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AutomationStudio

GENERAL FUNCTIONS

INTRODUCTION

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1. Introduction

Automation Studio™ is a unique design, animation and simulation software tool. Originally created for the automation industry, it now serves OEMs operating in various types of industries, and fulfills engineering, training, testing, and maintenance requirements. The workshops associated with the software reflect as thoroughly as possible the prevailing usage in the industry. The software drawing, documentation, and simulation capabilities combined with its intuitive interface make of Automation Studio™ an efficient tool to boost productivity, and to improve product development, training and maintenance processes.

In Automation Studio™ environment, users have ready access to all design tools. The core system contains three utilities: a Diagram Editor, a Project Explorer, and a Library Explorer. The Diagram Editor allows to generate and simulate diagrams, and create reports, while the Project Explorer handles file management, as well as the classification of all documents associated with a simulation project. The Library Explorer supplies the symbols libraries necessary for the creation of diagrams that make up your projects.

Finally, this software allows you to document your projects. You can print and export your diagrams along with the various associated lists and reports required to assemble a complete work file.

1.1 About Automation Studio™

Automation Studio™ is a simulation software package, in which various modules may be plugged.

Each module, also called "workshop", includes a component library which serves as a basis to create different types of circuits, such as hydraulic, pneumatic, electrical, etc. Users can create circuits based on a single technology or combine multiple technologies that interact with each other..

Automation Studio™ handles the editing, simulation, file and diagram management, printing and display functions.

☞ WARNING: the simulation of a project in Automation Studio™ depends on the number of documents to be simulated, the number of components and the general configuration of your computer. A poor configuration results in a significantly slower « simulated time » (as shown in the status bar).

☞ A 64 Mo video board helps improving the performance.

☞ A scroll wheel mouse is indispensable to design efficiently.

1.1.1 General Information

The Automation Studio™ user documentation has a modular structure. The current *Automation Studio™ - User's Guide* contains information regarding the main functions of the Project Explorer, the Library Explorer, the common functionalities for all the Editors; the Standard workshops Editor (Hydraulic, Pneumatic, Electrical Controls, Numerical, and Scale Diagrams), the Electrotechnical Editor and the Simulation mode. For each workshop (fluid, electrotechnical and SFC) and the catalog, you will find a User's Guide providing specific information including a Quick Start Guide so as to help you familiarize yourself quickly with the different functions related to that workshop.

Depending on the Automation Studio™ version you work with, some functions might be either limited (number of components, documents or projects, thermal simulation…) or missing (layers management, vendors' specific components, configurators or report types…)

However, all physics phenomena calculated by the simulator are available in all versions.

1.1.2 Sequence of Tasks

The sequence of tasks described in this section reflects the sequence that is normally followed when using the core system. Actually, changes and improvements made during the course of a project often require that some steps be repeated or restarted. Furthermore, this guide only deals with the general aspects of Automation Studio™; thus, functions specific to the workshops are not described in this document.
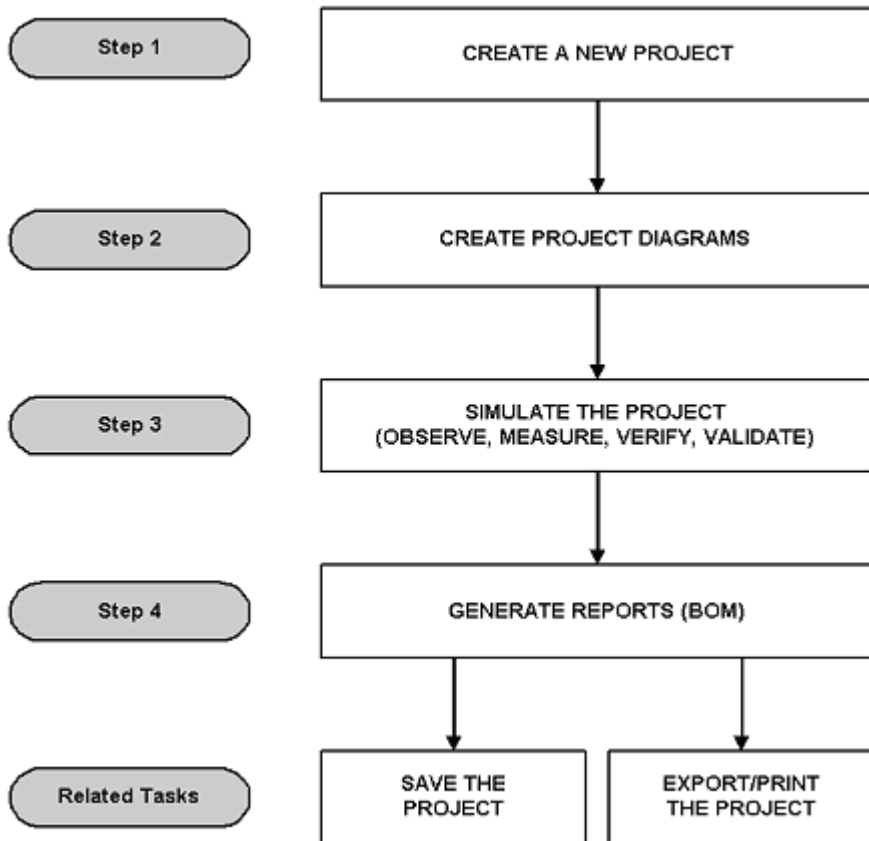
Figure 1–1: Tasks sequence

1.2 Contents of the Document

The workshops User's Guides complement this core system User's Guide. The workshop documents explain the theory and use of the software through exercises and examples so that the workshop technology is easily understood.

Refer to the workshops *User's Guide* for information on the different functions, components and examples of applications required to learn and use Automation Studio™.

All the instructions required to use functions that are shared by all the workshops can be found in this *User's Guide*. Specifically, these include the Project Explorer, the Library Explorer, and the Diagram Editor environments, along with their commands and dialog boxes. Instructions that are essential to the simulation of the different workshop technologies are also described.

Instructions are presented the way the process should be executed. The content is organized so that each step in each section follows the next step very closely. In fact, the basic Automation Studio™ system can be learned by reading this guide and following the sequence of chapters as they are presented. For tasks specific to a workshop, users are invited to read the *User's Guide* supplied with that specific workshop.

You may also obtain information by consulting the index and the appendices at the end of this document for a summary of reference data.

1.3 Conventions Used in this Document

It is important to know the conventions used in this guide. They were designed to present information in a clear and structured way. The same conventions apply in the *User's Guides* of the different workshops.

1.3.1 Typographical Conventions

The following specific typographical formats are employed in this guide.

The names of the user interface elements such as menus, commands, dialog boxes, buttons and fields are typed with a capital at the beginning of the word.

Example: Choose File ☐ Open.

The names of the keyboard keys are shown in small capitals.

Example: Press on the shift key to separate a component from a link.

The names of files and directories appear in capital letters.

Example: In the Directories list, select the C:\PROJECTS directory.

Text, which must be entered as shown, appears in bold.

Example: Type setup.exe and then press the enter key to start the installation software.

Names of variables, diagram titles and text representing information you must provide are indicated in italics.

Example: In the File Name box, type the name of your file with the .PR5 extension, in the form name.PR5.

Example: For more information, refer to the Windows User's Guide.

1.3.2 Choosing Versus Selecting

The word "choose" indicates a selection that triggers an action.

- Example: Choose the File → Exit.

The word select is used when identifying an object to be modified or when selecting an option in a dialog box.

- Example: Select the printer driver from the Printer drop-down list box.

1.3.3 Combinations and Sequences of Keys

KEY1+KEY2: The plus sign (+) indicates that you must press and hold down the first key while pressing the second one.

- Example: CTRL+A

KEY1, KEY2: The comma (,) directs you to press on the two keys successively.

- Example: ALT, F

1.3.4 Basic Notions and Terminological Conventions

There are two terminological conventions used in this document. One is for terms connected with the use of the mouse, and the second is for icons used in this document.

1.3.5 Terms Connected with the Use of the Mouse

Term	Definition
Point to an element	Position the mouse pointer on an element of the screen.
Click	Press and immediately release the mouse button. Unless otherwise indicated, click with the left mouse button.
Double-click	Press the mouse button twice in quick succession. Unless otherwise indicated, double-click with the left mouse button.
Drag	Press and hold the left mouse button as you move the mouse pointer across the screen.

1.3.6 Notes and Tips

The current help document uses icons to represent important notes and tips that simplify the commands that can be used.

Icon	Definition
	Indicates an important notice or notion.
	Indicates a tip or a trick that simplifies the use of commands in Automation Studio™.
	Indicates that a shortcut menu is available for that specific procedure.

2. Getting Started

This chapter describes the application's basic procedures and user interface.

2.1 Starting Automation Studio™

There are different techniques of starting Automation Studio™. You may choose the starting option which best suits your needs.

After Automation Studio™ has been installed, an icon appears on Windows' desktop.

To start Automation Studio™:

1.   Click on the Start menu at the bottom of the screen.

2.   Select the Program item.

3.   Select the Automation Studio™ item.

4.   Select the Automation Studio™ command.

Double-click on the Automation Studio™ icon on your desktop.

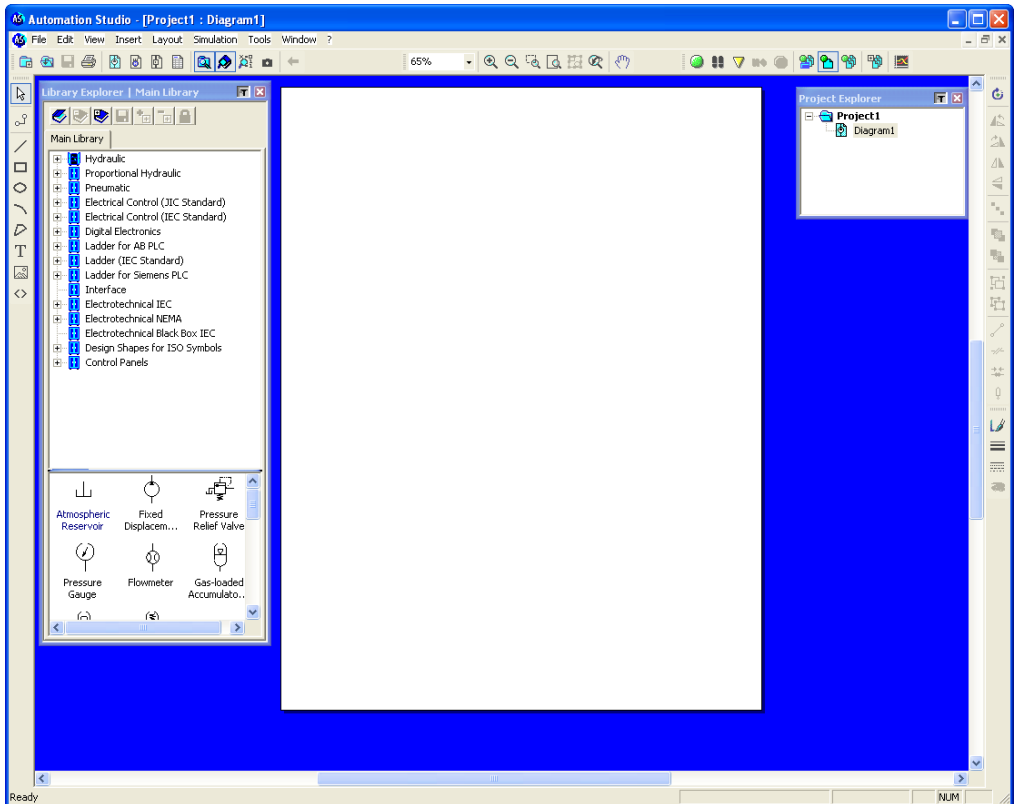The main window of Automation Studio™ opens as shown in the following figure.

Figure 2–1: Automation Studio™ main window

Upon opening, Automation Studio™ window exposes a blank diagram. It also introduces the Diagram Editor, the Project Explorer, and the Library Explorer and their corresponding toolbars.

The following chapter contains the detailed description of Automation Studio™ main window. In order to avoid redundancy in the information contained in the guide, functions appearing in the menus, toolbars and pop-up menus are only described in the menus and are referenced to throughout the *User's Guide*.

