

# Runtime Screens tool

User Guide

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TLXDSEEXP30E

W913294790301 01



**Telemecanique**

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## 1.1 Introduction

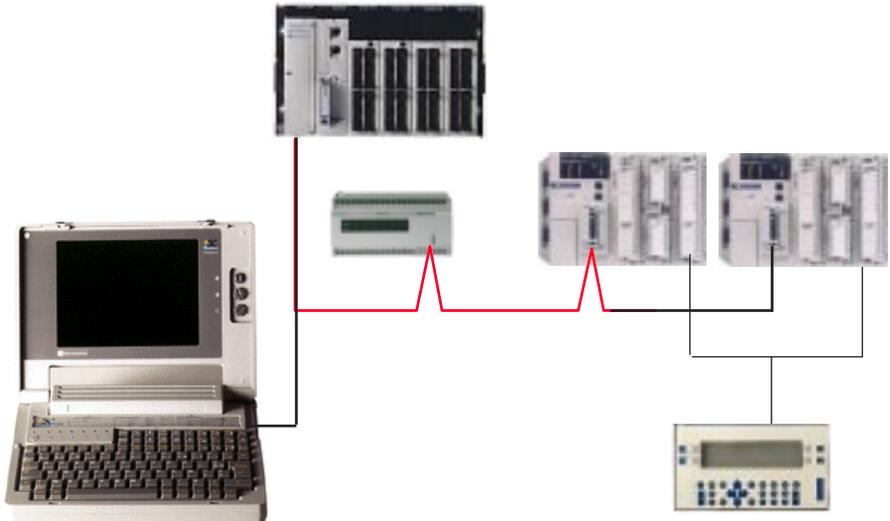
Runtime Screens is a tool integrated in PL7 Pro and PL7 Pro Dyn software, version V3.0 or later. Simple to use and quick, it is designed to facilitate the operation of an automated process.

The user controls and monitors operation of the installation and needs a quick, straightforward solution if problems arise.

Designers can use the Runtime Screens tool to develop screens which are adapted to the process and offer the user :

- a clear display of information : explanatory text, realtime values, color synoptic screens, etc
- the possibility of reacting quickly and easily : modification and **realtime monitoring** of PLC variables, etc

Runtime Screens operates on a PC. The commands to display a screen can be given via the keyboard, or using a mini terminal connected to the PLC on an input card, or via the user program.



The station is connected to TSX37, TSX57 PLCs via the terminal port or network, etc. The tool can be launched from the development or operating terminal by selecting Runtime Screens from the PL7-PRO or PL7-PRO-DYN "Application" menu.

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## 1.2 Creating the Screens

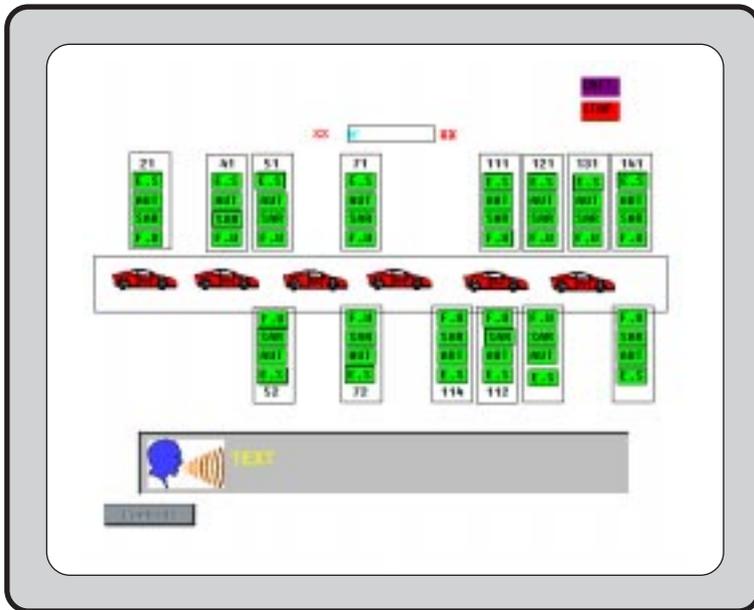
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The user can design and adapt each screen, using the integrated editor, depending on the requirements of the process and the operator.

Once created, each of these screens has a specific role and can be used in runtime.

Type of screen which can be created :

"PRODUCTIONLINE" screen showing the status of the processes, production quantities, selector switches, safety mechanisms, etc.



### Creating the list of messages :

This function is used to create the messages used in the screens.

### Using and creating graphic objects :

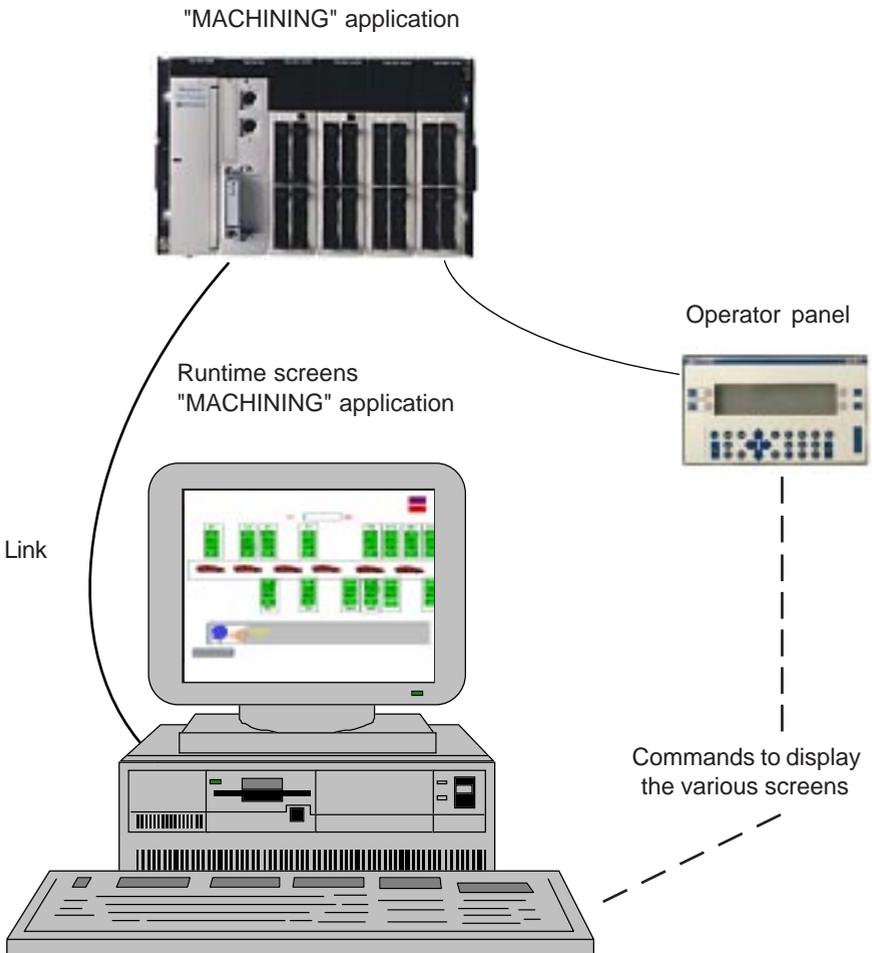
This function gives the developer access to a manufacturer graphic object library. It can also be used to create and save user-defined objects.

### 1.3 Using the Screens

When the station is connected to the PLC, the user can display the screens dynamically according to the state of the process.

Screens can be sequenced, according to their priority, either using a keyboard command or via a PLC request.

**The PLC contains the application, the terminal contains the application and its screens.**



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## 2.1 Accessing the "Runtime Screens" Function

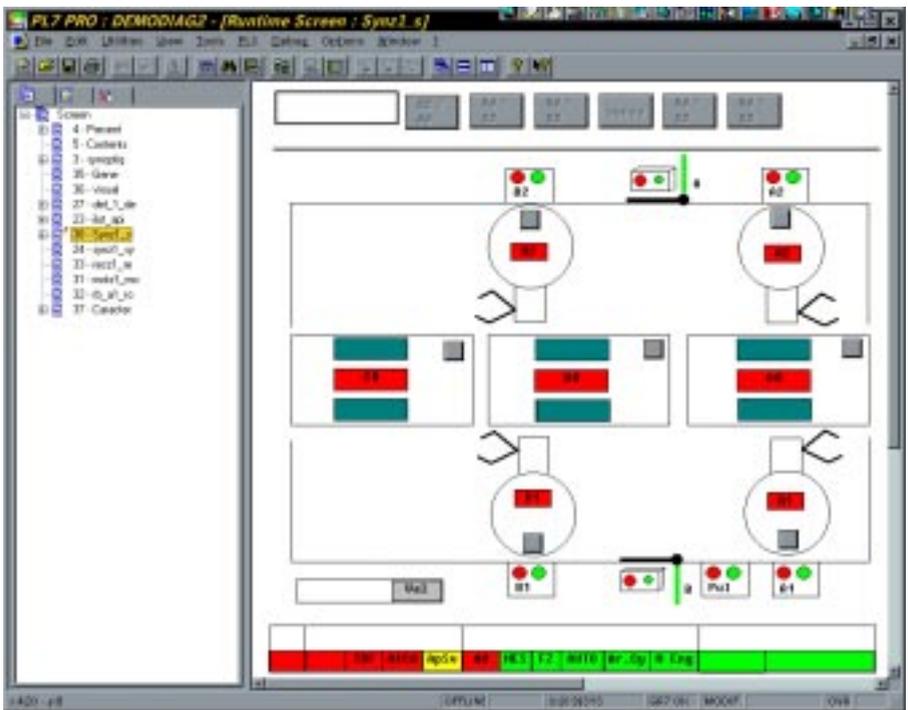
### 2.1-1 Conditions of Use

Runtime Screens is a tool integrated in PL7-PRO and PL7-PRO-DYN. Like all the other tools, it is accessed from the menu or from the "Application" browser.

### 2.1-2 Access Principles

To open Runtime Screens, open an application and select the "Runtime Screens" command in the "Application" browser.

The tool then opens and the application context saved last time the tool was used is restored.



## 2.2 Description of Runtime Screens

The screen editor (graphics editor) enables the user to create runtime screens for a given application.

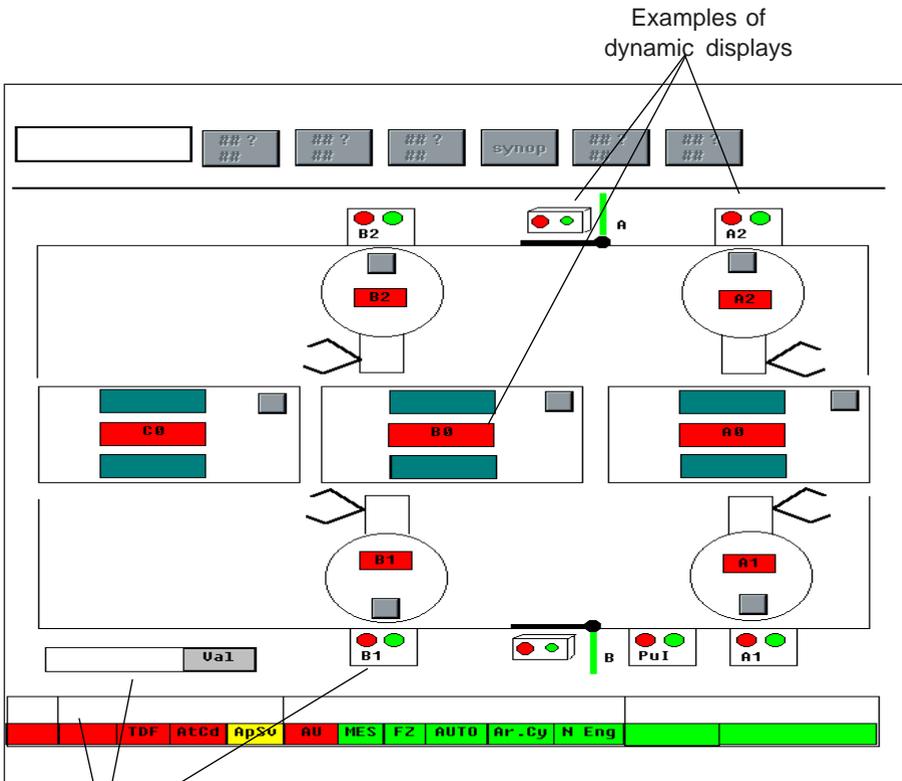
The user creates the runtime screens using lines, rectangles, ellipses, curves, polygons, images (BMP) and text, etc.

He can then create static parts (background, title, etc) and dynamic (animated) parts which are used to reflect the state of the process.

The user can assign a variable (bit, byte, single word, double word or floating point) and display conditions (continuous or depending on the value of variable) to the dynamic parts of the screen.

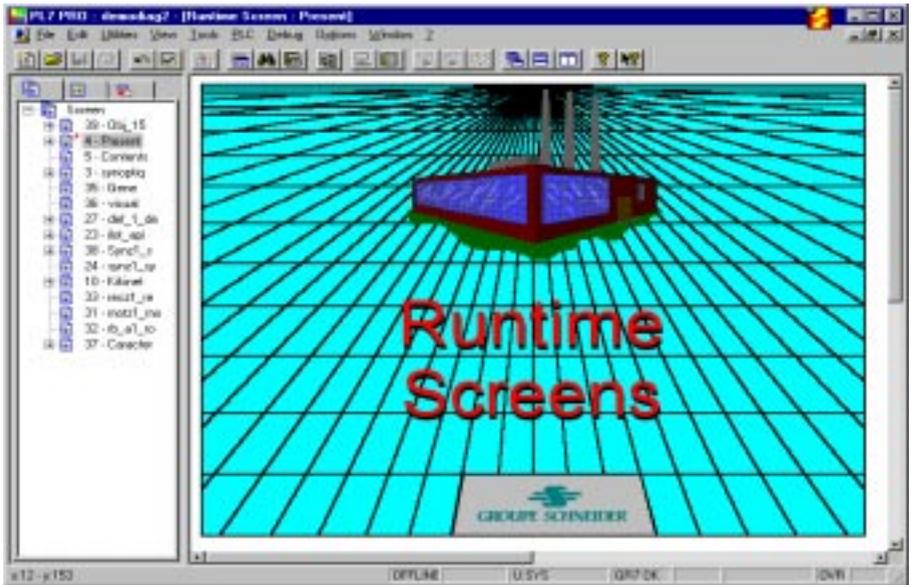
"Control elements" can be created to control the process.

The choice of animation parameters depends on the type of variable and the view required in the dynamic display.



## 2.3 Description of the Main Screen

Runtime Screens is displayed as follows :



The space occupied by the tool is divided into two windows which can be resized as required.

The **left-hand window** (tree window) has three tabs. Each of these contains a list of the tree structures which can be expanded or contracted depending on its content (operates in the same way as the Windows Explorer).

This window can display the list of screens, the list of messages and the library of graphic objects specific to Runtime Screens.

The **right-hand window** (graphics editor) is used :

- in offline mode to display, design and/or modify a graphic screen (or object), and associate PLC variables
- in online mode, to follow the dynamic animation by displaying the evolution of the associated PLC variables graphically (debugging is also possible in online mode)

The width of the two windows can be modified using the vertical bar which separates them. Moving to the right or left hides each of the windows in turn. When displayed in collapsed view, each window has horizontal and vertical scroll bars which can be used to move around and view the contents of the screen.

The size of the window is limited to 1280x1024 pixels.

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All the information relating to the runtime screen is saved when the tool is closed, ie. :

- the dimensions and the position of the tool within the PL7 software workshop
- the number of the graphic screen displayed (if there is one)
- the tool's configuration options
- the default properties for creating an object
- the position of the tool palettes (editor and utilities)

**This operating context is independent of the PLC application.**

The user can access the utilities for creating screens via dropdown menus. He can also use the tool palette (editor toolbar).

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### 2.3-1 Menus

#### Main PL7 menu, offline mode

The management of menus is context-specific (the tool which is open will display its own menu instead of the main PL7 software workshop menu).

However, all the tools which can be accessed via the "Application" browser have the same main menu. Only the commands for certain menus ("File", "Edit", "Utilities" and "View") have specific items.

