User Manual

Allen-Bradley

Library Designer and Library Object Manager

Allen-Bradley • Rockwell Software

Rockwell Automation

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Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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Preface Objectives

This preface covers the following topics:

- Purpose of This Manual
- Additional Resources
- Abbreviations

Purpose of This Manual

This manual is a user guide for the Library Designer plug-in and the Library Object Manager application. It provides procedures for the following:

- Creating Library Objects
- Decorating Library Objects
- Saving Library Objects and creating Library Object Repositories

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Application Code Manager User Manual, publication LOGIX-UM003A-EN-P.	User manual for the Application Code Manager (ACM) application.

You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Abbreviations

The following abbreviations are used in this publication.

Abbr	Meaning
ACM	Application Code Manager
FT	FactoryTalk®
FTAE	FactoryTalk Alarms and Events
GUI	Graphic User Interface
HMI	Human Machine Interface
I/O	Input/Output
LOM	Library Object Manager
ME	Machine Edition
SE	Site Edition
XML	Extensible Markup Language (Export format -.XML file extension)

Notes:

The Library Designer Plug-in and the Library Object Manager Application Overview

Chapter Objectives

This chapter provides information on the following topics:

Design Process

The Studio 5000® Application Code Manager (ACM) design process introduces a modular, Object-based approach to the creation of ACD controller code, FactoryTalk® View SE/ME display content, FactoryTalk Historian Tag and FactoryTalk Alarms and Events (FTAE) import configuration.

The Studio 5000 ACM design process separates function and configuration into two separate layers of data, and divides the design process into two distinct workflows, Library Management and Project Execution.

The design process involves a suite of applications and plug-ins:

- The Studio 5000 Logix Designer® application
- The Library Designer plug-in
- The Library Object Manager (LOM) application
- The Application Code Manager (ACM) application
- FactoryTalk View Studio

The Library Management Workflow

Studio 5000 Logix Designer

The Library Management workflow begins when a Librarian creates a specific instance of ACD controller code in the Logix Designer application. The specific instance is a single Project containing a single Controller. The Project includes a logical structure allowing for these Logix Objects:

- Controller Tags
- Tasks

- Motion Groups
- Add-On Instructions
- Data Types
- Trends
- I/O Configurations

Each Logix Object has an internal hierarchy of elements: for example, a Task may contain one or more Programs, each of which may contain one or more Routines.

Every Project has one Controller. There may be one, many, or no instances of any type of Logix Object in the Project when the specific instance is created. This single instance of controller code is saved to an ACD file.

Traditionally, controller code was designed and configured for a specific Project. In the Library Management workflow, Librarians design content not for a specific Project, but to provide a widely applicable set of functions. Project components are used to create Library Objects. Each Library Object is an independent functional entity that can be easily configured to meet a wide range of applications and can be used in many Projects.

Library Designer

The Library Management workflow continues in the Library Designer plug-in. Using the Library Designer plug-in, the Library can assign the Project, the Controller, and any of the Logix Objects to one or many Library Objects. Each Library Object defines a set of functions, capabilities, and connections: valve, motor, controller, module. Rather than being tied to one application, Library Objects can be configured to meet the needs of multiple applications.

The Librarian adds decorative elements (Custom Properties) to the Library Object, including Parameters, SubObjects, Functions, Substitutions, and External References. Decoration allows the Library Object to be configured when it is implemented in a Project in the ACM application. The ACM application can only access the decoration that has been added in the Library Designer plug-in.

Logix Objects can be restricted to a single Library Object or assigned to multiple Library Objects, each with a different set of decoration. A Library Object can contain a single Logix Object, or a Logix Object can be added as an element of a more complex Library Object. For example, a P_Alarm Add-On Instruction can be assigned to a valve Library Object and can also be an element of a Motor or Pump Library Object.

Each ACD file can include one Project Library Object, one Controller Library Object, and any number of Logix Object Library Objects.

While decoration is stored as part of the ACD file, it is treated as a separate layer of information from the base controller code.

Decoration allows the Librarian to control how the Library Object is instantiated, including configurations such as naming, tag values, conditional inclusion, and connections to other Library Objects. Project Engineers can instantiate one or many distinct instances of a Library Object within an ACM Project and can separately configure each instance.