3. Diagram Editor

This section introduces a detailed description of each item composing the main window of Automation Studio™. Items in the main window are divided into two categories: static and dynamic items.
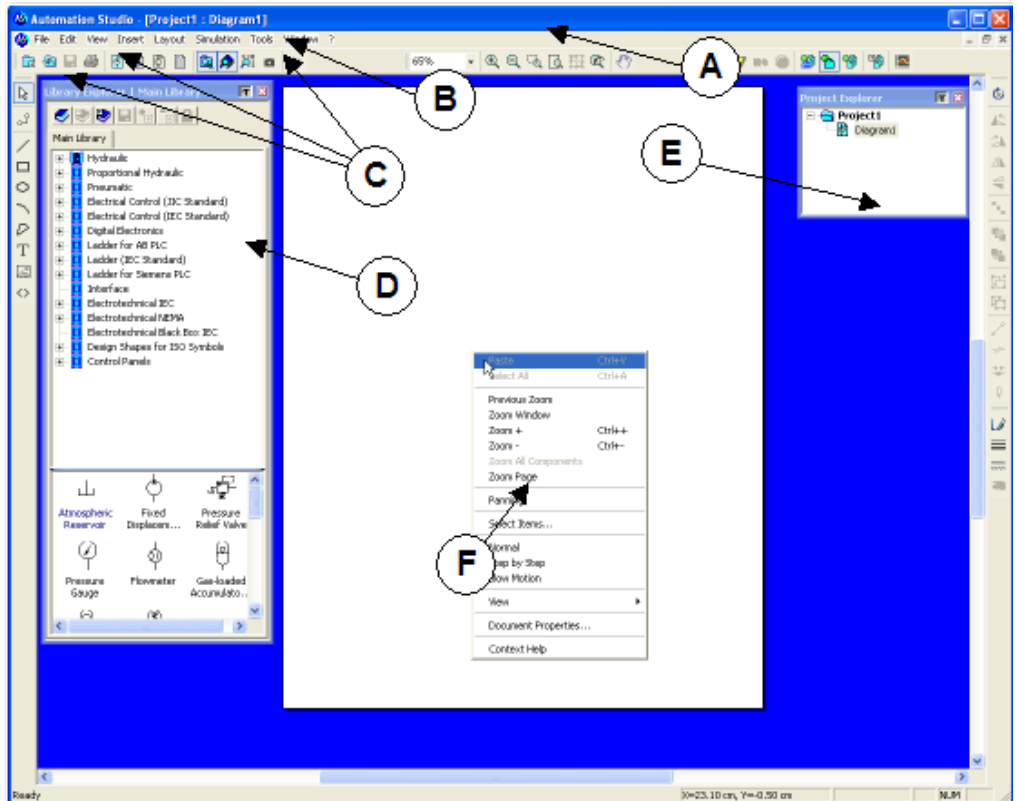

Figure 3–1: Diagram Editor

A: Title bar (static);

B: Menu bar (static);

C: Various toolbars (static);

D: Library Explorer (dynamic);

E: Project Explorer (dynamic);

F: Pop-up menu – example (dynamic).

3.1 Static Elements

Static elements consist of the title bar, menu bar, and the various toolbars. You may choose to display and move the toolbars depending on your needs.

3.1.1 Title Bar of the Software

When starting Automation Studio™, the title bar of the Diagram Editor displays by default « Automation Studio™ – [ASProjet1 : Diagram1] ». When saving for the first time or when opening an existing project, the title bar displays the name of the software followed by the name of the project and current diagram.

Figure 3–2: Title bar of the Automation Studio™ on opening

3.1.2 Menu Bar

The menu bar of the Diagram Editor contains nine menus. Each of these menus as well as their content is described in the following pages.
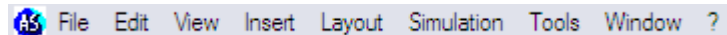
Figure 3–3: Menu bar

File Menu

The File menu comprises all the menu commands related to the management of files (creating, opening, saving, and printing).
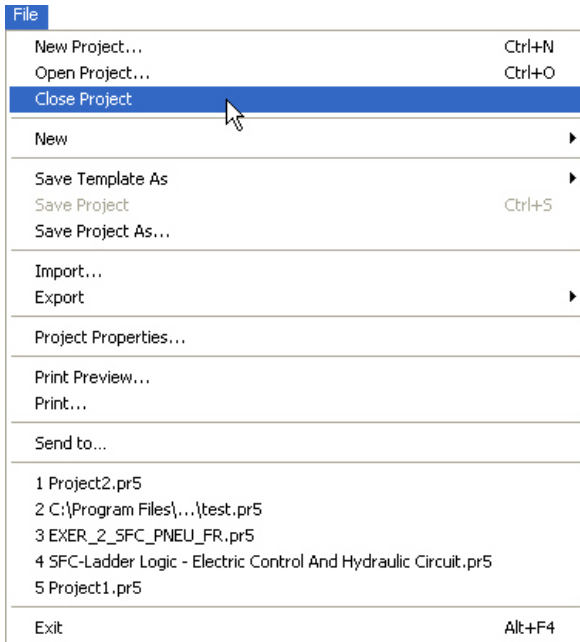
Figure 3–4: File menu

New Project…

This command allows the user to create a new project based on the available templates.

Open Project…

This command allows the user to open an existing project including those created in former versions back to version 3.x.

Close Project

This command allows the user to close a project and save, or discard the modifications that have been made. See section Saving a Project for the procedure.

New

This command allows the user to create a new document based on the following list:
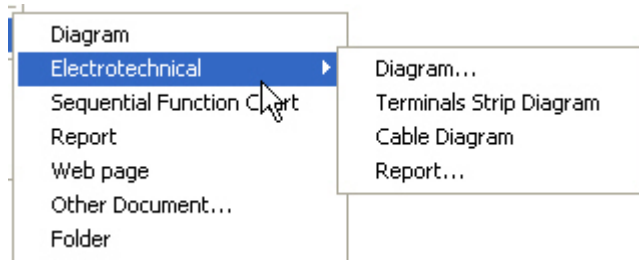

Figure 3–5: New submenu

Diagram: Create a new diagram.

Electrotechnical: Allows the insertion of various documents necessary to create an electrotechnical project (non standard library).

Sequential Function Chart: Allows the insertion and creation of a new SFC (non standard module) if authorized by the license.

Report: Allows the insertion of a Bill of Material (BOM) or Report document type.

Web Page: Allows the insertion of a link to a Web page.

Other Document…: Allows the insertion of a document other than an Automation Studio™ document. This document must come from an application properly installed on the user's workstation.

Directory: Allows the creation of directories and subdirectories.

Save as Template…

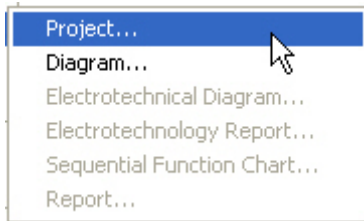This command allows to save a document as a template based on the following list:

Figure 3–6: Save as Template submenu

Project…: Allows the user to save a project template.

Diagram…: Allows the user to save a diagram template.

Electrotechnical Diagram…: Allows the user to save an electrotechnical template

Sequential Function Chart …: Allows the user to save an SFC template.

Report…: Allows the user to save a report template.

Save Project

This command allows the user to save a project as well as the modifications that have been made. See section Saving a Project for the procedure.

Save Project as…

This command allows the user to save, a project and its modifications under a different name without affecting the original version of the document. See section Saving a Project for the procedure.

Import

This command allows the user to import SFCs in GIE (Grafcet Importation / Exportation) and GIG (from the GRAPHITE software) formats.

Export…

This command allows the user to export a diagram or SFC.

The export is in DXF or EMF formats for diagrams (refer to the section Exporting a Diagram).

SFCs are exported in GIE format or in a format recognized by certain PLCs. The SFC export function is optional in the software; you must therefore posses the appropriate licence to access it.

Project Properties…

This command allows the user to enter, verify, and modify information concerning the current project. See section Project Properties to find out more about the tabs in the Project Properties dialog box.

The user can customize its own project properties.

Print Preview

This command allows the user to preview the current project before printing its contents. See section Print Preview for the procedure.

Print…

This command allows the user to print part or all of the current project's diagrams.

Send to…

This command allows a compressed copy of the current project to be sent via email. See section Sending a Project To for the procedure.

Exit

This command allows the user to completely close the application as opposed to the Close command, which only allows the user to close the project currently in use. See section Exiting from the Application for the procedure.

Edit Menu

The Edit menu comprises all the menu commands related to the viewing and modification of document properties, selected items on a diagram, and the editing commands related to a selection on the Diagram Editor.
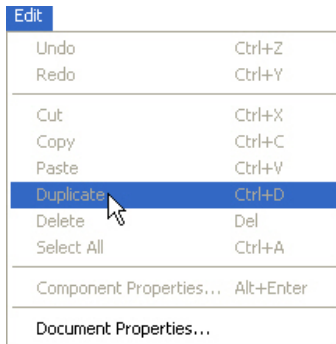

Figure 3–7: Edit menu

Undo

This command allows the user to cancel the last action performed in the current document.

Redo

This command allows the user to reinstate the action that has been previously undone, performed in the current document.

Cut

This command allows the user to remove a selected item from the current document and store it in the clipboard.

Copy

This command allows the user to copy a selected item from the current document and store it in the clipboard.

Paste

This command allows the user to insert an item from the clipboard into the current document.

Duplicate

This command allows the user to make an identical copy of a selected item from the current document.

Delete

This command allows the user to suppress a selected item from the current document, excepting components' satellites.

Select All

This command allows the user to select every item present on the diagram and on visible layers.

Component Properties…

This command allows the user to view, enter, and modify information related to the selected item in the current project.

Document Properties…

This command allows the user to view, enter, and modify information related to the current document. The user can customize his/her own diagram properties.

View Menu

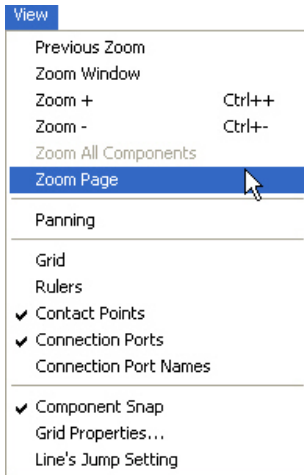The View menu comprises all the commands related to the modification of the viewing properties of a diagram.

Figure 3–8: View menu

Previous Zoom

This command allows the user to revert to the last view percentage.

Window Zoom

This command allows the user to select an area of the diagram and set the magnification in proportion to the selected area.

Zoom +

This command allows the user to view the page from a magnification percentage of 25% up to a maximum of 800% independently of the selected area.

Zoom –

This command allows the user to view the page from a magnification percentage of 800% down to a minimum of 25% independently of the selected area.

Zoom All Components

This command allows the user to view the complete set of components on the page independently of their position on the diagram.

Page Zoom

This command allows the user to view the entire page in its height.

Panning

This command allows the user to translate the page in real time and its content in a multidirectional movement.

Grid

This command allows the user to display the grid used to snap symbols into place.

Rulers

This command allows the user to display or not, the vertical and horizontal rulers.

Contact Points

This command allows the user to view the contact points of each symbol on the diagram.

Connection Ports

This command allows the user to view the connection ports of each symbol on the diagram.

Connection Port Names

This command allows the user to view the name of all the connection ports of each symbol on the diagram.

Hyperlink

This command allows the user to display assigned tagnames with an hyperlink format or as a normal text.

Component Snap

This command, when selected, ensures that symbols from the libraries snap to the grid on the diagram.

Grid Properties

This command allows the user to modify the drawing elements' snap properties as well as the colour of the grid.

Line's Jump Setting

This command allows the user to choose the representation on the diagram of two lines which cross or are connected in a point.

☞ The dynamic zoom, which is more user-friendly than clicking on buttons, is accessible when maintaining down the CTRL key and by using the mouse scroll wheel.

Insert Menu

The Insert menu comprises the commands related to adding drawing elements and text fields in a diagram. This menu is only visible when a diagram is active.
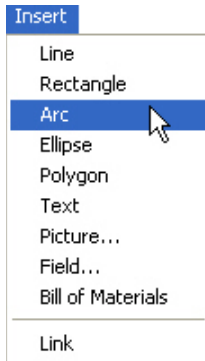
Figure 3–9: Insert menu

Line

This command allows the user to draw lines on a diagram.

Rectangle

This command allows the user to draw rectangles on a diagram.

Arc

This command allows the user to draw arcs on a diagram.

Ellipse

This command allows the user to draw ellipses of various sizes on a diagram.

Polygon

This command allows the user to draw polygons of various sizes on a diagram.

Text

This command allows the user to insert text areas in a diagram.

Picture…

This command allows the user to insert a JPG and BMP format image in a diagram.

Field…

This command allows the user to insert automatic fields containing the current diagram or project properties.

Bill of Materials

This command allows the user to automatically insert, in a diagram, bill of materials containing by default the Quantity and Name of Component properties. The bill of material can be configured.

Historique des révisions

This command allows the user to insert in a diagram a table that resumes the historic of the revisions. The way of work this table is the same as a Bill of Materials.

Link

This command allows the user to insert a link in a diagram.

Direct Link

This command allows the user to insert a direct link in a diagram.

Layout Menu

The Layout menu comprises all the commands related to the modification of the orientation and layout of elements in a diagram. This menu is visible only when a diagram is active.

In this case, an object can be a symbol, a group, or a multiple selection of these elements. If the selection is a group, the layout functions apply on the axis of symmetry and on the centre of rotation of the group. If it is a multiple selection, the layout functions apply individually on each element of the selection.
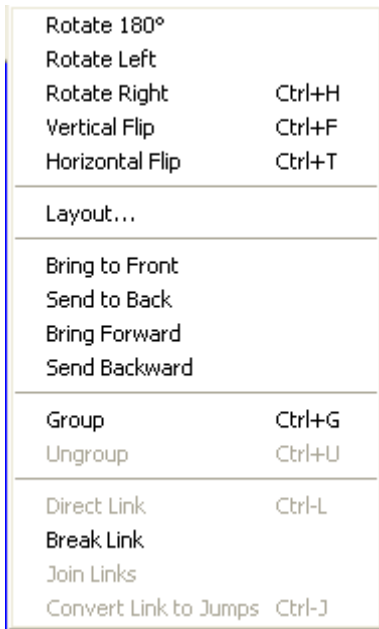
Figure 3–10: Layout menu

Rotate 180°

This command allows the user to apply a rotation of 180 degrees to a selected object.

Rotate Left

This command allows the user to apply a counter clockwise rotation of 90 degrees to a selected object.

Rotate Right

This command allows the user to apply a clockwise rotation of 90 degrees to a selected object.

Vertical Flip

This command allows the user to transpose a selected object on its vertical axis.

Horizontal Flip

This command allows the user to transpose a selected object on its horizontal axis.

