND OBJECT PROPERTIES

### 5.1 FRAME SET

#### 5.1.1 PROPERTIES

| Properties              | Available values                  | Description                                                                                                                                                                                                    |
|-------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>TopDim</i>           | $\geq 0$                          | Top-height of the frame (#pixel).                                                                                                                                                                              |
| <i>BottomDim</i>        | $\geq 0$                          | Bottom-height of the frame (#pixel).                                                                                                                                                                           |
| <i>LeftDim</i>          | $\geq 0$                          | Left-width of the frame (#pixel).                                                                                                                                                                              |
| <i>RightDim</i>         | $\geq 0$                          | Right-width of the frame (#pixel).                                                                                                                                                                             |
| <i>CharDimX</i>         | $> 0$                             | Horizontal space among grid points (#pixel).                                                                                                                                                                   |
| <i>CharDimY</i>         | $> 0$                             | Vertical space among grid points (#pixel).                                                                                                                                                                     |
| <i>Font</i>             | Name found in <i>Resources</i>    | Default font used when inserting new objects in page.                                                                                                                                                          |
| <i>Background Color</i> | ...                               | Background color selectable from palette. In addition this color is also set when inserting new objects in the frame.                                                                                          |
| <i>Text Color</i>       | ...                               | Foreground color selectable from palette. This color is set when inserting new objects in the frame.                                                                                                           |
| <i>Title bar</i>        | <i>Yes, No</i>                    | Title bar, settings can be found in <i>System options</i> dialog:<br>- <i>Yes</i> : page has title;<br>- <i>No</i> : page has not title.                                                                       |
| <i>Page Border</i>      | <i>Yes, No</i>                    | - <i>Yes</i> : page with outer border;<br>- <i>No</i> : page without outer border.                                                                                                                             |
| <i>Caption</i>          | Text otherwise <i>Resource ID</i> | Text on title bar or <i>Resource ID</i> . This property is not sensible if <i>Title Bar</i> field is set to <i>No</i> .                                                                                        |
| <i>System menu</i>      | <i>Yes, No</i>                    | If <i>Yes</i> denotes that there is a button with 'X' image on it and the behaviour is similar to <i>Windows Dialog</i> :<br>- <i>Yes</i> : page has close button;<br>- <i>No</i> : page has not close button. |
| <i>Appearance</i>       | <i>Flat, Raised, Sunken</i>       | - Flat<br>- Raised<br>- Sunken                                                                                                                                                                                 |



## 5.2 CHILD PAGE

### 5.2.1 PROPERTIES

| Properties              | Available values                  | Description                                                                                                                                                                                                    |
|-------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>CharDimX</i>         | > 0                               | Horizontal space among grid points (#pixel).                                                                                                                                                                   |
| <i>CharDimY</i>         | > 0                               | Vertical space among grid points (#pixel).                                                                                                                                                                     |
| <i>Font</i>             | Name found in <i>Resources</i>    | Default font used when inserting new objects in page.                                                                                                                                                          |
| <i>Background Color</i> | ...                               | Background color selectable from palette. In addition this color is also set when inserting new objects in the frame.                                                                                          |
| <i>Text Color</i>       | ...                               | Foreground color selectable from palette. This color is set when inserting new objects in the frame.                                                                                                           |
| <i>Title bar</i>        | <i>Yes, No</i>                    | Title bar, settings can be found in <i>System options</i> dialog:<br>- <i>Yes</i> : page has title;<br>- <i>No</i> : page has not title.                                                                       |
| <i>Page Border</i>      | <i>Yes, No</i>                    | - <i>Yes</i> : page with outer border;<br>- <i>No</i> : page without outer border.                                                                                                                             |
| <i>Caption</i>          | Text otherwise <i>Resource ID</i> | Text on title bar or <i>Resource ID</i> . This property is not sensible if <i>Title Bar</i> field is set to <i>No</i> .                                                                                        |
| <i>System menu</i>      | <i>Yes, No</i>                    | If <i>Yes</i> denotes that there is a button with 'X' image on it and the behaviour is similar to <i>Windows Dialog</i> :<br>- <i>Yes</i> : page has close button;<br>- <i>No</i> : page has not close button. |
| <i>Appearance</i>       | <i>Flat, Raised, Sunken</i>       | - Flat<br>- Raised<br>- Sunken                                                                                                                                                                                 |

### 5.2.2 EVENTS

| Event           | Description                                                                       |
|-----------------|-----------------------------------------------------------------------------------|
| <i>OnLoad</i>   | On loading this page, i.e. when calling from parent page.                         |
| <i>OnUnload</i> | On closing this page, when the page returns and the parent page will be restored. |



| Event               | Description                                                                                                                                  |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <i>OnDeactivate</i> | On calling a child page and the current page is no more active. This event does not exist in main page.                                      |
| <i>OnActivate</i>   | When the previous opened child page will be closed. This event does not appear in leaf page, i.e in the pages which do not call child pages. |
| <i>OnDraw</i>       | When the page starts drawing all the objects. The page has just drawn border, background, and title.                                         |
| <i>OnTimer</i>      | Asynchronous event. The user can link a procedure and it will be executed cyclically.                                                        |

## 5.3 POP-UP PAGE

### 5.3.1 PROPERTIES

| Properties              | Available values                  | Description                                                                                                                                                                                                     |
|-------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>XPos</i>             | $\geq 0$                          | Top-left 'x coordinate' edge of full page.                                                                                                                                                                      |
| <i>YPos</i>             | $\geq 0$                          | Top-left 'y coordinate' edge of full page.                                                                                                                                                                      |
| <i>XDim</i>             | $> 0$                             | Width of the page (#pixel).                                                                                                                                                                                     |
| <i>YDim</i>             | $> 0$                             | Height of the page (#pixel).                                                                                                                                                                                    |
| <i>CharDimX</i>         | $> 0$                             | Horizontal space among grid points (#pixel).                                                                                                                                                                    |
| <i>CharDimY</i>         | $> 0$                             | Vertical space among grid points (#pixel).                                                                                                                                                                      |
| <i>Modal</i>            | <i>Yes, No</i>                    | <ul style="list-style-type: none"> <li>- <i>Yes</i>: all the parent page objects will be disabled;</li> <li>- <i>No</i>: all the parent page objects will be enabled if they are completely visible.</li> </ul> |
| <i>Font</i>             | Name found in <i>Resources</i>    | Default font used when inserting new objects in page.                                                                                                                                                           |
| <i>Background Color</i> | ...                               | Background color selectable from palette. In addition this color is also set when inserting new objects in the frame.                                                                                           |
| <i>Text Color</i>       | ...                               | Foreground color selectable from palette. This color is set when inserting new objects in the frame.                                                                                                            |
| <i>Title bar</i>        | <i>Yes, No</i>                    | Title bar, the settings can be found in <i>System options</i> dialog: <ul style="list-style-type: none"> <li>- <i>Yes</i>: page has title;</li> <li>- <i>No</i>: page has not title.</li> </ul>                 |
| <i>Page Border</i>      | <i>Yes, No</i>                    | <ul style="list-style-type: none"> <li>- <i>Yes</i>: page with outer border;</li> <li>- <i>No</i>: page without outer border.</li> </ul>                                                                        |
| <i>Caption</i>          | Text otherwise <i>Resource ID</i> | Text on title bar or <i>Resource ID</i> .<br>This property is not sensible if the <i>Title Bar</i> field is set to <i>No</i> .                                                                                  |



| Properties         | Available values            | Description                                                                                                                                                                                                         |
|--------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>System menu</i> | <i>Yes, No</i>              | If <i>Yes</i> denotes that there is a button with <i>X</i> image on it and the behaviour is similar to <i>Windows Dialog</i> :<br>- <i>Yes</i> : page has close button;<br>- <i>No</i> : page has not close button. |
| <i>Appearance</i>  | <i>Flat, Raised, Sunken</i> | Flat<br>Raised<br>Sunken                                                                                                                                                                                            |

### 5.3.2 EVENTS

| Event               | Description                                                                                                                                  |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <i>OnLoad</i>       | On loading this page, i.e. when calling from parent page.                                                                                    |
| <i>OnUnload</i>     | On closing this page, when the page returns and the parent page will be restored.                                                            |
| <i>OnDeactivate</i> | On calling a child page and the current page is no more active. This event does not exist in main page.                                      |
| <i>OnActivate</i>   | When the previous opened child page will be closed. This event does not appear in leaf page, i.e in the pages which do not call child pages. |
| <i>OnDraw</i>       | When the page starts drawing all the objects. The page has just drawn border, background and title.                                          |
| <i>OnTimer</i>      | Asynchronous event. The user can link a procedure and it will be executed cyclically.                                                        |

## 5.4 STATIC

### 5.4.1 PROPERTIES

| Properties              | Available values                     | Description                                                                                                                                             |
|-------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>XPos</i>             | $\geq 0$                             | Top-left 'x coordinate' edge relative to page.                                                                                                          |
| <i>YPos</i>             | $\geq 0$                             | Top-left 'y coordinate' edge relative to page.                                                                                                          |
| <i>Name</i>             | Not empty                            | Name of object.                                                                                                                                         |
| <i>Text</i>             | Text otherwise<br><i>Resource ID</i> | Text or <i>Resource ID</i> shown in the object.                                                                                                         |
| <i>Font</i>             | Name found in<br><i>Resources</i>    | Font used for drawing the text in object.                                                                                                               |
| <i>Background Color</i> | ...                                  | Background color selectable from palette.                                                                                                               |
| <i>Text Color</i>       | ...                                  | Text color selectable from palette.                                                                                                                     |
| <i>Sel. Background</i>  | ...                                  | Background color selectable from palette when the object is chosen. This property is not sensible if the <i>Select</i> field is constant <i>FALSE</i> . |



| Properties                       | Available values                                | Description                                                                                                                                                                                                                                                             |
|----------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Sel.</i><br><i>Foreground</i> | ...                                             | Text color selectable from palette when the object is chosen. This property is not sensible if the <i>Select</i> field is constant <i>FALSE</i> .                                                                                                                       |
| <i>Appearance</i>                | <i>Flat</i> , <i>Raised</i> ,<br><i>Sunken</i>  | - Flat<br>- Raised<br>- Sunken                                                                                                                                                                                                                                          |
| <i>Border points</i>             | $\geq 0$                                        | Border thickness (#pixel). This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                                                                                                  |
| <i>Border color</i>              | ...                                             | Border color selectable from palette. This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                                                                                       |
| <i>Number of Chars</i>           | $> 0$                                           | Number of chars that this object can show. If the value is 0 the object will show the complete text. Otherwise with another value it can be truncated or extended.                                                                                                      |
| <i>Alignment</i>                 | <i>Right</i> , <i>Center</i> ,<br><i>Left</i>   | Text alignment in the object.                                                                                                                                                                                                                                           |
| <i>Refresh</i>                   | <i>TRUE</i> , <i>FALSE</i>                      | Continuous redraw of the object:<br>- <i>FALSE</i> : the <i>Text value</i> is read from memory and updated only when opening the page or when a child page is closed;<br>- <i>TRUE</i> : the <i>Text value</i> is read from memory and always updated.                  |
| <i>Select</i>                    | <i>TRUE</i> , <i>FALSE</i> ,<br><i>var_name</i> | Selected status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is selected and so it will show the colors <i>Select Back</i> , <i>Select Fore</i> . |
| <i>Visible</i>                   | <i>TRUE</i> , <i>FALSE</i> ,<br><i>var_name</i> | Visible status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is visible, otherwise it is hidden.                                                   |

## 5.4.2 EVENTS

| Event               | Description                              |
|---------------------|------------------------------------------|
| <i>BeforeUpdate</i> | Before the object is redrawn.            |
| <i>AfterUpdate</i>  | Immediately after the object is redrawn. |

## 5.5 LINE

### 5.5.1 PROPERTIES

| Properties  | Available values | Description                                    |
|-------------|------------------|------------------------------------------------|
| <i>XPos</i> | $\geq 0$         | Top-left 'x coordinate' edge relative to page. |
| <i>YPos</i> | $\geq 0$         | Top-left 'y coordinate' edge relative to page. |



| Properties           | Available values | Description                                        |
|----------------------|------------------|----------------------------------------------------|
| <i>X2Pos</i>         | > 0              | Bottom-right 'x coordinate' edge relative to page. |
| <i>Y2Pos</i>         | > 0              | Bottom-right 'y coordinate' edge relative to page. |
| <i>Name</i>          | Not empty        | Name of object.                                    |
| <i>Thickness pts</i> | > 0              | Line thickness (#pixel).                           |
| <i>Border col</i>    | ...              | Line color selectable from palette.                |

## 5.6 RECTANGLE

### 5.6.1 PROPERTIES

| Properties              | Available values   | Description                                                                                                                      |
|-------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <i>XPos</i>             | >= 0               | Top-left 'x coordinate' edge relative to page.                                                                                   |
| <i>YPos</i>             | >= 0               | Top-left 'y coordinate' edge relative to page.                                                                                   |
| <i>XDim</i>             | > 0                | Width (#pixel).                                                                                                                  |
| <i>YDim</i>             | > 0                | Height (#pixel).                                                                                                                 |
| <i>Name</i>             | Not empty          | Name of object.                                                                                                                  |
| <i>Border points</i>    | > 0                | Border thickness (#pixel).                                                                                                       |
| <i>Border color</i>     | ...                | Border color selectable from palette.                                                                                            |
| <i>Background Color</i> | ...                | Background color selectable from palette. This property is sensible only if <i>Transparent</i> is set to <i>TRUE</i> .           |
| <i>Transparent</i>      | <i>TRUE, FALSE</i> | Transparency:<br>- <i>TRUE</i> : transparent background;<br>- <i>FALSE</i> : solid background where color is <i>Back Color</i> . |

## 5.7 EDIT BOX

### 5.7.1 PROPERTIES

| Properties        | Available values               | Description                                                                                                           |
|-------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <i>XPos</i>       | >= 0                           | Top-left 'x coordinate' edge relative to page.                                                                        |
| <i>YPos</i>       | >= 0                           | Top-left 'y coordinate' edge relative to page.                                                                        |
| <i>Name</i>       | Not empty                      | Name of object.                                                                                                       |
| <i>Appearance</i> | <i>Flat, Raised, Sunken</i>    | - <i>Flat</i> : plain with use of <i>Border pts</i> and <i>Border col</i> ;<br>- <i>Raised</i> ;<br>- <i>Sunken</i> . |
| <i>Font</i>       | Name found in <i>Resources</i> | Font used for drawing the text in object.                                                                             |



| Properties              | Available values                                                                         | Description                                                                                                                                                                                                                    |
|-------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Background Color</i> | ...                                                                                      | Background color selectable from palette.                                                                                                                                                                                      |
| <i>Text Color</i>       | ...                                                                                      | Text color selectable from palette.                                                                                                                                                                                            |
| <i>Sel. Background</i>  | ...                                                                                      | Background color selectable from palette when the object is chosen. This property is not sensible if the <i>Selectable</i> field is constant <i>FALSE</i> .                                                                    |
| <i>Sel. Foreground</i>  | ...                                                                                      | Text color selectable from palette when the object is chosen. This property is not sensible if the <i>Selectable</i> field is constant <i>FALSE</i> .                                                                          |
| <i>Border points</i>    | $\geq 0$                                                                                 | Border thickness (#pixel). This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                                                         |
| <i>Border color</i>     | ...                                                                                      | Border color selectable from palette. This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                                              |
| <i>Number of Chars</i>  | $> 0$                                                                                    | Chars visible in the object. Width of entire object is calculated among this value and the size of <i>Font</i> . If <i>NumChar</i> are less than the value, the object shows this error string: #####.                         |
| <i>Format</i>           | String as <code>printf</code> or <code>.enum_name</code>                                 | The format can be numeric, to define as <code>printf</code> of C language (see 5.7.2), enumerative, if in this field there is <code>enum_name</code> defined in <i>Resources</i> (see 4.9).                                    |
| <i>Alignment</i>        | <i>Right, Center, Left</i>                                                               | Text alignment in the object.                                                                                                                                                                                                  |
| <i>Access</i>           | <i>RO, RW</i>                                                                            | Accesses variable <i>Assoc var</i> used in object:<br>- <i>RO</i> = read only;<br>- <i>RW</i> = read/write.                                                                                                                    |
| <i>Selection Order</i>  | $\geq 0$                                                                                 | Selection order of the object. It can be selected by pressing a key or by means of a procedure. In this case the selection moves from the current object to the previous or next <i>Sel. Order</i> object.                     |
| <i>Variable</i>         | Not empty                                                                                | Name of the variable that can be shown and edited with this object. It can be any variable of the project, (local, global, imported from PLC or target - see 2.9.2), a parameter (see 2.9.2) or an element of a set (see 4.6). |
| <i>Data type</i>        | <i>UNDEF, BOOL, SINT, USINT, BYTE, INT, UINT, WORD, DINT, UDINT, DWORD, REAL, STRING</i> | Type of <i>Assoc var</i> . If it is a variable, the type is defined automatically. This property is sensible if <i>Assoc var</i> is an explicit parameter.                                                                     |



| Properties        | Available values             | Description                                                                                                                                                                                                                                                                                                                                       |
|-------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Low limit</i>  | <i>CONSTANT, var_name</i>    | Name of variable or numeric constant. This is the least number that the object can show. It can be any variable of the project, (local, global, imported from PLC or target - see 2.9.2 ). This object shows an error string (!!!!!!!) if condition does not holds.<br>The * symbol means that there is no low limit.                             |
| <i>High limit</i> | <i>CONSTANT, var_name</i>    | Name of the variable or numeric constant. This is the maximum number that the object can show. It can be any variable of the project, (local, global, imported from PLC or target - see 2.9.2 ). This object views an error string (!!!!!!!) if condition does not hold. The * symbol means that there is no high limit.                          |
| <i>Refresh</i>    | <i>TRUE, FALSE</i>           | Enables continuous update of the value:<br>- <i>FALSE</i> : the <i>Assoc var</i> value is read from memory and updated only when open page or when a child page is closed;<br>- <i>TRUE</i> : the <i>Assoc var</i> value is read from memory and always updated.                                                                                  |
| <i>Visible</i>    | <i>TRUE, FALSE, var_name</i> | Visible status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is visible, otherwise hidden.                                                                                                                                   |
| <i>Selectable</i> | <i>TRUE, FALSE, var_name</i> | Selected status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is selected and so it will show the colors <i>Select Back</i> , <i>Select Fore</i> . If this field is <i>FALSE</i> the <i>Access</i> property is not sensible. |

## 5.7.2 FORMAT SPECIFICATION - PRINTF

If the object has not any enumerative format, the format string is composed as follows:

%[flags][width][.precision]type

The field has one or more characters, that describe the specification. The simplest format contains only percentage symbol and one char as type (for example: %s).