#### "File" menu

<b>F</b> ile <u>E</u> dit <u>U</u> tilities <u>V</u> iew ...
--

- **Export, Import** : Imports/exports screens from/to another application
- **Print** : Prints application screens/messages/objects

#### "Edit" menu

File <b>E</b> dit <u>U</u> tilities <u>V</u> iew ...
--

- **Create** : Creates a new screen
- **Undo** Last Action : Cancels the last action
- **Undo** : Cancels all modifications made since the last confirmation
- **Confirm** : Confirms all modifications made to each screen since the last confirmation
- **Cut, Copy, Paste, Delete** : These functions are context-specific. They can be used on all objects (screens, messages, complex objects, standard or simple objects (static or animated), images and controls).
- **SelectAll**: Selects all the elements
- **Properties** : Displays information relating to the screen

**"Utilities" menu**

File	Edit	<b>Utilities</b>	View ...
------	------	------------------	----------

- **Initialize Animation Table** : Creates a new animation table, taking into account the variables associated with the graphic objects selected
- **Initialize Cross References** : Creates the list of cross references for the variables associated with the graphic objects selected
- **Control via PLC** : The PLC requests are taken into account by the MENU variable (see section 2.5). A screen is called by the PLC (in this case, configuration parameters cannot be edited or modified).
- **Control via User** : The PLC requests are inhibited. The operator selects the screen he wishes to display.
- **Next Animated Object** : Used to select the next animated object
- **Previous Animated Object** : Used to select the previous animated object
- **Modes** : Lists the operations possible in the screen editor
  - **Selection**, to create Line, Rectangle, Ellipse, Curve, Polygon, Text, Image, Button, Control elements (Entry Field, Check Box, Spin Box, Scale Indicator).
  - **Flip Horizontal, Flip Vertical**
  - **Alignment (Top, Bottom, Left, Right)**
  - **Group, Ungroup** objects
  - **Foreground, Background**
- **Configure...** : Displays the tool's configuration options

**"View" menu**

File	Edit	Utilities	<b>View ...</b>
------	------	-----------	-----------------

- **List** : Displays and gives priority to the list of screens
- **Editor** : Displays (in full screen) and gives priority to the editor
- **Editor Toolbar** : Displays the "toolbox" which can be used to select the available elements from the graphics editor
- **Utilities Toolbar** : Displays the "toolbox" which can be used to access the available utilities
- **Information** : Used to display information about each object in a screen

**Main PL7 menu, online mode**

In online mode, all the functions can be accessed by the operator under certain configuration conditions (see section 2.5).

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## 2.3-2 Toolboxes

### • Editor toolbar

A floating tool palette, which can be accessed from the "View" menu, can be used by the designer of the page to quickly select an object type or a function.

Tools available :

Selection ----->		<- Display Object <u>P</u> roperties
Create <u>L</u> ine ----->		<- Create <u>R</u> ectangle
Create <u>E</u> llipse ----->		<- Create <u>C</u> urve
Create Closed Poly <u>g</u> on ----->		<- Create <u>T</u> ext
Display <u>I</u> mage ----->		<- Button
<u>E</u> ntry Field ----->		<- Check <u>B</u> ox
Spin <u>B</u> ox ----->		<- <u>S</u> cale Indicator
Flip <u>V</u> ertical ----->		<- Flip <u>H</u> orizontal
Align <u>L</u> eft ----->		<- Align <u>R</u> ight
Align <u>T</u> op ----->		<- Align <u>B</u> ottom
<u>G</u> roup Objects ----->		<- <u>U</u> ngroup Objects
<u>F</u> oreground ----->		<- <u>B</u> ackground



### • Utilities toolbar

A floating tool palette, which can be accessed from the "View" menu, can be used by the designer of the page to quickly select the type of service required.

Tools available :

<u>C</u> ontrol via PLC (F2) ----->		<- Control via <u>U</u> ser (F3)
<u>N</u> ext Animated Object (F4) ----->		<- <u>P</u> revious Animated Object (F5)
Initialize Animation <u>T</u> able (F6) ----->		<- Initialize Cross References (F7)
Display <u>L</u> ist of Screens (F8) ----->		<- Display <u>E</u> ditor (F9)

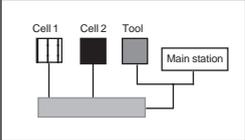
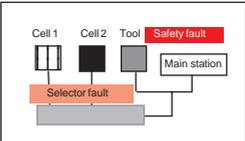
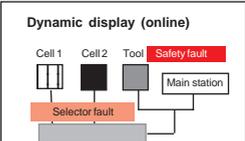


### 2.3-3 Shortcut Menus

The Shortcut menus are displayed by clicking the right mouse button. The content of the menu depends on the position of the mouse and the selected (active) object (or window).

## 2.4 Tutorial

### Recommended procedure for creating runtime screens

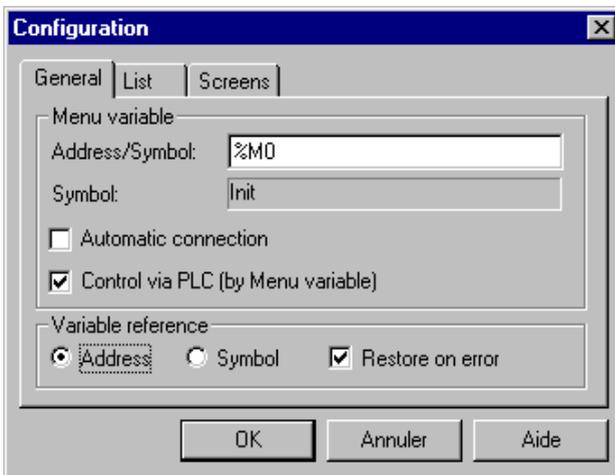
	Procedure	Example
SCREEN	Define the name of each screen	General faults
MESSAGE	Declare the list of messages to be associated with the variables	0 : Gate fault 1 : Selector fault 2 : Safety fault
GRAPHICS	Access the editor and draw the graphic objects for the screen : rectangle, ellipse, text, etc	
ANIMATION	Assign variables to the various graphic elements to be animated in online mode	
SAVE PRINT	Save - Print : screens, messages	Any medium : floppy disk, network, etc
DYNAMIC DISPLAY	Change to online mode	<p><b>Dynamic display (online)</b></p> 

## 2.5 Configuration Options

These options are used to configure the Runtime Screens tool. They can be modified at any time and are saved on closing (and restored in that state when the tool is next opened). The dialog box, which is accessed using the "Configure..." command in the "Utilities" menu, has the following three tabs:

- **General** : used to configure the global parameters
- **List** : used to configure the tree lists
- **Screens** : used to configure the editor for the graphic screens

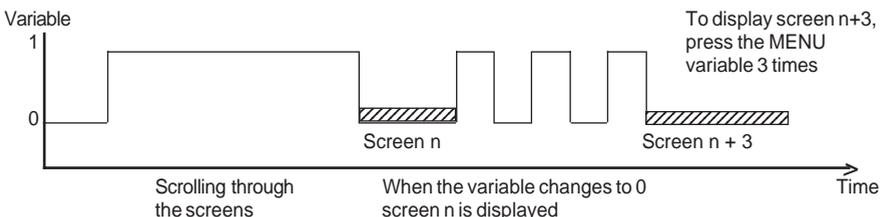
### "General" tab



**MENU variable** : This function is used to associate a bit, byte, word or double word type variable with the display for all the graphic screens entered.

In online mode, this variable is used to display a specific screen on the initiative of the PLC application program. This means the user can then browse through the various screens in his application using a pushbutton (without the need for a keyboard or pointing device).

- **Bit type variable** : The content of the variable is read continuously. Setting the variable to 1 displays the list of screens with the first screen selected. The selected screen is displayed when the MENU variable remains at 0 for longer than 1s (see the trend diagram below).



- 
- **Word type variable** : The content of the MENU variable is read continuously. If this variable contains a value corresponding to a screen number (defined or blank), the corresponding screen is displayed. If the variable changes value, the screen corresponding to this value is then displayed.

**Automatic connection** : Automatic connection to the PLC as soon as the Runtime Screens tool is launched.

**Control via PLC** : In online mode, the MENU variable determines the display of a screen.

**Warning :**

**This operating mode prohibits editing in online mode and modification of the configuration parameters.**

**Variable reference :**

- **Address** : On opening the screen, all the variables associated with these objects are updated in line with the current application, according to the "Address" of the variable entered in the screen.

Example : If the object is associated initially with variable %MD2500 VALVE, and in the current application we have %MD2500 PROBE, the object will still be associated with variable %MD2500 and its symbol is updated as %MD2500 PROBE.

- **Symbol** : This is the default selection where, on opening the screen, all the variables associated with these objects are updated in line with the current application, according to the "Symbol" of the variable entered in the screen.

Example : If the object is associated initially with variable %MD2500 VALVE, and in the current application we have %MD2500 THERMO and %MD2600 VALVE, the object will be associated with variable %MD2600 VALVE.

**The "MENU" variable is also updated in line with the selected reference.**

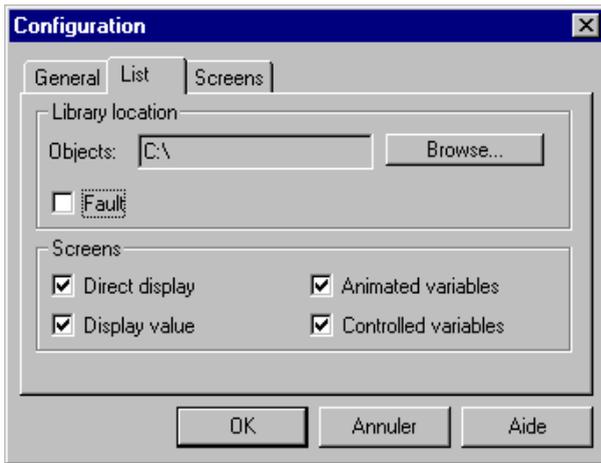
**Restore on error** : If this check box is selected, all the animated variables will be replaced in the case of an error with the internal variable "\_UNKNOW\_".

As each screen is loaded, before it is displayed, the software carries out a consistency check on any objects which are associated with a variable. If one or more errors are detected, a message is displayed once the screen has loaded. All errors are displayed. It is then easy for the user to identify all these variables in the list of screens.

If this box is not checked, animation of these erroneous objects is simply deleted (but not the object).

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## “List” tab



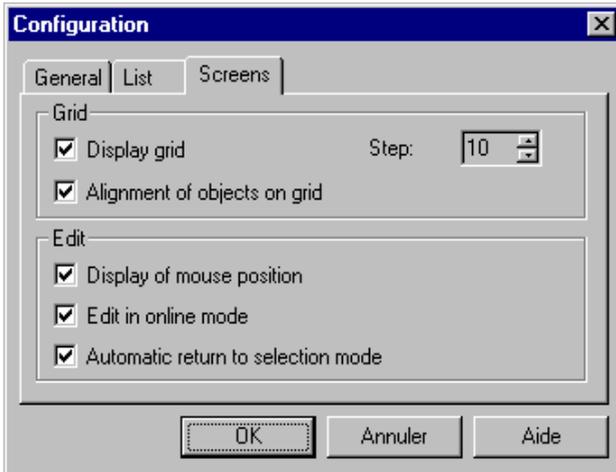
**Location** : It is possible to change the directory in which the objects are located. By default, the files are saved in the application directory. If the user wants to indicate another directory, he simply has to click on “Browse ...”. A dialog box then allows him to select the directory required. To return to the default configuration, simply check the “Default” box.

**Direct display** : If this box is checked, simply select a screen or a graphic object from its respective list for it to be displayed on the screen. If this box is not checked, the screen will be displayed after a few seconds.

**Display value** : This is used to display the value in front of the screen name.

**Animated variables, Controlled variables** : This is used to display the animation and/or control variables in the Runtime Screens tree window (left-hand window).

## “Screens” tab



### Grid :

The grid is made up of a set of points on a series of virtual horizontal and vertical lines, the spacing of which can be variable (between 10 and 50 pixels in steps of 5 pixels). This grid is particularly useful to be able to position graphic objects precisely. If the “Align objects on grid” box is checked, the objects are aligned on the points of the grid when they are created (snap to grid).

If the box is not checked, the objects created are not affected by this alignment (except when modifying the size or position).

### Edit

- **Display mouse position** : displays the position of the mouse in the status bar
- **Edit in online mode** : gives the option of modifying a screen (creation, modification and deletion) in online mode. Warning, online editing is not permitted in "PLC priority" mode (see section 2.5).
- **Automatic return to selection mode** : if this option is selected, the selection mode is activated automatically once an object has been created.

---

The tree window gives a user-friendly graphic view of all the information available, presented in the form of lists.

These lists can be expanded or contracted. They have a hierarchical structure with several levels. The declination of a tree structure is represented (as standard) by a + (element to be expanded) or - (element to be contracted). To expand or contract an element, simply click on these signs.

It is possible to use all the edit functions on the elements in these lists.

Launching the "Runtime Screens" tool opens the edit function on the list of screens.

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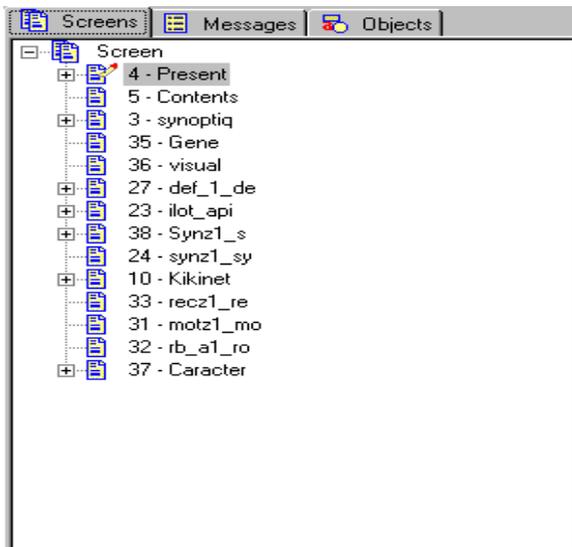
## 3.1 Attributes

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### 3.1-1 Names

This tree structure list is used to display and manage the screens (number and name) as well as display the list of variables associated with one or more objects defined in each screen.

When creating a new application, this list is empty. The list of screens appears as shown below :



---

The user can move the selection frame using the Up and Down arrow keys. If the “Direct display” option is selected (see section 2.5), simply select a screen (via the keyboard or the mouse) from the list for it to be displayed in the right hand window. If the “Direct display” option is not selected, the screen is only displayed one second after the user has stopped on the screen required.

### **Managing the list of screens**

The user can access all the functions available via the “Edit” menu or by clicking with the right mouse button on one of the elements in the list.

Create :

Creating a new screen. By default, the screen is named “New screen” or “Copy of new screen”.

If the screen is created via the root, it is created at the top of the list. If it is created from an existing screen, it is placed after this screen.

The order in which the screens are displayed (and their numbering) is determined by their creation order (increasing numbers). The order in the list may be varied as required, following any successive insertions/deletions. Once a screen is selected (by holding the left button down and dragging the mouse), it can be moved to any location in the list.

Undo Last Action :

This is used to cancel the last edit operations performed. Warning : this operation is only possible if the user has not performed any operations outside the list (modification of a screen, for example).

Export, Import :

This is used to import screens which have been saved previously or to export screens from the application to any other medium in order to save them.

Print :

This is used to print one or more screens.

Delete, Copy, Paste, Cut :

A screen can be deleted, cut (deleted and copied onto the Clipboard), copied and pasted. It then appears either after the selected element, or at the top of the list if the root is selected, with the name “Copy of screen x”.

However, the Clipboard can only be used within the same application (you cannot copy/paste between applications).

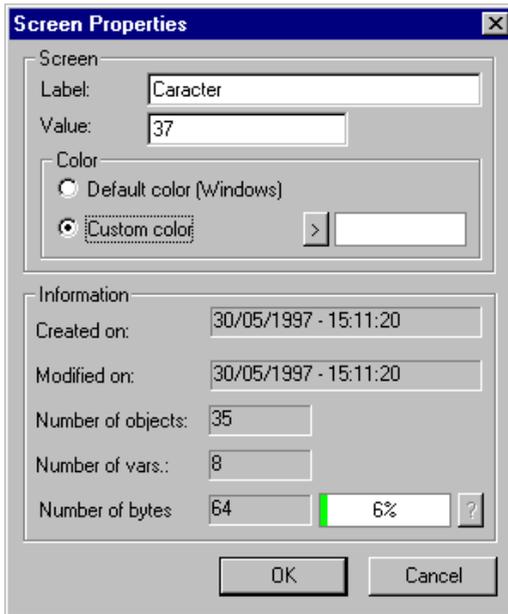
To modify the name of a screen, simply click on the name and wait for the change to edit mode (the name is selected). The name of a screen is limited to 200 characters.

Properties :

The screen name can be modified (200 characters max.) in the associated properties dialog box.

This box can also be used to enter the value which will enable it to be used by the numeric menu variable (see section 2.5). The display of this value is optional (see section 2.5).