Layout

This command opens the dialog, which allows alignment, distribution, scaling, and transformations. When multiple items are selected, the handles of the first item (the master) are blue whereas the ones of the other items (the slaves) are white. Most of the following manipulations apply to slaves relatively to the master or entire page.
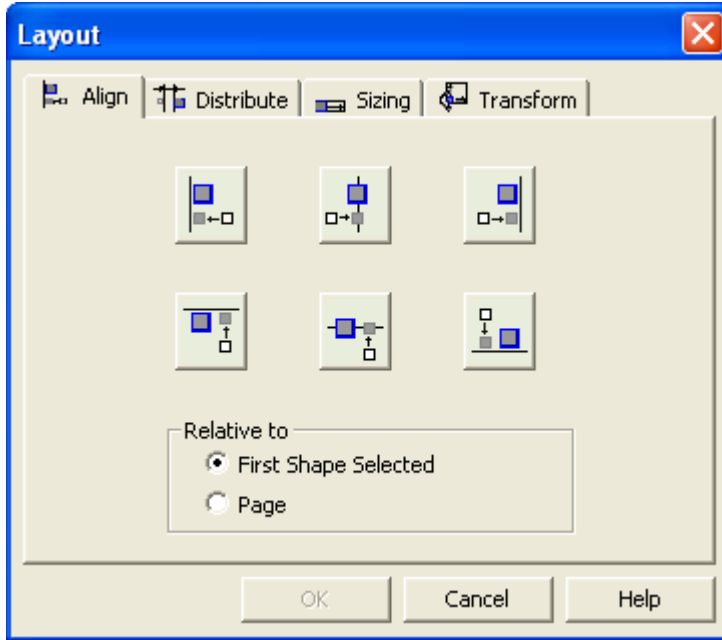
Alignment

Figure 3–11: « Alignment » tab

Vertical left	Allows the alignment of all selected items on a vertical axis, relatively to the left part of the master.
Vertical center	Allows the alignment of all selected items on a vertical axis, relatively to the center of the master
Vertical right	Allows the alignment if all selected items on a vertical axis, relatively to the right part of the master.
Horizontal up	Allows the alignment of all selected items on the horizontal axis, relatively to the upper part of the master.

|	
Horizontal center	Allows the alignment of all selected items on a horizontal axis relatively to the center of the master.
Horizontal down	Allows the alignment of all selected items on a horizontal axis relatively to the right part of the master.
Component	When this option is selected, the master becomes part of the diagram.
Page	When this option is selected, the master becomes the entire page.

Distribution
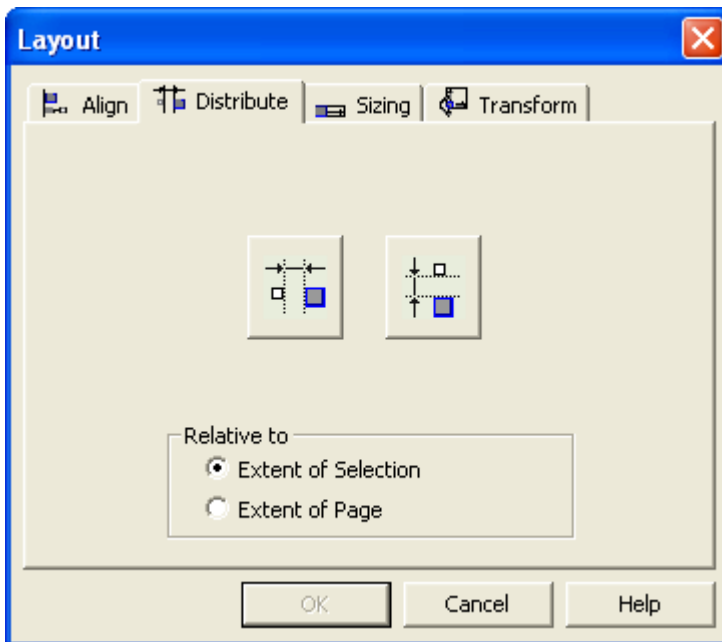
Figure 3–12: « Distribution » tab

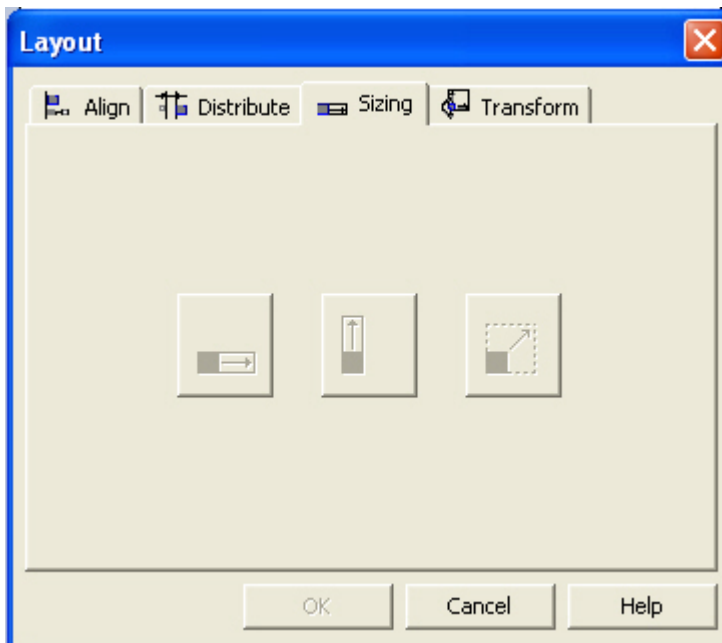| **Horizontal** | Allows to distribute evenly all vertical axis of symmetry of each of the selected items. |
Vertical	Allows to distribute evenly all horizontal axis of symmetry of each of the selected items.
Component	When this option is selected, the distribution is based on the items of the diagram.
Page	When this options is selected, the distribution is based on the entire page.

Dimensions

Figure 3–13: « Distribution » tab

Horizontal	Allows to stretch horizontally all selected items until they reach the master's dimensions.
Vertical	Allows to stretch vertically all selected items until they reach the master's dimensions.
Horizontal and vertical	Allows to stretch vertically and horizontally all selected items until they reach the master's dimensions.

Transformation

Any selected item inserted onto a diagram is circled with a rectangle and handles (blue or white). The coordinates of the upper left corner of this rectangle, also called selection box, can be located thanks to the X and Y values measured relatively to the upper left corner of the document.
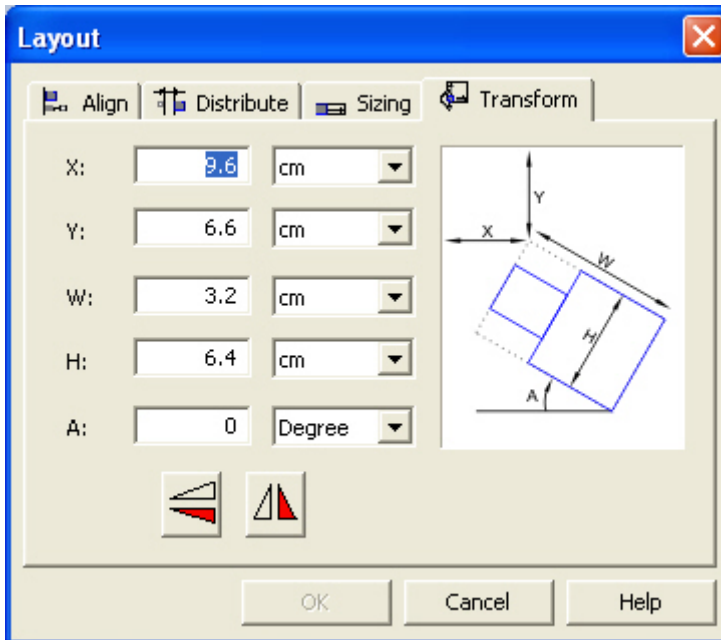
Figure 3–14 : « Transformation» tab

X	The abscissa (coordinate X) of the upper left corner of the selection box prior to any rotation or flip operation.
Y	The ordinate (coordinate Y) of the upper left corner of the selection box prior to any transformation. .
W	Width of the selection box prior to any rotation or flip operation.
H	Height of the selection box prior to any rotation or flip operation.
A	Angle of the selection box with the horizontal flip axis.
Horizontal flip	This button gives the state of the selected item. When you click on this button, the item is flipped horizontally.

Vertical flip	This button gives the state of the selected item. When you click on this button, the item is flipped vertically.
Image	This image gives a visual explanation.

Bring to Front

☞ Inserted symbols are laid on overlapping layers. The first layer can be seen above all the others and the last layer is below all the others.

This command allows the user to bring a selected object onto the first layer of the elements on the diagram.

Send to Back

This command allows the user to bring a selected object onto the last layer of the elements on the diagram.

Bring Forward

This command allows the user to bring a selected object one layer above the current one.

Send Backward

This command allows the user to bring a selected object one layer below the current one.

Group

This command allows the user to bring together selected objects into one element called a group.

Ungroup

This command allows the user to break up a selected element into individual objects.

☞ A link is a line connecting two or more symbols to be simulated.

Direct Link

This command allows to avoid all detours within a link. In other words, this command applies the rule of the "shortest distance between two points".

Break Link

This command allows the user to divide a link into two or more segments.

Join Links

This command allows the user to unite two distinct links into one.

Convert Link to Jumps

In the standard modules, this command allows the user to transform a link between two components into two jumps. These jumps have an identical mnemonic in order to reduce the number of links within a circuit.

☞ Jumps may be inserted from the library in order to keep the circuits that are spread out on several diagrams linked together.

Simulation Menu

The Simulation menu comprises the commands related to the simulation of a project or a diagram.

The simulation of a project or diagram launches the simulation engine that computes and solves the selected portion of the drawn circuit, and responds to the behaviour and animation of symbols.
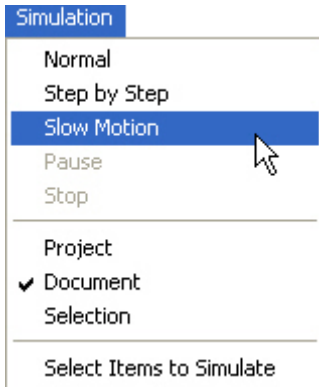
Figure 3–15: Simulation menu

Normal

This command allows the user to simulate a circuit in normal mode. This mode corresponds to the maximum speed of the simulation evaluation based on the installation.

Step by Step

This command allows the user to simulate a circuit in the Step by Step mode.

Slow Motion

This command allows the user to simulate a circuit in a slow motion mode.

Pause

This command allows the user to temporarily stop the simulation of a circuit and to resume it later on.

Stop

This command allows the user to permanently stop a simulation and to return to the editing mode.

Project

This command allows the user to simulate the set of diagrams included in the current project.

Document

This command allows the user to simulate the current diagram.

Selection

This command allows the user to simulate selected diagrams with the Simulated Items command.

Select Items to Simulate

This command allows the user to select diagrams from the current project for their simultaneous simulation.

Tools Menu

The Tools menu comprises commands related to the configuration of the software and fields, and to the verification of a diagram.
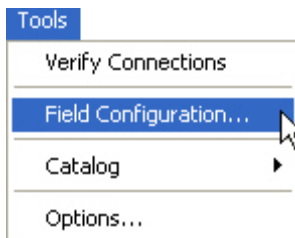
Figure 3–16: Tools menu

Verify Connections …

This command allows the user to verify all the connections on every component in the active diagram.

Field Configuration…

This command allows the user to customize components property fields.

Catalog

This menu allows the user to access the catalog manager.

Options…

This command allows the user to adjust the application and its modules based on his preferences.

Window Menu

1. Windows Organization

Automation Studio™ allows you to organize the display of projects and their diagrams in different windows. You can easily optimize the display of these windows while designing and simulating your project.

2. Benefits from Multiwindowing

The capability of Windows to display simultaneously multiple windows facilitates the exchange of information between the different open windows on your screen. In Automation Studio™, this capability is a highly useful analysis tool for the following applications:

- To evaluate one or more diagrams during simulation;

- To highlight sections of the diagram which behaviour under simulation is of particular interest.

This feature is useful when working on complex circuits contained on large-size diagrams or during the simulation of a project containing many diagrams. The following figure is an example of how a multiwindow display enables to view two different windows at the same time.
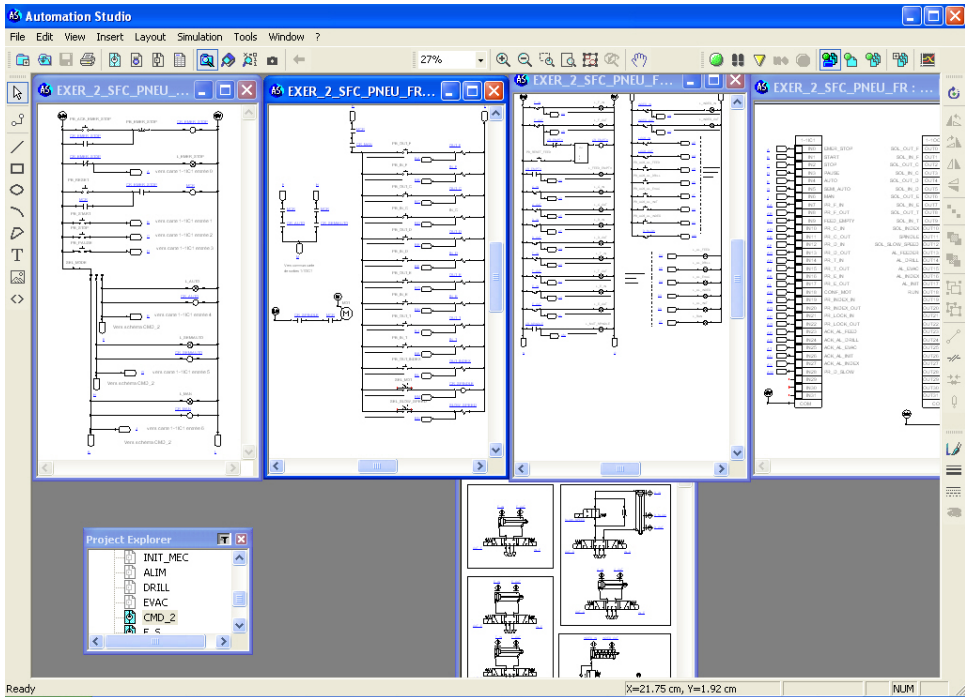
Figure 3–17: Simulation and Multiwindowing

3. Window Layout

From the Window menu, you can organize the layout of open windows during your work session. The following is a description of the different commands in this menu. See the *Windows User's Guide* for more information on the organization of windows.