Library Object Manager

The Library Management workflow is completed when the Librarian opens the decorated ACD file in the Library Object Manager application. The Library Object Manager application lets the Librarian publish each Library Object, either directly to the ACM Database or to a file in HSL4 format. The published Library Object can be registered by an ACM Project. HSL4 files can be distributed individually or as part of a Repository.

The Librarian can add non-Logix user interface features such as HMI (FactoryTalk View SE/ME) and Historian (FactoryTalk Historian SE) components to the Library Object in the Library Object Manager application. This can only be done after the Library Object has been published from the ACD file to a Folder or ACM Database Repository. The features added in the Library Object Manager application are saved to the individual HSL4 file or database entry for the Library Object and are not saved to the original ACD file.

Each Library Object file saved from the Library Object Manager application is classified within a four-level hierarchy:

Solution -> Library Type -> Category -> Catalog Number

For example, an analog input module might be classified as follows:

- Solution: (RA-LIB) ACM 1.00
  Solution will, in most cases, name the Library Object Repository for the Library Object.
- Library Type: Modules
  Library Type is a general classification for the Library Object based on its function, such as Module, valve, or motor.
- Category: Analog
  Category is a more specific classification for the Library Object, based on its function.
- Catalog Number: 1734-IE2C/C
  The specific identifier for the Library Object.

Each Library Object file must have a distinct version number per Solution. Just as the same Logix Object can be used to create one or many Library Objects within the Library Designer plug-in, the same Library Object can be used to create one or many distinct Library Object files (versions) within the Library Object Manager application.

Library Objects can be quickly distributed, then registered into and configured for multiple Projects in multiple locations. Library Objects are available to any Project Engineer that requires the functionality the Library Object provides. Projects can be built and executed by Project Engineers without the need for high level programming support. Librarians can rapidly create and distribute new Library Objects to meet the needs of specific applications.

FactoryTalk View Studio

Librarians use the FactoryTalk View Studio application to create Site Edition (SE) and Machine Edition (ME) Symbols. The Symbol objects are created as graphic displays and exported to XML. The XML files are imported into the Library Object Manager application and added as non-Logix content to Library Objects.

The Project Execution Workflow

Application Code Manager

In the Application Code Manager application, Library Objects become the building blocks for Project Engineers to rapidly create and deploy Projects. Execution is simply a matter of registering, adding, and configuring the Library Objects. Projects can be completed without requiring high-end programming support.

In the Project Execution workflow, Project Engineers select Library Objects in the ACM application, configure the Library Object Parameters to meet the requirements of the current application, and then complete the workflow by creating the Project to ACD controller code.

Project Engineers can request new Library Objects from Librarians, reuse Library Objects from their own previous Projects, or share Library Objects with other Project Engineers. Completed Projects can, in turn, be used to create new Library Objects.

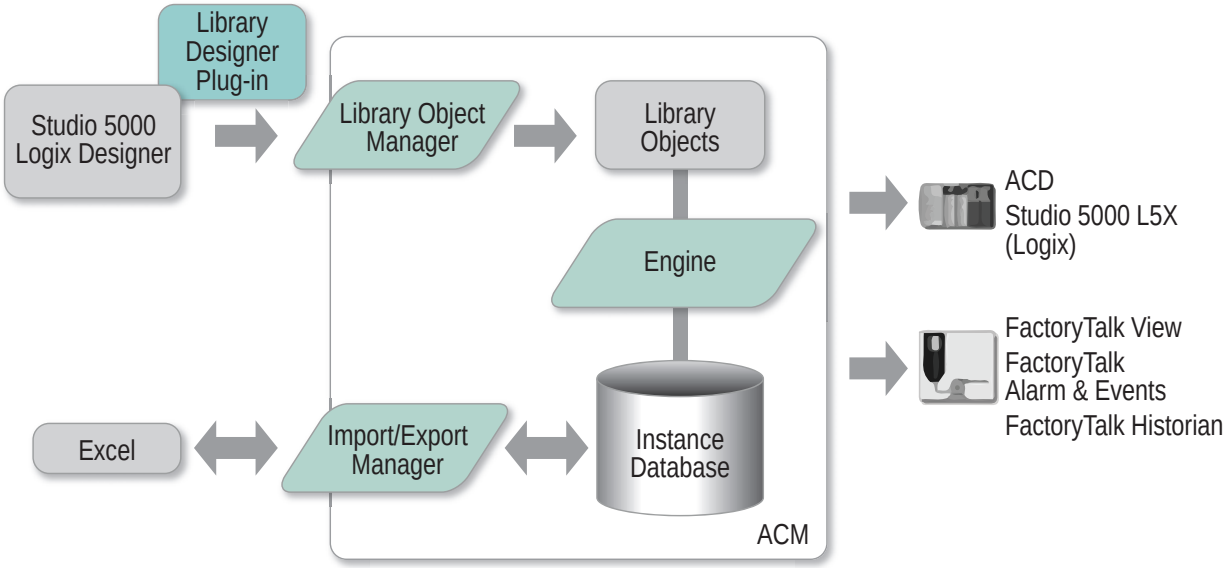
Features of the Library Designer Plug-in