This box can also be used to select the background color for the screen.

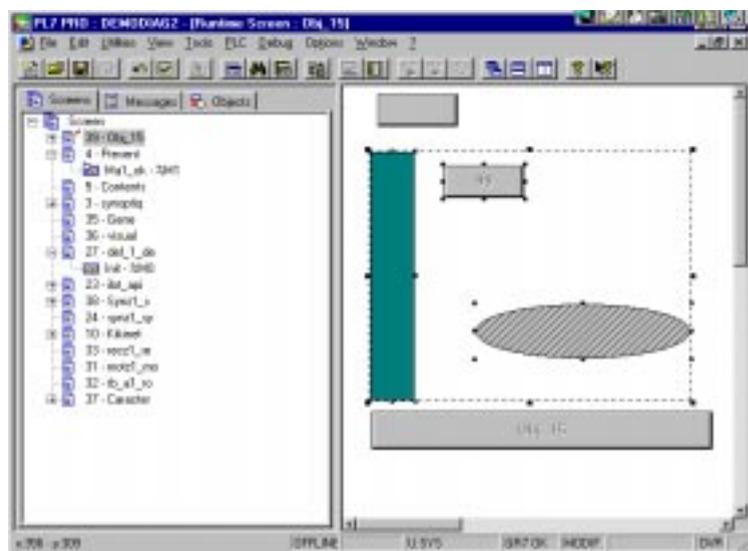


### 3.1-2 List of Variables

If a screen contains animated objects, the user can expand the tree (by clicking on +) to display the list of animated and controlled variables.

Selecting one of these variables selects it in the graphic screen (if this screen is displayed). If several objects are animated and/or controlled by the same variable, they are all selected (the multiple selection handles are displayed).

Warning : The variables contained in an associated object are not displayed (see section 3.2-3).



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## 3.2 Editor Objects

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### 3.2-1 The Various Types

4 types of object are available :

- standard graphic elements : line, rectangle, ellipse, curve, polygon, text
- images : bitmap files (\*.BMP)
- controls : button, check box, entry field, spin box, scale indicator
- grouped objects : groups of objects made up of the three types of object described above and objects from the object library

*An example of a graphic screen containing all these objects is shown in the Appendix.*

All these objects are used to make up a screen. They may be static or animated.

When creating a screen, it is possible to undo all the operations performed since the last save (creation, modification, deletion or modification of the object attributes). This operation is only possible if the user has not started to edit another screen.

#### **Line :**

Horizontal, vertical and diagonal lines.  
Choice of line color, style and width.

In selection mode, only two handles at each end of the line are visible.

#### **Rectangle :**

Rectangle with square edges.  
Choice of color and width of the border, background color, fill pattern and style to apply to the corners (straight-edged or rounded).

#### **Ellipse :**

Ellipse or circle.  
Choice of color and width of the contour, background color and fill pattern.

#### **Curve :**

Curve drawn within a rectangle.  
Choice of color and width of the curve, background color and fill pattern.

#### **Polygon :**

Element made up of straight segments. It may be open or closed.  
Choice of color and width of the border, background color and fill pattern.

---

A polygon is created in the same way as creating n consecutive lines, except that the start of a straight segment is determined by the end of the preceding straight segment. To create a closed polygon, simply release the mouse button when drawing the last segment at the start point for the first segment.

To create an open polygon, simply double-click at the end of the last segment.

In selection mode, the handles are visible at each corner of the rectangle in which the object is located.

**Text :**

Single or multiple lines of text defined in a rectangle

Choice of text font, size and color

Choice of style

Choice of text borders and background color for the text selection zone.

Horizontal alignment of text in the selection zone.

Possibility of displaying static text, a value or a message during animation.

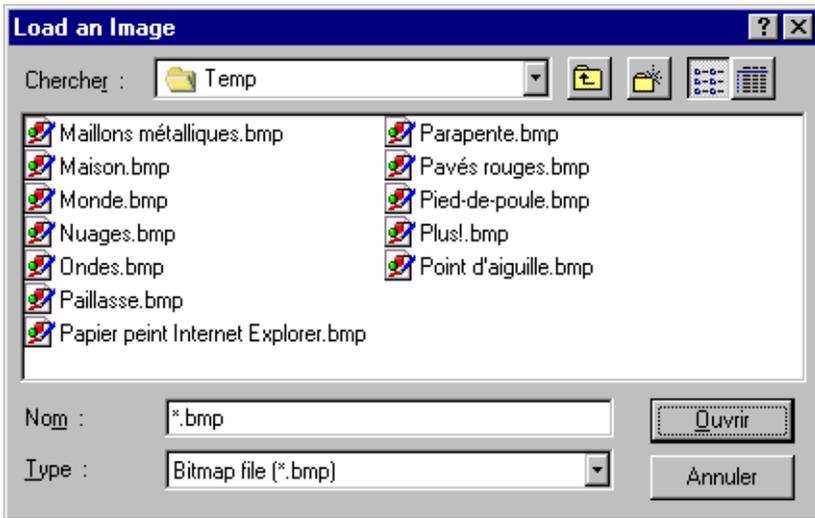
In creation mode, the designer first defines the rectangle bordering the display zone. The default text is displayed. To modify the text, the new character strings must be entered in the "Properties" box which can be accessed by clicking with the right mouse button (see section 3.2-2).

**Images :**

One (or more) graphic images can be inserted in a runtime screen.

Simply select "Image", which opens a browser box from which the required image (.bmp) can be selected.

See the example on the next page :



Select a bitmap from the dialog box and click on Open. The image is then displayed on the screen, framed by a selection box with its four resizing handles. It can then be moved, copied, pasted, deleted or resized.

Warning : Changing the size of an image may significantly impair its quality as well as affecting the display performance. If the image is not copied into the application, only the link with the application (path) is saved (see section 3.2-2) and the image is not exported during an export (see section 3.6-1).

Only BMP format images are recognized. The incorporation of a large number of images in a graphic screen is not recommended as the loading and display times may be very long.

**To retain the graphic quality if two (or more) images are used in a screen, the machine must be equipped with a graphics card managing the “True Color (24 bits)” mode, otherwise the colors of the images will be impaired.**

### Control objects (button, check box, entry field, spin box, scale indicator)

Control objects are graphic objects which are used to launch an action (change screen, modify the value of a variable (control)). This latter function is in addition to the Modify Variable function.

The manipulation of these "controls" is the same as for all the graphic objects (selecting, moving, resizing, cut/copy/paste). They may be part of an animated object. However, their appearance (contour, background color, text font) is managed by the system and can only be modified using the system tools.

These controls can be accessed via the tool palette. Clicking on the control button displays a secondary palette containing all the available controls.



**Button :**

Clicking on a button accesses a specific screen in online mode.



**Check box :**

Immediate Set/Reset of a bit



**Entry field :**

Modification of a variable : entry of a value in decimal, hexadecimal (16# as prefix) or binary (2# as prefix) format, then Enter. The values taken by the variable must be limited.



**Spin box :**

Horizontal and vertical : modification of a variable by unitary increment or decrement. The values taken by the variable must be limited.



**Scale indicator :**

Horizontal and vertical : modification of a variable by moving a scale indicator. The values taken by the variable may be limited.

The type of data controlled for the selected control is summarized in the following table :

	Bit	Byte	Word	Double word	Floatingpoint
<b>Entry field</b>	x	x	x	x	x
<b>Check box</b>	x				
<b>Spin box</b>	x	x	x	x	x
<b>Scale indicator</b>		x	x	x	x

The actual scale indicator value when it is modified by the user appears in the status bar : Example : Control : %MW0 = 65

The controls (control elements) are used to control a PLC variable. If the controlled value is modified by the program and **if the control is not highlighted** (ie. if it is not active) it is updated. It is therefore possible to use an entry field to display the evolution of a variable.

**However, this operating mode is not recommended (use a text type object + value).**

---

**Grouped objects :**

These objects are created when a group of objects is combined (use of multiple selection). They can contain static and animated graphic elements, images and controls as well as other grouped objects.

It is possible to associate a variable with a grouped object in order to animate it.

Warning : If an animated grouped object is ungrouped, the animation is lost.

---

**3.2-2 Object Attributes**

A contextual "Properties..." dialog box is used to modify the attributes of one (or more) selected objects or the default attributes of new objects. It is made up of a number of tabs which are determined by the type of object selected. Each of the tabs is made up of attributes of the same nature.

Depending on the selected object, the following tabs may be displayed : Animation, Type of Animation, Drawing, Text, Image, Button, Control

This dialog box is displayed on the screen in the following cases :

- Selection of the "Attribute ..." button in the tool palette
- "Properties..." menu in the PL7 main menu or shortcut menu
- Pressing the "Enter" key when an object (or group of objects) is selected

This dialog box functions as follows : once displayed, it remains visible permanently on the screen (as long as the user does not explicitly close it) and **the information displayed will correspond to the object(s) selected** in the editor. It is also possible to browse through the objects of a screen and to display their attributes quickly. If no objects are selected, the default properties of the objects used since their creation are displayed.

When a group of objects (or a grouped object) has been selected, if it is made up of objects whose attributes are different (for example line width, color, etc) no attributes will be selected in the dialog box. Selecting a specific attribute imposes it on all the objects in the selection (or the grouped object).

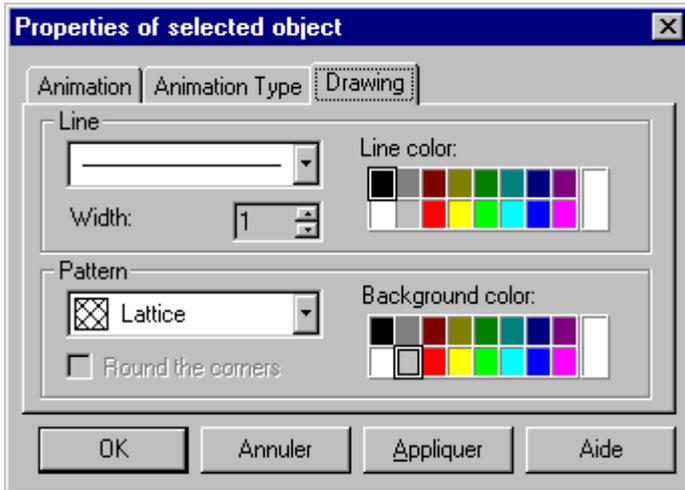
This dialog box is used to modify the attributes of a selected object. It is possible to display the modifications made immediately by pressing the "Apply" button.

Different attributes can be applied according to the function of the objects.

---

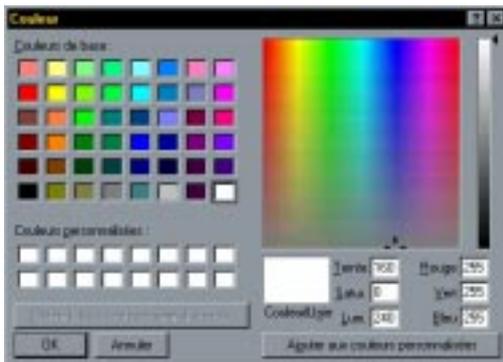
## “Drawing” tab

This tab is used to define the graphic characteristics of the selected object.



Attributes which can be modified :

- Line : line, dotted line and dot-dash line, arrow (single and double-headed), none
- Width : the width of the line varies between 1 and 10 pixels
- Color : line color :
  - palette : white, black, gray, red, yellow, green, cyan, blue, magenta, dark gray, dark red, dark yellow, dark green, dark cyan, dark blue, dark magenta
  - additional colors : clicking on the white rectangle opens the screen for selecting additional colors and colors which can be customized.



It is possible to select one of the 48 basic colors or to design a specific color by placing the two crosshairs on the positions corresponding to the desired color.

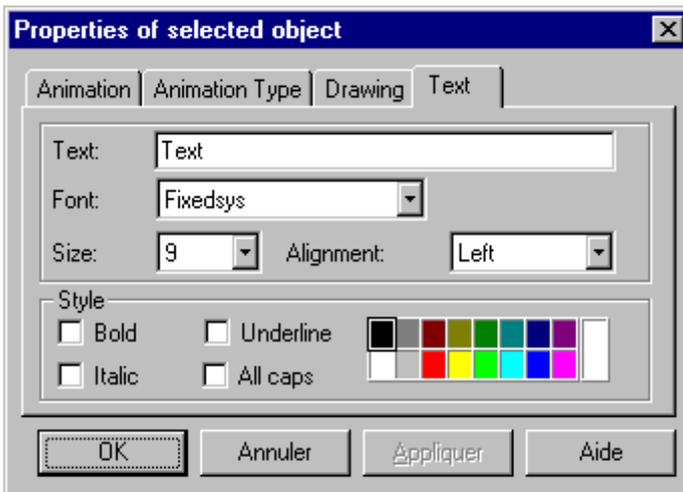
Pressing the "Add to Custom Colors", saves this color as a specific color.

Warning : With some old graphics cards which have low memory capacity, it may be possible that the color displayed does not correspond to the color selected (raster effect).

- Pattern : none (transparent background), fill (with selected background color), horizontal lines - vertical lines, diagonal (up) - diagonal (down), lattice - square grid, other : choice of 10 levels of gray
- Round the corners : only valid for rectangular objects (inoperative for bar charts)
- Color : background colors for the pattern (same as line colors)

### “Text” tab

This tab is used to define the text properties.



Attributes which can be modified :

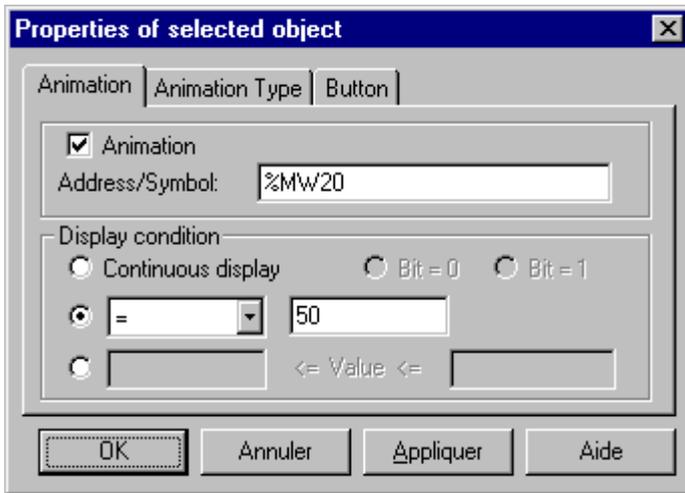
- Text : text entry
- Font : font type (display of the list of fonts referenced by Windows)
- Size : font size
- Alignment : alignment of text (left, center or right in relation to the display zone)
- Style : text style (bold, italic, underlined or transparent) and color. "Transparent" only applies to the background.
- Color : choice of text color

---

## “Animation” tab

All graphic objects (single or grouped) created in the page can be animated. However, the type of animation depends on the type of graphic object to be animated. Animation of a graphic object corresponds to the association of the three following elements :

- a variable (bit, word, double word, floating point)
- a display type (standard, value, message, trend diagram, bar chart)
- a display condition

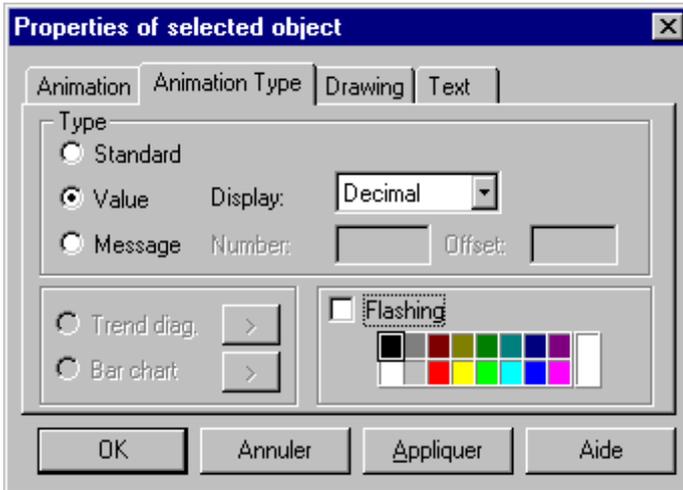


Attributes which can be modified :

- Animation : the object is animated if the box is checked.
- Address/Symbol : Variable associated with the object.
- Display condition :
  - Continuous display : no display condition (the graphic object is always displayed on the screen)
  - bit = 0, bit = 1 : display the object according to the state (0 or 1) of the associated binary variable
  - <, >, = : display the object if its value is greater than, less than, or equal to the specified value
  - < = value < = : display the object if its value is between upper and lower limits

## “Type of Animation” tab

This tab is used to define the screen animation characteristics.