The Window menu comprises the commands related to the organization of the windows layout and the duplication of specific windows.
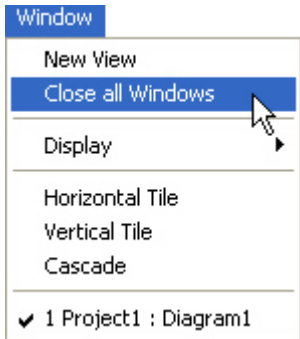
Figure 3–18: Window menu

New Window

This command allows the user to open a new window that shows a different view of the current diagram.

Close All Windows

This command allows the user to close all the windows of the current project.

Display

This command allows the user to display the various utility programs for managing Automation Studio™, as well as the toolbars the user may require to work.
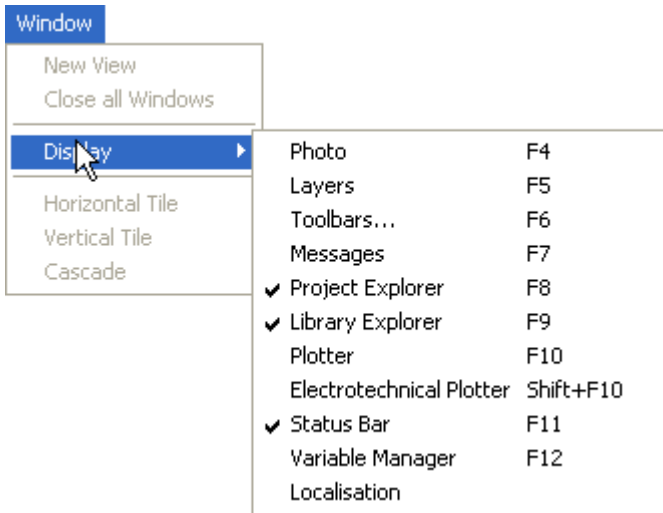
Figure 3–19: Display submenu

Toolbars…: this command allows the user to select the toolbars to be displayed on the screen. See section Toolbars to find out more about all the toolbars.

Photo: this command allows the user to display or hide the photo window, if available.

Layers: this command allows the user to display or hide the layers window.

Messages: this command allows the user to display the message window.

Project Explorer: this command allows the user to display the Project Explorer.

Library Explorer: this command allows the user to display the Library Explorer.

Plotter: this command allows the user to display the Plotter for standard Editor.

Eectrotechnical Plotter : this command allows the user to display the Electrotechnical Plotter.

Status Bar: this command allows the user to display the Status Bar.

Variables Explorer: this command allows the user to display the Variables Explorer.

Localisation : this command allows the user to open the size and dimension dialog box for the Panel Layout Workshop.

Horizontal Tile

This command allows the user to display the various projects' windows horizontally, whether they are active or not.

Vertical Tile

This command allows the user to display the various projects' windows vertically, whether they are active or not.

Cascade

This command allows the user to display the various projects' windows, whether they are active or not, one after the other with a slight gap between them.

Open Project or Diagram Window

This command allows the user to select the project's window to be displayed on top.

Help Menu

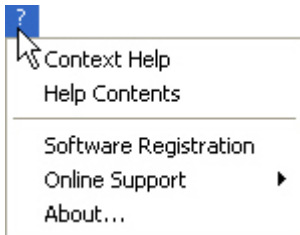The Help menu comprises the commands related to the contextual help.

Figure 3–20: Help menu

Context Help

This command opens the contextual help of the current window (Project, Library Explorer, etc.); or of the current element (component, group, DAO, etc.).

Help Content

This command opens the Table of Contents of Automation Studio™ User's Guide.

Software Registration

This command allows the user to register his/her copy of Automation Studio™ with Famic Technologies Inc. through the Internet.

☞ Your workstation must be connected to the Internet to access this service.

☞ You must register your copy of Automation Studio™ to access the online support.

Online Support

This command allows the user to access the various Web services available for Automation Studio™.
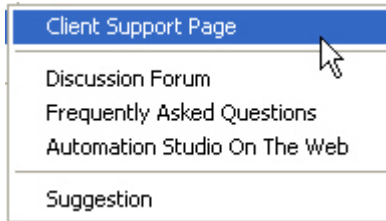
Figure 3–21: Online Support submenu

Client Support Page: this command allows the user to gain access to his/her personal technical support portal.

☞ Your version must be registered upon installation or by mail/fax or through the Software Registration command from the Help menu.

Discussion Forum: this command allows the user to gain access to our online discussion forum regarding Automation Studio™.

Frequently Asked Questions: this command gives access to the list of frequently asked questions. These questions were asked by Automation Studio™ users who encountered similar problems, and whom the Technical Support team gave answers to. In order to help other and future users, and to facilitate the access to this information, we have decided to gather those FAQ and to release them.

Automation Studio™ on the Web: this command allows the user to directly access the software's newest features.

Suggestions: this command allows the user to access a virtual suggestion box, which users may send suggestions to via email.

About…

This command allows the user to view the information such as modules, system, identification, etc., which pertains to the installation of the software.

3.1.3 Toolbars

☞ In order to display or hide a toolbar, choose Window → Display → Toolbars, then check or uncheck the toolbar. This command is also available through the F6 key or through a

shortcut menu when the pointer is placed on top of any toolbar. To move a toolbar, click on the toolbar without releasing the mouse button, then move the mouse to the place the toolbar is to be released.

Project Toolbar

The Project toolbar contains buttons that correspond to commands of the Project Explorer and Diagram Editor that are most often used. The toolbar automatically adjusts itself to the functioning utility. When the command is unavailable in the utility, the button is greyed out and is no longer inaccessible.
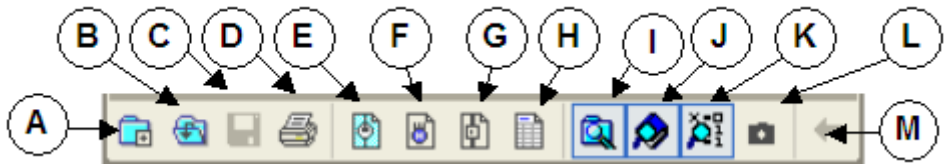

Figure 3–22: Project toolbar

The toolbar contains the following commands.

Command	Description
A - New Project	Creates a new project.
B - Open	Opens an existing project.
C - Save	Saves the current project.
D - Print	Launches the print sequence.
E - New Diagram	Creates a new diagram (standard).
F - New Electrotechnical Diagram	Creates a new electrotechnical diagram. This is a non-standard module that can only be used with the appropriate license.
G - New Report	Creates a new bill of material (BOM - or report type of documents.
H - New SFC	Creates a new SFC. This is a non-standard module that can only be used with the appropriate license
I - Project Explorer	Opens or closes the Project Explorer window.
J - Library Explorer	Opens or closes the Library Explorer window.
K - Variable Explorer	Opens or closes the Variable Explorer window.
L - Pictures	Opens or closes the Photo window.
M - Back	Allows the user to navigate between hyperlinks.

Edit Toolbar

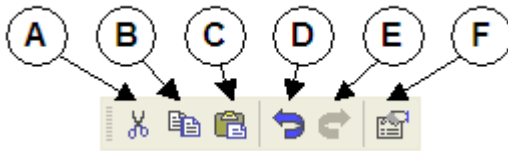The Edit toolbar of the Diagram Editor appears by default only when a diagram is active.

Figure 3–23: Edit toolbar

The toolbar contains the following commands.

Command	Description
A - Cut	Removes the selected object and stores it in the Clipboard.
B - Copy	Copies the selected object and stores it in the Clipboard.
C - Paste	Adds the content of the Clipboard onto the diagram.
D - Undo	Cancels the last executed action.
E - Redo	Reinstates the last cancelled command.
F - Properties	Displays the component's Properties dialog box that introduces the selected item's properties.

Simulation Toolbar

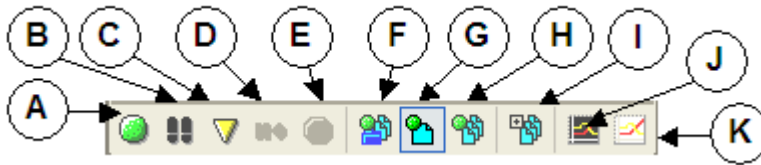The Simulation toolbar of the Diagram Editor contains the following buttons.

Figure 3–24: Simulation toolbar

Command	Description
A - Normal	Simulates a circuit in normal speed.
B - Step by Step	Simulates a circuit step by step. Each mouse click corresponds to one cycle.
C - Slow Motion	Simulates a circuit at the slowest speed.
D - Pause	Interrupts simulation.
E - Stop	Stops simulation.
F - Project Simulation	Selects all the current project's diagrams when launching simulation.
G - Document Simulation	Selects the current diagram when launching simulation.
H - Selection Simulation	Selects the selected items when launching simulation.
I - Select Items to Simulate	Opens the dialog box of diagrams to be simulated in the current project.
J - Plotter	Opens or closes the Plotter window.
K - Electrotechnical Plotter	Opens or closes the Electrotechnical Plotter window.

View Toolbar

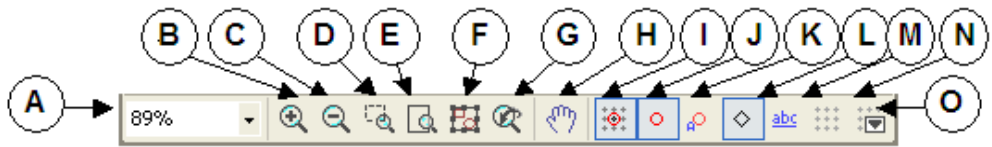The View toolbar of the Diagram Editor contains the following buttons.

Figure 3–25: View toolbar

Command	Description
A - Zoom %	Drop-down list allowing the selection of a predefined percentage of image magnification on the screen.
B - Zoom +	Increases the image magnification of the diagram (maximum enlargement percentage of 800%).
C - Zoom -	Reduces the image magnification of the diagram (minimum reduction percentage of 25%).
D - Window Zoom	Allows the user to frame an area and enlarge it to display its magnification in proportion to the selected area.
E - Page Zoom	Displays the whole diagram on the screen.
F - Zoom all Components	Displays all items contained in the workspace.
G - Zoom Page Width	Displays the page width wise.
H - Panning	Moves into the panning mode.
I - Component Snap	Enables or disables the component snap onto the grid
J - Connexion ports	Display or hide the Connexion ports.
K - Connexion Port Names	Display or hide the Connexion Ports.Name
L - Contact Points	Display or hide the Contact Points
M - Hyperlinks	Display tagname as hyperlinks or normal text
N - Grid	Display or hide the Grid.

Command	Description
O - Grid Properties	Opens the dialog properties of the grid.

Insert Toolbar

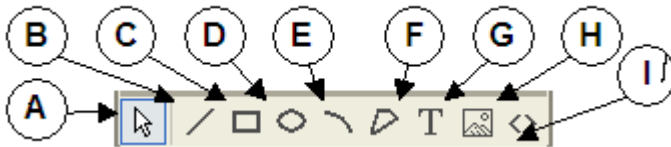The Insert toolbar of the Diagram Editor contains the following buttons.

Figure 3–26: Insert toolbar

Command	Description
A - Selection	Allows the selection of an item in the workspace.
B - Line	Draws a line.
C - Rectangle	Draws a rectangle.
D - Ellipse	Draws an ellipse.
E - Arc	Draws an arc.
F - Polygon	Draws a polygon.
G - Text	Inserts a text box.
H - Image	Inserts an image.
I - Field	Inserts a field.

Layout Toolbar

The Layout toolbar of the Diagram Editor contains the following buttons.
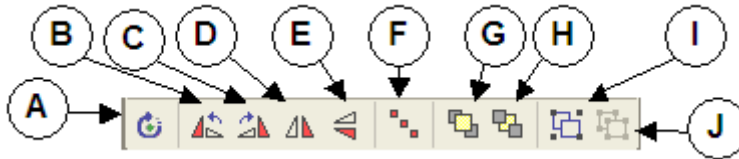
Figure 3–27: Layout toolbar

Command	Description
A - Rotate Left 90°	Pivots the selection 90° counter clockwise.
B - Rotate Right 90°	Pivots the selection 90° clockwise.
C - Free Rotation	Allows the user to pivot the selection freely using the handles.
D - Vertical Flip	Inverts the selection on its vertical axis.
E - Horizontal Flip	Inverts the selection on its horizontal axis.
F - Bring to Front	Brings the selection to the first layer of the diagram.
G - Send to Back	Sends the selection to the back layer of the diagram.
H - Group	Groups all the selected elements.
I - Ungroup	Ungroup the selected group.
J - Layout	Allows to change symbols' alignment and layout

Links Toolbar

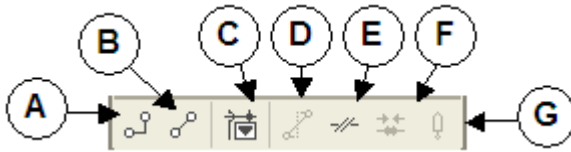La barre d'outils « Liens » de l'Éditeur de schémas contient les boutons suivants.