Next table explains in details functions and values.

| Field        | Available values                                                                                                                                                                                     | Description                                                                                                          |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <i>flags</i> | <ul style="list-style-type: none"> <li>- + prints always the sign, even if the number is positive.</li> <li>- 0 prints zeros in head until <i>width</i> (if specified) or <i>NumChar</i>.</li> </ul> | This char is an option for chars order, print sign, number of decimal digit. This field may have more than one flag. |



| Field            | Available values                                                                                                                                                                                                                                                                                                                                         | Description                                                                                                                                                                                                              |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>width</i>     | $> 0, \leq NumChar$                                                                                                                                                                                                                                                                                                                                      | Maximum chars can be printed. Allows to view values that do not fill <i>NumChar</i> fully.                                                                                                                               |
| <i>precision</i> | $\geq 0$                                                                                                                                                                                                                                                                                                                                                 | Decimal digits after the point. If the field is an integer and there is a precision the object shows a decimal point. E.g. the value is 102 integer, and precision is 2, with <i>%.2d</i> , the number is shown as 1.02. |
| <i>type</i>      | <ul style="list-style-type: none"> <li>- <i>%d</i>: Integer with sign.</li> <li>- <i>%f</i>: Real.</li> <li>- <i>%x</i>: Hexadecimal with lowercase chars.</li> <li>- <i>%X</i>: Hexadecimal with uppercase chars.</li> <li>- <i>%s</i>: String.</li> <li>- <i>%@sdf</i>: Password.</li> <li>- <i>[%d,u,f,x]</i>: Custom measure unit format.</li> </ul> | Mandatory field.                                                                                                                                                                                                         |

### 5.7.3 EVENTS

| Event               | Description                                                                         |
|---------------------|-------------------------------------------------------------------------------------|
| <i>BeforeUpdate</i> | Before the object is redrawn.                                                       |
| <i>AfterUpdate</i>  | Immediately after the object is redrawn.                                            |
| <i>OnGotFocus</i>   | Whenever object is selected.                                                        |
| <i>OnLostFocus</i>  | Whenever object loses the selection.                                                |
| <i>OnEnter</i>      | Whenever the object is selected and receives the command for entering in edit-mode. |
| <i>OnClick</i>      | Whenever HMI receives a pressure on the object, valid only for touchscreen systems. |
| <i>OnChange</i>     | Whenever the user confirms the modifications and the value is different from start. |

## 5.8 TEXT BOX

### 5.8.1 PROPERTIES

| Properties        | Available values            | Description                                                                                                                                                                     |
|-------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>XPos</i>       | $\geq 0$                    | Top-left 'x coordinate' edge relative to page.                                                                                                                                  |
| <i>YPos</i>       | $\geq 0$                    | Top-left 'y coordinate' edge relative to page.                                                                                                                                  |
| <i>Name</i>       | Not empty                   | Name of object.                                                                                                                                                                 |
| <i>Appearance</i> | <i>Flat, Raised, Sunken</i> | <ul style="list-style-type: none"> <li>- <i>Flat</i>: plain with use of <i>Border pts</i> and <i>Border col</i>;</li> <li>- <i>Raised</i>;</li> <li>- <i>Sunken</i>.</li> </ul> |



| Properties              | Available values               | Description                                                                                                                                                                                                                                                                                                                  |
|-------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Font</i>             | Name found in <i>Resources</i> | Font used for drawing the text in the object.                                                                                                                                                                                                                                                                                |
| <i>Background Color</i> | ...                            | Background color selectable from palette.                                                                                                                                                                                                                                                                                    |
| <i>Text Color</i>       | ...                            | Text color selectable from palette.                                                                                                                                                                                                                                                                                          |
| <i>Border points</i>    | $\geq 0$                       | Border thickness (#pixel). This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                                                                                                                                                       |
| <i>Border color</i>     | ...                            | Border color selectable from palette. This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                                                                                                                                            |
| <i>Number of Chars</i>  | $> 0$                          | Chars visible in the object. Width of entire object is calculated among this value and the size of <i>Font</i> .                                                                                                                                                                                                             |
| <i>Number of Rows</i>   | $> 0$                          | Rows visible in the object. Height of entire object is calculated among this value and the size of <i>Font</i> .                                                                                                                                                                                                             |
| <i>Show line number</i> | <i>TRUE, FALSE</i>             | Flag for viewing number of lines.                                                                                                                                                                                                                                                                                            |
| <i>Access</i>           | <i>RO, RW</i>                  | Access on variable <i>Assoc string</i> used in object:<br>- <i>RO</i> : read only;<br>- <i>RW</i> : read/write.                                                                                                                                                                                                              |
| <i>Selection order</i>  | $\geq 0$                       | Selection order on which the object can be selected with the pressure of a key or with a procedure. In this case the selection moves from the current object to the previous or next <i>Sel.Order object</i> .                                                                                                               |
| <i>String variable</i>  | <i>Not empty</i>               | Name of variable that can be shown and edited with this object. It can be any string variable of the project, (local, global, imported from PLC or target - see 2.9.2 ).                                                                                                                                                     |
| <i>Refresh trg</i>      | <i>TRUE, FALSE, var_name</i>   | Enables update of the value:<br>- <i>FALSE</i> : the <i>Assoc string</i> value is read from memory and updated only when opening page or when a child page is closed.<br>- <i>TRUE</i> : the <i>Assoc string</i> value is read from memory and always updated.<br>The runtime sets automatically the value to <i>FALSE</i> . |
| <i>Visible</i>          | <i>TRUE, FALSE, var_name</i>   | Visible status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is visible, otherwise hidden.                                                                                                              |



## 5.8.2 EVENTS

| Event               | Description                                                                         |
|---------------------|-------------------------------------------------------------------------------------|
| <i>BeforeUpdate</i> | Before the object is redrawn.                                                       |
| <i>AfterUpdate</i>  | Immediately after the object is redrawn.                                            |
| <i>OnClick</i>      | Whenever HMI receives a pressure on the object, valid only for touchscreen systems. |
| <i>OnChange</i>     | Whenever the user confirms the modifications and the value is different from start. |

## 5.9 IMAGE

### 5.9.1 PROPERTIES

| Properties              | Available values                                | Description                                                                                                                                                                                                           |
|-------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>XPos</i>             | const $\geq 0$ ,<br>variable                    | Top-left 'x coordinate' edge relative to page. It is possible to assign a variable only if <i>Style</i> is set to <i>Floating</i> .                                                                                   |
| <i>YPos</i>             | const $\geq 0$ ,<br>variable                    | Top-left 'y coordinate' edge relative to page. It is possible to assign a variable only if <i>Style</i> is set to <i>Floating</i> .                                                                                   |
| <i>XDim</i>             | $> 0$                                           | Width (#pixel).                                                                                                                                                                                                       |
| <i>YDim</i>             | $> 0$                                           | Height (#pixel).                                                                                                                                                                                                      |
| <i>Name</i>             | Not empty                                       | Name of object.                                                                                                                                                                                                       |
| <i>Appearance</i>       | <i>Flat</i> , <i>Raised</i> ,<br><i>Sunken</i>  | <ul style="list-style-type: none"> <li>- <i>Flat</i> = plain with use of <i>Border pts</i> and <i>Border col</i>;</li> <li>- <i>Raised</i>;</li> <li>- <i>Sunken</i>.</li> </ul>                                      |
| <i>Border points</i>    | $\geq 0$                                        | Border thickness (#pixel). This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                                                |
| <i>Border color</i>     | ...                                             | Border color selectable from palette. This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                                     |
| <i>Bitmap</i>           | Name found in<br><i>Resources</i>               | Bitmap used for drawing the image in object.                                                                                                                                                                          |
| <i>Background image</i> | Image object in the<br>page                     | Name of another object that is redrawn when <i>Style</i> is set to <i>Floating</i> . It is sensible only if it is overlapped with this image.                                                                         |
| <i>Visible</i>          | <i>TRUE</i> , <i>FALSE</i> ,<br><i>var_name</i> | Visible status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is visible, otherwise it is hidden. |
| <i>Style</i>            | <i>Docking</i> , <i>Floating</i>                | <ul style="list-style-type: none"> <li>- <i>Docking</i>: fixed position;</li> <li>- <i>Floating</i>: variable position, according to <i>XPos</i> variable and <i>Ypos</i> variable.</li> </ul>                        |



## 5.10 ANIMATION

### 5.10.1 PROPERTIES

| Properties                | Available values                                                                                                                       | Description                                                                                                                                                                                                     |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>XPos</i>               | $\geq 0$                                                                                                                               | Top-left 'x coordinate' edge relative to page.                                                                                                                                                                  |
| <i>YPos</i>               | $\geq 0$                                                                                                                               | Top-left 'y coordinate' edge relative to page.                                                                                                                                                                  |
| <i>XDim</i>               | $> 0$                                                                                                                                  | Width (#pixel).                                                                                                                                                                                                 |
| <i>YDim</i>               | $> 0$                                                                                                                                  | Height (#pixel).                                                                                                                                                                                                |
| <i>Name</i>               | Not empty                                                                                                                              | Name of object.                                                                                                                                                                                                 |
| <i>Appearance</i>         | <i>Flat</i> , <i>Raised</i> ,<br><i>Sunken</i>                                                                                         | <ul style="list-style-type: none"> <li>- <i>Flat</i> = plain with use of <i>Border pts</i> and <i>Border col</i>;</li> <li>- <i>Raised</i>;</li> <li>- <i>Sunken</i>.</li> </ul>                                |
| <i>Border points</i>      | $\geq 0$                                                                                                                               | Border thickness (#pixel). This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                                          |
| <i>Border color</i>       | ...                                                                                                                                    | Border color selectable from palette. This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                               |
| <i>Image list</i>         | Name found in<br><i>Resources</i>                                                                                                      | It contains the images that the object can view and the value range.                                                                                                                                            |
| <i>Animation variable</i> | <i>var_name</i>                                                                                                                        | Name of the variable that is compared with value range in <i>Image list</i> .                                                                                                                                   |
| <i>Data type</i>          | <i>SINT</i> , <i>USINT</i> ,<br><i>BYTE</i> , <i>INT</i> , <i>UINT</i> ,<br><i>WORD</i> , <i>DINT</i> ,<br><i>UDINT</i> , <i>DWORD</i> | Type of <i>Animation var</i> . If it is a variable, the type is automatically defined.                                                                                                                          |
| <i>Visible</i>            | <i>TRUE</i> , <i>FALSE</i> ,<br><i>var_name</i>                                                                                        | Visible status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is visible, otherwise hidden. |

### 5.10.2 EVENTS

| Event               | Description                              |
|---------------------|------------------------------------------|
| <i>BeforeUpdate</i> | Before the object is redrawn.            |
| <i>AfterUpdate</i>  | Immediately after the object is redrawn. |



## 5.11 BUTTON

### 5.11.1 PROPERTIES

| Properties                | Available values                                | Description                                                                                                                                  |
|---------------------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <i>XPos</i>               | $\geq 0$                                        | Top-left 'x coordinate' edge relative to page.                                                                                               |
| <i>YPos</i>               | $\geq 0$                                        | Top-left 'y coordinate' edge relative to page.                                                                                               |
| <i>XDim</i>               | $> 0$                                           | Width (#pixel).                                                                                                                              |
| <i>YDim</i>               | $> 0$                                           | Height (#pixel).                                                                                                                             |
| <i>Name</i>               | Not empty                                       | Name of object.                                                                                                                              |
| <i>Text/Img</i>           | Empty or explicit text or Resource ID or Bitmap | Text or image to view in the button:<br>- string;<br>- Resource ID;<br>- bitmap.                                                             |
| <i>Selection Text/Img</i> | Empty or explicit text or Resource ID or Bitmap | Text or image to view in the button when it is selected:<br>- string;<br>- Resource ID;<br>- bitmap.                                         |
| <i>Font</i>               | Name found in <i>Resources</i>                  | Font used for drawing the text in object. This field is not sensible if it shows a bitmap.                                                   |
| <i>Appearance</i>         | <i>Flat</i> , <i>Raised</i> , <i>Sunken</i>     | - <i>Flat</i> : plain with use of <i>Border pts</i> and <i>Border col</i> ;<br>- <i>Raised</i> ;<br>- <i>Sunken</i> .                        |
| <i>Border points</i>      | $\geq 0$                                        | Border thickness (#pixel). This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                       |
| <i>Border color</i>       | ...                                             | Border color selectable from palette. This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> or <i>Text</i> is not empty. |
| <i>Background color</i>   | ...                                             | Background color selectable from palette. This property is sensible only if <i>Transparent</i> is set to <i>TRUE</i> .                       |
| <i>Selection border</i>   | ...                                             | Border color when the object is selected. This property is not sensible if <i>Selection var</i> is <i>FALSE</i> fixed.                       |
| <i>Sel. background</i>    | ...                                             | Background color when the object is selected. This property is not sensible if <i>Selection var</i> is <i>FALSE</i> fixed.                   |



| Properties                | Available values                                         | Description                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Selection order</i>    | $\geq 0$                                                 | Selection order on which the object can be selected with the pressure of a key or with a procedure. In this case the selection moves from the current object to the previous or next <i>Sel. Order</i> object.                                                                                                                                                             |
| <i>Visible</i>            | <i>TRUE, FALSE, var_name</i>                             | Visible status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is visible, otherwise it is hidden.                                                                                                                                                      |
| <i>Transparent</i>        | <i>TRUE, FALSE, var_name</i>                             | Transparency. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is transparent.                                                                                                                                                                                          |
| <i>Press variable</i>     | Empty or <i>var_name</i>                                 | When the button is pressed <i>var_name</i> is set to <i>TRUE</i> . When the button is not pressed, <i>var_name</i> is set to <i>FALSE</i> .                                                                                                                                                                                                                                |
| <i>Selection variable</i> | <i>TRUE, FALSE, var_name</i>                             | Selected status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is selected and so it will show the colors <i>Select Back</i> , <i>SelectBord</i> . If this field is <i>FALSE</i> <i>SelectBord</i> and <i>Select Back</i> properties are not sensible. |
| <i>Action</i>             | <i>Call, OpenPage, Close, NextField, PrevField, Edit</i> | Action executed on button pressure.                                                                                                                                                                                                                                                                                                                                        |
| <i>Action par</i>         | <i>page_name proc_name</i>                               | Parameter associated with the action executed on button pressure. It is sensible only if <i>Action</i> is <i>OpenPage</i> ( <i>Action par</i> = name of the page to open) or <i>Call</i> ( <i>Action par</i> = name of the procedure to execute ).                                                                                                                         |
| <i>Alignment</i>          | <i>Right, Center, Left</i>                               | Text alignment in the object.                                                                                                                                                                                                                                                                                                                                              |

### 5.11.2 EVENTS

| Event            | Description                                                                           |
|------------------|---------------------------------------------------------------------------------------|
| <i>OnClick</i>   | Whenever HMI receives a pressure on the object, valid only for touchscreen systems.   |
| <i>OnRelease</i> | Whenever HMI releases the pressure on the object, valid only for touchscreen systems. |



## 5.12 PROGRESS BAR

### 5.12.1 PROPERTIES

| Properties               | Available values                                                                                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>XPos</i>              | $\geq 0$                                                                                        | Top-left 'x coordinate' edge relative to page.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>YPos</i>              | $\geq 0$                                                                                        | Top-left 'y coordinate' edge relative to page.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>XDim</i>              | $> 0$                                                                                           | Width (#pixel).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>YDim</i>              | $> 0$                                                                                           | Height (#pixel).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>Name</i>              | Not empty                                                                                       | Name of object.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>Appearance</i>        | <i>Flat</i> , <i>Raised</i> ,<br><i>Sunken</i>                                                  | <ul style="list-style-type: none"> <li>- <i>Flat</i>: plain with use of <i>Border pts</i> and <i>Border col</i>;</li> <li>- <i>Raised</i>;</li> <li>- <i>Sunken</i>.</li> </ul>                                                                                                                                                                                                                                                                                                                        |
| <i>Border points</i>     | $\geq 0$                                                                                        | Border thickness (#pixel). This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>Border color</i>      | ...                                                                                             | Border color selectable from palette. This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> or <i>Text</i> is not empty.                                                                                                                                                                                                                                                                                                                                                           |
| <i>Bar color</i>         | ...                                                                                             | Color of step bar, selectable from palette.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>Background color</i>  | ...                                                                                             | Background color selectable from palette.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Visible</i>           | <i>TRUE</i> , <i>FALSE</i> ,<br><i>var_name</i>                                                 | Visible status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is visible, otherwise it is hidden.                                                                                                                                                                                                                                                                                  |
| <i>Refresh trigger</i>   | <i>TRUE</i> , <i>FALSE</i> ,<br><i>var_name</i>                                                 | <p>Object redraw:</p> <ul style="list-style-type: none"> <li>- <i>FALSE</i>: the <i>Progress var</i> value is read from memory and updated only when opening page or when a child page is closed.</li> <li>- <i>TRUE</i>: the <i>Progress var</i> value is read from memory and always updated.</li> <li>- <i>var_name</i>: the <i>Progress var</i> value is read from memory and updated only when the variable becomes <i>TRUE</i>. After the update the runtime sets it to <i>FALSE</i>.</li> </ul> |
| <i>Progress variable</i> | Not empty                                                                                       | Step variable. This is the filling percentage of bar in relation with the range assigned by <i>Lo limit</i> and <i>Hi limit</i> . It can be any string variable of the project (local, global, imported from PLC or target) or a parameter (see 2.9.2).                                                                                                                                                                                                                                                |
| <i>Data type</i>         | UNDEF, BOOL, SINT, USINT, BYTE, INT, UINT, WORD, DINT, UDINT, DWORD, LWORD, REAL, LREAL, STRING | Type of <i>Progress var</i> . If it is a variable, the type is automatically defined. This property is sensible if <i>Progress var</i> is an explicit parameter.                                                                                                                                                                                                                                                                                                                                       |



| Properties         | Available values            | Description                                                                                                                                                                                                               |
|--------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Low limit</i>   | Constant or <i>var_name</i> | Name of the variable or numeric constant. This is the least value for step bar. It can be any variable of the project, (local, global, imported from PLC or target - See. § ) with type specified by <i>Data type</i> .   |
| <i>High limit</i>  | Constant or <i>var_name</i> | Name of the variable or numeric constant. This is the maximum value for step bar. It can be any variable of the project, (local, global, imported from PLC or target - See. § ) with type specified by <i>Data type</i> . |
| <i>Orientation</i> | Horizontal, vertical        | Direction of step bar.                                                                                                                                                                                                    |