Attributes which can be modified :

- Type :

- Standard : Display the object with its attributes
- Value : The value taken by the variable is displayed aligned according to the display mode selected.
- Display : Selection of decimal, hexadecimal (value preceded by 16#), binary (value preceded by 2#) or ASCII display mode.

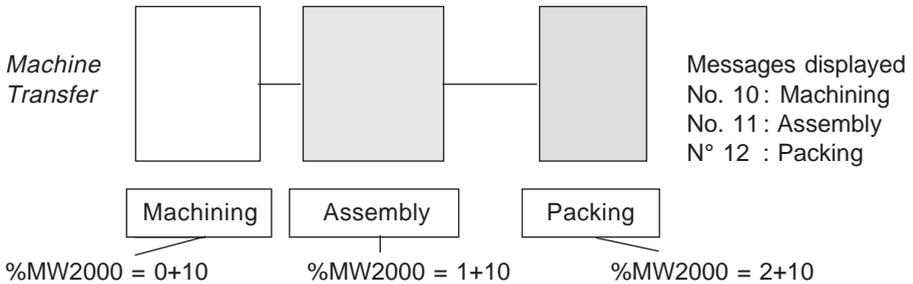
If the object definition zone is too small to display the value, the field is filled with # characters. The font used is that which is defined in the “Text” tab seen earlier. In offline mode, if this style of animation is selected, the object is displayed on the screen in the selected font and size.

Message : Either the user enters the number of the message he wants to display in the “Number” field, regardless of the display condition defined, or, if the variable is a single word, double word or floating point, the user enters the term “VAL” in the field to obtain the word value as the number of the message to be displayed, regardless of the display condition defined (continuous or comparison). An “Offset” field is used to enter a value which can be added to the value “VAL” of the word.

Example :

Display on the screen all operating tasks containing word %MW2000.

For variable %MW2000, enter the term “VAL” in the “Number” field, enter 10 in the “Offset” field.



The messages displayed will be messages 10, 11, 12 successively.

If the message does not exist or if the value calculated is out of range, the message "#message???" is displayed.

- Flashing : The graphic object flashes in the specified flashing color if its display condition is true.
- Trend diag. : The attributes for trend diagram type animation can be modified by clicking on the > button to open the "Trend diagram" dialog box.
- Bar chart : The attributes for bar chart type animation can be modified by clicking on the > button to open the "Bar chart" dialog box.

The display types cannot be accessed (grayed out) by all graphic objects. The table below gives precise information on the options available to the designer :

	Line	Rectangle	Ellipse	Curve	Polygon	Text	Grouped object	Image	Control
Standard	X	X	X	X	X	X	X	X	X
Value						X			
Message						X			
Tr. diag.		X							
Bar chart		X							
Flashing		X	X	X	X	X			

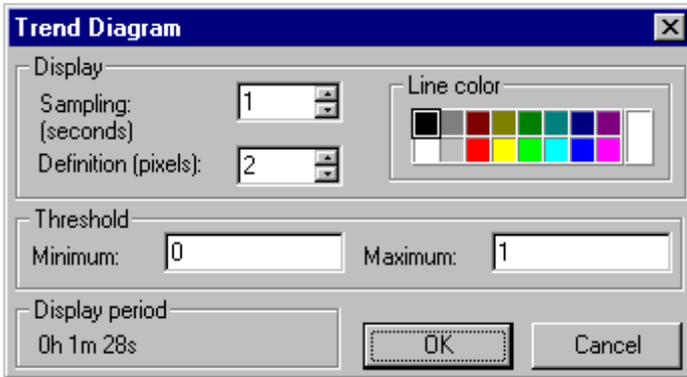
Limitations :

- Object types : grouped object, image, control, bar chart and trend diagram cannot flash.
- A "bar chart" rectangle cannot have rounded corners.

### Trend diagram

Trend diagrams are used to represent the evolution of a variable graphically. The curve representing the trend diagram evolves from right to left. The number of trend diagrams must be limited as their display adversely affects performance.

Each trend diagram has its own definition and sampling frequency.



Attributes which can be modified :

- Display :
  - Sampling (seconds) : time taken to refresh the screen. This time may vary between 1 and 999 seconds in intervals of 1 second (1 second is the default setting).
  - Definition (pixels) : The display of each new value is represented by a straight segment, the length of which is fixed by the definition. This definition may vary between 2 and 20 pixels (the default setting is 2 pixels).
- Line colors
- Thresholds :
  - Minimum, Maximum : The value of these thresholds indicates between which values the graphic representation of the variable evolves.  
For binary variables, these values must be 0 and 1.

The time scale is linked to the size of the trend diagram zone, the sampling rate and the definition selected. This scale is inserted below the line of the trend diagram.

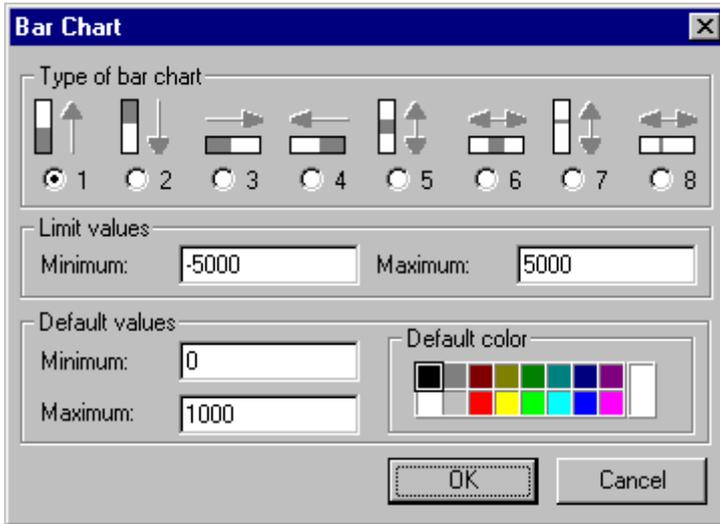
**It is possible to superimpose several bar charts : To do this, simply assign the “None” pattern attribute to them (they then become transparent).**

**The number of trend diagrams must be limited to avoid adversely affecting the display performance.**

---

## Bar chart

Bar charts are used to represent the evolution of a variable graphically in the form of rectangles.



Attributes which can be modified :

- Type of bar chart :
  - 1 : Evolution of bar chart in upward direction
  - 2 : Evolution of bar chart in downward direction
  - 3 : Evolution from left -> right
  - 4 : Evolution from right -> left
  - 5 : The value of the variable is distributed symmetrically in relation to a horizontal axis corresponding to the average of the limit values.
  - 6 : The value of the variable is distributed symmetrically in relation to a vertical axis corresponding to the average of the limit values.
  - 7 : The vertical bar charts fill in the difference (symmetrically) of the actual value of the variable in relation to the average of the limit values.
  - 8 : The horizontal bar charts fill in the difference (symmetrically) of the actual value of the variable in relation to the average of the limit values.
- Limit values : These values indicate the range of evolution displayed. If the value of the associated variable equals the minimum limit value, the bar chart is empty; if the value of the associated variable equals the maximum limit value, the bar chart is full (background color of field).  
The default values are set at 0 (minimum) and 1000 (maximum).

- Default values :

It is possible to set a default color and default values.

- Default colors :

The following rules apply when filling the bar chart with the defined default color :

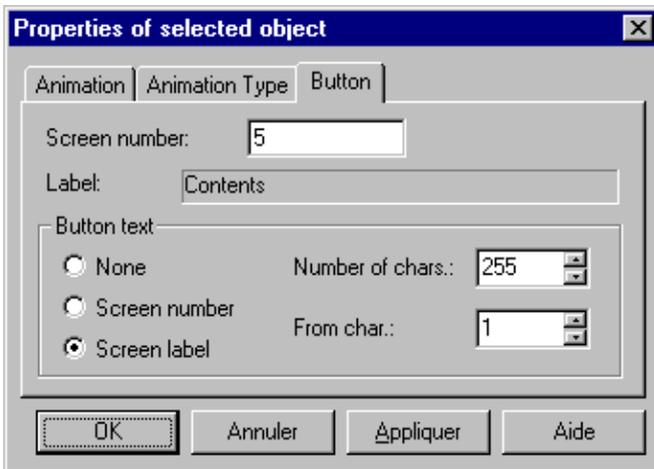
Minimum : Fill with default color if the value of the variable is less than or equal to the Minimum default value.

Maximum : Fill with default color if the value of the variable is greater than or equal to the Maximum default value.

**It is possible to superimpose several bar charts : To do this, simply assign the “None” pattern attribute to them (they then become transparent).**

### “Button” tab

Buttons are used to create a link between different screens. Activation of the button accesses the screen defined during parameter entry.



Attributes which can be modified :

- Screen : Entry of the number of the screen controlled by the button (either by direct entry, or using the scroll arrows). The name associated with the selected screen is displayed to the right.
- Button text :
  - None : No text on the button
  - Screen name : The name of the screen appears on the button.

---

It is possible to shorten the text and select the part of the name which the user wants to display on the button by filling in the following fields :

Number of characters, From character

- Screen number : The number of the screen appears on the button.

Examples :

None

Screen number

Screen name

Section of screen name

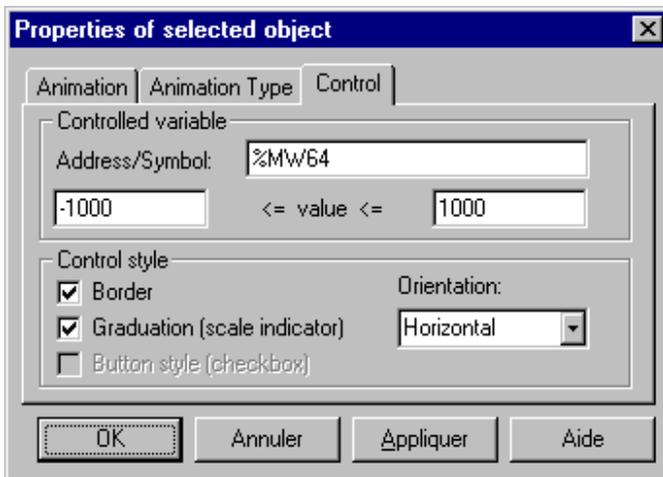


Number of characters : 2

From character : 4

### “Control” tab

This tab is used to define the controlled variable and the values of its operating range.



Attributes which can be modified :

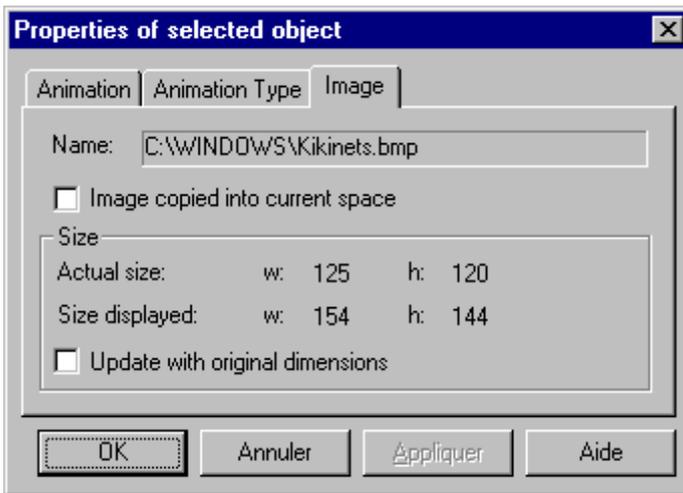
- Controlled variable :
  - Address/Symbol : Variable controlled in this way (see section 3.2-1 for authorized types)
  - Limit values : Minimum and maximum values which can be used by the type of variable entered. By default, the minimum limit value is set at 0 and the maximum limit value is set at 1000.  
If the variable entered is a bit, these two fields are grayed out, and values 0 and 1 are frozen.

- Control style :

This is used to adjust the graphic features according to the type of control element selected.

### “Image” tab

Bitmap type images (.BMP) can be integrated in a screen. This tab is used to define the characteristics.



Attributes which can be modified :

- Name : Full path for accessing the bitmap file (disk:\directory\name), unless the image is saved in the application. In this case, only the name appears.
- Image copied into current space : Checking this box copies the bitmap into the application space. If the box is not checked, the bitmap is deleted from this space.
- Size : Information on the actual size of the image and the size displayed indicates whether the original image has been resized (increased or decreased).
  - Update with original dimensions : Resizes the bitmap to its original size.

“Image copied into current space” box :

This dialog box is used to copy the selected image file into the application space. This offers several advantages :

- The file is saved with the application (\*.STX) thus reducing the risk of losing the image.

- 
- When the application is closed, it is compressed (images included) which significantly reduces the amount of disk space used
  - Image loading is quicker.
  - The image will be exported at the same time as the screen (see section 3.6-1).

The "Image copied ..." box only appears when the bitmap is located in the working directory (location of the application when it is open).

---

### 3.2-3 Information on Objects

A dialog box ("Information" command in the "View" menu) is used to display information on each object contained in a screen. This box is particularly useful for grouped objects.

Information displayed :

- Type of object
- Position of object
- Size of object
- Variable associated with the object (address, symbol, comment) and controlled variable (if it is a control element).

In addition, the following information is given about a grouped object :

- The number of objects it contains
- The variables associated with the objects it contains

If the user selects an item from this list, handles appear around the animated item.

**Information on the Selected Object** ✕

Object

Type:

Position:

Size:

Associated variable:

Grouped object

Number of animated objects:

Associated variable(s):

---

### 3.2-4 Manipulating Objects

A pointing device is required when designing a graphic page. Keyboard shortcuts are provided to give the designer rapid access to the majority of functions.

The floating tool palette can be used by the designer of the page to quickly select an object type or a function (see section 2.3-2).

#### Creating an object

The operating mode for creating a graphic object is as follows :

- Select an object type from the tool palette.
- Click the left mouse button on the position at which the top left corner or bottom right corner of the new object will be inserted. Holding this button down and moving the mouse alters the position of the corner diagonally opposite the start point, thus adjusting the size of the object being created. Releasing the button confirms the creation.

If when creating the object, and before releasing the left mouse button, the user presses the ESC key, creation of the object is aborted.

Once the object has been created, if the "Automatic return to selection mode" box has not been checked in the "Configure..." menu, the mode remains unchanged. It is then possible to create several consecutive objects of the same type without having to reselect a specific object type from the palette.

#### Single selection of one (or more) objects

There are 3 ways of selecting an object :

- Click with the left mouse button on the object (in selection mode)
- Successive clicks with the left mouse button. Each click selects the next graphic object (in the list of objects). The coordinates in the box are that of the mouse position.
- Successive presses on the TAB key. Each press selects the next graphic object (in the list of objects). SHIFT + TAB is used to reverse the order.

The last two methods are used to select a "hidden" object (in the background behind another).

Change an object to "Selection" mode:

A frame appears around the selected object; the handles in each of the 4 corners (except in certain particular cases) can be used to resize the object.

These resizing handles are drawn in reverse video in relation to the color of the screen background and the object in order to distinguish these colors.

---

### Multiple selection of one (or more) objects

Several objects can be selected simultaneously using the following 2 methods :

- Multiple consecutive selection : Frame the objects to be selected by defining a selection zone (same method as for creating objects). If there are any objects in the zone, these are incorporated in the list of selected objects. The selection box has resizing handles in each of the 4 corners which can be used to change the size and position of the selected objects.
- Multiple non-consecutive selection : Press the SHIFT key, then click on the objects to be selected, holding the SHIFT key down. Each object selected has its own resizing handles. When the user releases the SHIFT key (end of selection), a selection box including all the objects selected is displayed. It has resizing handles in each of the 4 corners which can be used to change the size of all the selected objects (the handles for each individual object are not displayed).

Note : Pressing SHIFT + clicking the mouse acts in the same way as a bistable ; clicking on an object which is not selected selects it, while clicking on a selected object deselects it.

Select All is used to select all the objects on the screen.

### Moving one (or more) objects

An object (or a group of objects) can be moved using the following 2 methods :

Select an object (or multiple objects) in the editor. Click with the left button inside the selected object (or inside the box which represents the zone containing the selected objects), then, holding the button down, move the object or selection box to the required position. This object is then displayed in dotted lines while the object is moved which aids its positioning.

Objects can also be moved by pressing the arrow keys on the keyboard successively. One press on an arrow key moves the selection by one pixel (or by the grid unit if the grid is active) in the direction of the arrow.

Pressing SHIFT + an arrow moves the selection in steps of 10 pixels.