Figure 3–28 : Barre d'outils Format

Command	Description
A - Links	Creates technological links.
B - Direct Link	Removes all deviations in a link.
C - Line 's Jump Setting	Removes all deviations in a link.
D - Link to Direct Link	Convert Link to Direct Link and the reverse.
E - Break Link	Divides a link into two or more segments.
F - Join Links	Connects two distinct segments linked by a connection into a single link.
G - Convert Link to Jumps	Transforms a link into two jumps with the same mnemonic.

Format Toolbar

The Format toolbar of the Diagram Editor contains the following buttons.
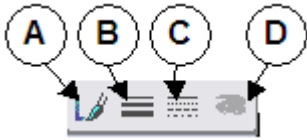
Figure 3–29: Format toolbar

Command	Description
A - Colour	Modifies the line colour of the selected graphic object, as well as the font colour of typed text on the diagram only.
B - Thickness	Modifies the thickness of the line of the selected graphic object on the diagram only.
C - Line style	Modifies the graphical lines' style.
D - Visible	Makes the selected components visible or invisible.

3.1.4 Status Bar

The status bar displays the description of menus and commands for each utility when selected by the user. It also contains different information slots displaying the current mode (Simulation or Editing) or the status of specific keys (MAJ, NUM, DEF, INS). Furthermore, in the Diagram Editor, it informs the user on the pointer's position on the diagram.

The following information is displayed on the right-hand side of the Status bar.
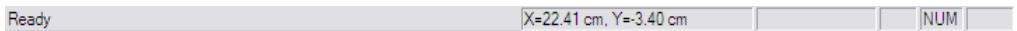

Figure 3–30: Status bar

Slot	Function
ST **XX :XX :XX.XX**	Elapsed time since simulation started.
X=XXX,Y=YYY	Indicates the pointer's coordinates in the diagram.
X %	Indicates the zoom factor currently used in the diagram.

3.1.5 Plotter

The Plotter allows the user to watch the evolution in time of various variables in a graphic window during simulation. Several variables of different components can be viewed simultaneously in a single graph.

Description of the Plotter

The displayed values are established by default by the software. Some of them are modifiable while others remain static. The following list provides a short description of the data available in the Plotter and in its table of variables.
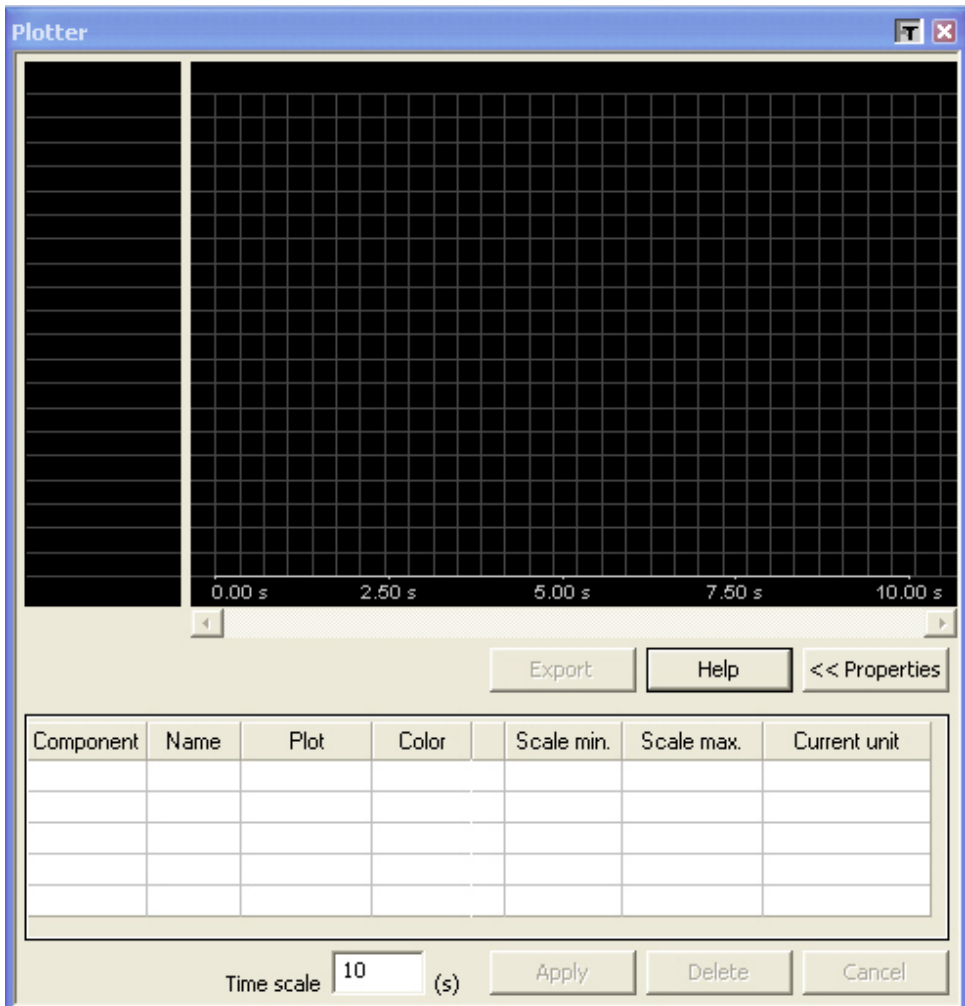
Figure 3–31: Plotter

☞ Each project has its own standard plotter.and its own Electrotechnical Plotter

Zone	Description
Scale	Displays the Y-axis (ordinates) of each selected variable.
Graph	Plotting area of the evolution curves.
Properties list	Modifiable display of the variable properties list.
Component	Displays the internal identifier in the list. This value is static.
Name	Displays the name of the component. This value is static.
Variable (Plot)	Displays the name of the variable. This value is static.
Colour	Displays the colours, defined by default, and which identify the variable and its curve. This colour is modifiable.
Min. Scale	Displays the minimal traceable value of the associated variable. A value is assigned to each variable by default. This value is modifiable
Max. Scale	Displays the maximal traceable value of the associated variable. A value is assigned to each variable by default. This value is modifiable
Current unit	Displays the component's measure unit value. This value is static.
Interval-Time	Displays the value of the time interval visible on the graph for all traced variables. This value appears in seconds and can be modified.
Export	Exports the curves in a tabulated .txt format.
Help	Displays the help text of this dialog box.
Properties	Gives access to the list of variables modifiable and of static properties.

Zone	Description
Apply	Executes a modification or a deletion, and applies it to the graph and scale. Click on this button after each modification or after all modifications have been entered.
Delete	Removes a selected variable in the list.
Cancel	Allows the user to invalidate a modification or deletion that has previously been executed.

3.1.6 Display of Photos

There are photos for various hydraulic, pneumatic and electrotechnical components from the main library. The photo window displays these photos both in edit and simulation mode.

☞ To display this window, go to the menu "Window" → "Display" → "Photo" or use the "F4" key.

Photo window description
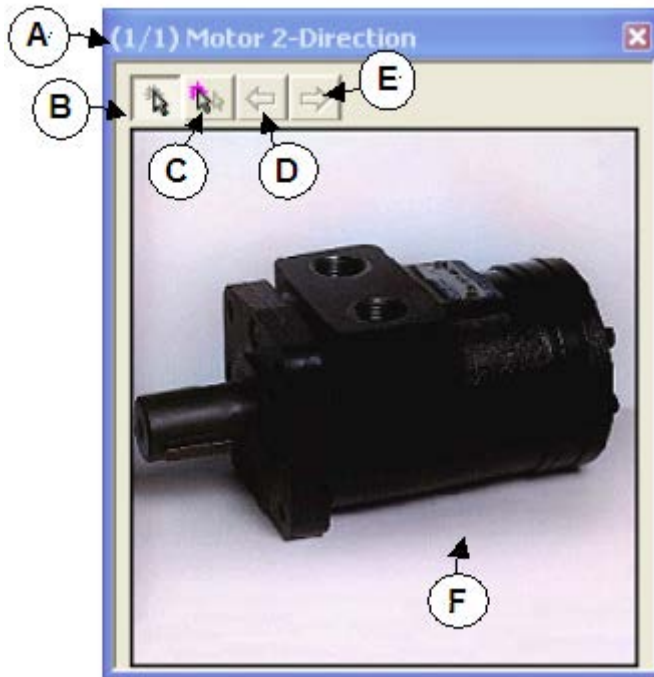
Figure 3–32 : Photo window

Zone	Description
A - Title	(Number of the displayed photo / Number of photos) Name of component
B - Visualisation by click	When this button is active, simply left-click with the mouse on the desired component to view its photo. As long as the component remains selected, and provided that a photo is linked to it, the photo window remains open.

Zone	Description
C - Visualisation by hovering	When this button is active, simply place the mouse pointer over the desired component to visualise its photo. If no photo is linked to the component, the window disappears after a while.
D - Previous	Allows to visualise the previous photo, provided that it exists.
E - Next	Allows to visualise the next photo if it exists.
F - Display	Photo display zone. If a photo does not exist then this window automatically disappear after a while

3.1.7 Message Window

This window automatically opens to inform the user of any detected errors that require correction.

3.2 Management Utilities

The management utilities are used to manage projects. Each of these utilities offers the possibility to manage projects based on users' requirements, whether to manage variables or to create component libraries.

To display or hide the management utilities:

Select the Window menu   ☐ Display ☐select the

Automation Studio™ opens the list of utilities to be displayed or hidden. When the name of a utility is preceded by a checkmark, it means that it is actually being displayed on the screen. Figure 3–19: Display submenu shows all utilities available in Automation Studio™. Each of these utilities is described in the following pages.

☞ In order to optimize the workspace, every utility window is supplied with a "Thumbtack". When in this position, the "thumbtack" allows windows to automatically roll up. Once rolled up, windows only show their title bar unless the mouse pointer is placed upon the window title bar.. To prevent windows from automatically rolling up on themselves, the "thumbtack" button must be in this position .

3.2.1 Library Explorer

The Library Explorer contains the symbols libraries which include thousands of symbols for hydraulic, pneumatic, control command components, etc. The Library Explorer provides all necessary elements to build a functional circuit. It also allows the user to create and manage new libraries and new components according to his/her requirements.
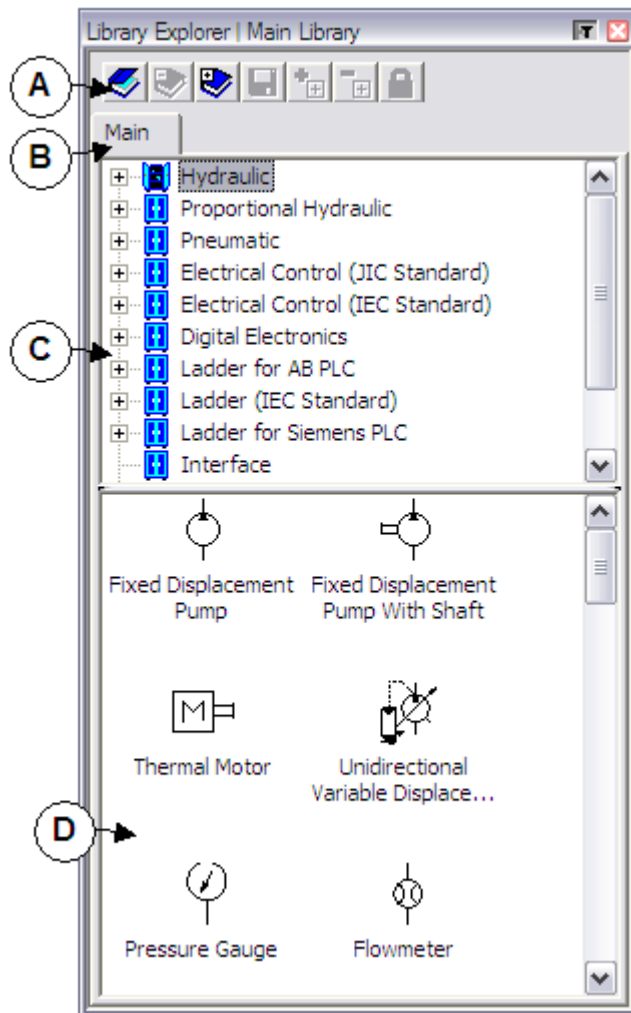
Figure 3–33: Library Explorer window

The elements composing the Library Explorer are the following:

Command	Description
A - Toolbar	Allows to manage, select, and create libraries and components. The Library Explorer toolbar is described in detail in the following pages. .
B - Tab(s)	Allows to select the library complying with your diagram's requirements in order to facilitate the creation of circuits. The Main Library tab corresponds to the standard library of Automation Studio™.
C - Library window	Allows to display the tree, to select subgroups, as well as specialized workshop families such as hydraulics, pneumatics, etc. Each type of library contains corresponding components.
D Component window	Allows to display and select the components necessary to build a circuit.

Library Explorer Toolbar

The Library Explorer toolbar of the Diagram Editor consists of the following buttons.

Figure 3–34: Library Explorer toolbar

Command	Description
A - Open library	Opens one of the libraries available, either the standard or customized libraries.
B - Create library	Creates a library that can be customized based on the project requirements.
C - Save library	Saves the libraries that have been customized based on the project requirements..
D - Create category	Creates a category of components that can be customized based on the project requirements.
E - Delete category	Deletes a category of components. Only categories created by the user can be deleted; categories supplied with Automation Studio™ cannot.
F - Lock/Unlock	Locks/unlocks a library thanks to a password so as to protect it from being deleted by mistake.