## 5.12.2 EVENTS

| Event               | Description                              |
|---------------------|------------------------------------------|
| <i>BeforeUpdate</i> | Before the object is redrawn.            |
| <i>AfterUpdate</i>  | Immediately after the object is redrawn. |

## 5.13 CUSTOM CONTROL

### 5.13.1 PROPERTIES

| Properties        | Available values             | Description                                                                                                                                                                                                                |
|-------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>XPos</i>       | $\geq 0$                     | Top-left 'x coordinate' edge relative to page.                                                                                                                                                                             |
| <i>YPos</i>       | $\geq 0$                     | Top-left 'y coordinate' edge relative to page.                                                                                                                                                                             |
| <i>XDim</i>       | $> 0$                        | Width (#pixel).                                                                                                                                                                                                            |
| <i>YDim</i>       | $> 0$                        | Height (#pixel).                                                                                                                                                                                                           |
| <i>Name</i>       | Not empty                    | Name of object.                                                                                                                                                                                                            |
| <i>Control ID</i> | $> 0$                        | Identifier of custom control type.                                                                                                                                                                                         |
| <i>Visible</i>    | <i>TRUE, FALSE, var_name</i> | Visible status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is visible, otherwise it is hidden.      |
| <i>Refresh</i>    | <i>TRUE, FALSE</i>           | Continuous redraw of the object:<br>- <i>FALSE</i> : the body of the runtime object is updated only when opening page or when a child page is closed.<br>- <i>TRUE</i> : the body of the runtime object is always updated. |



## 5.13.2 EVENTS

| Event               | Description                              |
|---------------------|------------------------------------------|
| <i>BeforeUpdate</i> | Before the object is redrawn.            |
| <i>AfterUpdate</i>  | Immediately after the object is redrawn. |

## 5.14 CHART

### 5.14.1 PROPERTIES

| Properties          | Available values           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>XPos</i>         | $\geq 0$                   | Top-left 'x coordinate' edge relative to page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>YPos</i>         | $\geq 0$                   | Top-left 'y coordinate' edge relative to page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>XDim</i>         | $> 0$                      | Width (#pixel).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>YDim</i>         | $> 0$                      | Height (#pixel).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>Name</i>         | Not empty                  | Name of object.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>Track 1</i>      | <i>var_name</i>            | <p>Opens a dialog with the following options:</p> <ul style="list-style-type: none"> <li>- the array with data of track (<i>Data Source</i>);</li> <li>- the visibility condition of the track (<i>TRUE</i> or boolean variable);</li> <li>- <i>Color</i> of the track;</li> <li>- the scale factor (range among two horizontal divisions);</li> <li>- the offset (displacement of the track 0-Y);</li> <li>- step of print label for Y axis;</li> <li>- three horizontal bars with name, value and colors.</li> </ul> <p>If <i>var_name</i> is empty the track is not defined and not drawn.</p> |
| <i>Track 2</i>      | <i>var_name</i>            | As <i>Track 1</i> , but for track 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Track 3</i>      | <i>var_name</i>            | As <i>Track 1</i> , but for track 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Track 4</i>      | <i>var_name</i>            | As <i>Track 1</i> , but for track 4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Track 5</i>      | <i>var_name</i>            | As <i>Track 1</i> , but for track 5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Track 6</i>      | <i>var_name</i>            | As <i>Track 1</i> , but for track 6.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Track 7</i>      | <i>var_name</i>            | As <i>Track 1</i> , but for track 7.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Track 8</i>      | <i>var_name</i>            | As <i>Track 1</i> , but for track 8.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Track Left</i>   | $\geq 0$ , <i>var_name</i> | Integer value that is the track for Y axis left. It is admitted a constant value (ex 1). If empty means that the chart must not draw the label for Y axis left.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>Track Right</i>  | $\geq 0$ , <i>var_name</i> | As <i>Track Left</i> for the right side.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>Format Left</i>  | String as <i>printf</i>    | Format of Y axis left as <i>c printf</i> function.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>Format Right</i> | String as <i>printf</i>    | As <i>Format Left</i> for the right side.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>XLabel</i>       | $\geq 0$ , <i>var_name</i> | Step for X-axis labels. How many divisions of horizontal bar must have labels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



| Properties              | Available values               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>X Scale</i>          | <i>var_name</i>                | Scale factor of x-Axis. Value range among two divisions of horizontal bars. An empty value indicates that the chart is in autoscale mode.                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>Len Data</i>         | <i>var_name</i>                | Name of the variable that contains the array index samples. The chart adds the sample values when the <i>Refresh</i> is <i>TRUE</i> . If the value remains unchanged the chart does not add new values. The runtime maintains the last value of this field. Constant values are not allowed.                                                                                                                                                                                                                               |
| <i>X Offset</i>         | <i>var_name</i>                | Variable name for the deviation of 0 for x-Axis, left or right. A positive value moves the chart values to left.                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>Grid</i>             | <i>Yes, No</i>                 | Visibility of the grid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>X Div. Grid</i>      | value                          | Number of division on horizontal bar, used with scale factor and offset for drawing the chart tracks.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>Y Div. Grid</i>      | value                          | Number of division on vertical bar, used with scale factor and offset for drawing the chart tracks.                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>Background color</i> | ...                            | Background color selectable from palette.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>Appearance</i>       | <i>Flat, Raised, Sunken</i>    | <ul style="list-style-type: none"> <li>- <i>Flat</i>: plain with use of <i>Border pts</i> and <i>Border col</i>;</li> <li>- <i>Raised</i>;</li> <li>- <i>Sunken</i>.</li> </ul>                                                                                                                                                                                                                                                                                                                                            |
| <i>Border points</i>    | $\geq 0$                       | Border thickness (#pixel). This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>Border color</i>     | ...                            | Border color selectable from palette. This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> or <i>Text</i> is not empty.                                                                                                                                                                                                                                                                                                                                                                               |
| <i>Font</i>             | Name found in <i>Resources</i> | Font used for drawing the label in object.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>Refresh</i>          | <i>TRUE, FALSE, var_name</i>   | <p>Continuous redraw of the object:</p> <ul style="list-style-type: none"> <li>- <i>FALSE</i>: the chart is updated only when opening page or when a child page is closed;</li> <li>- <i>TRUE</i>: the chart object is always updated, synchronized with others objects;</li> <li>- <i>var_name</i>: the chart is drawn on rising edge of boolean variable. This value <i>TRUE</i> of this variable is the moment when the char adds the samples.</li> </ul> <p>(<i>Len Data</i> &lt;&gt; internal HMI index of data).</p> |
| <i>Visible</i>          | <i>TRUE, FALSE, var_name</i>   | Visible status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is visible, otherwise it is hidden.                                                                                                                                                                                                                                                                                                      |
| <i>Format X</i>         | String as <i>printf</i>        | Format of X axis as <i>c printf</i> function.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |



| Properties            | Available values           | Description                                                                                                                                                                                                              |
|-----------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>X Data</i>         | $\geq 0$ , <i>var_name</i> | X-Axis array values. If there is a constant value in this property each Y sample has a X value equal to the product among X Data and the index in array.<br>Ex. $Y = \text{track}[3] = 20 \text{ X} = 3 * \text{X Data}$ |
| <i>X Color</i>        | ...                        | Color of X-Axis label.                                                                                                                                                                                                   |
| <i>Grid Step</i>      | Value                      | Space among two points of grid in pixel. The property is sensible if the grid is visible.                                                                                                                                |
| <i>Sample Buffer</i>  | Value                      | Number of samples that the runtime can store. The older are deleted if the size has exceeded.                                                                                                                            |
| <i>Grid Color</i>     | ...                        | Color of grid if it is visible.                                                                                                                                                                                          |
| <i>Bord. Color</i>    | ...                        | Color of border grid.                                                                                                                                                                                                    |
| <i>Vertical Bar 1</i> | $\geq 0$ , <i>var_name</i> | Name of variable for drawing a vertical fixed bar on chart. It is allowed also a constant value. The * symbol means that there is not this vertical bar.                                                                 |
| <i>Color bar 1</i>    | ...                        | Color of vertical bar 1 if different from *.                                                                                                                                                                             |
| <i>Vertical Bar 2</i> |                            | As <i>Vert. Bar 1</i> , but relative to bar 2.                                                                                                                                                                           |
| <i>Color bar 2</i>    |                            | As <i>Color bar 1</i> , but relative to bar 2.                                                                                                                                                                           |
| <i>Vertical Bar 3</i> |                            | As <i>Vert. Bar 1</i> , but relative to bar 3.                                                                                                                                                                           |
| <i>Color bar 3</i>    |                            | As <i>Color bar 1</i> , but relative to bar 3.                                                                                                                                                                           |
| <i>Clear Data</i>     | <i>var_name</i>            | Boolean variable. If it is <i>TRUE</i> and <i>Refresh</i> is <i>TRUE</i> the chart deletes all the previous data.                                                                                                        |

## 5.14.2 EVENTS

| Event               | Description                              |
|---------------------|------------------------------------------|
| <i>BeforeUpdate</i> | Before the object is redrawn.            |
| <i>AfterUpdate</i>  | Immediately after the object is redrawn. |

## 5.15 TREND

### 5.15.1 PROPERTIES

| Properties  | Available values | Description                                    |
|-------------|------------------|------------------------------------------------|
| <i>XPos</i> | $\geq 0$         | Top-left 'x coordinate' edge relative to page. |
| <i>YPos</i> | $\geq 0$         | Top-left 'y coordinate' edge relative to page. |
| <i>XDim</i> | $> 0$            | Width (#pixel).                                |
| <i>YDim</i> | $> 0$            | Height (#pixel).                               |
| <i>Name</i> | Not empty        | Name of object.                                |



| Properties              | Available values           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Track 1</i>          | <i>var_name</i>            | <p>Open a dialog with the following options:</p> <ul style="list-style-type: none"> <li>- the variable will be sampled each <i>Sampling Time</i> seconds;</li> <li>- the visibility condition of the track (<i>TRUE</i> or boolean variable);</li> <li>- color of the track;</li> <li>- the scale factor (range among two horizontal divisions);</li> <li>- the offset (displacement of the track 0-Y);</li> <li>- step of print label for Y axis;</li> <li>- three horizontal bars with name, value and colors.</li> </ul> <p>If <i>var_name</i> is empty the track is not defined and not drawn.</p> |
| <i>Track 2</i>          | <i>var_name</i>            | As <i>Track 1</i> , but for track 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>Track 3</i>          | <i>var_name</i>            | As <i>Track 1</i> , but for track 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>Track 4</i>          | <i>var_name</i>            | As <i>Track 1</i> , but for track 4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>Track 5</i>          | <i>var_name</i>            | As <i>Track 1</i> , but for track 5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>Track 6</i>          | <i>var_name</i>            | As <i>Track 1</i> , but for track 6.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>Track 7</i>          | <i>var_name</i>            | As <i>Track 1</i> , but for track 7.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>Track 8</i>          | <i>var_name</i>            | As <i>Track 1</i> , but for track 8.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>Track Left</i>       | $\geq 0$ , <i>var_name</i> | Integer value that is the track for Y axis left. It is admitted a constant value (ex. 1). If empty means that the chart must not draw the label for Y axis left.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>Track Right</i>      | $\geq 0$ , <i>var_name</i> | As <i>Track Left</i> for the right side.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <i>Format Left</i>      | String as <i>printf</i>    | Format of Y axis left as <i>c printf</i> function.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>Format Right</i>     | String as <i>printf</i>    | As <i>Format Left</i> for the right side.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>XLabel</i>           | $\geq 0$ , <i>var_name</i> | Step for X-axis labels. How many divisions of horizontal bar must have labels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>X Scale</i>          | <i>var_name</i>            | Scale factor of x-Axis. Value range among two divisions of horizontal bars. An empty value indicates that the chart is in autoscale mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Sampling Time</i>    | $> 0$                      | Sampling time measured in seconds. Every <i>Sampling Time</i> seconds the trend sample the value even if the chart is not shown.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>X Offset</i>         | <i>var_name</i>            | Variable name for the deviation of 0 for x-Axis, left or right. A positive value moves the chart values to left.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>Grid</i>             | <i>Yes, No</i>             | Visibility of the grid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>X Div. Grid</i>      | Value                      | Number of division on horizontal bar, used with scale factor and offset for drawing the chart tracks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>Y Div. Grid</i>      | Value                      | Number of division on vertical bar, used with scale factor and offset for drawing the chart tracks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>Background color</i> | ...                        | Background color selectable from palette.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |



| Properties            | Available values               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Appearance</i>     | <i>Flat, Raised, Sunken</i>    | <ul style="list-style-type: none"> <li>- <i>Flat</i>: plain with use of <i>Border pts</i> and <i>Border col</i>;</li> <li>- <i>Raised</i>;</li> <li>- <i>Sunken</i>.</li> </ul>                                                                                                                                                                                                                                                                                                                                    |
| <i>Border points</i>  | $\geq 0$                       | Border thickness (#pixel). This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> .                                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>Border color</i>   | ...                            | Border color selectable from palette. This property is sensible only if <i>Appearance</i> is set to <i>Flat</i> or <i>Text</i> is not empty.                                                                                                                                                                                                                                                                                                                                                                       |
| <i>Font</i>           | Name found in <i>Resources</i> | Font used for drawing the label in object.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>Refresh</i>        | <i>TRUE, FALSE, var_name</i>   | <p>Continuous redraw of the object:</p> <ul style="list-style-type: none"> <li>- <i>FALSE</i>: the chart is updated only when opening page or when a child page is closed;</li> <li>- <i>TRUE</i>: the chart object is always updated, synchronized with others objects;</li> <li>- <i>var_name</i>: the chart is drawn on rising edge of boolean variable. This value <i>TRUE</i> of this variable is the moment when the char adds the samples.</li> </ul> <p>(Len Data &lt;&gt; internal HMI index of data)</p> |
| <i>Visible</i>        | <i>TRUE, FALSE, var_name</i>   | Visible status of the object. It can be constant ( <i>TRUE</i> or <i>FALSE</i> ) or linked with a boolean variable <i>var_name</i> : if <i>var_name</i> is <i>TRUE</i> the object is visible, otherwise it is hidden.                                                                                                                                                                                                                                                                                              |
| <i>Format Time</i>    | <i>Default list</i>            | <p>Format for X-axis label. The choices are:</p> <ul style="list-style-type: none"> <li>- <i>ss</i>: seconds;</li> <li>- <i>mm.ss</i>: minutes, seconds;</li> <li>- <i>hh.mm</i>: hours, minutes;</li> <li>- <i>hh.mm.ss</i>: hours, minutes, seconds.</li> </ul>                                                                                                                                                                                                                                                  |
| <i>X Color</i>        | ...                            | Color of X-Axis label.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>Grid Step</i>      | Value                          | Space among two points of grid in pixel. The property is sensible if the grid is visible.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>Sample buffer</i>  | Value                          | Number of samples that the runtime can store. The older are deleted if the size has exceeded.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>Grid Color</i>     | ...                            | Color of grid if it is visible.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>Bord. Color</i>    | ...                            | Color of border grid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Vertical Bar 1</i> | $\geq 0$ , <i>var_name</i>     | Name of variable for drawing a vertical fixed bar on chart. It is allowed also a constant value. The * symbol means that there is not this vertical bar.                                                                                                                                                                                                                                                                                                                                                           |
| <i>Color bar 1</i>    | ...                            | Color of vertical bar 1 if different from *.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>Vertical Bar 2</i> |                                | As <i>Vert. Bar 1</i> , but relative to bar 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>Color bar 2</i>    |                                | As <i>Color bar 1</i> , but relative to bar 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |



| Properties            | Available values | Description                                                                                                       |
|-----------------------|------------------|-------------------------------------------------------------------------------------------------------------------|
| <i>Vertical Bar 3</i> |                  | As <i>Vert. Bar 1</i> , but relative to bar 3.                                                                    |
| <i>Color bar 3</i>    |                  | As <i>Color bar 1</i> , but relative to bar 3.                                                                    |
| <i>Clear Data</i>     | <i>var_name</i>  | Boolean variable. If it is <i>TRUE</i> and <i>Refresh</i> is <i>TRUE</i> the chart deletes all the previous data. |

### 5.15.2 EVENTS

| Event               | Description                              |
|---------------------|------------------------------------------|
| <i>BeforeUpdate</i> | Before the object is redrawn.            |
| <i>AfterUpdate</i>  | Immediately after the object is redrawn. |



## 6. APPENDIX II: FILE FOR TARGET DESCRIPTION

The *.def* files contain some definitions of target environment. PageLab uses this information for generating custom code.