### Modifying the size of one (or more) objects

The method for modifying the size of a graphic object is as follows :

- Select a graphic object in the editor. A frame appears around the selected object; the handles in each of the 4 corners can be used to resize the object.
- Pulling the handles in a certain direction extends the object in that direction. Each of the handles can have an effect in 2 dimensions. The object is then displayed in dotted lines, which makes it easier to position it and obtain the required size.

This method is the same when several objects are selected.

---

### **Deleting one (or more) objects**

Pressing DELETE when an object or a group of objects is selected deletes it. Warning : In this case, the object (or group of objects) is not placed on the Clipboard (it is not a "Cut" operation).

### **Cut/Copy/Paste**

Cut : Deletes one or more selected objects and puts them on the Clipboard.

Copy : Copies one or more selected objects onto the Clipboard.

Paste : Pastes one or more objects from the Clipboard to the position indicated by the mouse. The objects remain selected.

Warning : The Clipboard in the Runtime Screens editor is not the same as that used by Windows. Any data placed there is saved in a private format. It cannot be recovered by another application program.

It is possible to copy/paste between screens within the same application.

### **Alignment**

A group of selected objects can be aligned to the top, bottom, left or right of the selection box.

### **Flipping an object**

The selected object can be rotated (in relation to a vertical or horizontal axis).

This command has no effect on text or a bitmap (no "mirror" effect).

### **Group/Ungroup**

The main reason for grouping a set of objects is to create a "grouped object" which will be handled in the editor as a new object. A grouped object can be created from other grouped objects.

Group : Select several objects, then click on the Group button in the toolbar. At this moment, the handles of the selected objects disappear. A selection box (containing all the selected objects) is displayed with handles.

Ungroup : Select a grouped object then click on the Ungroup button in the toolbox. Each of the individual objects in the grouped object is selected (with the handles displayed). A selection box (containing all the selected objects) is displayed with the handles and the link between the objects is undone.

### **Foreground/Background**

Bring an object to the front : If an object is selected, this command can be used to modify the order in which objects are drawn (initially the order in which they were created) so that the selected object is drawn last.

This brings the selected object to the front.

Send an object to the back : If an object is selected, this command can be used to modify the order in which objects are drawn (initially the order in which they were created) so that the selected object is drawn first.

This sends the selected object to the back.

Note : Modifying the graphic attributes of an object, moving it or resizing it has no effect on its order of display on the screen.

### Undo

It is possible to undo all the operations performed since the last save (creation, modification, deletion or modification of the attributes of an object). This operation is only possible if the user has not yet confirmed his actions.

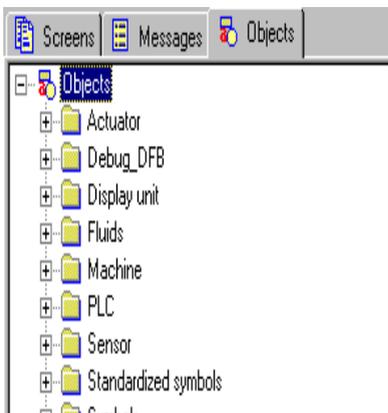
## 3.3 Object Library

The graphic object library is a set of objects intended for use in the screens of an application.

They may be part of a manufacturer library or a user library (which may or may not be specific to the application).

By default, they are stored in the application directory. They are then saved with the application. However, it is possible to assign them a different directory (see section 2.5). If this is the case, the list of objects displayed corresponds to the objects located in that directory.

This list is displayed as follows :



**The list of manufacturer objects is described, by family, in section 5.3 (appendix).**

These objects are either :

- **static** : no animation variables
- **dynamic** : one or more animation variables are associated with them. The type and a manufacturer reference (which can be modified) are given by default.

---

### 3.3-1 Managing the List of Graphic Objects

Managing the list of graphic objects is similar to managing the list of screens. However, it has one additional hierarchical level. Graphic objects are organized into families, which enables the screen designer to manage them more easily.

#### **Create : New family**

Creates a new family (action is only possible if the "Object library" item is selected). A data entry field appears at the end of the list with the name "New family". The user can then enter the name of the family and confirm.

#### **Create : New object**

Creates a new object (action is only possible if a family is selected). An edit zone appears at the end of the selected family with the name "New object". The user can then enter the name of the object and confirm.

#### **Edit functions**

An object can be deleted (via the menu or the keyboard - DELETE key -), cut (object deleted and copied onto the Clipboard), copied onto the Clipboard, pasted from the Clipboard (it then appears at the end of the list) and inserted at a given position in the list.

These edit functions are also possible for object families.

The deletion of a family deletes all its component objects.

#### **Rename**

Modifying the name of an object (or family). Simply click on the name then hold the left mouse button down for 1 second to change to edit mode (the name is selected). The object or family name can contain a maximum of 40 characters.

#### **Undo**

This is used to cancel the last edit operation performed.

Warning : This operation is only possible if the user has not performed any operations outside the list (modification of a screen, for example).

#### **Print**

Prints one or more objects from the same family.

---

### 3.3-2 Nature of Graphic Objects

Graphic objects have exactly the same form as graphic screens. They are saved in a file with the extension .ODG.

The file name corresponds to the name of the object.

---

### 3.3-3 Exporting and Importing Graphic Objects

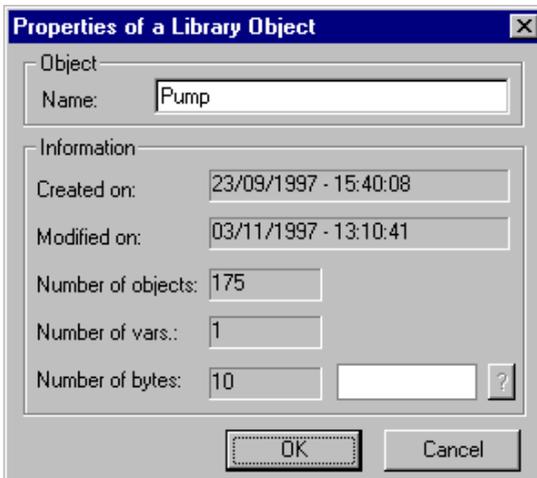
These operations are the same as those for the graphic screens (see section 3.6).

---

### 3.3-4 Properties of Graphic Objects

When a graphic object is selected, a dialog box can be used to modify its name (200 characters max.) and to display the following information :

- Graphic object creation date
- Date of the last modification
- Number of different animation variables used in this object - space occupied by these variables
- Size of the graphic object
- Family to which it belongs
- Location of the object

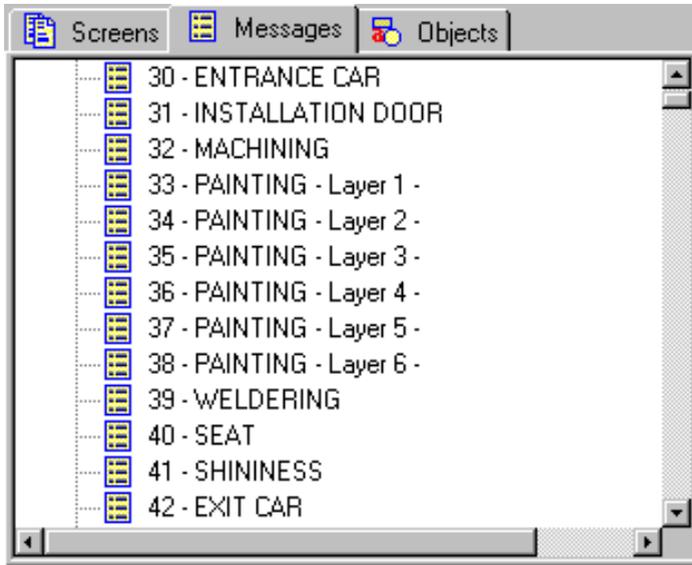


---

### 3.4 Messages

---

This tree-structured list is used to display and manage messages (number and name). When creating a new application, this list is empty. The list of messages is displayed as follows :



The Runtime Screens user can access all the functions available via the main menu or by clicking with the right mouse button on one of the elements in the list.

#### **Create :**

Creating a new message : An edit zone appears at the beginning of the list with the default name “New Message” preceded by its rank. Clicking with the left mouse button switches to edit mode, where the user can enter the message text and confirm with Enter.

To modify a message, simply click on it and wait for the change to edit mode (the name is selected) and enter the new text.  
A message can contain up to 200 characters.

#### **Delete, Cut, Copy, Paste :**

A message can be deleted, cut (deleted and copied onto the Clipboard), copied onto the Clipboard, pasted from the Clipboard (it then appears at the beginning of the list) or inserted at a given position in the list.

**Properties :**

Clicking on this message opens a dialog box which can be used to modify the message text (this is another option available for modifying the name of a message). This screen can also be used to enter the value of the rank associated with this message.

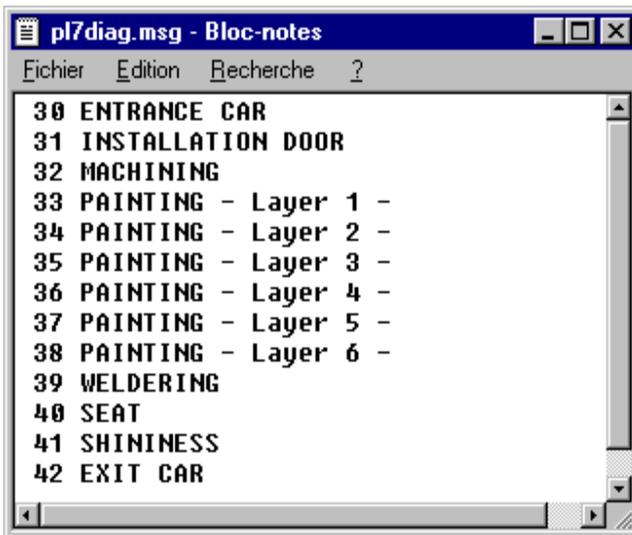
**Undo action :**

This is used to cancel the last edit operation performed. Warning : This operation is only possible if the user has not performed any operations outside the list (modification of a screen, for example).

**Export, Import**

The PL7DIAG.MSG file is Text format. The user can therefore easily create a file using any editor or word processing package under Windows (save as TXT format) then import it.

A dialog box is used to indicate the directory and the file to be loaded or saved. If the user loads a message file, it is inserted at the end of the list of existing messages and the PL7DIAG.MSG file is updated.

**Print**

This is used to print all the messages.

---

## 3.5 Printing

---

It is possible to print all data handled : screens, messages and graphic objects. In order to improve the presentation, the user can insert a title page and a table of contents at the beginning of his document.

The print request is made in one of two ways :

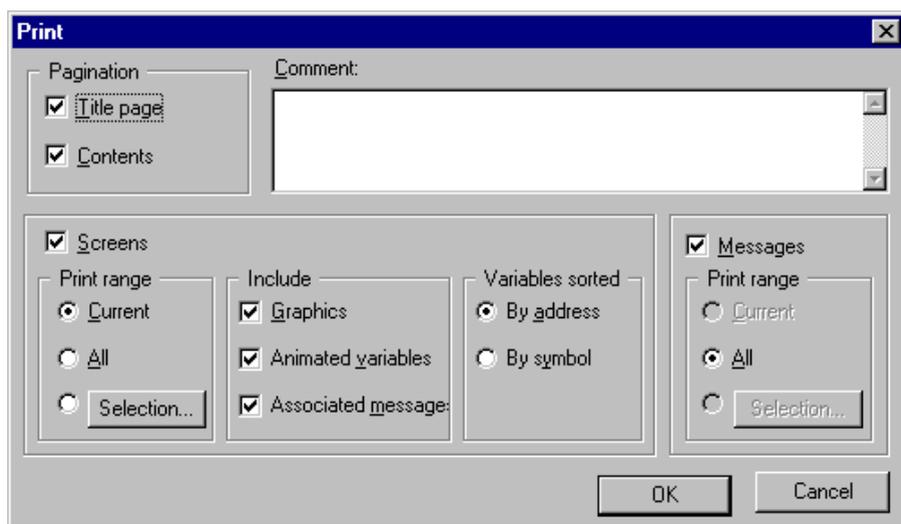
- by selecting the "Print" command from the PL7 "File" menu
- by selecting the "Print" command from the shortcut menus available for each type of object

Whichever method is used, the print setup is always context-specific. Only those parameters relating to the objects being handled are available to the user.

---

### 3.5-1 Printing Screens and Messages

When printing screens or messages, the parameters are defined as follows :



## Header

The user can print a title page, a table of contents and a comment. When the user decides to print a title page, he can enter a comment in the "Comment" edit field in the dialog box.

## Screens - Messages

Activation of the parameters concerning the print range depends on the context in which the user decides to print.

There are two possible scenarios :

- The user is in the browser, at the root; the print setup box opens and the items selected by default are :

- Range : All (the "Selection" button is active)

For the screens only

- Include : all the items are checked

- Variables sorted : By address (the items in this group are only active if the "Animated variables" item is checked).

- The user is in the browser on a screen (or a message); the print setup box opens and the items selected by default are :

- Range : Current (the "All" item and the "Selection" button are active)

For the screens only

- Include : all the items checked

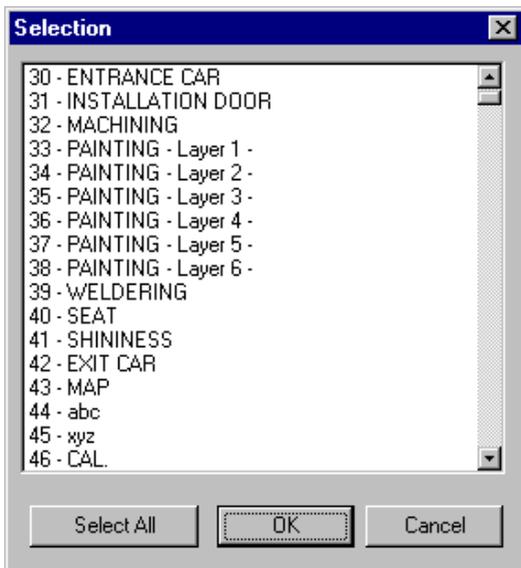
- Variables sorted : By address (the items in this group are only active if the "Animated variables" item is checked).

In both cases, the user can modify the parameters as required. Clicking on "OK" immediately only prints the information relating to that type of element.

It is possible to select more than one type of element and to modify their print parameters.

A selection of elements can be printed by clicking the "Selection" button (if it is available).

A dialog box opens in which one, several or all the elements to be printed can be selected :



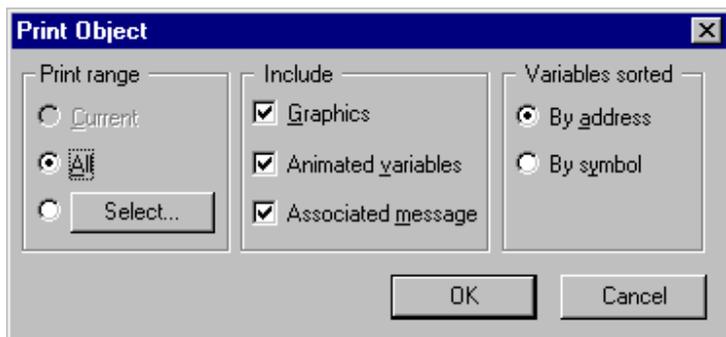
The parameters used for printing are previously configured via "Print Setup" in the PL7 "File" menu (printer used, page orientation, etc).

The data handled by Runtime Screens is not printed in the overall documentation file for the application. Only local printing is possible.

---

### 3.5-2 Printing Objects

When printing objects, the parameters are defined as follows :



This parameter screen is used in the same way as the one for the screens/messages (see section 3.5-1).

**When printing objects, it is not possible to print a title page, a table of contents or a comment.**

---

### 3.5-3 Pagination of Document and Information Printed

#### The title page

Printing the title page is optional. It is only printed if the user has checked the corresponding option in the print dialog box..

This title page is similar to the title page of the PL7 documentation file. It contains the following information :

- A title (the name of the station)
- The name of the application
- The version of the application
- The date the application was last modified
- The name of the target PLC
- The name of the menu variable
- A comment, if required, entered by the user

An overview of the title page is given on the following page.

---

# CUT

TECHNICAL DOCUMENTATION	
Application	DEMODIAG.STX
Application version	1
Date of the last modification	27/05/97 19:33:16
Target PLC	TSX 5710
Menu variable Name Comment	%M15 Control
Comments : Runtime screens for production supervision	

## The contents

Printing the contents is optional. It is only printed if the user has checked the corresponding option in the print dialog box.

The contents is a list of all the objects printed and indicates the page number of each object.