3.2.2 Project Explorer

The Project Explorer controls all functions related to the management of opened projects and their documents. Thanks to shortcut menus related to the selected document, the Project Explorer makes it possible to create, display, save, export/import, send to, and simulate a document as well as to print it in parts or in whole.
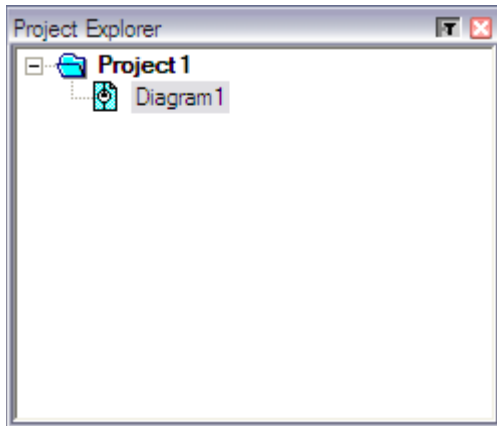
Figure 3–35: Project Explorer window

Command	Description
Tree window	Allows the user to select elements from a project's tree, and to implement an action on the selected element (print, copy, rename, etc.).

To take full advantage of the software, it is strongly suggested that projects or files are managed through the File menu of the main window, and documents through the shortcut menus of the Project Explorer.

3.2.3 Variable Manager

The Variable Manager offers the user the ability to filter, modify, view, and link to OPC items all the variables contained in the active project. It also allows to create and delete internal variables.
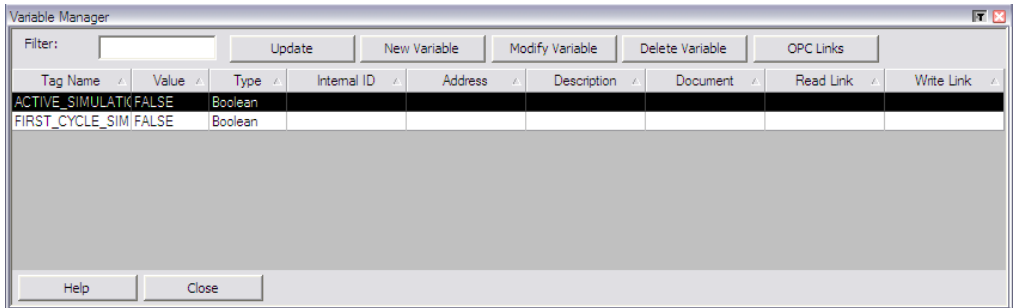
Figure 3–36: Variable Manager window

Command	Description
Filter	Sorts out variables based on a specific character chain. Variables with a mnemonic containing the character chain defined as filter are sorted out to be displayed.
Update	In editing mode, refreshes the variable list after having added or deleted internal variables or components.
	In simulation mode, it allows to update the variable's value.
New Variable	Creates a new internal variable. See Adding a Variable
Modify Variable	Modifies one of the variable properties. See Modifying a Variable
Delete Variable	Deletes an internal variable. Does not allow the user to suppress a component's variable.
	To delete a components variable, the component itself has to be removed from the diagram.
OPC Links	Opens the dialog box used to create read/write links to OPC items. See Creating an External Link.
Variable List	Displays the project's variables based on the current filter.

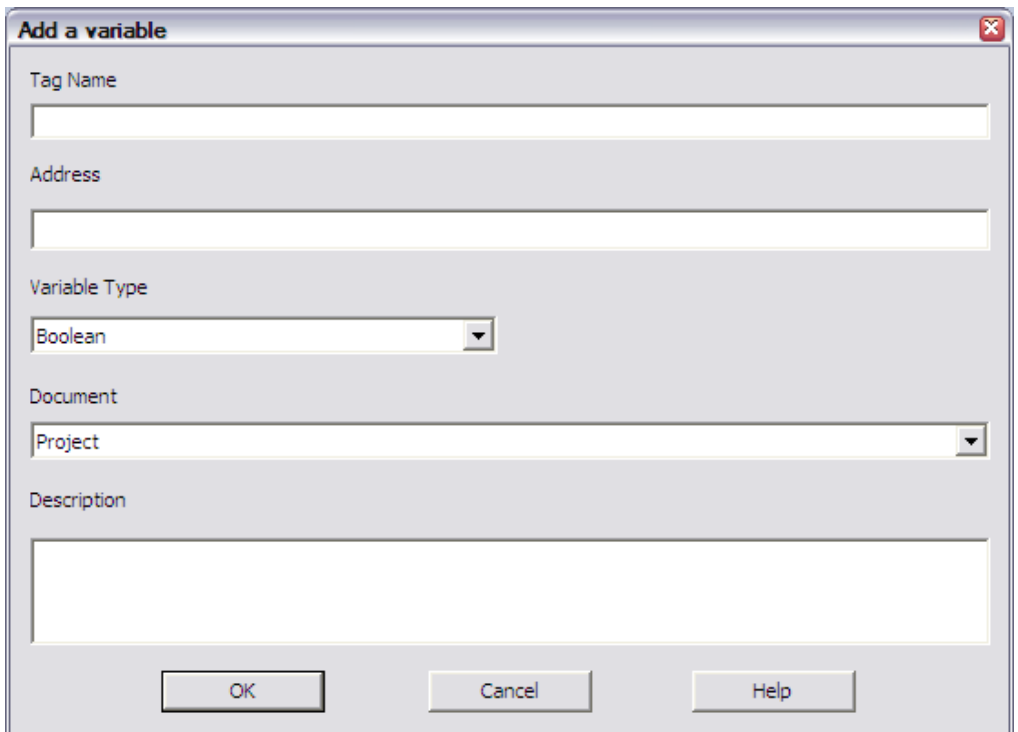| Command	Description
Help	Opens the contextual help.
Close	Shuts the Variable Manager's window.

Adding a Variable

To create an internal variable:

1. Click on the New Variable button (in the Variable Manager window or in the Ladder of SFC Component Properties dialog box).

The OPC Settings dialog box opens.

2. Fill in the various fields.

3. Click OK.

☞ You can only create internal variables. Component variables are automatically created when components are created.

☞ The tag name of the variable must not contain spaces and must start with a letter or a number. It must include at least one letter. It must be unique in the project or document based on the global or local link of the variable. Reserved names must not be used (ABS, SQR, etc.).

☞ The address must comply with the manufacturer's syntax and be unique in the project.

Figure 3–37: Add a Variable dialog box

The following is a description of the fields composing this dialog box.

Field	Description
Tag Name	Displays the variable's tag name and allows it to be modified if the field is not greyed out.
Address	Allows to type in the variable's address when it is a PLC variable.
Variable Type	This drop-down list allows the selection of one of the following types of variable: Generic Boolean; Integer (32 bits); Float (32 bits).
Document	This drop-down list allows to specify whether the variable is global for the current project or local for a document: Project (global); Diagram name (locale for a diagram or SFC).
Description	Allows the user to type in a comment related to the variable.

Modifying a Variable

To modify the name, initial value, address, or description of a selected variable:

Select the variable you wish to modify and click the Modify Variable button or double-click on the line containing the variable.

The Modify Variable dialog box opens.

Modify the required fields.

Click on OK.

The Modify Variable dialog box closes.

The new properties are saved and updated.

All diagrams, in which the modified variable appears, are also updated with the new properties.

☞ Only variables of transmitter, transmitter/receiver components may be modified. Fields are grayed out for variables of receiver components.

☞ Variables' tag name must start with a letter or a number and must not contain a space. The name must contain at least one letter. The variable's tag name must be unique in the project or document depending on the link (global or local) of the variable. Reserved names must not be used (ABS, SQR, etc.).

☞ The address must comply with the manufacturer's syntax and be unique in the project.

☞ It is possible to modify the link (affiliation document) of a variable.

Figure 3–38: Modify Variable dialog box

Here is a description of the available fields in the Modify Variable dialog box:

Field	Description
Tag Name	Displays the variable's tag name and allows it to be modified if the field is not greyed out.
Value	Allows to type in an initial value for the variable.
Hexadecimal/Binary	Allows to convert whole numbers into hexadecimal and binary numbers.
Address	Allows to type in the variable's address when it is a PLC variable.
Description	Displays comments related to the variable.

Sorting Variables

To sort variables:

Click on a column header in the table. The variables in that column are alphabetically sorted.

Click on the header of the same column a second time and the order of the variables is reversed.

Filtering Variables

To filter variables:

Type in a character string. This string must begin by either a letter or a number. It must also contain at least two characters, one of which must be a letter. It must not contain any spaces.

Only variables containing this character string are displayed in the table.

Supervising Variables' Values in Simulation Mode

You may find yourself in a situation in which a circuit is not behaving the way it's intended to. To solve this problem, and if simulation has not helped yet, you can rely on the Variable Manager to inform you on the state or value of variables. You can then identify the components and variables that do not behave properly.

To view the variables' values:

Start simulation.

Filter and sort variables if necessary.

Adjust the size of the Variable Manager window if necessary.

Click on the Update button to refresh the variables' values.

☞ Only variables that can act as a transmitter, transmitter/receiver, or receiver can be viewed in the Variable Manager. For other variables (pressure, flow, etc.), refer to Plotter.

3.2.4 Layer Manager

The layer manager allows the creation of various layers in standard and electrotechnical editing diagrams (not available for SFC).
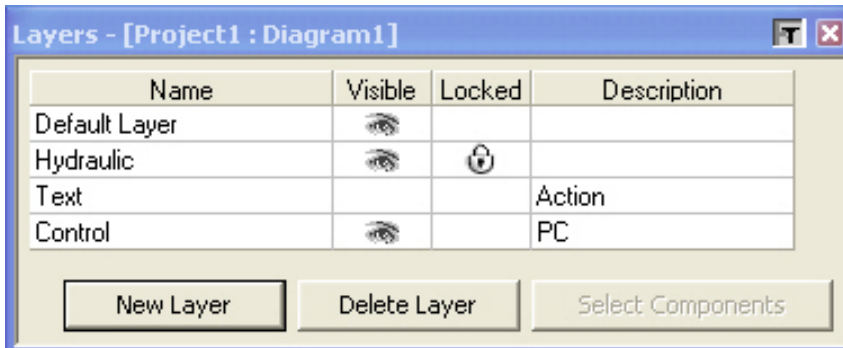
Figure 3–39: Layer Manager window

Zone	Description
Name Column	Gives a name to the layer. Each layer's name must be unique.
Visibility Column	Makes the selected layer visible or invisible. If a layer is invisible it cannot be printed, nor can it be exported.
Locked Column	Allows the user to lock or unlock the selected layer. If a layer is locked the user will not be able to modify its elements.
Description Column	Allows the user to describe the selected layer.
New Layer	Creates a new layer.
Delete Layer	Deletes a layer and all elements that belong to it.
Select Components	Allows the user to select all the components of the active layer.

Layer activation

There are two methods to activate a layer:

- Left-click with your mouse on the desired layer in the layer manager window, then click on an empty zone of the diagram.

Or

- Select a component that is part of the desired layer.

Positioning of an element on a layer

If the element comes from the library or from another diagram, then activate the desired layer and insert the element into the diagram.

If the element is already on the diagram, there are two solutions:

- Cut the component (CTRL + X), select the desired layer in the layer manager, click on an empty zone in the diagram and paste the component.

Or

- Open the component properties dialog (component or group) and go to the displayed information. Modify with the drop-down menu the "layer" property.

☞ If you group components that belong to different layers, the group and its components then belong to the active layer. If you ungroup them, each component returns to its initial layer.

☞ Satellites (displayable property of a component) belong to the same layer as its corresponding component.

3.3 Shortcut Menus

The Diagram Editor's shortcut menus have been created in order to facilitate access to tool and menu bars. With the exception of a few commands specifically created for specific cases, all commands found in the shortcut menus are either in the tools or the menu bars.

3.3.1 Open a shortcut Menu

Shortcut menus are displayed when right-clicking on an element within the Diagram Editor. The shortcut menu of this element opens on the screen, and the user may then choose the available command from this menu.

3.3.2 Specific Commands of Shortcut Menus

Some commands are only available through shortcut menus. They are neither accessible through standard menus, nor through button bars. These commands specifically apply to the selected item or to the current context. Refer to other guides to discover specific context menu.

Symbol in Simulation

Animation

This command applies to the components in the Diagram Editor while in Simulation mode. It allows the user to open the window in order to see the synchronized cross-section view of the component.

Setting

Clicking on some components during simulation allows the user to modify the functional adjustment setting (e.g.: valve opening pressure) applied to components or to control the position or state (distributors, shut-off

Symbol Area in the Library Explorer

Small/Medium/large Icons

This command applies to components in the Library Explorer. It allows the user to determine the display size of the components within the symbols library window.

Rename

This command applies to new components, libraries, and categories in the Library Explorer and to projects and diagrams in the Project Explorer. It allows to give the selected element a

different name than the one automatically assigned by the software. Therefore, the user can rename documents and work tools in concordance with his/her specific needs.

4. Creation and Management of a Project and its Documents

This chapter describes the instructions required for to create and manage projects within the Project Explorer.

This chapter covers the following topics:

- Management of projects (files created by Automation Studio™) and of their documents;

- Management of documents from a project.

4.1 Creation of a New Project

To create a new project:

Choose File   Project.