The *.def* file consists of two sections. It is allowed comment, that starts with a semicolon(;).

This file is included in *pajx* file.

### 6.1 TARGET PROPERTIES

#### 6.1.1 DESCRIPTION

This section consist of five records, which support one or more parameters. Each record is on new line and the elements must be separated with spaces or tabs.

| Record Structure   |             |             |                                                                                                                                                   |
|--------------------|-------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Header             | Param. 1    | Param. 2    | Description                                                                                                                                       |
| <i>SCREEN</i>      | <i>dimX</i> | <i>dimY</i> | Screen dimension of target measured in pixel:<br>- <i>DimX</i> : width;<br>- <i>DimY</i> : height.                                                |
| <i>SAVESCREEN</i>  | 0/1         | ---         | Target board can save and restore video memory:<br>- 0: no save;<br>- 1: save and restore.                                                        |
| <i>TOUCHSCREEN</i> | 0/1         | ---         | Target board has touchscreen, i.e. can use the pressure events:<br>- 0: no touchscreen;<br>- 1: exists touchscreen.                               |
| <i>REFRESH</i>     | msec        | ---         | Refresh time of all objects in page, measured in milliseconds.                                                                                    |
| <i>FONT_FORMAT</i> | "HH"/"VH"   | ---         | Font encoding.                                                                                                                                    |
| <i>ColorSET</i>    | "RGB"       | ---         |                                                                                                                                                   |
| <i>BMP_FORMAT</i>  | "SIMULAB"   | ---         | Image encoding.                                                                                                                                   |
| <i>UNICODE</i>     | 0/1         | ---         | Target board has support for unicode fonts.                                                                                                       |
| <i>JOYPAD</i>      | 0/1         | ---         | Target board has a joypad that can be used for moving among elements of page and can be connected to actions.                                     |
| <i>INIT</i>        | 0/1         | ---         | If set to 1 says that HMI run-time has <i>Video_InitHMI()</i> , invoked on target start-up. Typically it is used for custom commands on start-up. |
| <i>BMPFULL</i>     | 0/1         | ---         | If set to 1 generates PLC code extended for bitmap instead binary bitmap.                                                                         |



## 6.2 OBJECT VERSION

The graphical objects (editbox, textbox, static, bitmap, etc.) can have a version, or cannot exist. The syntax is:

```
CTRL "Name" "Version"
```

where:

- *Name*: name of graphical object. Ex. *Editbox*;
- *Version*: version of HMI run-time objects.

If this value is set to -1, PageLab does not make available this object.

## 6.3 SYSTEM ENUMERATIVES

Enumeratives of *.def* file are maps for binding among numeric values and strings, or other numeric values.

Each enumerative has an identifier, that specifies a function in the map with this syntax:

```
ENUM id en_key en_val
```

where:

- *id*: enumerative identifier;
- *en\_key*: value-key of record, must be a number;
- *en\_val*: value of value-key, can be a number or string.

### 6.3.1 DESCRIPTIONS

This paragraph describes the values for system enumeratives.

- Enumerative 100

With this key you can define new buttons (the names will be shown in the *Key* field of actions table (see 4.8.5).

The number of lines is not limited. But the user must define at least all the elements of 102 enumerative.

- *id*: 100;
- *en\_key*: key encoding, one byte;
- *en\_val*: string with key name.

- Enumerative 101

With this key you can define new actions (the names will be shown in *Action* field of actions table).

- *id*: 101;
- *en\_key*: action identifier;
- *en\_val*: string with action name.

This enumerative has a well defined number of lines. The following table shows you the corresponding actions.

| en_key | Action                                             |
|--------|----------------------------------------------------|
| 0      | Calls local or global procedures.                  |
| 1      | Opens child page.                                  |
| 2      | Closes current page.                               |
| 3      | Selects next object <i>Edit Box, Button, etc..</i> |



| en_key | Action                                                  |
|--------|---------------------------------------------------------|
| 4      | Selects previous object <i>Edit Box, Button</i> , etc.. |
| 9      | Enters editing-mode ( <i>Edit Box, Button</i> ).        |
| 10     | Leaving (not implemented).                              |

The string `en_val` is arbitrary.

#### - Enumerative 102

Selection and edit functions:

- `id: 102;`
- `en_key`: identifier of edit function;
- `en_val`: string with the name of associated string.

The name of this field `en_val` must be the same of `en_val` of 100 enumerative, so that PageLab associates an edit function with a key.

This enumerative has a well defined number of lines. See the actions in the table below:

| en_key | Edit function                                                              |
|--------|----------------------------------------------------------------------------|
| 0      | Confirms modifications and leaves editing-mode.                            |
| 1      | Loses modification and leaves editing-mode.                                |
| 2      | Deletes selected character.                                                |
| 3      | Moves cursor left.                                                         |
| 4      | Moves cursor right.                                                        |
| 5      | Selects the previous element of an enumerative associated with an Editbox. |
| 6      | Selects the next element of an enumerative associated with an Editbox.     |
| 7      | Deletes the first character on the left.                                   |
| 8      | Inserts tab character.                                                     |
| 9      | Switching to uppercase alphanumeric characters for a single character.     |
| 10     | Transition to permanent uppercase alphanumeric characters.                 |

#### - Enumerative 103

Define a color palette, the encoding is RGB:

- `id: 103;`
- `en_key`: index of the color inside palette;
- `en_val`: RGB color encoding.

RGB encoding represents 24 bit of colors: `0x00bbggrr` where `bb` (1 byte) intensity of blue, `gg` (1 byte) the green and `rr` (1 byte) the red. The intensity is at least 0 and at most `0xff`.

The number of lines is not limited. The user can define which colors he wants.

#### - Enumerative 104

Names of object styles (shown on *Appearance* property):

- `id: 104;`
- `en_key`: style;
- `en_val`: string with the name of style.

This enumerative contains at most 3 records, supported by PageLab.



| en_key | Style        |
|--------|--------------|
| 0      | Flat, plane. |
| 1      | Raised.      |
| 2      | Sunken.      |

### 6.3.2 EXAMPLE

```

;
;   Target properties
;
SCREEN      128   64
SAVESCREEN  1
REFRESH     50
FONT_FORMAT      "VH"
JOYPAD       1
INIT         1
BMPFULL      1
UNICODE      1
;
;   Versions of controls
;
CTRL"Static"          1
CTRL"EditBox"         1
CTRL"TextBox"        -1
CTRL"Button"          2
CTRL"Progress"        0
CTRL"Animation"       0
CTRL"Image"           0
CTRL"CustomCtrl"-1
CTRL"Chart"           -1
CTRL"Trend"           -1

;
;   Enumeratives
;
;   ENUM 100: key codes
;
ENUM100   13   "Enter"
ENUM100   8    "Left"
ENUM100   12   "Right"
ENUM100   11   "Up"
ENUM100   10   "Down"

```



```

ENUM100    19    "LongEnter"
ENUM100    15    "LongLeft"
ENUM100    16    "LongRight"
ENUM100    17    "LongUp"
ENUM100    18    "LongDown"
ENUM100    30    "VK_F1"
ENUM100    31    "VK_F2"
ENUM100    32    "VK_F3"
ENUM100    33    "VK_F4"
ENUM100    34    "VK_F5"
ENUM100    35    "VK_F6"
ENUM100    36    "VK_F7"
ENUM100    37    "VK_F8"
ENUM100    38    "VK_F9"
ENUM100    39    "VK_F10"
;
; ENUM 101: key-related actions
;
ENUM101     0    "Call"
ENUM101     1    "OpenPage"
ENUM101     2    "Close"
ENUM101     3    "NextField"
ENUM101     4    "PrevField"
ENUM101     9    "Edit"
;
; ENUM 102: editing-mode keys
;
ENUM102     0    "Enter"
ENUM102     1    "LongLeft"
ENUM102     3    "Left"
ENUM102     4    "Right"
ENUM102     5    "Up"
ENUM102     6    "Down"
;
; ENUM 103: color codes
;
;                               BBGRR
ENUM103     0    "0x00000000"  ; Bianco
ENUM103     1    "0x00FFFFFF"  ; Nero
;
; ENUM 104: controls appearance
;
ENUM104     0    "Flat"
ENUM104     1    "Raised"
ENUM104     2    "Sunken"

```





## 7. APPENDIX III: DESCRIPTION OF PARAMETER FILE

As described in section 2.8.4 it is possible to link in PageLab some variables from external device.

In some objects you can define an explicit or implicit syntax in order to use the parameter mode.

To use the implicit syntax, @Device.Parametro, PageLab requires a .PARX file in xml format.

For example:

```
<parameters>
<par ipa="10100" name="Par_TAB" descr="Tab (map code)" defval="0" min="0"
max="65535" um="num" typetarg="unsignedShort">
  <protocol name="Modbus" commaddr="15716" commsubindex="0"/>
  <protocol name="CanOpen" commaddr="15716" commsubindex="0"/>
</par>
<par ipa="10001" name="Gain_Ntc_AI2" descr="NTC calibration gain AI2" de-
fval="32768" min="0" max="65535" um="num" typetarg="unsignedShort">
  <protocol name="Modbus" commaddr="15617" commsubindex="0"/>
  <protocol name="CanOpen" commaddr="15617" commsubindex="0"/>
</par>
<par ipa="11308" readonly="false" name="Modem_InitStr1" defval="" descr="Init
String (1st part)" typetarg="string" strsize="19">
  <protocol name="Modbus" commaddr="15821" commsubindex="0"/>
  <protocol name="CanOpen" commaddr="15821" commsubindex="0"/>
</par>
</parameters>
```

Where each parameter has these fields.

- *ipa*: parameter index used as input value of *Video\_SetParam()*, *Video\_GetParam()*. If there are nodes with protocol type, they have more priority than *ipa*, so PageLab uses them.
- *Name*: parameter name.
- *descr*: complete description of parameter.
- *defval*: default value of parameter.
- *min*: minimum value of parameter.
- *max*: maximum value of parameter.
- *um*: measure unit of parameter.
- *typetarg*: type of parameter.

The available values with the translation in PLC are:

- *char*: SINT;
- *unsignedChar*: USINT;
- *short*: INT;
- *unsignedShort*: UINT;
- *int*: DINT;
- *unsignedInt*: UDINT;
- *boolean*: BOOL;



- *digitalInput*: BOOL;
  - *digitalOutput*: BOOL;
  - *float*: REAL;
  - *double*: REAL;
  - *string*: STRING.
- *strsize*: number of character if it is a string type.

## 8. APPENDIX IV: ELEMENTS OF HMI RUNTIME

### 8.1 FUNCTIONS

This chapter lists all the functions that HMI run-time exports to PageLab and so the user can use them into script and procedures.

These functions are divided into several categories which are shown in details in the following paragraphs.

#### 8.1.1 SYSTEM FUNCTIONS: HARDWARE AND OPERATING SYSTEM

```
unsigned char Video_InitHMI (unsigned char dmy)
```

Function of initialization for HMI runtime

| Parameter     | Description                                        |
|---------------|----------------------------------------------------|
| dmy           | Reserved. Set 0.                                   |
| Return Value  | Description                                        |
| Video_InitHMI | <i>TRUE</i> if successful, <i>FALSE</i> otherwise. |

```
unsigned char Video_Switch (unsigned char on);
```

Turn on/off the display

| Parameter    | Description                                                                 |
|--------------|-----------------------------------------------------------------------------|
| on           | <i>TRUE</i> : turns on the display.<br><i>FALSE</i> : turns of the display. |
| Return Value | Description                                                                 |
| Video_Switch | Not sensible (always <i>TRUE</i> ).                                         |

```
unsigned char Video_LCDContrast( unsigned char more );
```

Display contrast

| Parameter         | Description                                                                             |
|-------------------|-----------------------------------------------------------------------------------------|
| more              | <i>TRUE</i> : increases display contrast.<br><i>FALSE</i> : decreases display contrast. |
| Return Value      | Description                                                                             |
| Video_LCDContrast | Not sensible (always <i>TRUE</i> ).                                                     |

```
unsigned char Video_SaveRect( unsigned short x1, unsigned short y1, unsigned short x2, unsigned short y2 );
```

Save display area to memory

| Parameter | Description                                            |
|-----------|--------------------------------------------------------|
| x1        | Top-left 'x coordinate' edge relative to full page.    |
| y1        | Top-left 'y coordinate' edge relative to full page.    |
| x2        | Bottom-down 'x coordinate' edge relative to full page. |
| y2        | Bottom-down 'y coordinate' edge relative to full page. |



| Return Value   | Description                         |
|----------------|-------------------------------------|
| Video_SaveRect | Not sensible (always <i>TRUE</i> ). |

```
unsigned char Video_WriteFromBuff( unsigned short x1,unsigned short y1, unsigned short x2,unsigned short y2 );
```

Restore display area from memory (previously saved with Video\_SaveRect).

| Parameter           | Description                                             |
|---------------------|---------------------------------------------------------|
| x1                  | Not sensible (saved area has the original coordinates). |
| y1                  | Not sensible (saved area has the original coordinates). |
| x2                  | Not sensible (saved area has the original coordinates). |
| y2                  | Not sensible (saved area has the original coordinates). |
| Return Value        | Description                                             |
| Video_WriteFromBuff | Not sensible (always <i>TRUE</i> ).                     |

```
unsigned char Video_Lock( unsigned char res );
```

Lock the display resources for exclusive access

| Parameter    | Description                                        |
|--------------|----------------------------------------------------|
| res          | Reserved. Set 0.                                   |
| Return Value | Description                                        |
| Video_Lock   | Not sensible (return input parameter <i>res</i> ). |

```
unsigned char Video_Unlock( unsigned char res );
```

Unlock the display resource after exclusive access

| Parameter    | Description                                        |
|--------------|----------------------------------------------------|
| res          | Reserved. Set 0.                                   |
| Return Value | Description                                        |
| Video_Unlock | Not sensible (return input parameter <i>res</i> ). |

```
unsigned char Video_Sleep( unsigned short msec );
```

Suspend the task where the function is used

| Parameter    | Description                             |
|--------------|-----------------------------------------|
| msec         | Suspends time measured in milliseconds. |
| Return Value | Description                             |
| Video_Unlock | Not sensible (always <i>TRUE</i> ).     |

## 8.1.2 FUNCTION FOR MANAGING PROJECT RESOURCES AND COMMON PROPERTIES

```
unsigned char Video_SetWndSysProps( unsigned long pFont, unsigned long colFore, unsigned long colBack );
```

Set common properties for all pages in the project



| Parameter                         | Description                                                                                                        |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------|
| pFont                             | Address of font for printing text in title bar (the font must be added with <code>Video_AddFont</code> function ). |
| colFore                           | Text color of <i>Title Bar</i> .                                                                                   |
| colBack                           | Background color of <i>Title Bar</i> .                                                                             |
| Return Value                      | Description                                                                                                        |
| <code>Video_SetWndSysProps</code> | Not sensible (always <i>TRUE</i> ).                                                                                |

```
unsigned char Video_SetEditKey( unsigned char id, unsigned char code );
```

Set key-code for editing functions

| Parameter                     | Description                                                         |
|-------------------------------|---------------------------------------------------------------------|
| id                            | Identifier of editing function (see. Enumerative table 102, 6.3.1). |
| code                          | Key code associated with editing function.                          |
| Return Value                  | Description                                                         |
| <code>Video_SetEditKey</code> | Not sensible (always <i>TRUE</i> ).                                 |

```
unsigned char Video_AddFont( unsigned long pFont, unsigned char charLen,
unsigned char charHei, unsigned char offs );
```

Publish a new font in HMI run-time

| Parameter                  | Description                                                               |
|----------------------------|---------------------------------------------------------------------------|
| pFont                      | Address of first byte of font.                                            |
| charLen                    | Character width of font (#pixel).                                         |
| charHei                    | Character height of font (#pixel).                                        |
| offs                       | Byte offset of a font that starts with ASCII 0x00 (subset of characters). |
| Return Value               | Description                                                               |
| <code>Video_AddFont</code> | <i>TRUE</i> if successful, <i>FALSE</i> otherwise.                        |

```
unsigned char Video_AddFontUnicode( unsigned long pFont, unsigned char char-
Len, unsigned char charHei );
```

Publish a new unicode font in HMI run-time

| Parameter                         | Description                                        |
|-----------------------------------|----------------------------------------------------|
| pFont                             | Address of first byte of font.                     |
| charLen                           | Character width of font (#pixel).                  |
| charHei                           | Character height of font (#pixel).                 |
| Return Value                      | Description                                        |
| <code>Video_AddFontUnicode</code> | <i>TRUE</i> if successful, <i>FALSE</i> otherwise. |

```
unsigned char Video_LoadLanguage( unsigned long pResStrings, unsigned long
pEnums );
```

Load strings and enumeratives of any language



| Parameter          | Description                                             |
|--------------------|---------------------------------------------------------|
| pResStrings        | Address of first resources string for current language. |
| pEnums             | Address of first resources string for current language. |
| Return Value       | Description                                             |
| Video_LoadLanguage | <i>TRUE</i> if successful, <i>FALSE</i> otherwise.      |

```

unsigned char Video_DrawFrames(unsigned short left, unsigned short top, un-
signed short right, unsigned short bottom,
    unsigned long colBack, unsigned char fBar,
    unsigned long pTitle, unsigned char fResStr,
    unsigned char fSysBtn, unsigned char style );