## Information on objects

Each object is printed in a specific way :

- Screens : The graphic representation plus the grid (if it is displayed on the screen) with addresses, which are used to distinguish the positions of the variables; the list of variables animated in this screen; the list of messages used in this screen. Each heading is optional, but at least one of them must be selected.
- Messages : the list of messages
- The graphic objects from the library : the selection of information is the same as for the screens.

For screen or graphic type objects and depending on the option selected in the dialog box, the user can choose to print the list of animated variables sorted by address or by symbol.

The information printed for these variables is as follows:

- The positions, X and Y, of the variable (coordinates on the grid)
- the address
- the symbol
- the type of animation
- the animation condition
- the flashing information

Below is an example of a printout of the list of animated variables for a screen :

Position		Addresses	Symbols	Type of animation	Animation condition	Flashing
X	Y					
24	176	%MF400	TANK	Decimal value	Continuous	N
28	356	%MW100	INC_TANK	Bar chart	Continuous	N
23	140	%MW104	%MW104	Standard	Continuous	N
236	6	%MW20	SECOND	VAL message, Offset 0	Continuous	N
186	297	%MW501	Motor 1	Standard	Continuous	N
78	197	%MW20	SECOND	VAL message, Offset 10	Continuous	N
291	193	%S6	%S6	Standard	Continuous	N

---

## The footer

The footer is printed at the bottom of each page and includes the following information :

- The name of the application
- The name of the object printed in the current page
- The date the screen was last modified
- The page number
- The total number of pages
- The print date

Below is an example of a footer :

PL7DIAG.STX	Screen modified 05/06/1997	Printed : 05/06/1997	Page : 15/67
Screen 4 presenta.			

---

### 3.5-4 Controlling Printing

Once the user has configured the print function as required and clicked on "OK", printing begins.

A dialog box is displayed which follows the progress.

Clicking on the "Cancel" button aborts printing.



## 3.6 Saving/Restoring

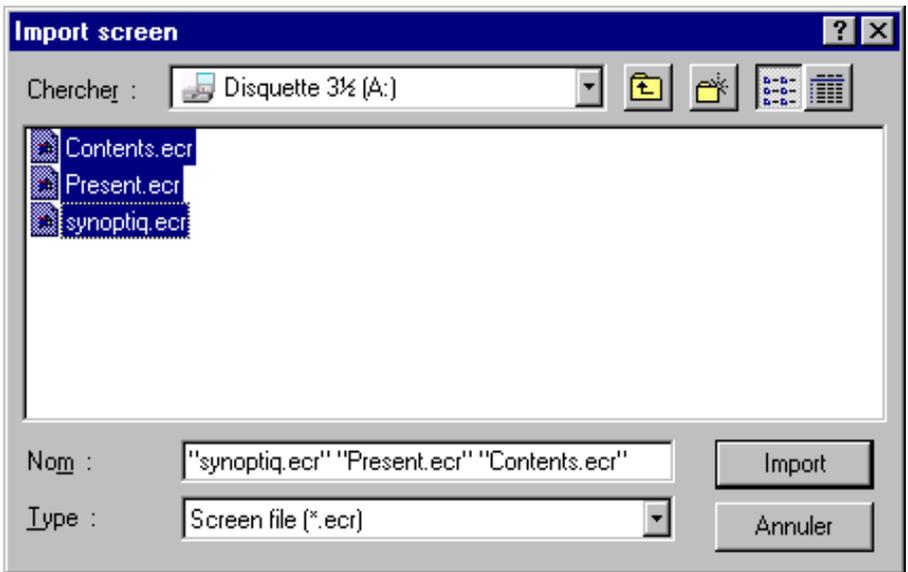
### 3.6-1 Archiving and Restoring Screens

#### Import - Export

From the list of screens, it is possible to import screens which have been saved previously or to export screens from the application to any other medium in order to save them.

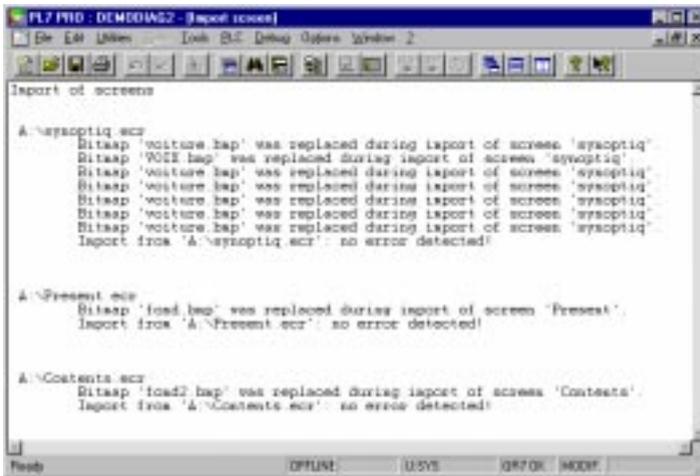
#### Importing a screen :

Selecting the "Import" command from the "File" menu opens a dialog box which functions like the generic boxes in Windows. It can be used to find screens which have already been saved (onto floppy disks, for example). One or more screens can be loaded (single or multiple selection from the list).



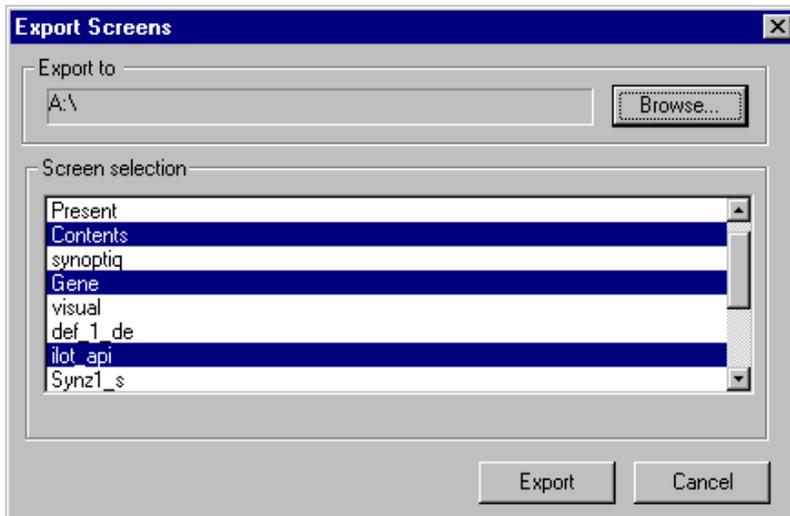
The screen(s) are loaded in the application and appear at the beginning of the list of existing screens. If the imported screens have the same name as some already present in the application, these screens appear with the name preceded by "Copy of ...". Once the screens have been imported, the messages can be imported. (see section 2.5).

A consistency check is carried out during this operation and a report like the one below is generated as follows :



### Exporting a screen :

Selecting the "Export" command from the "File" menu opens a dialog box which functions like the generic boxes in Windows. It can be used to save screens into a directory specified by the user (onto floppy disks, for example). One or more screens can be saved (single or multiple selection from the list).



The message file is exported at the same time as the screens.

**If the bitmap images (.BMP) used by the screen(s) have already been copied into the application space, these are also exported.**

---

## 3.6-2 Archiving and Restoring Messages

### Import - Export

From the list of screens, it is possible to import messages which have been saved previously or to export messages from the application to any other medium in order to save them.

#### Import a list of messages :

Selecting the "Import" command from the "File" menu opens a dialog box which functions like the generic boxes in Windows. It can be used to find a list of messages (\*.msg) which has already been saved (onto floppy disks, for example).

#### Export a list of messages :

Selecting the "Export" command from the "File" menu opens a dialog box which functions like the generic boxes in Windows. It can be used to save a list of messages (\*.msg) into a directory specified by the user (onto floppy disks, for example).

Please note : The PL7DIAG.MSG file is Text format. The user can therefore easily create a file using any editor or word processing package under Windows (save as TXT format) then import it.

---

## 3.6-3 The Files Created

Files created in the application (.STX) are as follows :

- for each screen, an .ECR file giving the name of the screen
  - for the messages, a single PL7DIAG.MSG file
  - for the Utilities\Configure... configuration, the CONF\_ECX.DAT file
  - xxxx.BMPfile(s) corresponding to the images copied into the application space
- The WKEX?????.TMP file is created in the temporary directory.

A section [ECREXP] is created in the PL7.CFG file to store the size and position of the tool in PL7, as well as the position of the first screen.

---

The change to online mode is made as follows :

- either via the Connect command in the PLC menu
- or via the “Connect” button in the toolbar

The current screen is animated according to the state of the PLC variables associated with the objects making up the screen.

In addition, if the “Edit in online mode” function is activated and the control via PLC function is not active (see section 2.5), the functions to edit a screen (creation, modification, or deletion of a static or animated graphic object) are available.

---

## 4.1 Animating Objects

---

The animated objects which make up a screen are displayed when their display condition is true.

For a grouped object, if it is animated and its display condition is not true, none of its component elements are displayed (even if it includes animated objects for which the display condition is true).

---

### 4.1-1 Object Display Order

All objects in a screen are displayed according to their order of creation or the order in which they were repositioned by the user (using the Up/Down function).

Animated objects can be superimposed. It is up to the user to manage superimposing correctly (one animated object may hide another). As far as graphic animation is concerned, superimposed objects are managed correctly.

Superimposing can also be of interest if trend diagrams or bar charts are being used (eg. a text object on a chart). Warning : superimposing a bitmap over an animated object may have a significant adverse effect on performance (see section 3.2-1).

The display order is the same regardless of the operating mode of the PL7 workshop : offline or online.

**Windows control type objects are always placed above other graphic objects. It is highly inadvisable to superimpose control elements over other control elements. This significantly increases the risk of "control" errors.**

---

### 4.1-2 Selecting an Animated Object

Animated objects can be selected using the mouse (in the "Utilities" tool palette) or using the F4 and F5 keys. Pressing F4 selects the animated objects in the order in which they were created or repositioned by the user (F5 performs this operation in reverse). Each time an animated object is selected, its associated variable and comment (if there is one) are displayed in the status bar.

Even if an animated object is not displayed in the screen (display condition not true), it can still be selected.

Controls can be selected via the keyboard using the TAB key (SHIFT + TAB does the reverse). Once the control is selected, it can be modified using either the mouse or the keyboard.

---

### 4.1-3 The Tool Palette

A utilities toolbar is available in online mode (see section 2.3-2).

An associated function key can be used by the operator to access each function.

Tools available :

<u>C</u> ontrol via PLC (F2) ----->		<- Control via <u>U</u> ser (F3)
<u>N</u> ext Animated Object (F4) -----> (F5)		<- <u>P</u> revious Animated Object
Initialize Animation <u>T</u> able -----> (F6)		<- <u>I</u> nitialize Cross References (F7)
Display <u>L</u> ist of Screens -----> (F8)		<- Display <u>E</u> ditor (F9)

---

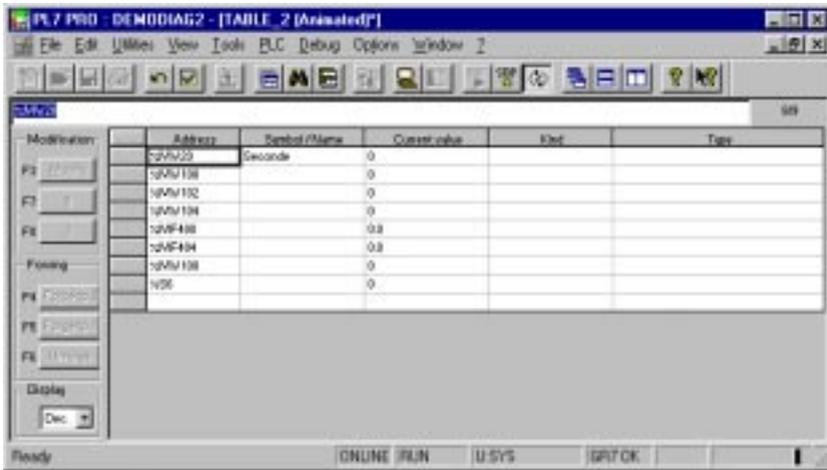
### 4.1-4 Modifying Variables

It is possible to modify the content of any variable associated with an animated object. This is done by selecting the "Animation Table" command.

To activate this tool, select the reference object for this variable (using the keyboard or the mouse) and select the "Modify Variable" button in the tool palette (or press F6). The animation table is then displayed with the selected variable.

Several objects can be selected (usual selection method).

Calling the "Modify Variable" function initializes the animation table with all the animated variables associated with the selected objects (limited to 40 variables per table).

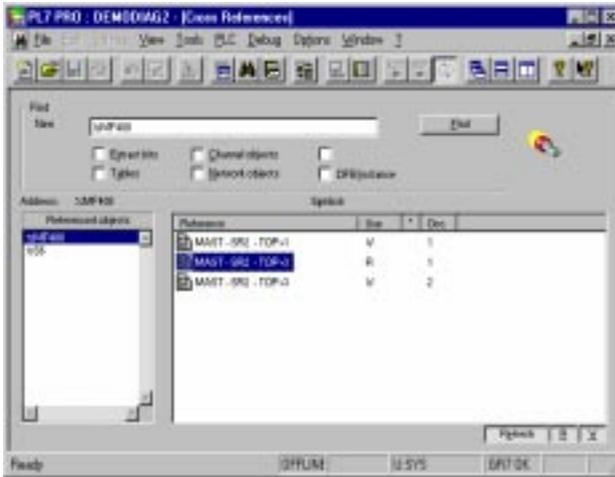


#### 4.1-5 Finding a Variable

It is possible to find a variable which is part of the application. This variable is either a variable associated with an animated object (selected using the keyboard or the mouse) or any other variable.

In the former case, selecting the "Find Variable" button in the tool palette (or pressing F7) activates the "Cross References" tool and displays the occurrences of this variable in the application.

In the latter case, the "Cross References" tool is activated and the user can find the required variable in the application.



---

## 4.2 Managing the List of Screens/Animated Screens

It is possible to display either the list of screens, or a graphic screen, or both at once. The various modes for displaying information can be accessed directly either using the tool palette or the function keys.

F8 displays the list of screens + the current screen.

F9 displays the current graphic screen.

---

## 4.3 Managing Keyboard and/or PLC Control

The type of control is specified in the PL7 configuration options. However, it can be modified in online mode.

The "Control via User" button activates (or inhibits) this type of control (F2 function key).

The "Control via PLC" button activates (or inhibits) this type of control (F3 function key).

The graphic state of the button on the tool palette (whether it looks "pushed down" or not) corresponds to the state of the current type of control.

## 5.1 Equivalent Keyboard and Mouse Functions

### Graphics editor :

SPACEBAR	Selects the next object Modifies the state of a checkbox (when it is highlighted)
SHIFT + SPACEBAR	Selects the previous object
DELETE, BACKSPACE	Deletes a selected object (without putting it on the Clipboard)
ALT + BACKSPACE	Cancels the last action
ENTER	Online : enables (the button or entry field)
TAB	Highlights the next control element
SHIFT TAB	Highlights the previous control element
Arrow keys	Offline and online : Moves the selected object in the indicated direction by one pixel.
SHIFT Arrow keys	Offline : Moves the selected object in the indicated direction by ten pixels.
PGUP	Scrolls vertically upwards Modifies the value of a scale indicator
PGDOWN	Scrolls vertically downwards Modifies the value of a scale indicator
CTRL + right arrow	Scrolls horizontally to the right
CTRL + left arrow	Scrolls horizontally to the left
INS	Copies an object from the Clipboard
CTRL + X	Cuts a selected object and puts it onto the Clipboard
CTRL + C	Pastes a selected object and puts it onto the Clipboard
CTRL + V	Copies an object from the Clipboard
CTRL +	Groups a selected group of objects
CTRL -	Ungroups a grouped object
CTRL + Z	Cancels the modifications made since the last confirmation
CTRL + W	Confirms all modifications made in PL7 Diag since the last confirmation

### Tree window :

TAB	Expands an element in the tree list
SHIFT TAB	Contracts an element in the tree list
INS	Inserts a screen/message/object from the Clipboard
DELETE	Deletes a selected screen/message/object (without putting it on the Clipboard)

---

CTRL + X	Cuts a selected screen/message/object and puts it onto the Clipboard
CTRL + C	Copies a selected screen/message/object and puts it onto the Clipboard
CTRL + V	Inserts a screen/message/object from the Clipboard
F2	Control via the PLC
F3	Control via the user
F4	Next animated object
F5	Previous animated object
F6	Modifies the variable
F7	Browsing
F8	List of screens
F9	Full screen editor

---

---

## 5.2 Recommendations for Use

---

### 5.2-1 Limiting the Number of Animated Variables

The number of different variables used in a screen is limited as follows :

- Maximum number of bits which can be used simultaneously : **202**
- Maximum number of single words which can be used simultaneously : **168**
- Maximum number of double words which can be used simultaneously : **126**

Using variables of different types in a screen :

The PLC response frame is made up of 1024 bytes, 6 of which are used by the system.