The Project Templates dialog box opens and offers a selection of templates to choose from, and which the user can base his new project on.
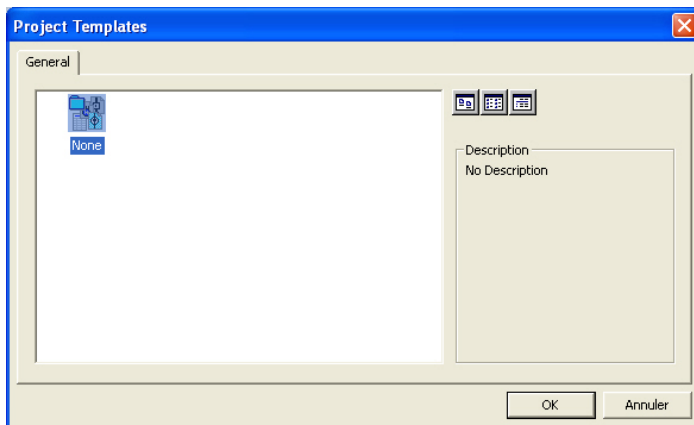
Figure 4–1: Project Templates dialog box

Choose the desired template or choose "None" if none of the available templates correspond to your needs.

Then, click on "OK" to create the new project.

A new project identical to the selected model opens on the screen as well as in the Project Explorer. By default, a name is assigned to the project; this name may be modified. By default, the software includes a blank diagram within the new project.

You may now include documents of your choice in the new project. (For more details on how to manage diagrams, refer to the section Creating a New Document.)

4.1.1 Saving a New Project

When a project is created, by default it is labelled with a sequential name. To save the new project, follow these steps:

Select File ☐ Save Project as.
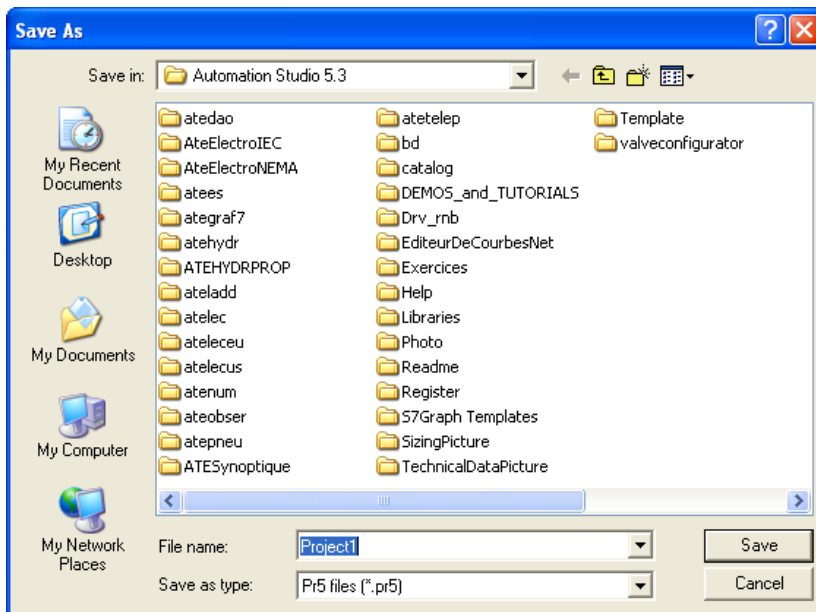
The Save As dialog box appears on the screen.

Figure 4–2: Save as dialog box

Type in the name of the file in the File name field.

Select the appropriate directory from the Save in drop-down list.

Click on Save.

If the option "Always Prompt Summary Info at the First Save" is checked in the Application branch of the Options available from the Tools menu, then, the Project Properties dialog box opens on the screen, and displays the Summary Info branch. The information from the Project Properties dialog box may be modified at any time. You may fill it out now and modify it later.

To complete the procedure for saving a new project:

Click on OK.

The new document has been created and is ready to receive all the elements and modifications you wish to include.

If you want to save a project for the Automatin Studio™ Runtime Application, you have to choose the extension ASR instead of PR5.

4.1.2 Opening a Project

To open a project:

Choose File   ☐ Open Project...

The Open Project… dialog box appears on the screen.
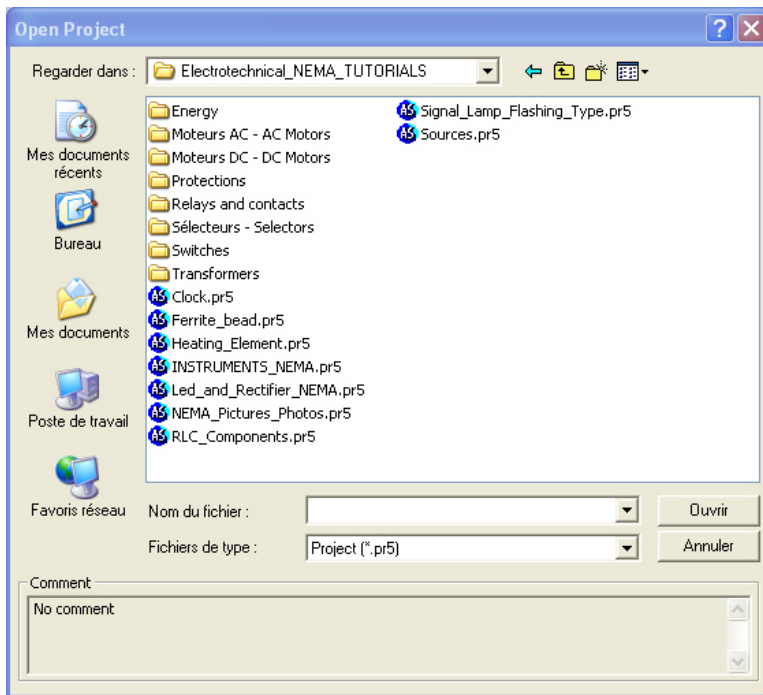
Figure 4–3: OpenProject... dialog box

From the Drives and Directory lists, select the disk and directory containing the project.

Then, select the file you want to open so that it appears in the File name field.

Click on the Open button.

4.1.3 Closing a Project

To close a project:

Choose File   ☐ Close Project.

If no modification has been made since the project was last saved, the software just closes the current project.

If modifications have been made since the last time the project was saved, a message appears on the screen requiring confirmation to save the latest modifications.

If you wish to save the modifications, click on the "Yes" button.

If the project has already been saved under a specific name, a new save is automatically executed.

Had the project never been saved, the "Save As" dialog box automatically opens. See section Saving a New Project for the procedure.

If you do not wish to save the last modifications, click on "No".

The software closes the project. The most recent modifications are lost.

The Project Explorer no longer contains that project.

4.2 Creating a New Document

It is possible to include different types of documents within a project. These different types include diagrams integrating components from standard workshops, documents integrating components from non-standard workshops, reports, and documents coming from external applications such as Web pages, Word-processing documents, spreadsheets, etc.

4.2.1 Creating a New Diagram

To create a new diagram:

Choose File ☐ New ☐ Diagram.

The Diagram Templates dialog box opens on the screen.
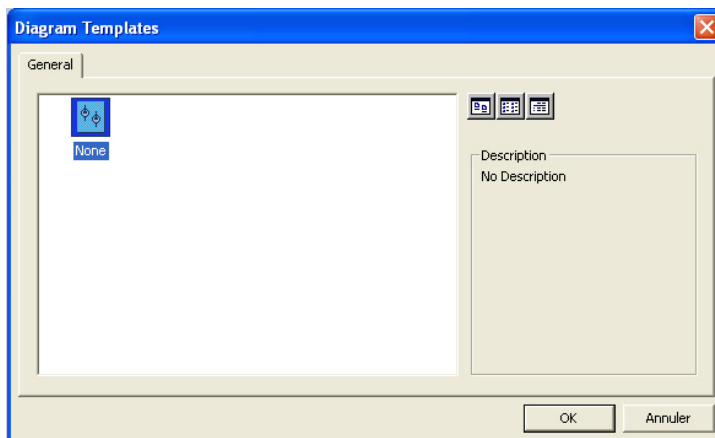
Figure 4–4: Diagram Templates dialog box

Select the template corresponding to your requirements. If none of the templates suits you, select the "None" template and modify it according to your needs.

Click on OK.

☞ You may create a new diagram compliant with your needs and standards, and save it as a template. See section

Saving a Template for the procedure.

☞ A diagram template may contain drawn elements, a header, components, and images. Refer to the section Inserting a Graphic Element_Menu_Insertion for inserting fields, graphic elements, and images in a diagram.
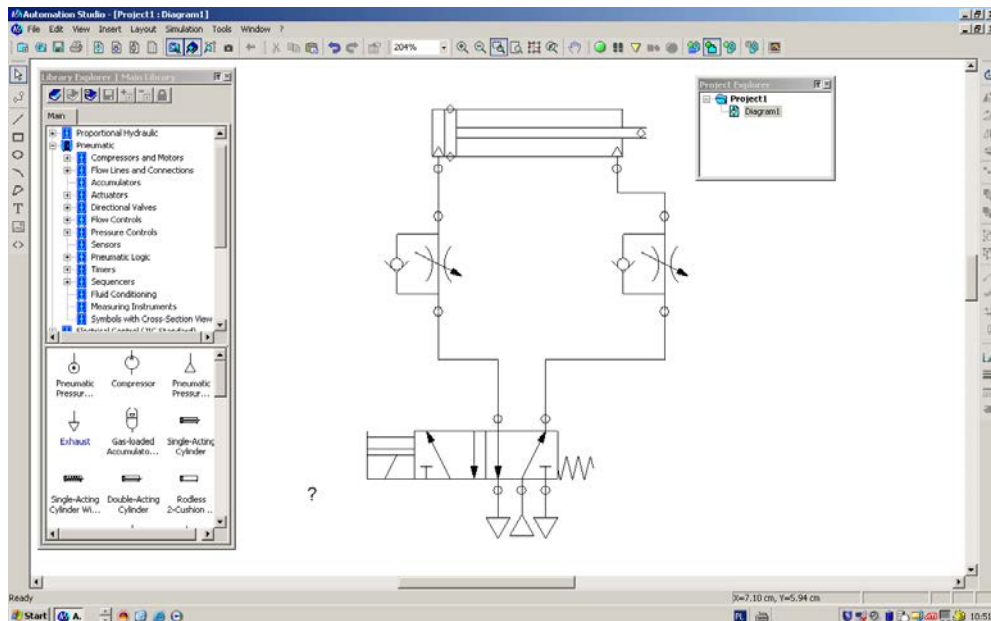
5. Project example

Open new project. Display of the initial screen afer project opening is shown in picture 5.1.
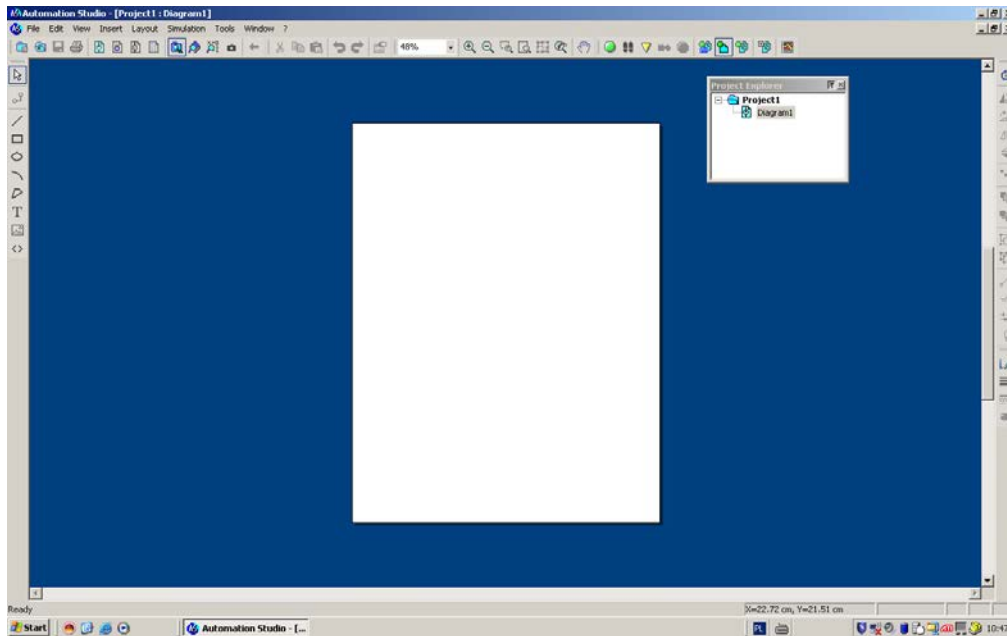
Picture 5.1. Initial screen after opening of new project

From pneumatic library place elements as shown in the picture 5.2.

Picture 5.2 . Basic pneumatic circuit build using pneumatic library.