```

Function for draw frame-set

| Parameter        | Description                                                                                               |
|------------------|-----------------------------------------------------------------------------------------------------------|
| left             | Width of left frame (#pixel).                                                                             |
| top              | Height of top frame (#pixel).                                                                             |
| right            | Width of right frame (#pixel).                                                                            |
| bottom           | Height of bottom frame (#pixel).                                                                          |
| colBack          | Background color.                                                                                         |
| fBar             | - <i>TRUE</i> : shows title bar;<br>- <i>FALSE</i> : hides title-bar.                                     |
| pTitle           | Text of title bar:<br>NULL: No string in title.                                                           |
| fResStr          | - <i>TRUE</i> : pTitle is a resource string;<br>- <i>FALSE</i> : pTitle is an address of constant string. |
| fSysBtn          | - <i>TRUE</i> : shows system;<br>- <i>FALSE</i> : hides system button.                                    |
| style            | - 0: Flat;<br>- 1: Raised;<br>- 2: Sunken.                                                                |
| Return Value     | Description                                                                                               |
| Video_DrawFrames | Not sensible (always <i>TRUE</i> ).                                                                       |

### 8.1.3 FUNCTIONS FOR OPERATING WITH PAGES

```

unsigned char Video_InitPage( unsigned short x1, unsigned short y1, unsigned
short x2, unsigned short y2,
    unsigned long pTitle, unsigned short wData );

```

Show a page on display

| Parameter | Description                                            |
|-----------|--------------------------------------------------------|
| x1        | Top-left 'x coordinate' edge relative to full page.    |
| y1        | Top-left 'y coordinate' edge relative to full page.    |
| x2        | Bottom-down 'x coordinate' edge relative to full page. |



| Parameter      | Description                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| y2             | Bottom-down 'y coordinate' edge relative to full page.                                                                                                                                                                                                                                                                                                                                      |
| pTitle         | Address of <i>Text</i> of title bar:<br>- <i>NULL</i> : no text in title bar.                                                                                                                                                                                                                                                                                                               |
| wData          | Feature declaration:<br>b0..b7:<br>- 0: Flat;<br>- 1: Raised;<br>- 2: Sunken.<br>b8:<br>- 0: no title bar;<br>- 1: shows title bar.<br>b9:<br>- 0: pTitle is an address of constant string;<br>- 1= pTitle is a resource string.<br>b10:<br>- 0: no system button;<br>- 1: shows system button.<br>b11:<br>- 0: window not modal;<br>- 1: modal window (sensible only for pop-ups windows). |
| Return Value   | Description                                                                                                                                                                                                                                                                                                                                                                                 |
| Video_InitPage | Not sensible (always <i>TRUE</i> ).                                                                                                                                                                                                                                                                                                                                                         |

```
unsigned char Video_SetPageColors( unsigned long colFore, unsigned long colBack );
```

Assign all colors for current page

| Parameter           | Description                         |
|---------------------|-------------------------------------|
| colFore             | Color of the text of page.          |
| colBack             | Background color of page.           |
| Return Value        | Description                         |
| Video_SetPageColors | Not sensible (always <i>TRUE</i> ). |

```
unsigned char Video_ClrScreen( );
```

Delete entire display area and fill with background color defined with `Video_SetPageColors`

| Return Value    | Description                                        |
|-----------------|----------------------------------------------------|
| Video_ClrScreen | <i>TRUE</i> if successful, <i>FALSE</i> otherwise. |

```
unsigned char Video_ClrRect( unsigned short x1, unsigned short y1, unsigned short x2, unsigned short y2 );
```

Delete only a portion of display and fill with background color defined with `Video_SetPageColors`



| Parameter     | Description                                            |
|---------------|--------------------------------------------------------|
| x1            | Top-left 'x coordinate' edge relative to full page.    |
| y1            | Top-left 'y coordinate' edge relative to full page.    |
| x2            | Bottom-down 'x coordinate' edge relative to full page. |
| y2            | Bottom-down 'y coordinate' edge relative to full page. |
| Return Value  | Description                                            |
| Video_ClrRect | <i>TRUE</i> if successful, <i>FALSE</i> otherwise.     |

```
unsigned char Video_SetFont( unsigned long fontPtr );
```

Load a font as current font for drawing objects. To correctly execute this function, the font must be declared with Video\_AddFont.

| Parameter     | Description                                        |
|---------------|----------------------------------------------------|
| fontPtr       | Address of first byte of font.                     |
| Return Value  | Description                                        |
| Video_SetFont | <i>TRUE</i> if successful, <i>FALSE</i> otherwise. |

```
unsigned char Video_SetColors( unsigned long colForeTxt, unsigned long col-  
BackTxt, unsigned long colForeSel, unsigned long colBackSel );
```

Assign the current colors for drawing objects

| Parameter       | Description                                        |
|-----------------|----------------------------------------------------|
| colForeTxt      | Text color.                                        |
| colBackTxt      | Background color.                                  |
| colForeSel      | Text color for selection.                          |
| colBackSel      | Background color for selection.                    |
| Return Value    | Description                                        |
| Video_SetColors | <i>TRUE</i> if successful, <i>FALSE</i> otherwise. |

```
unsigned char Video_ResetMaps( unsigned char res );
```

Delete the maps saved for every object. The maps are created adding an object at once, with access mode kACS\_INIT.

| Parameter       | Description                                        |
|-----------------|----------------------------------------------------|
| res             | Reserved. Set 0.                                   |
| Return Value    | Description                                        |
| Video_ResetMaps | Not sensible (return input parameter <i>res</i> ). |



### 8.1.4 FUNCTION FOR OBJECTS

```
unsigned char Video_NextEdit( unsigned char fRWOOnly );
```

Enable selection for next objects identified by *Sel*. *Order* attribute.

| Parameter      | Description                                                                                                                                                        |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fRWOOnly       | Limit for selecting the next edit-box:<br>- <i>FALSE</i> : next edit-box must be selectable;<br>- <i>TRUE</i> : the next edit-box must be selectable and writable. |
| Return Value   | Description                                                                                                                                                        |
| Video_NextEdit | Handle of selected objects; if -1 the function has an error.                                                                                                       |

```
unsigned char Video_PrevEdit( unsigned char fRWOOnly );
```

Enable selection for previous objects identified by *Sel*. *Order* attribute.

| Parameter      | Description                                                                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fRWOOnly       | Limit for selecting the next edit-box:<br>- <i>FALSE</i> : the next edit-box must be selectable;<br>- <i>TRUE</i> : the next edit-box must be selectable and writable. |
| Return Value   | Description                                                                                                                                                            |
| Video_PrevEdit | Handle of selected objects; if -1 the function has an error.                                                                                                           |

```
unsigned char Video_EnterEdit( unsigned short wHnd );
```

Enter edit-mode of an Edit Box otherwise execute the action for a button. The object holds the task until exits from edit-mode.

| Parameter       | Description                                                                                                |
|-----------------|------------------------------------------------------------------------------------------------------------|
| wHnd            | Handle of object that must be edited or execute his action.                                                |
| Return Value    | Description                                                                                                |
| Video_EnterEdit | Return pressed key code for exiting edit-mode. If return -1 is an error only if the object is an edit-box. |

```
unsigned char Video_EnterEditSel( unsigned short wHnd, unsigned char onlySelect )
```

Select object or enter edit-mode of an Edit box otherwise execute the action for a button. The object holds the task until exit from edit-mode.

| Parameter  | Description                                                                                                     |
|------------|-----------------------------------------------------------------------------------------------------------------|
| wHnd       | Handle of object that must be edited or execute his action.                                                     |
| OnlySelect | - <i>FALSE</i> : as VideoEnterEdit();<br>- <i>TRUE</i> : enables only the selection without entering edit-mode. |



| Return Value       | Description                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------------------|
| Video_EnterEditSel | Return pressed key code for exiting edit-mode. If return -1 is an error only if the object is an edit-box. |

```
unsigned char Video_PushButton( unsigned short wHnd );
```

Enter press-mode for buttons. The object holds the task until exit from press-mode. This function is sensible only for touchscreen systems.

| Parameter        | Description                                                                                                                                                                                                 |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| wHnd             | Handle of button.                                                                                                                                                                                           |
| Return Value     | Description                                                                                                                                                                                                 |
| Video_PushButton | <ul style="list-style-type: none"> <li>- <i>TRUE</i>: last pressure event was in button area;</li> <li>- <i>FALSE</i>: last pressure event was outside button area;</li> <li>- <i>-1</i>: error.</li> </ul> |

```
short Video_FirstLastEdit( unsigned char rwReq, unsigned char last )
```

Return the handle of first or last selectable controls.

| Parameter           | Description                                                                                                                                |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| rwReq               | Boolean parameter. It indicates if the function checks for the objects that have read-write access mode.                                   |
| last                | <ul style="list-style-type: none"> <li>- <i>TRUE</i>: last selectable object;</li> <li>- <i>FALSE</i>: first selectable object.</li> </ul> |
| Return Value        | Description                                                                                                                                |
| Video_FirstLastEdit | Handle of the object; -1 if errors or do not exist selectable objects                                                                      |

## 8.1.5 DRAWING FUNCTIONS

```
unsigned char Video_Line( unsigned short x1, unsigned short y1, unsigned short x2, unsigned short y2, unsigned char pts, unsigned long color );
```

Draw a line

| Parameter    | Description                                            |
|--------------|--------------------------------------------------------|
| x1           | Top-left 'x coordinate' edge relative to full page.    |
| y1           | Top-left 'y coordinate' edge relative to full page.    |
| x2           | Bottom-down 'x coordinate' edge relative to full page. |
| y2           | Bottom-down 'y coordinate' edge relative to full page. |
| pts          | Thickness.                                             |
| color        | Line color.                                            |
| Return Value | Description                                            |
| Video_Line   | <i>TRUE</i> if successful, <i>FALSE</i> otherwise.     |

```
unsigned char Video_Rectangle( unsigned short x1, unsigned short y1, unsigned short x2, unsigned short y2, unsigned char pts, unsigned char transp, unsigned long bordCol, unsigned long fillCol );
```



Draw a rectangle

| Parameter       | Description                                                             |
|-----------------|-------------------------------------------------------------------------|
| x1              | Top-left 'x coordinate' edge relative to full page.                     |
| y1              | Top-left 'y coordinate' edge relative to full page.                     |
| x2              | Bottom-down 'x coordinate' edge relative to full page.                  |
| y2              | Bottom-down 'y coordinate' edge relative to full page.                  |
| pts             | Border thickness.                                                       |
| transp          | - <i>TRUE</i> : transparent square;<br>- <i>FALSE</i> : solid square.   |
| bordCol         | Border color.                                                           |
| fillCol         | Fill color. The value is not sensible if <i>transp</i> is <i>TRUE</i> . |
| Return Value    | Description                                                             |
| Video_Rectangle | <i>TRUE</i> if successful, <i>FALSE</i> otherwise.                      |

```
unsigned char Video_DrawBorder( unsigned char style, unsigned short x1, unsigned short y1, unsigned short x2, unsigned short y2, unsigned char pts, unsigned char color );
```

Draw a border outside the rectangle area

| Parameter        | Description                                                |
|------------------|------------------------------------------------------------|
| style            | - 0: flat;<br>- 1: raised;<br>- 2: sunken.                 |
| x1               | Top-left 'x coordinate' edge relative to full page.        |
| y1               | Top-left 'y coordinate' edge relative to full page.        |
| x2               | Bottom-down 'x coordinate' edge relative to full page.     |
| y2               | Bottom-down 'y coordinate' edge relative to full page.     |
| pts              | Border thickness. It is sensible only if <i>style</i> = 0. |
| color            | Border color. It is sensible only if <i>style</i> = 0.     |
| Return Value     | Description                                                |
| Video_DrawBorder | <i>TRUE</i> if successful, <i>FALSE</i> otherwise.         |

```
unsigned char Video_DelBorder( unsigned char style, unsigned short x1, unsigned short y1, unsigned short x2, unsigned short y2, unsigned char pts );
```

Delete a border outside the rectangle area. The color of fill is the page color assigned with Video\_SetPageColors

| Parameter | Description                                            |
|-----------|--------------------------------------------------------|
| style     | - 0: flat;<br>- 1: raised;<br>- 2: sunken.             |
| x1        | Top-left 'x coordinate' edge relative to full page.    |
| y1        | Top-left 'y coordinate' edge relative to full page.    |
| x2        | Bottom-down 'x coordinate' edge relative to full page. |



| Parameter       | Description                                             |
|-----------------|---------------------------------------------------------|
| y2              | Bottom-down 'y coordinate' edge relative to full page.  |
| pts             | Border thickness It's sensible only if <i>style</i> = 0 |
| Return Value    | Description                                             |
| Video_DelBorder | <i>TRUE</i> if successful, <i>FALSE</i> otherwise.      |

```
unsigned char Video_PrintBitmap( unsigned long ptrBmp, unsigned short x,
unsigned short y );
```

Print a bitmap coded with run-time HMI format

| Parameter         | Description                                         |
|-------------------|-----------------------------------------------------|
| ptrBmp            | Address of first byte of bitmap.                    |
| x                 | Top-left 'x coordinate' edge relative to full page. |
| y                 | Top-left 'y coordinate' edge relative to full page. |
| Return Value      | Description                                         |
| Video_PrintBitmap | Not sensible (always <i>TRUE</i> ).                 |

```
unsigned char Video_DelBitmap( unsigned long ptrBmp, unsigned short x, un-
signed short y );
```

Delete a bitmap where it is not transparent, coded with run-time HMI format

| Parameter       | Description                                         |
|-----------------|-----------------------------------------------------|
| ptrBmp          | Address of first byte of bitmap.                    |
| x               | Top-left 'x coordinate' edge relative to full page. |
| y               | Top-left 'y coordinate' edge relative to full page. |
| Return Value    | Description                                         |
| Video_DelBitmap | Not sensible (always <i>TRUE</i> ).                 |

```
unsigned long Video_InitBmpTreeRefresh( unsigned short x1,
unsigned short y1, unsigned short x2, unsigned short y2 );
```

Switch context of drawing area. With this call all the next drawing functions uses the invisible device context

| Parameter                | Description                                            |
|--------------------------|--------------------------------------------------------|
| x1                       | Top-left 'x coordinate' edge relative to full page.    |
| y1                       | Top-left 'y coordinate' edge relative to full page.    |
| x2                       | Bottom-down 'x coordinate' edge relative to full page. |
| y2                       | Bottom-down 'y coordinate' edge relative to full page. |
| Return Value             | Description                                            |
| Video_InitBmpTreeRefresh | Address of invisible device context.                   |

```
unsigned long Video_EndBmpTreeRefresh( unsigned short pDC,
unsigned short x1, unsigned short y1,
unsigned short x2, unsigned short y2 );
```



Restore original device context and copy the area from invisible context to display context

| Parameter               | Description                                            |
|-------------------------|--------------------------------------------------------|
| pDC                     | Address of invisible device context.                   |
| x1                      | Top-left 'x coordinate' edge relative to full page.    |
| y1                      | Top-left 'y coordinate' edge relative to full page.    |
| x2                      | Bottom-down 'x coordinate' edge relative to full page. |
| y2                      | Bottom-down 'y coordinate' edge relative to full page. |
| Return Value            | Description                                            |
| Video_EndBmpTreeRefresh | Not sensible (always <i>TRUE</i> ).                    |

### 8.1.6 FUNCTIONS FOR TEXT

```
unsigned char Video_PrintStr( char * str, unsigned short x, unsigned short y );
```

Print a string using the current font set with *SetFont* and current colors set with *SetColors()*

| Parameter      | Description                                         |
|----------------|-----------------------------------------------------|
| str            | Text to print.                                      |
| x              | Top-left 'x coordinate' edge relative to full page. |
| y              | Top-left 'y coordinate' edge relative to full page. |
| Return Value   | Description                                         |
| Video_PrintStr | Number of chars printed.                            |

```
unsigned char Video_PrintResStr( unsigned short idRes, unsigned short x, unsigned short y );
```

Print a resources string using the current font set with *SetFont* and current colors set with *SetColors()*

| Parameter         | Description                                         |
|-------------------|-----------------------------------------------------|
| idRes             | Identifiers of resource.                            |
| x                 | Top-left 'x coordinate' edge relative to full page. |
| y                 | Top-left 'y coordinate' edge relative to full page. |
| Return Value      | Description                                         |
| Video_PrintResStr | Number of chars printed.                            |

```
unsigned char Video_PrintNChar( char * str, unsigned char accMode, unsigned short x, unsigned short y, unsigned char nChar, unsigned long format );
```

Print at most *nChar* characters of a string, using the current font set with *SetFont* and current colors set with *SetColors()*. It uses also a format for drawing the text.