Types authorized for animation variables :

- Memory elements (%MX, %MB, %MW, %MD, %MF, %MWn:Xm, %MDn[%MWm], etc)
- I/O elements and their management variables (%In.m and %In.MOD.ERR or %IN.m.ERR)
- Chart bits (%Xi)
- etc

The following elements are not accepted :

- Constants (%KB, %KW, %KD, %KF)
- Immediate values (34, 1.0<sup>45</sup>, etc)
- Tables of elements (%MWn :m, etc)

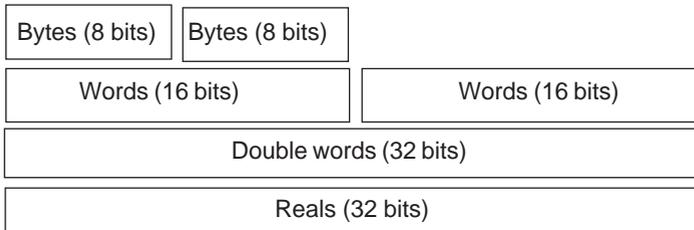
#### Optimization :

These limits are only applicable when using different variables. If several objects are animated by the same variable, optimization of the communicating layer means that they are only counted once.

---

### 5.2-2 Organization of the Variables in the Memory

Optimization is achieved by the overlapping of bytes, words and double words in the memory space.



As shown in the previous diagram, words, bytes, double words and reals are only masks in the same space. Variable %MW0 is, for example, included in %MD0. The cost of an exchange of a double word is less than that of two single words. The more grouping is possible, the better the performance. The animation function must therefore attempt to group as many values as possible to accelerate exchanges, although this may slow down the processing of values received by an algorithm which organizes double words into bytes or word bits.

To avoid problems of overlapping, the optimizer only generates double words with even addresses.

The optimizer algorithm can be briefly introduced by the following rules :

Word bits relating to one word are replaced by the word	%MW5:X1  %MW5:X2  %MW5
Word bits relating to consecutive words are replaced by a double word if the first word is an even address.	%MW4:X1  %MW5:X2  %MD4 but not %MW5:X1 and %MW6:X2
Bytes overlapping one word are replaced by that word	%MB8  %MB9  %MW4
Bytes and word bits based on the same word become one word	%MW4:X1  %MB9  %MW4
Words overlapping one word bit or one byte absorb these variables	%MW4  %MW4:X5  %MB8
Words which are followed by bytes are replaced by double words	%MW4  %MB11  %MD4
Two consecutive words become one double word (if the first word is even)	%M4  %MW5  %MD4
Floating points are replaced by double words	%MF5  %MD5
Double words overlapping bytes, words or word bits absorb these objects	

For word bits where no differences are evident, bit 0 is the least significant, and 15 the most significant. So if %MW0 is 1, %MW0:X0 is 1, and if %MW0 is 65536, %MW0:X15 is 1. There is nothing unusual about this.

The area occupied and the area which is still available is displayed in the screen properties.

---

### **5.2-3 Performance**

The number of exchanges per second between the terminal and the PLC (fluidity of the animation of graphic objects) depends on several factors, including :

- the type of PLC and its scan time
- the type of driver used
- the type of PC (especially its processor)
- the use of Runtime Screens

### **Creating the graphic screen**

Limit the number of variables used to animate the objects.

Avoid creating large objects (occupying a large area of the screen).

If it is possible to superimpose trend diagrams (or bar charts), it is not advisable to superimpose more than three or four objects of this type.

The use of images (.bmp files) can considerably impair performance especially if their size has been modified and if the animated objects (with a transparent background) are displayed on top of them.

If an image has to be used in several different sizes in a single screen, it is preferable to create several images, each of the required size, and use them in the screen without modifying them.

### **Using graphic screens (online mode)**

It is advisable to close all other tools (animation tables, editors, etc).

---

---

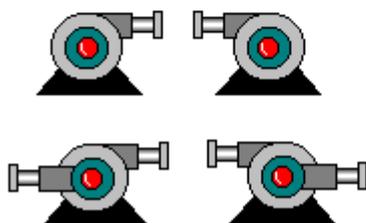
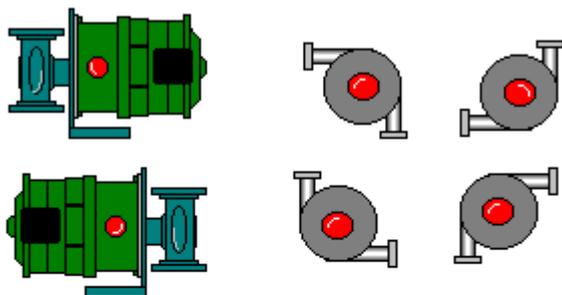
## 5.3 Object Library

---

### 5.3-1 Actuators

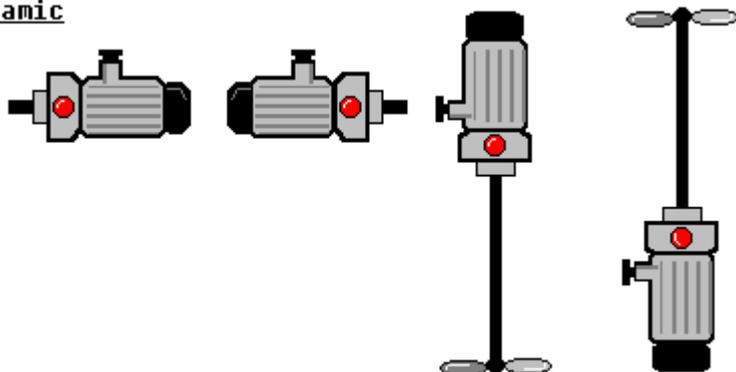
#### Pump

##### Dynamic



#### Motor

##### Dynamic





---

### 5.3-2 Display Units

Display

**Static**

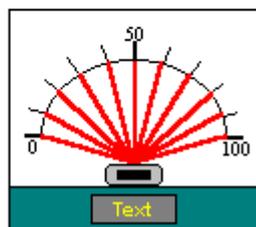
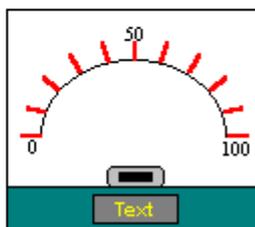
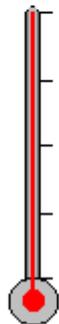
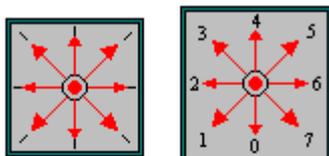


**Dynamic**



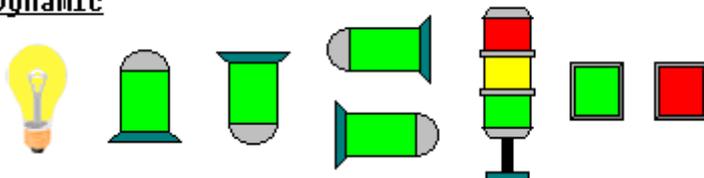
VU meter

**Dynamic**

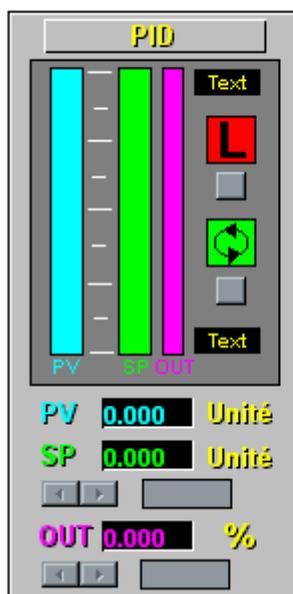


Indicator lamp

**Dynamic**



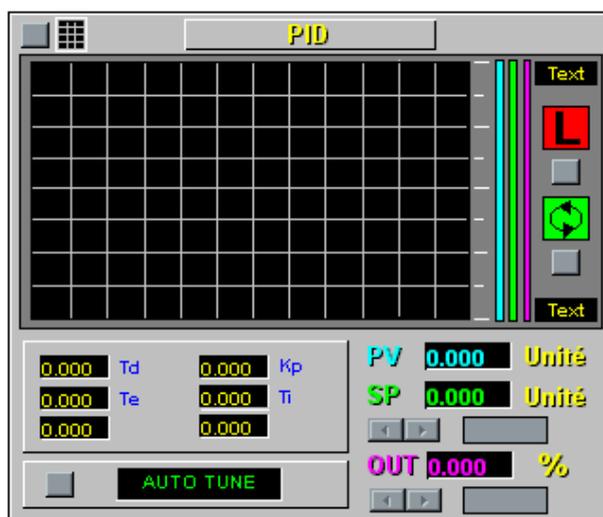
## PID

Dynamic

%MF0 : PU  
 %MF2 : SP  
 %MF4 : OU  
 %MF6 : MAX  
 %MF8 : MIN  
 %MF10 : Alarm H  
 %MF12 : Alarm L

%M0 : L/R  
 %M1 : A/M

## TUNE PID

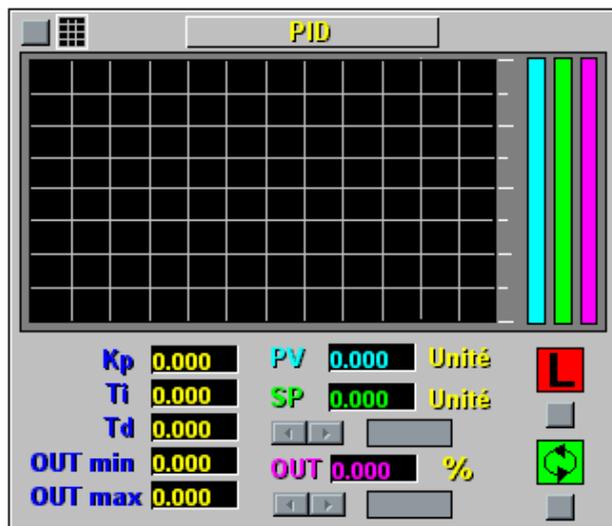
Dynamic

%MF0 : PU  
 %MF2 : SP  
 %MF4 : OU  
 %MF10 : Alarm H  
 %MF12 : Alarm L  
 %MF14 : Kp  
 %MF16 : Ti  
 %MF18 : Td  
 %MF20 : Te

%M0 : L/R  
 %M1 : A/M  
 %M2 : Auto Tune  
 %M10 : Grid

## TUNE 2 PID

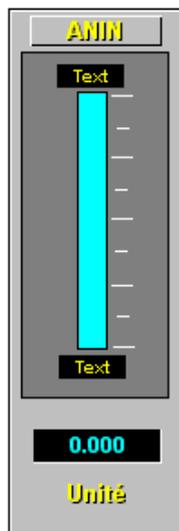
### Dynamic



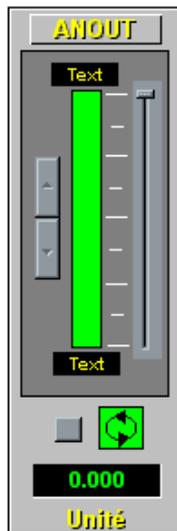
%MF0 : PU  
%MF2 : SP  
%MF4 : OU  
%MF10 : Alarm H  
%MF12 : Alarm L  
%MF14 : Kp  
%MF16 : Ti  
%MF18 : Td  
%MF20 : OUT min  
%MF22 : OUT max  
%M0 : L/R  
%M1 : A/M  
%M10 : Grid

## ANIN ANOUT

### Dynamic

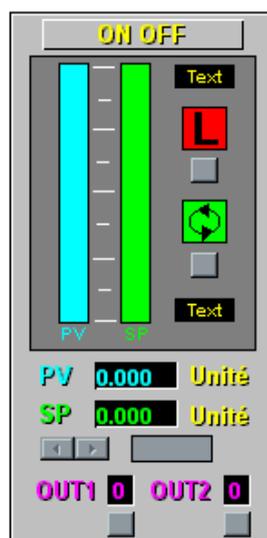
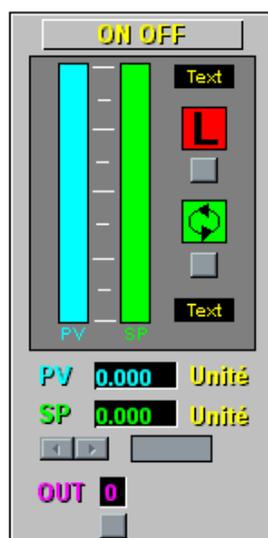


%MF0 : ANIN  
%MF6 : MAX  
%MF8 : MIN  
%MF10 : Alarm H  
%MF12 : Alarm L



%MF0 : ANOUT  
%MF6 : MAX  
%MF8 : MIN  
%MF10 : Alarm H  
%MF12 : Alarm L  
%M0 : A/M

## ON OFF

Dynamic

%MF0 : PU

%MF2 : SP

%MF6 : MAX

%MF8 : MIN

%MF10 : Alarm H

%MF12 : Alarm L

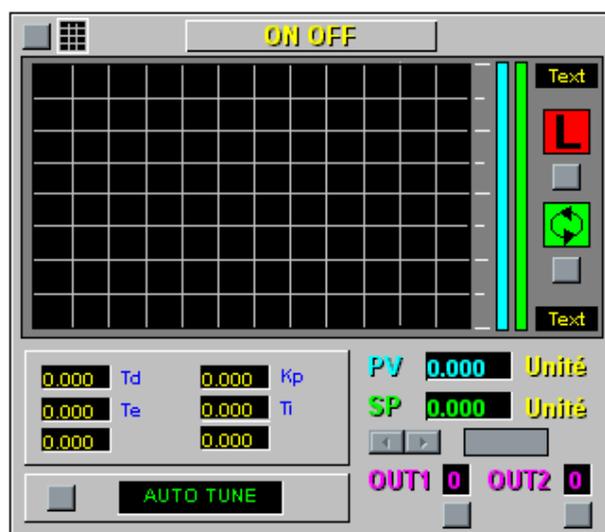
%M0 : L/R

%M1 : A/M

%M2 : OUT1

%M3 : OUT2

## TUNE ON OFF

Dynamic

%MF0 : PU

%MF2 : SP

%MF4 : OU

%MF10 : Alarm H

%MF12 : Alarm L

%MF14 : Kp

%MF16 : Ti

%MF18 : Td

%MF20 : Te

%M0 : L/R

%M1 : A/M

%M2 : OUT1

%M3 : OUT2

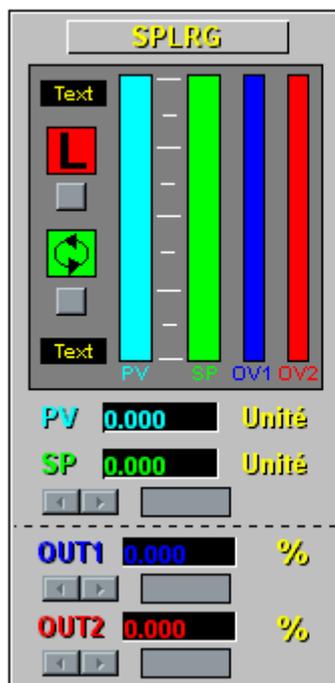
%M4 : Auto Tune

%M10 : Grid

---

## SPLRG

### Dynamic



%MF0 : PV

%MF2 : SP

%MF4 : OV1

%MF6 : OV2

%MF8 : MIN

%MF10 : Alarm H

%MF12 : Alarm L

%MF14 : MAX

%M0 : L/R

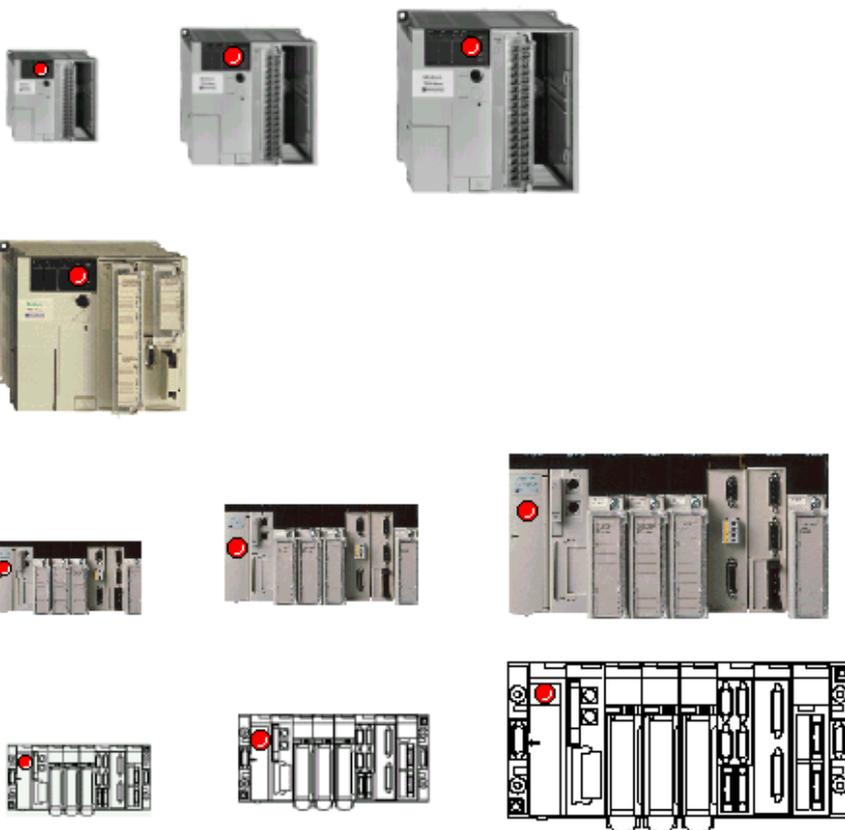
%M1 : A/M

---

### 5.3-3 PLCs

#### PLC

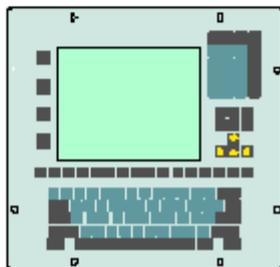
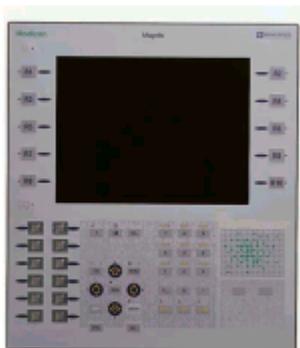
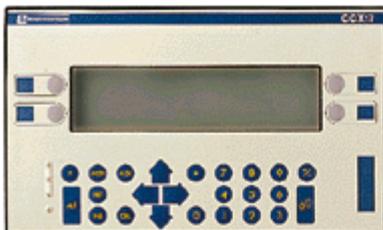
#### Dynamic