After finishing of the circuit run the simulation. Screen should look like in the picture 5.3.
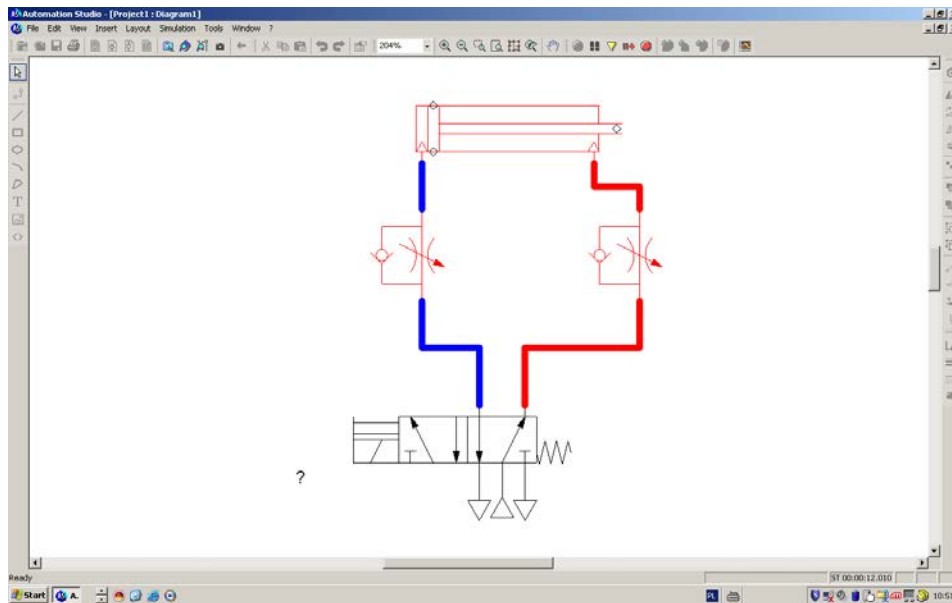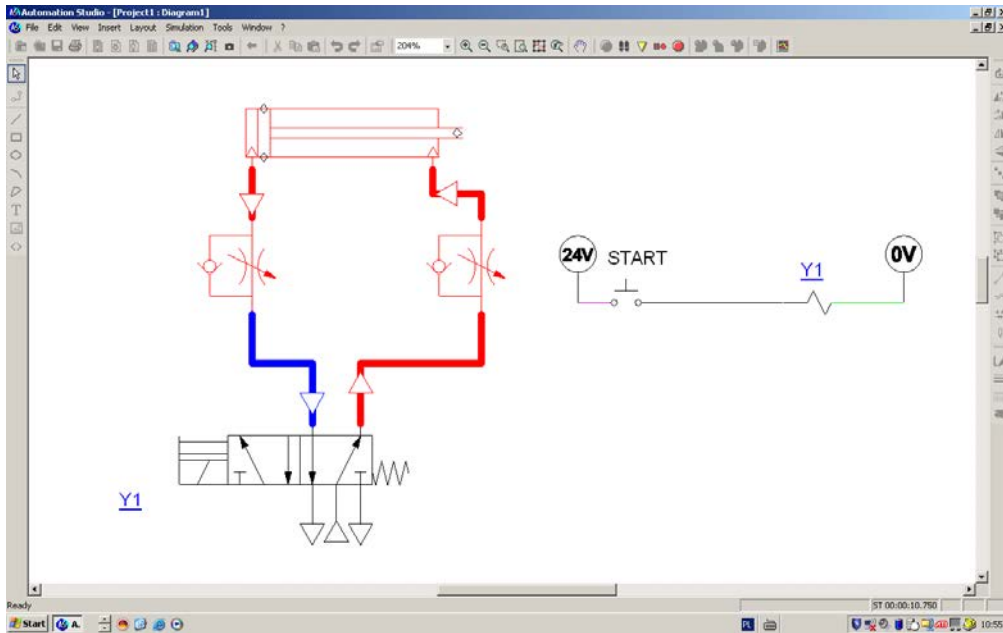

Picture 5.3. Simulated pneumatic circuit.

If the simulation runs well, modify scheme adding components from Electro technical library. Add solenoid element and link name as shown in the picture 5.4.
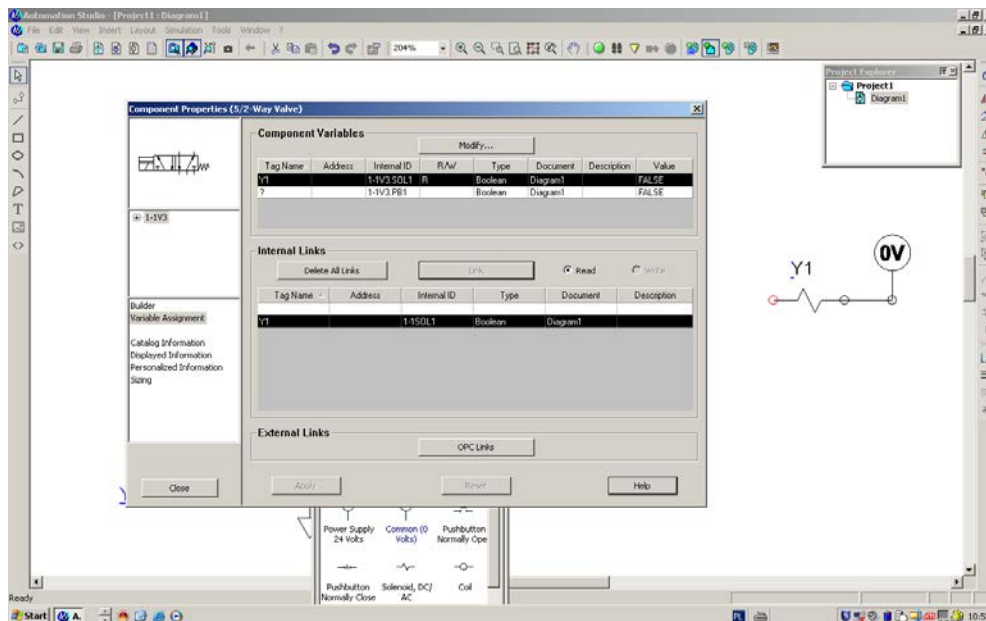

Picture 5.4. Linking solenoid Y1 with solenoid valve.

Build complete electric circuit as shown in the picture 5.5 adding manual switch called START and run the simulation. Properly working circuit is presented in the picture 5.6.

Picture 5.5. Simulation of electro pneumatic circuit.

If the simulation runs well, modify scheme adding proximity switch called S1. In the Variable browser add S1 variable and link proximity switch with this name as shown in the picture 5.6.
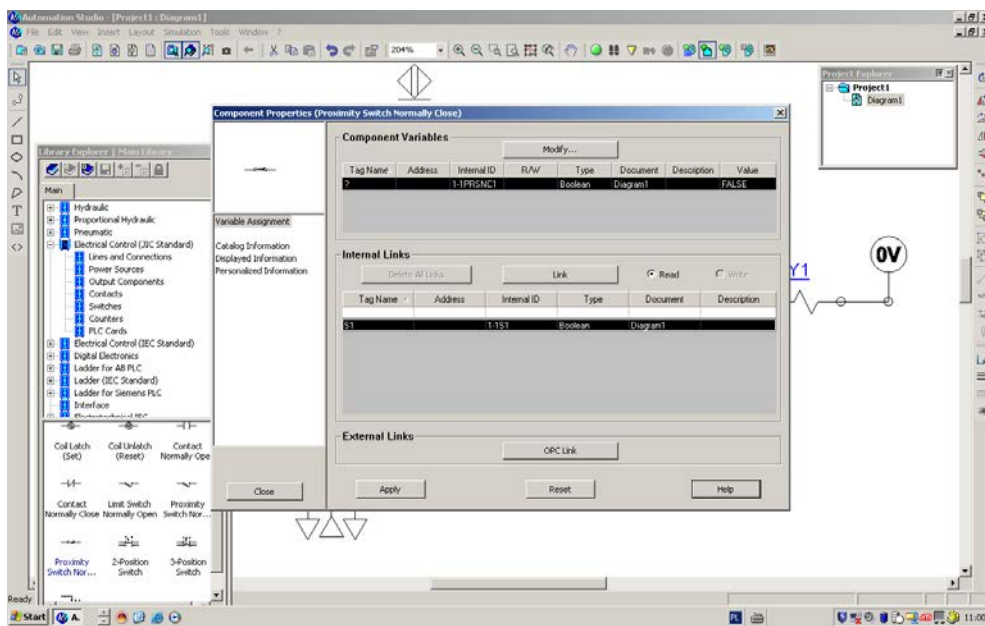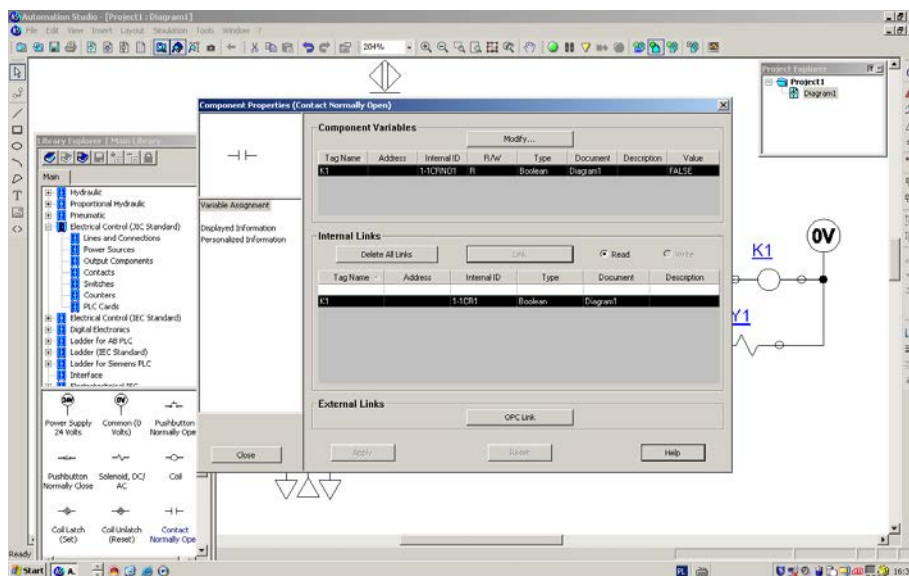

Picture 5.6. Linking of variable S1 with proximity switch

After adding of the element and proper linking modify electric circuit adding additional relay called K1 as shown in the picture 5.7.
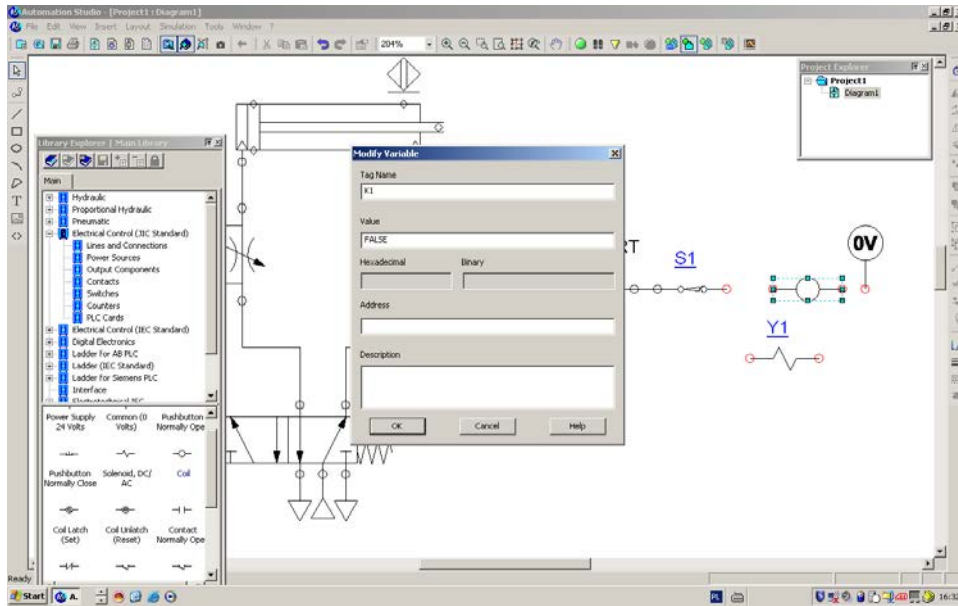
Picture 5.7 . Adding additional relay K1

After inserting of solenoid coil add two additional contacts connected with K1 as shown in the picture 5.8.

Picture 5.8 Adding of additional contact related to K1.

Rebuild electric circuit and run the simulation. Final circuit during simulation in shown in the picture 5.9.

After momentary pressing of the START button pneumatic cylinder should execute one complete stroke reaching proximity switch and return to its initial position.
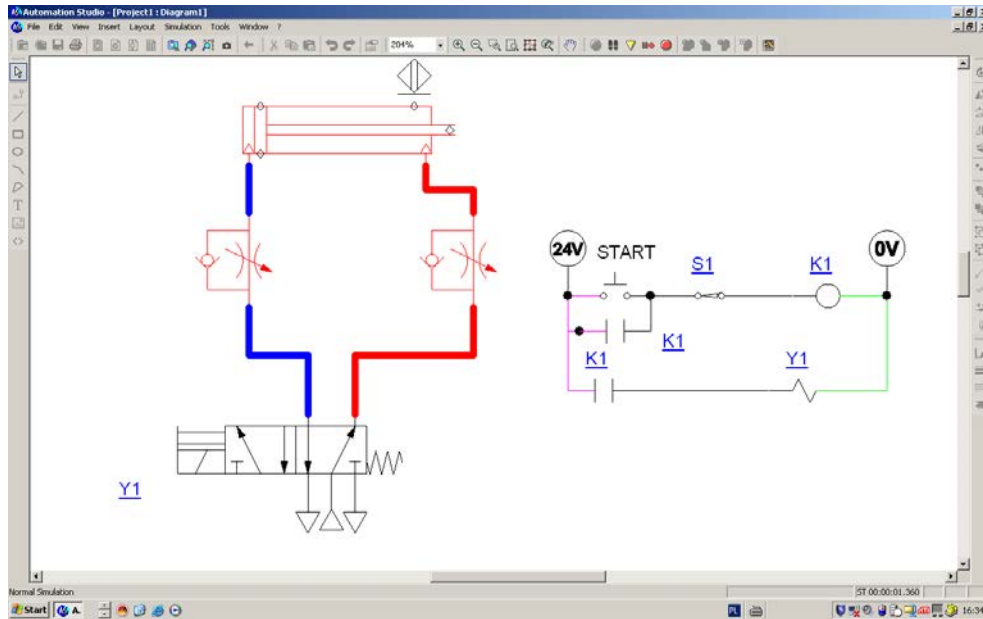
Picture 5.9. One shoot electro-pneumatic circuit during simulation.

Make following modification to presented circuit :

- Observe circuit after proximity sensor moving away

- Add additional limit switch, which should be active as initial condition of movement

- Add additional pneumatic cylinders and rebuild electric circuit to build simple sequential movement of two cylinders