If *nChar* is less than string length, it truncates the string; otherwise apply the alignment.



| Parameter        | Description                                                                                                                                                                                                                   |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| str              | Text to print.                                                                                                                                                                                                                |
| accMode          | <ul style="list-style-type: none"> <li>- kACS_PRINT: print with colForeTxt and colBackTxt colors.</li> <li>- kACS_SELECT: print with colForeSel and colBackSel colors.</li> </ul>                                             |
| x                | Top-left 'x coordinate' edge relative to full page.                                                                                                                                                                           |
| y                | Top-left 'y coordinate' edge relative to full page.                                                                                                                                                                           |
| nChar            | Maximum number of chars to print.                                                                                                                                                                                             |
| format           | Alignment of text. It is sensible only if <i>nChar &gt; length of str</i> : <ul style="list-style-type: none"> <li>- 0x08 = right alignment;</li> <li>- 0x10 = center alignment;</li> <li>- 0x20 = left alignment.</li> </ul> |
| Return Value     | Description                                                                                                                                                                                                                   |
| Video_PrintNChar | Number of chars of truncated string.                                                                                                                                                                                          |

### 8.1.7 FUNCTIONS FOR PARAMETER ACCESS

```
unsigned short Video_GetParam( unsigned char idxDevice, unsigned short idx-
Param, unsigned char subIdxParam, unsigned long pVal, unsigned char type )
```

Read a parameter from a device

| Parameter      | Description                                                                                                                                                                                       |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| idxDevice      | Index of device connected.                                                                                                                                                                        |
| idxParam       | Index of parameter.                                                                                                                                                                               |
| subIdxParam    | Sub-index of parameter.                                                                                                                                                                           |
| pVal           | Address of variable that contains the read value.                                                                                                                                                 |
| type           | Parameter type. Available values:<br>tyBool, tySInt, tyUSInt, tyByte, tyInt,<br>tyUInt, tyWord, tyDInt, tyUDInt, tyDWord,<br>tyReal, tyString.                                                    |
| Return Value   | Description                                                                                                                                                                                       |
| Video_GetParam | Integer values: <ul style="list-style-type: none"> <li>- 0 = successful;</li> <li>- 1 = index of parameter not found;</li> <li>- 2,8,9 = system errors;</li> <li>- 3 = type not valid.</li> </ul> |

```
unsigned short Video_SetParam( unsigned char idxDevice, unsigned short idx-
Param, unsigned char subIdxParam, unsigned long pVal, unsigned char type )
```



Write a parameter to a device.

| Parameter      | Description                                                                                                                                                                                                                                                                             |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| idxDevice      | Index of device connected.                                                                                                                                                                                                                                                              |
| idxParam       | Index of parameter.                                                                                                                                                                                                                                                                     |
| subIdxParam    | Sub-index of parameter.                                                                                                                                                                                                                                                                 |
| pVal           | Address of variable that contains the value to write.                                                                                                                                                                                                                                   |
| type           | Parameter type. Available values:<br>tyBool, tySInt, tyUSInt, tyByte, tyInt, tyUInt, tyWord, tyDInt, tyUDInt, tyDWord, tyReal, tyString.                                                                                                                                                |
| Return Value   | Description                                                                                                                                                                                                                                                                             |
| Video_SetParam | Integer values:<br>- 0 = successful;<br>- 1 = index of parameter not found;<br>- 2,8,9 = system errors;<br>- 3 = type not valid;<br>- 4 = read-only parameter;<br>- 5 = cannot write now;<br>- 6 = the value is less than the min value;<br>- 7 = the value is more than the max value. |

### 8.1.8 FUNCTIONS FOR EVENTS

```
unsigned char Video_SendEvent( unsigned short msgID, unsigned short wParam
);
```

Send an event from code

| Parameter | Description                                                                                                                                                                                                                                                                                                                                                                        |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| msgID     | Available values:<br>- kWM_NULL = no event;<br>- kWM_KEY = key pressure;<br>- kWM_MSG = open message;<br>- kWM_SELECT = select an edit-box, a button;<br>- kWM_PUSH = pressure on button.                                                                                                                                                                                          |
| wParam    | Event parameter. It has a different meaning according to msgID:<br>- if kWM_NULL= not sensible;<br>- if kWM_KEY= pressed key.<br>For the key a constant value exists. The syntax is:<br>kKEY_<key> Ex. LongLeft -> kKEY_LongLeft<br>- if kWM_MSG =ID of message page to open;<br>- if kWM_SELECT= handle of selected edit-box, button;<br>- if kWM_PUSH= handle of pressed button. |



| Return Value    | Description                                        |
|-----------------|----------------------------------------------------|
| Video_SendEvent | <i>TRUE</i> if successful, <i>FALSE</i> otherwise. |

```
unsigned long Video_GetEvent( unsigned char dmy );
```

Pop an event from queue

| Parameter      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| dmy            | Reserved. Set 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Return Value   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Video_GetEvent | <p>Double word with inside the encoding.</p> <p>16 low bit = type of event:</p> <ul style="list-style-type: none"> <li>- kWM_NULL = no event;</li> <li>- kWM_KEY = key pressure;</li> <li>- kWM_MSG = open message;</li> <li>- kWM_SELECT = select an edit-box, a button;</li> <li>- kWM_PUSH = pressure on button.</li> </ul> <p>16 high bit = event parameter:</p> <ul style="list-style-type: none"> <li>- if kWM_NULL= not sensible;</li> <li>- if kWM_KEY= pressed key;</li> <li>- if kWM_MSG= ID of message page to open;</li> <li>- if kWM_SELECT= handle of selected edit-box, button;</li> <li>- if kWM_PUSH= handle of pressed button.</li> </ul> |

## 8.2 FUNCTION BLOCKS

FUNCTION BLOCK: Video\_GetPageColors

Get the page colors of the page where called

| Frame structure: FB_VIDEO_GETPAGEColorS |        |                         |
|-----------------------------------------|--------|-------------------------|
| Local variables                         | Type   | Description             |
| ---                                     |        |                         |
| Input variables                         | Type   | Description             |
| ---                                     |        |                         |
| Output variables                        | Type   | Description             |
| color                                   | word32 | Text color in the page. |
| back                                    | word32 | Background of the page. |

FUNCTION BLOCK: Static01

Text strings with variable visibility



| Frame structure: FB_STATIC01 |        |                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Local variables              | Type   | Description                                                                                                                                                                                                                                                                                                                                                                            |
| memVis                       | byte   | Visibility status of the previous execution.                                                                                                                                                                                                                                                                                                                                           |
| Input variables              | Type   | Description                                                                                                                                                                                                                                                                                                                                                                            |
| wHnd                         | word16 | Handle of the object. Must be unique among static objects.                                                                                                                                                                                                                                                                                                                             |
| x                            | word16 | Top-left 'x coordinate' edge relative to full page.                                                                                                                                                                                                                                                                                                                                    |
| y                            | word16 | Top-left 'y coordinate' edge relative to full page.                                                                                                                                                                                                                                                                                                                                    |
| accMode                      | byte   | <ul style="list-style-type: none"> <li>- kACS_IDLE = no effect;</li> <li>- kACS_INIT = first draw on display;</li> <li>- kACS_PRINT = update draw on display.</li> </ul>                                                                                                                                                                                                               |
| fResStr                      | byte   | Boolean value: <ul style="list-style-type: none"> <li>- FALSE = pString is the address of string to draw;</li> <li>- TRUE = pString is the identifier of resource string.</li> </ul>                                                                                                                                                                                                   |
| pString                      | word32 | Text to draw. It is different according to fResStr.                                                                                                                                                                                                                                                                                                                                    |
| pFont                        | word32 | Address of font for drawing text. The font must be initialized with Video_AddFont.                                                                                                                                                                                                                                                                                                     |
| foreCol                      | word32 | Text color.                                                                                                                                                                                                                                                                                                                                                                            |
| bckCol                       | word32 | Background color.                                                                                                                                                                                                                                                                                                                                                                      |
| pVisVar                      | word32 | Visibility. Available values: <ul style="list-style-type: none"> <li>- FALSE = text not visible;</li> <li>- TRUE = text always visible;</li> <li>- var_addr = address of boolean variable.</li> </ul>                                                                                                                                                                                  |
| format                       | word16 | Format for numeric values, encoded in 32 bit: <ul style="list-style-type: none"> <li>b3               <ul style="list-style-type: none"> <li>1= right alignment</li> </ul> </li> <li>b4               <ul style="list-style-type: none"> <li>1= center alignment</li> </ul> </li> <li>b5               <ul style="list-style-type: none"> <li>1= left alignment</li> </ul> </li> </ul> |
| style                        | byte   | <ul style="list-style-type: none"> <li>- 0 = flat</li> <li>- 1 = raised</li> <li>- 2 = sunken</li> </ul>                                                                                                                                                                                                                                                                               |
| bordPts                      | byte   | Border thickness. It is sensible only if style = 0                                                                                                                                                                                                                                                                                                                                     |
| bordCol                      | word32 | Border color. It is sensible when style = 0 and bordPts > 0 and not pSelVar = 1 fixed.                                                                                                                                                                                                                                                                                                 |
| selBackCol                   | word32 | Background color when object is selected. It is not sensible if pSelVar = 0 fixed.                                                                                                                                                                                                                                                                                                     |



| Frame structure: FB_STATIC01 |        |                                                                                                                                                                                                                                                                         |
|------------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| selForeCol                   | word32 | Text color when selected. It is not sensible if pSelVar = 0 fixed.                                                                                                                                                                                                      |
| pRefrVar                     | word32 | Variable for update:<br>- <i>FALSE</i> = the object is redrawn only when the page is opening or when returning from child page;<br>- <i>TRUE</i> = the object is always redrawn.                                                                                        |
| pSelVar                      | word32 | Selection flag for the object. Suggest if the object must uses { 'selBackCol' } and { 'selForeCol' }. Available values:<br>- <i>FALSE</i> = object is never selected;<br>- <i>TRUE</i> = object is always selected;<br>- <i>var_addr</i> = address of boolean variable. |
| numChars                     | word16 | Number of max characters. 0 indicates that the string is drawn with the entire value of pString.                                                                                                                                                                        |
| Output variables             | Type   | Description                                                                                                                                                                                                                                                             |
| ---                          |        |                                                                                                                                                                                                                                                                         |

FUNCTION BLOCK: Image

Image object

| Frame structure: FB_IMAGE |        |                                                                                                      |
|---------------------------|--------|------------------------------------------------------------------------------------------------------|
| Local variables           | Type   | Description                                                                                          |
| memVis                    | byte   | Visibility status of the previous execution.                                                         |
| memSel                    | byte   | Selection status of the previous execution.                                                          |
| Input variables           | Type   | Description                                                                                          |
| wHnd                      | word16 | Handle of the object. Must be unique among image objects.                                            |
| x1                        | word16 | Top-left 'x coordinate' edge relative to full page.                                                  |
| y1                        | word16 | Top-left 'y coordinate' edge relative to full page.                                                  |
| px1                       | word32 | Address of variable for moving image on X-Axis. It is sensible only if <i>floating</i> = <i>TRUE</i> |
| py1                       | word32 | Address of variable for moving image on Y-Axis. It is sensible only if <i>floating</i> = <i>TRUE</i> |



| Frame structure: FB_IMAGE |        |                                                                                                                                                                                                                                                                                                             |
|---------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| type_x                    | byte   | Type for px1. Available values:<br>tySInt; tyUSInt; tyByte; tyInt;<br>tyUInt; tyWord; tyDInt; tyUDInt;<br>tyDWord.<br>It is sensible only if <i>floating</i> = <i>TRUE</i> and<br>px1 <> <i>NULL</i>                                                                                                        |
| type_y                    | byte   | Type for py1. Available values:<br>tySInt; tyUSInt; tyByte; tyInt;<br>tyUInt; tyWord; tyDInt; tyUDInt;<br>tyDWord.<br>It is sensible only if <i>floating</i> = <i>TRUE</i> and<br>py1 <> <i>NULL</i>                                                                                                        |
| dx                        | word16 | Width (#pixel).                                                                                                                                                                                                                                                                                             |
| dy                        | word16 | Height (#pixel).                                                                                                                                                                                                                                                                                            |
| style                     | byte   | - 0 = flat<br>- 1 = raised<br>- 2 = sunken                                                                                                                                                                                                                                                                  |
| floating                  | byte   | Position of object:<br>- <i>FALSE</i> = docking<br>- <i>TRUE</i> = floating                                                                                                                                                                                                                                 |
| bordPts                   | byte   | Border thickness. It is sensible only if<br>style = 0                                                                                                                                                                                                                                                       |
| bordCol                   | word32 | Border color. It is sensible when <i>style</i> = 0<br>bordPts > 0 and not pSelVar = 1 fixed.                                                                                                                                                                                                                |
| bordSelCol                | word32 | Border color for selected object. It is<br>sensible when <i>style</i> = 0 and bordPts > 0<br>and not pSelVar = 0 fixed                                                                                                                                                                                      |
| accMode                   | byte   | - kACS_IDLE = no effect<br>- kACS_INIT = first draw on display<br>- kACS_PRINT = update draw on display<br>- kACS_QUERY = request for updating<br>output variables<br>- kACS_BCKQUERY = request for updating<br>output variables when the object is in<br>background pages<br>- kACS_DELETE = delete object |
| pBmp                      | word32 | Address of first byte of bitmap to view. It is<br>not sensible if pSelBmp = 1 fixed.                                                                                                                                                                                                                        |
| pSelBmp                   | word32 | Address of first byte of bitmap to view<br>when selected. It is not sensible if<br>pSelBmp = 0 fixed.                                                                                                                                                                                                       |



| Frame structure: FB_IMAGE |        |                                                                                                                                                                                                                                                                              |
|---------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pSelVar                   | word32 | Selection flag for the object. Suggest if the object must uses { 'bordCol', 'pBmp' } or { 'bordSelCol', 'pSelBmp' }. Available values:<br>- <i>FALSE</i> = object is never selected<br>- <i>TRUE</i> = object is always selected<br>- var_addr = address of boolean variable |
| pVisVar                   | word32 | Flag of visibility. Available values:<br>- <i>FALSE</i> = image not visible<br>- <i>TRUE</i> = image always visible<br>- var_addr = address of boolean variable                                                                                                              |
| Output variable           | Type   | Description                                                                                                                                                                                                                                                                  |
| reqRefr                   | byte   | Request refresh, updated when the object is called with accMode = kACS_QUERY or accMode = kACS_BCKQUERY.                                                                                                                                                                     |
| abs_x1                    | word16 | Top-left 'x coordinate' edge relative to full page obtained with the sum among 'x1' and 'px1'. The value is updated when the object is called with accMode = kACS_INIT or accMode = kACS_QUERY.                                                                              |
| abs_y1                    | word16 | Top-left 'y coordinate' edge relative to full page obtained with the sum among 'y1' and 'py1'. The value is updated when the object is called with accMode = kACS_INIT or accMode = kACS_QUERY.                                                                              |
| mem_x1                    | word16 | Value read from abs_x1 when the object is called with accMode = kACS_INIT or accMode = kACS_PRINT.                                                                                                                                                                           |
| mem_y1                    | word16 | Value read from abs_y1 when the object is called with accMode = kACS_INIT or accMode = kACS_PRINT.                                                                                                                                                                           |

FUNCTION BLOCK: Animation

Animation object

| Frame structure: FB_ANIMATION |        |                                                               |
|-------------------------------|--------|---------------------------------------------------------------|
| Local variables               | Type   | Description                                                   |
| memBmp                        | word32 | Address of bitmap of the previous execution                   |
| Input variables               | Type   | Description                                                   |
| wHnd                          | word16 | Handle of the object. Must be unique among animation objects. |
| x1                            | word16 | Top-left 'x coordinate' edge relative to full page.           |
| y1                            | word16 | Top-left 'y coordinate' edge relative to full page.           |
| x2                            | word16 | Bottom-right 'x coordinate' edge relative to full page.       |



| Frame structure: FB_ANIMATION |        |                                                                                                                                                                                                                 |
|-------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| y2                            | word16 | Bottom-right 'y coordinate' edge relative to full page                                                                                                                                                          |
| style                         | byte   | <ul style="list-style-type: none"> <li>- 0 = flat</li> <li>- 1 = raised</li> <li>- 2 = sunken</li> </ul>                                                                                                        |
| bordPts                       | byte   | Border thickness. It is sensible only if style = 0                                                                                                                                                              |
| bordCol                       | word32 | Border color. It is sensible when style = 0 bordPts > 0 and not pSelVar = 1 fixed                                                                                                                               |
| accMode                       | byte   | <ul style="list-style-type: none"> <li>- kACS_IDLE = no effect</li> <li>- kACS_INIT = first draw on display</li> <li>- kACS_PRINT = update draw on display</li> </ul>                                           |
| pBmpArr                       | word32 | Address of first image to view.                                                                                                                                                                                 |
| pCaseArr                      | word32 | Address of first element of selection.                                                                                                                                                                          |
| nArrEl                        | byte   | Number of elements in image list.                                                                                                                                                                               |
| pBmpDef                       | word32 | Address of bitmap to view pSelVar not in pCaseArr.                                                                                                                                                              |
| pSelVar                       | word32 | Address of variable for selection.                                                                                                                                                                              |
| type                          | byte   | Type of pSelVar. Available values:<br>tyBool; tySInt; tyUSInt; tyByte;<br>tyInt; tyUInt; tyWord; tyDInt;<br>tyUDInt; tyDWord.                                                                                   |
| pVisVar                       | word32 | Flag of visibility. Available values:<br><ul style="list-style-type: none"> <li>- FALSE = image not visible</li> <li>- TRUE = image always visible</li> <li>- var_addr = address of boolean variable</li> </ul> |
| Output variable               | Type   | Description                                                                                                                                                                                                     |
| ---                           |        |                                                                                                                                                                                                                 |