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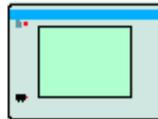
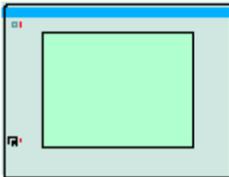
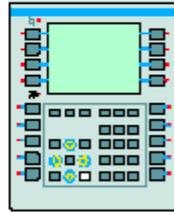
CCX

Static



Magelis

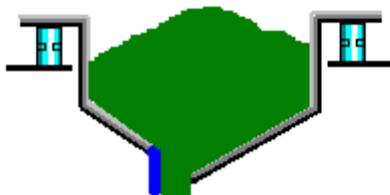
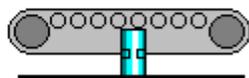
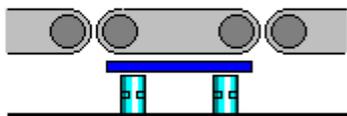
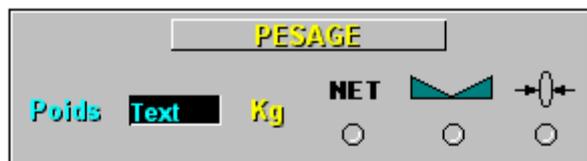
Static



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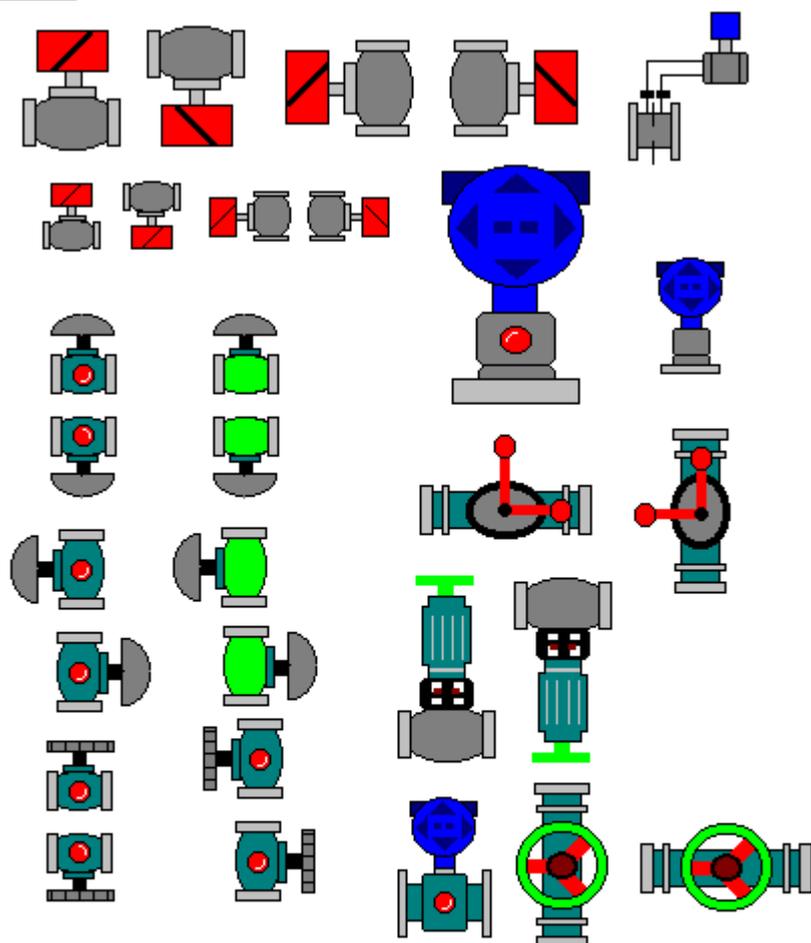
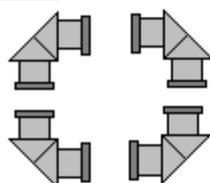
## Weighing

### Dynamic



## 5.3-4 Sensors

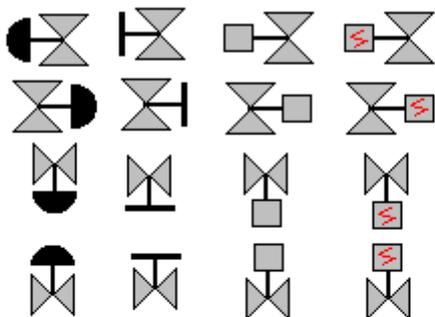
Valve

DynamicStatic

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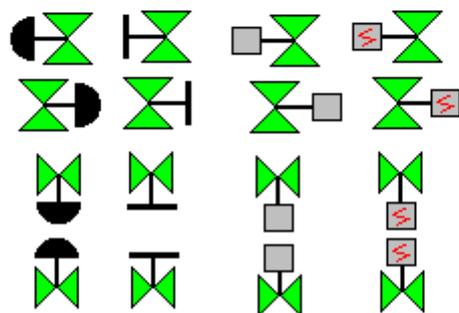
## Standard valve

### Static



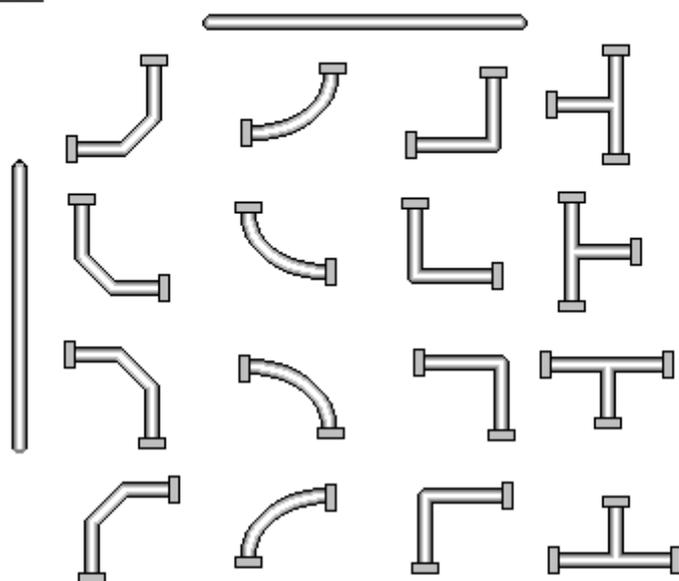
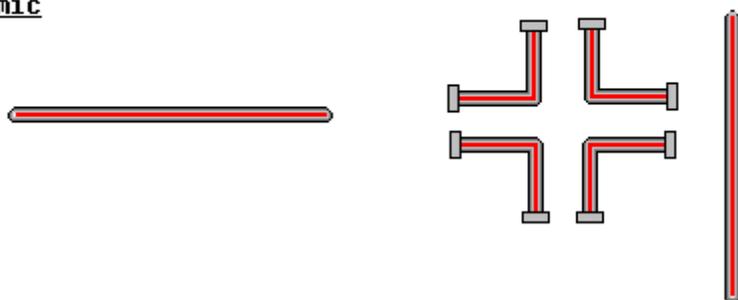
---

### Dynamic



## 5.3-5 Fluids

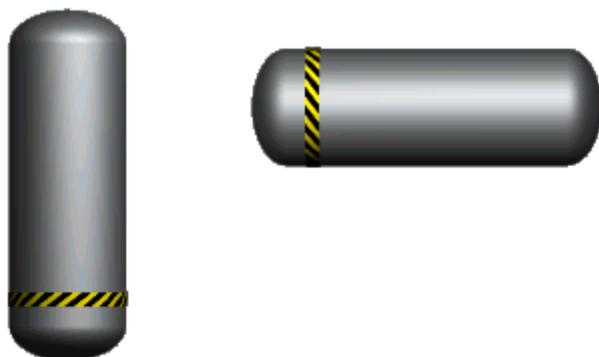
## Tubes

StaticDynamic

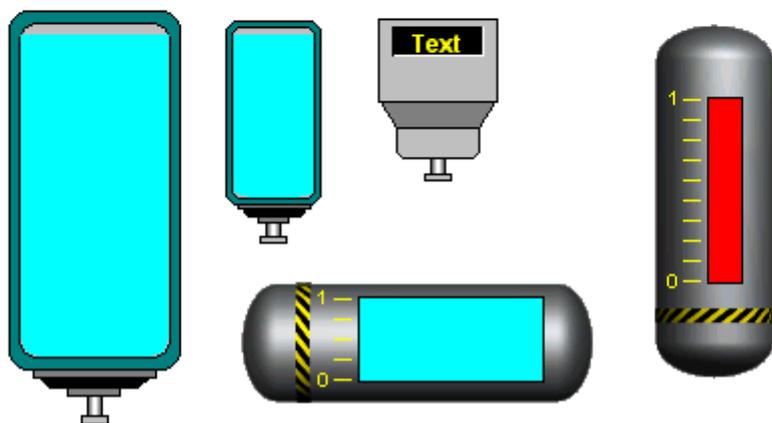
---

Tank

Static

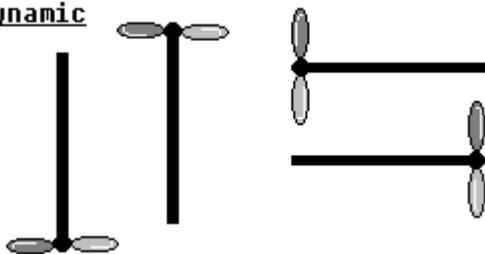


Dynamic



Agitator

Dynamic

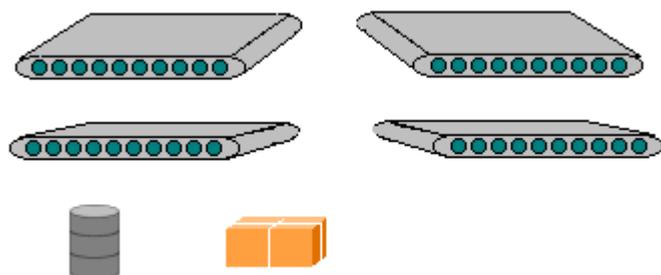


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### 5.3-6 Machines

#### Conveyor

##### Static



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##### Dynamic



#### Machine

##### Static



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##### Dynamic

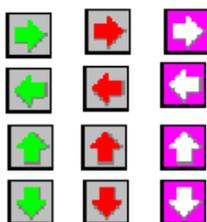


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### 5.3-7 Symbols

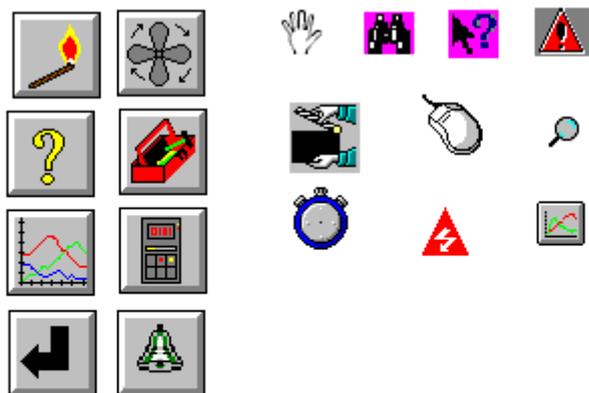
#### Arrow

##### Static



#### Icon

##### Static



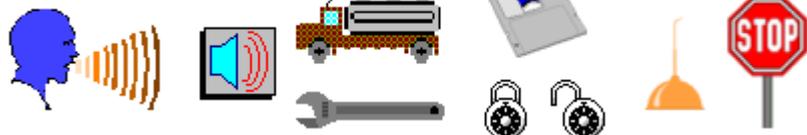
---

##### Dynamic



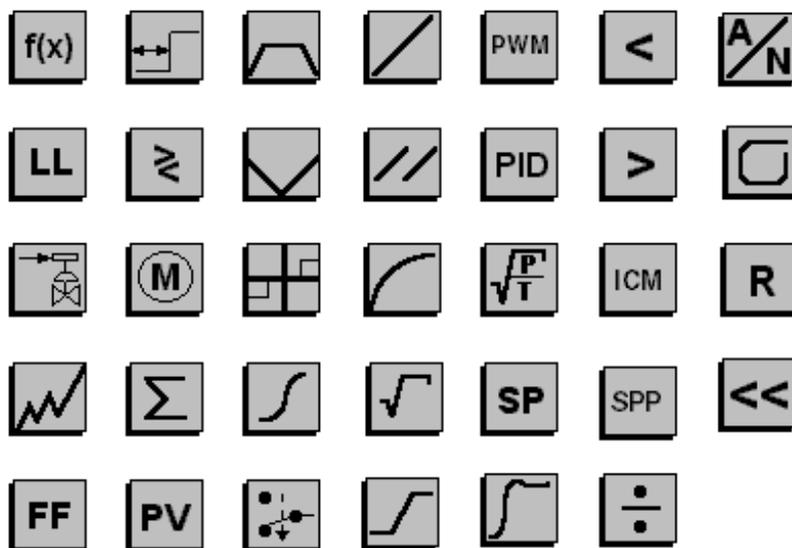
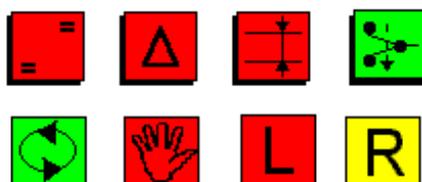
#### Miscellaneous

##### Static



## 5.3-8 Standard Symbols

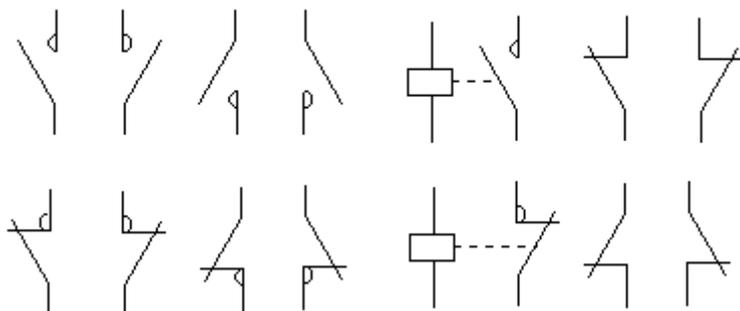
## Function block

StaticDynamic

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Electrical

Static



Process control

Static