FUNCTION BLOCK: Button02

Button object

| Frame structure: FB_BUTTON02 |        |                                                             |
|------------------------------|--------|-------------------------------------------------------------|
| Local variables              | Type   | Description                                                 |
| memVis                       | byte   | Visibility status of the previous execution.                |
| memTransp                    | byte   | Transparency status of the previous execution.              |
| memSel                       | byte   | Selection status of the previous execution.                 |
| Input variables              | Type   | Description                                                 |
| wHnd                         | word16 | Handle of the object. Must be unique among buttons objects. |
| x1                           | word16 | Top-left 'x coordinate' edge relative to full page.         |
| y1                           | word16 | Top-left 'y coordinate' edge relative to full page.         |



| Frame structure: FB_BUTTON02 |        |                                                                                                                                                                          |
|------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| x2                           | word16 | Bottom-right 'x coordinate' edge relative to full page.                                                                                                                  |
| y2                           | word16 | Bottom-right 'y coordinate' edge relative to full page.                                                                                                                  |
| fResStr                      | byte   | Boolean value:<br>- <i>FALSE</i> = pString is the address of string to draw<br>- <i>TRUE</i> = pString is the identifier of resource string                              |
| pText                        | word32 | Text to draw on the button. It has different meaning according to fResStr. If this field is <i>NULL</i> , no text is drawn.                                              |
| pFont                        | word32 | Address of font for drawing text. The font must be initialized with Video_AddFont.                                                                                       |
| style                        | byte   | - 0 = flat<br>- 1 = raised<br>- 2 = sunken                                                                                                                               |
| bordPts                      | byte   | Border thickness. It is sensible only if style = 0                                                                                                                       |
| bordCol                      | word32 | Border color and text color. It is sensible only if style = 0 and bordPts > 0, or pString different as <i>NULL</i> , and not pSelVar = 1 fixed.                          |
| fillCol                      | word32 | Color of button area. It is sensible only if pTransp different as 1 fixed, and not pSelVar = 1 fixed.                                                                    |
| bordSelCol                   | word32 | Border color and text color when selected. It is sensible only if style = 0 and bordPts > 0, or pString different as <i>NULL</i> , and not pSelVar = 0 fixed.            |
| fillSelCol                   | word32 | Color of button area when selected. It is sensible only if pTransp different as 1 fixed, and not pSelVar = 0 fixed.                                                      |
| accMode                      | byte   | - kACS_IDLE = no effect<br>- kACS_INIT = first draw on display<br>- kACS_PRINT = update draw on display                                                                  |
| pVisVar                      | word32 | Flag of visibility. Available values:<br>- <i>FALSE</i> = image not visible<br>- <i>TRUE</i> = image always visible<br>- var_addr = address of boolean variable          |
| pTransp                      | word32 | Flag of transparency. Available values:<br>- <i>FALSE</i> = button always solid<br>- <i>TRUE</i> = button always transparent<br>- var_addr = address of boolean variable |



| Frame structure: FB_BUTTON02 |        |                                                                                                                                                                                                                                                                                   |
|------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pPressVar                    | word32 | Address of a boolean variable.<br>Pressed button= *pPressVar = <i>TRUE</i><br>Released button= *pPressVar = <i>FALSE</i> .<br>If the field is <i>NULL</i> there is no variable.                                                                                                   |
| pSelVar                      | word32 | Selection flag for the object. Suggest if the object must uses {'bordCol', 'fillCol'} or {'bordSelCol', 'fillSelCol'}.<br>Available values:<br>- <i>FALSE</i> = object is never selected<br>- <i>TRUE</i> = object is always selected<br>- var_addr = address of boolean variable |
| format                       | word16 | Format of numeric values encoded with 16 bit:<br>b4<br>1= right alignment<br>b5<br>1= center alignment<br>b6<br>1=left alignment                                                                                                                                                  |
| order                        | word16 | Number for establishing a sequential selection                                                                                                                                                                                                                                    |
| Output variable              | Type   | Description                                                                                                                                                                                                                                                                       |
| ---                          |        |                                                                                                                                                                                                                                                                                   |

FUNCTION BLOCK: EditBox01

Edit object

| Frame structure: FB_EDITBOX01 |        |                                                                                    |
|-------------------------------|--------|------------------------------------------------------------------------------------|
| Local variables               | Type   | Description                                                                        |
| memVis                        | byte   | Visibility status of the previous execution.                                       |
| Input variables               | Type   | Description                                                                        |
| wHnd                          | word16 | Handle of the object. Must be unique among edit-box objects.                       |
| x1                            | word16 | Top-left 'x coordinate' edge relative to full page.                                |
| y1                            | word16 | Top-left 'y coordinate' edge relative to full page.                                |
| x2                            | word16 | Bottom-right 'x coordinate' edge relative to full page.                            |
| y2                            | word16 | Bottom-right 'y coordinate' edge relative to full page.                            |
| pFont                         | word32 | Address of font for drawing text. The font must be initialized with Video_AddFont. |
| style                         | byte   | - 0 = flat<br>- 1 = raised<br>- 2 = sunken                                         |
| foreCol                       | word32 | Text color.                                                                        |



| Frame structure: FB_EDITBOX01 |        |                                                                                                                                                                                                                 |
|-------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| bckCol                        | word32 | Background color.                                                                                                                                                                                               |
| foreSelCol                    | word32 | Text color when selected. It is sensible only if pCanSel is not 0 fixed.                                                                                                                                        |
| bckSelCol                     | word32 | Background color when selected. It is sensible only if pCanSel is not 0 constant.                                                                                                                               |
| bordPts                       | byte   | Border thickness. It is sensible only if style = 0                                                                                                                                                              |
| bordCol                       | word32 | Border color. It is sensible when style = 0 bordPts > 0                                                                                                                                                         |
| rw                            | byte   | - FALSE = read-only mode<br>- TRUE = read-write mode                                                                                                                                                            |
| refr                          | byte   | Request refresh:<br>- FALSE = the object is redrawn only when the page is opening or return from child page<br>- TRUE = the object is always redrawn                                                            |
| pVar                          | word32 | Address of variable or parameter according to format. It cannot be NULL.<br>If it is a parameter is encoded in this way:<br>b0..b7 = Subindex parameter<br>b8..b23 = IPA parameter<br>b24..b32 = Device address |
| type                          | byte   | Type of data. Available values:<br>tyBool; tySInt; tyUSInt; tyByte; tyInt;<br>tyUInt; tyWord; tyDInt; tyUDInt;<br>tyDWord, tyReal                                                                               |
| pVarMin                       | word32 | Min value for edit-box variable.<br>If bit b16-b17 (LSB) of field format contains 0 the limit is not set, if contains 1 is a constant limit, if contains 2 it is a variable limit.                              |
| pVarMax                       | word32 | Max value for edit-box variable.<br>If bit b14-b15 (LSB) of field format contains 0 the limit is not set, if contains 1 is a constant limit, if contains 2 it's a variable limit.                               |
| enumId                        | int16  | Identifier of enumerative. If 0 no enumerative associated with this field exists.                                                                                                                               |



| Frame structure: FB_EDITBOX01 |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| format                        | word32 | <p>View format encoded in 32 bit:</p> <p>b0</p> <ul style="list-style-type: none"> <li>- 0 = draw sign only if number is negative</li> <li>- 1 = draw sign also for positive numbers</li> </ul> <p>b1</p> <ul style="list-style-type: none"> <li>- 0 = does not print most significant null digits</li> <li>- 1 = draw zeroes on most significant null digits</li> </ul> <p>b2</p> <ul style="list-style-type: none"> <li>- 0 = 'pVar' is a variable</li> <li>- 1 = 'pVar' is a parameter</li> </ul> <p>b3</p> <p>1 = right alignment</p> <p>b4</p> <p>1 = center alignment</p> <p>b5</p> <p>1 = left alignment</p> <p>b10</p> <p>Exadecimal format, with a..f lowercase</p> <p>b11</p> <p>Exadecimal format, with A..F uppercase</p> <p>b14..b15</p> <ul style="list-style-type: none"> <li>- 0=no max limit</li> <li>- 1=constant max limit</li> <li>- 2=variable max limit</li> </ul> <p>b16..b17</p> <ul style="list-style-type: none"> <li>- 0=no min limit</li> <li>- 1=constant min limit</li> <li>- 2=variable min limit</li> </ul> <p>b24..b26</p> <p>Precision (real numbers)</p> <p>b27..b31</p> <p>Width (cfr. § 1.7.2)</p> |
| pVisVar                       | word32 | <p>Flag of visibility. Available values:</p> <ul style="list-style-type: none"> <li>- <i>FALSE</i> = object not visible</li> <li>- <i>TRUE</i> = object always visible</li> <li>- <i>var_addr</i> = address of boolean variable</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| pCanSel                       | word32 | <p>Available values:</p> <ul style="list-style-type: none"> <li>- <i>FALSE</i> = object not selected</li> <li>- <i>TRUE</i> = object always selected</li> <li>- <i>var_addr</i> = address of boolean variable</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| order                         | byte   | Number for establish a sequential selection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |



| Frame structure: FB_EDITBOX01 |      |                                                                                                                                                                                                                                                                                    |
|-------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| accMode                       | byte | <ul style="list-style-type: none"> <li>- kACS_IDLE = no effect</li> <li>- kACS_INIT = first draw on display</li> <li>- kACS_PRINT = update draw on display</li> <li>- kACS_SELECT = update draw on display when selected</li> <li>- kACS_MODIFY = enter in editing mode</li> </ul> |
| Output variable               | Type | Description                                                                                                                                                                                                                                                                        |
| outKey                        | char | Key code for exiting editing-mode.                                                                                                                                                                                                                                                 |

FUNCTION BLOCK: TextBox

Text box object

| Frame structure: FB_TEXTBOX |        |                                                                                                                                           |
|-----------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Local variables             | Type   | Description                                                                                                                               |
| memVis                      | byte   | Visibility status of the previous execution.                                                                                              |
| base                        | word16 | Number of first line seen in object.                                                                                                      |
| Input variables             | Type   | Description                                                                                                                               |
| wHnd                        | word16 | Handle of the object. Must be unique among textbox objects.                                                                               |
| x1                          | word16 | Top-left 'x coordinate' edge relative to full page.                                                                                       |
| y1                          | word16 | Top-left 'y coordinate' edge relative to full page.                                                                                       |
| x2                          | word16 | Bottom-right 'x coordinate' edge relative to full page.                                                                                   |
| y2                          | word16 | Bottom-right 'y coordinate' edge relative to full page.                                                                                   |
| pFont                       | word32 | Address of font for drawing text. The font must be initialized with <code>Video_AddFont</code> .                                          |
| style                       | byte   | <ul style="list-style-type: none"> <li>- 0 = flat</li> <li>- 1 = raised</li> <li>- 2 = sunken</li> </ul>                                  |
| foreCol                     | byte   | Text color.                                                                                                                               |
| bckCol                      | byte   | Background color.                                                                                                                         |
| bordPts                     | byte   | Border thickness It is sensible only if <code>style = 0</code>                                                                            |
| bordCol                     | byte   | Border color. It is sensible when <code>style = 0</code> and <code>bordPts &gt; 0</code>                                                  |
| LineNr                      | byte   | <ul style="list-style-type: none"> <li>- <code>FALSE</code> = hide line number</li> <li>- <code>TRUE</code> = show line number</li> </ul> |
| rw                          | byte   | <ul style="list-style-type: none"> <li>- <code>FALSE</code> = read-only mode</li> <li>- <code>TRUE</code> = read-write mode</li> </ul>    |
| pVar                        | word32 | Address of string variable. It cannot be <code>NULL</code> .                                                                              |
| szpVar                      | word32 | Size of pVar.                                                                                                                             |



| Frame structure: FB_TEXTBOX |        |                                                                                                                                                                                                                                                                                                                         |
|-----------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pVisVar                     | word32 | Flag of visibility. Available values:<br>- <i>FALSE</i> = object not visible<br>- <i>TRUE</i> = object always visible<br>- var_addr= address of boolean variable                                                                                                                                                        |
| order                       | byte   | Number for establishing a sequential selection.                                                                                                                                                                                                                                                                         |
| accMode                     | byte   | Access mode. Available values:<br>- kACS_IDLE = no effect<br>- kACS_INIT = first draw on display<br>- kACS_PRINT = update draw on display<br>- kACS_SELECT = update draw on display when selected<br>- kACS_MODIFY = enter editing mode<br>- kACS_SCROLLUP= scroll up one line<br>- kACS_SCROLLDW= scroll down one line |
| rqCursPos                   | word16 | Char Index where move the cursor.                                                                                                                                                                                                                                                                                       |
| rqCursRow                   | word16 | Row to select.                                                                                                                                                                                                                                                                                                          |
| dispCurs                    | byte   | - <i>TRUE</i> = the cursor is always visible even if it is not enabled editing mode<br>- <i>FALSE</i> = the cursor is visible only if it is enabled editing mode.                                                                                                                                                       |
| dispRow                     | byte   | - <i>TRUE</i> = the row selection is always visible even if it is not enabled editing mode<br>- <i>FALSE</i> = the row selection is visible only if it is enabled editing mode                                                                                                                                          |
| bckSelCol                   | word32 | Future developments.                                                                                                                                                                                                                                                                                                    |
| wParam                      | word32 | Future developments.                                                                                                                                                                                                                                                                                                    |
| lParam                      | word32 | Future developments.                                                                                                                                                                                                                                                                                                    |
| Output variable             | Type   | Description                                                                                                                                                                                                                                                                                                             |
| outKey                      | char   | Key code for exiting editing-mode.                                                                                                                                                                                                                                                                                      |
| outCursPos                  | word16 | Char index where there is the cursor.                                                                                                                                                                                                                                                                                   |
| outCursRow                  | word16 | Index of selected row.                                                                                                                                                                                                                                                                                                  |

FUNCTION BLOCK: Progress

Progress bar object

| Frame structure: FB_PROGRESS |        |                                                              |
|------------------------------|--------|--------------------------------------------------------------|
| Local variables              | Type   | Description                                                  |
| memVis                       | byte   | Visibility status of the previous execution                  |
| memVal                       | word32 | Progress status of the previous execution                    |
| Input variables              | Type   | Description                                                  |
| wHnd                         | word16 | Handle of the object. Must be unique among progress objects. |
| x1                           | word16 | Top-left 'x coordinate' edge relative to full page.          |
| y1                           | word16 | Top-left 'y coordinate' edge relative to full page.          |



| Frame structure: FB_PROGRESS |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| x2                           | word16 | Bottom-right 'x coordinate' edge relative to full page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| y2                           | word16 | Bottom-right 'y coordinate' edge relative to full page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| style                        | byte   | <ul style="list-style-type: none"> <li>- 0 = flat</li> <li>- 1 = raised</li> <li>- 2 = sunken</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| barCol                       | word32 | Color of step bar.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| bckCol                       | word32 | Background color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| bordPts                      | byte   | Border thickness. It is sensible only if <code>style = 0</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| bordCol                      | word32 | Border color. It is sensible when <code>style = 0</code> and <code>bordPts &gt; 0</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| pVar                         | word32 | Step variable. This is the filling percentage of bar in relation with the range assigned by <code>pMin</code> and <code>pMax</code> .                                                                                                                                                                                                                                                                                                                                                                                                                          |
| type                         | byte   | Type of <code>pVar</code> . Assigned values:<br><code>tyBool</code> ; <code>tySInt</code> ; <code>tyUSInt</code> ; <code>tyByte</code> ; <code>tyInt</code> ; <code>tyUInt</code> ; <code>tyWord</code> ; <code>tyDInt</code> ; <code>tyUDInt</code> ; <code>tyDWord</code>                                                                                                                                                                                                                                                                                    |
| pMin                         | word32 | Min value for edit-box variable.<br>If bit b0 (LSB) of field <i>format</i> contain 0 is a constant limit, if contain 1 it is a variable limit.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| pMax                         | word32 | Min value for edit-box variable.<br>If bit b1 (LSB) of field <i>format</i> contain 0 is a constant limit, if contain 1 it is a variable limit.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| format                       | word32 | View format encoded in bit:<br>b0 <ul style="list-style-type: none"> <li>- 0 = <code>pMin</code> contains a constant value of Type 'type'</li> <li>- 1 = <code>pMin</code> contains the address of variable of Type 'type'</li> </ul> b1 <ul style="list-style-type: none"> <li>- 0 = <code>pMax</code> contains a constant value of Type type</li> <li>- 1 = <code>pMax</code> contains the address of variable of Type type</li> </ul> b2 <ul style="list-style-type: none"> <li>- 0 = horizontal orientation</li> <li>- 1 = vertical orientation</li> </ul> |
| pVisVar                      | word32 | Flag of visibility. Available values:<br><ul style="list-style-type: none"> <li>- <code>FALSE</code> = object not visible</li> <li>- <code>TRUE</code> = object always visible</li> <li>- <code>var_addr</code> = address of boolean variable</li> </ul>                                                                                                                                                                                                                                                                                                       |
| accMode                      | byte   | Access mode. Available values:<br><ul style="list-style-type: none"> <li>- <code>kACS_IDLE</code> = no effect</li> <li>- <code>kACS_INIT</code> = first draw on display</li> <li>- <code>kACS_PRINT</code> = update draw on display</li> </ul>                                                                                                                                                                                                                                                                                                                 |



| Frame structure: FB_PROGRESS |      |             |
|------------------------------|------|-------------|
| Output variable              | Type | Description |
| ---                          |      |             |

FUNCTION BLOCK: CustomCtrl

Embedded function block which implements custom control

| Frame structure: FB_CUSTOMCTRL |        |                                                                                                                                                                                                                              |
|--------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Local variables                | Type   | Description                                                                                                                                                                                                                  |
| memVis                         | byte   | Visibility status of the previous execution.                                                                                                                                                                                 |
| ptrFunct                       | word32 | Address of function that implements <i>Type</i> wCtrlID.                                                                                                                                                                     |
| data0                          | word32 | Local variable.                                                                                                                                                                                                              |
| data1                          | word32 | Local variable.                                                                                                                                                                                                              |
| data2                          | word32 | Local variable.                                                                                                                                                                                                              |
| data3                          | word32 | Local variable.                                                                                                                                                                                                              |
| Input variables                | Type   | Description                                                                                                                                                                                                                  |
| wHnd                           | word16 | Handle of the object. Must be unique among custom control objects.                                                                                                                                                           |
| x1                             | word16 | Top-left 'x coordinate' edge relative to full page.                                                                                                                                                                          |
| y1                             | word16 | Top-left 'y coordinate' edge relative to full page.                                                                                                                                                                          |
| x2                             | word16 | Bottom-right 'x coordinate' edge relative to full page.                                                                                                                                                                      |
| y2                             | word16 | Bottom-right 'y coordinate' edge relative to full page.                                                                                                                                                                      |
| wCtrlID                        | word16 | Identifier of custom control.                                                                                                                                                                                                |
| pVisVar                        | word32 | Flag of visibility. Available values:<br>- <i>FALSE</i> = object not visible<br>- <i>TRUE</i> = object always visible<br>- <i>var_addr</i> = address of boolean variable                                                     |
| refr                           | byte   | Request refresh:<br>- <i>FALSE</i> = the object is redrawn only when the page is opening or return from child page<br>- <i>TRUE</i> = the object is always redrawn                                                           |
| accMode                        | byte   | Access mode. Available values:<br>- <i>kACS_IDLE</i> = no effect<br>- <i>kACS_INIT</i> = first draw on display<br>- <i>kACS_PRINT</i> = update draw on display<br>The value greater than 200 can be used for custom purpose. |
| wParam                         | word16 | 16 bit data without sign, used for custom purpose                                                                                                                                                                            |
| lParam                         | int32  | 32 bit data with sign, used for custom purpose                                                                                                                                                                               |
| rParam                         | float  | 32 bit real data with sign, used for custom purpose                                                                                                                                                                          |
| Output variable                | Type   | Description                                                                                                                                                                                                                  |
| ---                            |        |                                                                                                                                                                                                                              |



**FUNCTION BLOCK: Chart**
**Chart object**

| <b>Frame structure: FB_CHART</b> |             |                                                                                                                       |
|----------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>Local variables</b>           | <b>Type</b> | <b>Description</b>                                                                                                    |
| memVis                           | byte        | Visibility status of the previous execution                                                                           |
| grx1                             | word16      | Top-left 'x coordinate' edge relative to full page.                                                                   |
| gry1                             | word16      | Top-left 'y coordinate' edge relative to full page.                                                                   |
| grx2                             | word16      | Bottom-right 'x coordinate' edge relative to full page.                                                               |
| gry2                             | word16      | Bottom-right 'y coordinate' edge relative to full page.                                                               |
| pChart                           | word32      | Handle of the chart created after ACS_INIT.                                                                           |
| lastIdxSamples                   | word32      | Actual index of inserted track data.                                                                                  |
| <b>Input variables</b>           | <b>Type</b> | <b>Description</b>                                                                                                    |
| wHnd                             | word16      | Handle of the object. Must be unique among chart objects.                                                             |
| x1                               | word16      | Top-left 'x coordinate' edge relative to full page.                                                                   |
| y1                               | word16      | Top-left 'y coordinate' edge relative to full page.                                                                   |
| x2                               | word16      | Bottom-right 'x coordinate' edge relative to full page.                                                               |
| y2                               | word16      | Bottom-right 'y coordinate' edge relative to full page.                                                               |
| pFont                            | word32      | Address of font for drawing text. The font must be initialized with Video_AddFont.                                    |
| style                            | byte        | <ul style="list-style-type: none"> <li>- 0 = flat</li> <li>- 1 = raised</li> <li>- 2 = sunken</li> </ul>              |
| bordPts                          | byte        | Border thickness. It is sensible only if <i>style</i> = 0                                                             |
| bordCol                          | byte        | Border color. It is sensible when <i>style</i> = 0 and <i>bordPts</i> > 0                                             |
| backCol                          | byte        | Background color.                                                                                                     |
| pNSamples                        | word32      | Address of the number of available samples to add in the chart. This value is used only when refresh is <i>TRUE</i> . |
| tyNSamples                       | byte        | Type of the number of samples.                                                                                        |
| tyXOffset                        | byte        | Type of the offset of X-axis.                                                                                         |
| pXOffset                         | word32      | Address of the offset of X-axis. (move right-left the chart in order to 0 ).                                          |
| tyTrackRight                     | word16      | Type of default track for right Y-Axis                                                                                |
| pTrackRight                      | word32      | Address of the track of right Y-Axis. (if 0 the right label will not drawn).                                          |
| tyTrackLeft                      | word16      | Type of default track for left Y-Axis.                                                                                |



| Frame structure: FB_CHART |        |                                                                                                                                                                                                                                 |
|---------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pTrackLeft                | word32 | Address of the track of left Y-Axis. (if 0 the left label will not drawn).                                                                                                                                                      |
| formatLeft                | word32 | Label format of left Y-Axis.                                                                                                                                                                                                    |
| formatRight               | word32 | Label format of right Y-Axis.                                                                                                                                                                                                   |
| format                    | Word32 | Label format of X-Axis.                                                                                                                                                                                                         |
| iDivGridX                 | word16 | Number of division on horizontal bar , used with scale factor and offset for drawing the chart tracks (Ex. scale X=1, iDivGridX = 5 value between 0 and 5 ). Sensible even if the grid is not visible.                          |
| iDivGridY                 | word16 | Number of division on vertical bar , used with scale factor and offset for drawing the chart tracks (Ex. scale Y=1, iDivGridY = 5 value between 0 and 5 ).<br>Sensible even if the grid is not visible.                         |
| fGrid                     | byte   | Draw grid:<br>- <i>FALSE</i> = grid not visible<br>- <i>TRUE</i> = grid visible                                                                                                                                                 |
| iXLabelDiv                | word16 | Step for X-axis labels. How many division of horizontal bar must have labels.                                                                                                                                                   |
| tyXScaleType              | byte   | Type of X-Axis scale.                                                                                                                                                                                                           |
| pXScale                   | word32 | Address of Scale factor of x-Axis. Value range among two division of horizontal bars. 0 value indicate that the chart is in auto-scale mode.                                                                                    |
| pClearVar                 | Word32 | Address of boolean variable. If it is <i>TRUE</i> the chart delete all the previous data.                                                                                                                                       |
| accMode                   | byte   | Access mode. Available values:<br>- <i>kACS_IDLE</i> = no effect<br>- <i>kACS_INIT</i> = first draw on display<br>- <i>kACS_PRINT</i> = update draw on display<br>- <i>kACS_CLOSE</i> = close the chart and delete all the data |
| pXData                    | word32 | Address or constant for X-Axis definition.<br>Available values:<br>- constant: number of samples * constant start with 0<br>- variable = array that contains pNSamples samples with X-axis value                                |
| tyXData                   | byte   | Type of 'pXData' array. If tyXData = tyUndefined is a constant.                                                                                                                                                                 |
| XlabelCol                 | word32 | Color of X-Axis label.                                                                                                                                                                                                          |
| iDotStep                  | word16 | Space among two points of grid in pixel. The property is sensible if the grid is visible.                                                                                                                                       |
| iSampleBuffer             | word16 | Number of samples that the run-time can store. The older ones are deleted if the size is exceeded.                                                                                                                              |



| Frame structure: FB_CHART |             |                                                                                                                                                                                                                                                                                     |
|---------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| arXBars                   | word32[3]   | Array of addresses of vertical bars. If 0 the vertical bar is not defined, otherwise the address of variable or constant value.                                                                                                                                                     |
| arXBarsType               | word16[3]   | Type of variable that indicates the value of vertical bars. If arXBarsType[n] = tyUndefined and arXBars[n] is not NULL, the value of arXBars[n] is a numeric constant.                                                                                                              |
| arXBarsCol                | word32[3]   | Colors of vertical bars.                                                                                                                                                                                                                                                            |
| GridCol                   | word32      | Color of grid.                                                                                                                                                                                                                                                                      |
| BorderGridColor           | word32      | Color of border of grid.                                                                                                                                                                                                                                                            |
| pVisVar                   | word32      | Flag of visibility. Available values:<br>- FALSE = object not visible<br>- TRUE = object always visible<br>- var_addr = address of boolean variable                                                                                                                                 |
| arTrkData                 | word32[8]   | Array of addresses of data. The nth of arTrkData contains the address of first elements of array of nth track. If address is NULL the track is not define.                                                                                                                          |
| arTrkType                 | byte[8]     | Array of data. The nth of arTrkType contains the type of nth elements of arTrkData. This value is sensible only if the element of arTrkData is not NULL.                                                                                                                            |
| arTrkCol                  | byte[8]     | Array of track colors. This value is sensible only if the element of arTrkData is not NULL.                                                                                                                                                                                         |
| arTrkVis                  | word32[8]   | Array of visibility flags. The nth element of arTrkMinY determines the visibility of the track:<br>- FALSE = track not visible<br>- TRUE = track always visible<br>- var_addr = address of boolean variable<br>This value is sensible only if the element of arTrkData is not NULL. |
| arTrkScaleY               | word32[8]   | Array of Y-axis scale. The range of samples for every horizontal division.                                                                                                                                                                                                          |
| arTrkScaleType            | word16[8]   | Type of variable of Y-Axis scale. If constant value arTrkScaleType[n] = tyUndefined.                                                                                                                                                                                                |
| arTrkOffset               | word32[8]   | Array of offset of Y-Axis for every track. The displacement of the track from 0 high and low.                                                                                                                                                                                       |
| arTrkOffsetType           | word16[8]   | Type array of offset of Y-Axis for every track. If constant value arTrkOffsetType[n] = tyUndefined.                                                                                                                                                                                 |
| iYLabelDiv                | word16[8]   | Array that contains on every step draw the Y-Axis label.                                                                                                                                                                                                                            |
| arTrkBarValue             | word32[8*3] | Array of addresses of variables for horizontal bars.                                                                                                                                                                                                                                |
| arTrkBarValueType         | word16[8*3] | Array of types of variable for horizontal bars.                                                                                                                                                                                                                                     |



| Frame structure: FB_CHART |             |                                      |
|---------------------------|-------------|--------------------------------------|
| arTrackBarName            | word32[8*3] | Array of names for horizontal bars.  |
| arTrkBarCol               | word32[8*3] | Array of colors for horizontal bars. |
| Output variable           | Type        | Description                          |
| ---                       |             |                                      |

FUNCTION BLOCK: Trend

Trend object

| Frame structure: FB_TREND |        |                                                                                                          |
|---------------------------|--------|----------------------------------------------------------------------------------------------------------|
| Local variables           | Type   | Description                                                                                              |
| memVis                    | byte   | Visibility status of the previous execution.                                                             |
| grx1                      | word16 | Top-left 'x coordinate' edge relative to full page.                                                      |
| gry1                      | word16 | Top-left 'y coordinate' edge relative to full page.                                                      |
| grx2                      | word16 | Bottom-right 'x coordinate' edge relative to full page.                                                  |
| gry2                      | word16 | Bottom-right 'y coordinate' edge relative to full page.                                                  |
| pChart                    | word32 | Handle of the chart created after ACS_INIT.                                                              |
| FirstSamplingTimeS        | word32 | Sampling time in seconds take on ACS_INIT or when cleared.                                               |
| FirstSamplingTimeMS       | word16 | Sampling time in milli-seconds take on ACS_INIT or when cleared.                                         |
| LastSamplingTimeS         | word32 | Sampling time in seconds take every acquisition.                                                         |
| LastSamplingTimeMS        | word16 | Sampling time in millisecond take every acquisition.                                                     |
| InitDraw                  | Byte   | If TRUE the trend is just drawn.                                                                         |
| Input variables           | Type   | Description                                                                                              |
| wHnd                      | word16 | Handle of the object. Must be unique among chart objects.                                                |
| x1                        | word16 | Top-left 'x coordinate' edge relative to full page.                                                      |
| y1                        | word16 | Top-left 'y coordinate' edge relative to full page.                                                      |
| x2                        | word16 | Bottom-right 'x coordinate' edge relative to full page.                                                  |
| y2                        | word16 | Bottom-right 'y coordinate' edge relative to full page.                                                  |
| pFont                     | word32 | Address of font for drawing text. The font must be initialized with Video_AddFont.                       |
| style                     | byte   | <ul style="list-style-type: none"> <li>- 0 = flat</li> <li>- 1 = raised</li> <li>- 2 = sunken</li> </ul> |



| Frame structure: FB_TREND |        |                                                                                                                                                                                                       |
|---------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| bordPts                   | byte   | Border thickness It is sensible only if <i>style</i> = 0                                                                                                                                              |
| bordCol                   | byte   | Border color. It is sensible when <i>style</i> = 0 bordPts > 0                                                                                                                                        |
| backCol                   | byte   | Background color.                                                                                                                                                                                     |
| pNSamples                 | word32 | Inherited from chart but contains acquisition time in seconds.                                                                                                                                        |
| tyNSamples                | byte   | Not used.                                                                                                                                                                                             |
| tyXOffset                 | byte   | Type of the offset of X-axis.                                                                                                                                                                         |
| pXOffset                  | word32 | Address of the offset of X-axis (move right-left the chart in order to 0 )                                                                                                                            |
| tyTrackRight              | word16 | Type of default track for right Y-Axis.                                                                                                                                                               |
| pTrackRight               | word32 | Address of the track of right Y-Axis (if 0 the right label will not drawn).                                                                                                                           |
| tyTrackLeft               | word16 | Type of default track for left Y-Axis.                                                                                                                                                                |
| pTrackLeft                | word32 | Address of the track of left Y-Axis (if 0 the left label will not drawn).                                                                                                                             |
| formatLeft                | word32 | Label format of left Y-Axis.                                                                                                                                                                          |
| formatRight               | word32 | Label format of right Y-Axis.                                                                                                                                                                         |
| format                    | Word32 | Label format of X-Axis. Available values:<br>- 0 = ss<br>- 1 = mm.ss<br>- 2 = hh.mm<br>- 3 = hh.mm.ss                                                                                                 |
| iDivGridX                 | word16 | Number of division on horizontal bar, used with scale factor and offset for drawing the chart tracks. (Ex. scale X=1, iDivGridX = 5 value between 0 and 5). Sensible even if the grid is not visible. |
| iDivGridY                 | word16 | Number of division on vertical bar, used with scale factor and offset for drawing the chart tracks (Ex. scale Y=1, iDivGridY = 5 value between 0 and 5). Sensible even if the grid is not visible.    |
| fGrid                     | byte   | Draw grid:<br>- FALSE = grid not visible<br>- TRUE = grid visible                                                                                                                                     |
| iXLabelDiv                | word16 | Step for X-axis labels. How many division of horizontal bar must have labels.                                                                                                                         |
| tyXScaleType              | byte   | Type of X-Axis scale.                                                                                                                                                                                 |
| pXScale                   | word32 | Address of Scale factor of x-Axis. Value range among two division of horizontal bars. 0 value indicate that the chart is in auto-scale mode.                                                          |
| pClearVar                 | Word32 | Address of boolean variable. If it is TRUE the chart delete all the previous data.                                                                                                                    |



| Frame structure: FB_TREND |           |                                                                                                                                                                                                                                                                         |
|---------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| accMode                   | byte      | Access mode. Available values:<br><ul style="list-style-type: none"> <li>- kACS_IDLE = no effect</li> <li>- kACS_INIT = first draw on display</li> <li>- kACS_PRINT = update draw on display</li> <li>- kACS_CLOSE = close the chart and delete all the data</li> </ul> |
| XlabelCol                 | word32    | Address or constant for X-Axis definition. Available values:<br><ul style="list-style-type: none"> <li>- constant: number of samples * constant start with 0</li> <li>- variable: array that contains pNSamples samples with X-axis value</li> </ul>                    |
| iDotStep                  | word16    | Type of pXData array. If tyXData = tyUndefined is a constant.                                                                                                                                                                                                           |
| iSampleBuffer             | word16    | Color of X-Axis label.                                                                                                                                                                                                                                                  |
| arXBars                   | word32[3] | Space among two points of grid in pixel. The property is sensible if the grid is visible.                                                                                                                                                                               |
| arXBarsType               | word16[3] | Number of samples that the run-time can store. The older ones are deleted if the size exceeds.                                                                                                                                                                          |
| arXBarsCol                | word32[3] | Array of addresses of vertical bars. If 0 the vertical bar is not defined, otherwise the address of variable or constant value.                                                                                                                                         |
| GridCol                   | word32    | Type of variable that indicates the value of vertical bars. If arXBarsType[n] = tyUndefined and arXBars[n] is not NULL, the value of arXBars[n] is a numeric constant.                                                                                                  |
| BorderGridColor           | word32    | Colors of vertical bars.                                                                                                                                                                                                                                                |
| pVisVar                   | word32    | Color of grid.                                                                                                                                                                                                                                                          |
| arTrkData                 | word32[8] | Color of broder of grid.                                                                                                                                                                                                                                                |
| arTrkType                 | byte[8]   | Flag of visibility. Available values:<br><ul style="list-style-type: none"> <li>- FALSE = object not visible</li> <li>- TRUE = object always visible</li> <li>- var_addr = address of boolean variable</li> </ul>                                                       |
| arTrkCol                  | byte[8]   | Array of addresses of data. The nth of arTrkData contains the address of first elements of array of nth track. If address is NULL the track is not define.                                                                                                              |
| arTrkVis                  | word32[8] | Array of data. The nth of arTrkType contains the type of nth elements of arTrkData. This value is sensible only if the element of arTrkData is not NULL.                                                                                                                |
| arTrkScaleY               | word32[8] | Array of track colors. This value is sensible only if the element of arTrkData is not NULL.                                                                                                                                                                             |



| Frame structure: FB_TREND |             |                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| arTrkScaleType            | word16[8]   | <p>Array of visibility flags. The nth element of arTrkMinY determines the visibility of the track:</p> <ul style="list-style-type: none"> <li>- <i>FALSE</i> = track not visible</li> <li>- <i>TRUE</i> = track always visible</li> <li>- <i>var_addr</i> = address of boolean variable</li> </ul> <p>This value is sensible only if the element of arTrkData is not <i>NULL</i>.</p> |
| arTrkOffset               | word32[8]   | Array of Y-axis scale. The range of samples for every horizontal division.                                                                                                                                                                                                                                                                                                            |
| arTrkOffsetType           | word16[8]   | Type of variable of Y-Axis scale. If constant value arTrkScaleType[n] = tyUndefined                                                                                                                                                                                                                                                                                                   |
| iYLabelDiv                | word16[8]   | Array of offset of Y-Axis for every track. The displacement of the track from 0 high and low.                                                                                                                                                                                                                                                                                         |
| arTrkBarValue             | word32[8*3] | Type array of offset of Y-Axis for every track. If constant value arTrkOffsetType[n] = tyUndefined                                                                                                                                                                                                                                                                                    |
| arTrkBarValueType         | word16[8*3] | Array that contains on every step draw the Y-Axis label.                                                                                                                                                                                                                                                                                                                              |
| arTrackBarName            | word32[8*3] | Array of addresses of variables for horizontal bars.                                                                                                                                                                                                                                                                                                                                  |
| arTrkBarCol               | word32[8*3] | Array of types of variable for horizontal bars.                                                                                                                                                                                                                                                                                                                                       |
| Output variable           | Type        | Description                                                                                                                                                                                                                                                                                                                                                                           |
| ---                       |             |                                                                                                                                                                                                                                                                                                                                                                                       |