The Library Designer plug-in allows a Librarian to perform these tasks:

- Creating Library Objects
- Specifying the Logix content that is included in the Library Object
- Decorating the Library Object with Parameters, SubObjects, Substitutions, Functions, and External References
- Creating Substitutions for text strings that extend to all elements of a Library Object during instantiation
- Creating Substitution overrides for specific elements
- Creating mathematical and logical Expressions using decorative elements
- Assigning Parameters to be populated by user input, calculated values (Functions and Expressions), or references to other elements
- Setting conditions for inclusion of any element of a Library Object during instantiation
- Making Tags and Tag members accessible to the ACM application by adding them as Parameters or External References
- Populating Tags based on Parameters, Functions, and Expressions

Library Objects

A Library Object (Library) is the class definition of an Object. A Library Object is instantiated. Individual Library Object files (HSL4) are XML formatted and registered in the ACM Database. A Library Object typically defines parameters, subclasses, user interface contents, and portions of controller code (for example, Logix) and HMI code (for example, FactoryTalk View SE/ME).



Library Objects contain controller code, as well as decoration (Custom Properties). Decoration is applied to a Library Object in the Library Designer plug-in. Decoration can be inherited from a Library Object that is higher in scope. Decoration that is applied to a Library Object is inherited by, or available to, all elements that are contained within the Library Object. Decoration can also be applied directly to an element, overriding inheritance from the Library Object and from Library Objects of higher scope.

The Project Library Object and Controller Library Object are added to an ACD file using separate menu commands in the Library Designer plug-in. The Project and Controller Library Objects are placed higher in the Library Object hierarchy than any Logix Object Library Objects and have predefined Parameters. It is not necessary to create these Library Objects in order to create Library Objects from the Logix Objects in the ACD file.

Library Objects designated as Modules in the Library Designer plug-in will be brought into ACM Projects as Hardware components rather than Software components. The Library Designer plug-in features a Module Wizard that ensures that required Parameters are included when the new Module Library Object is created.

Parameters, Substitutions, Functions, External References, and Expressions created in the Library Designer plug-in can be accessed, reused, and rescoped multiple times using the **Expression Builder** (refer to The Library Designer Plug-in: The Expression Builder on page 103). Functions and Expressions that are saved in the Library Designer plug-in become program resources and are available to all Projects that are opened in the program. The Library Designer plug-in also includes a set of Predefined Parameters that is available to all Projects.

Types of Decoration

Each type of decoration has a distinct role in configuring a Library Object.

Parameters

A Parameter is an argument that is exposed for external access and that controls how the Library Object is instantiated.

Parameters have a simple data type: Boolean, string, integer, or real.

Parameters are set and modified by direct user input (immediate), calculation results, or references to other Parameters.

Parameters added as a decorative element are only accessible through the Application Code Manager application, and are not accessible once the completed Project is exported to code.

Parameters created in the Library Designer plug-in have these functions:

- Storing information that is pertinent to the specific instance of the Library Object, but that is not functional: for example, the customer contact information for a Project
- Differentiating each instance of a Library Object in a Project: for example, the slot location of Module Object
- Configuring each instance of a Library Object in a Project: for example, to set whether a specific instance of a valve Object has Permissives or Interlocks
- Populating a Tag through user input or a specific external reference

Parameters allow a single instance of base controller code to have many variations and to be used in a variety of different applications.

Parameters are instantiated once. A Parameter must be unique within a Library Object. A Parameter can be copied to other Library Objects and to Library Objects of different scope.

Parameters can be collected together into a SubObject. A SubObject is a grouped set of Parameters that can be instantiated multiple times. Examples include the channels of an analog input or the contact information for a Project team member. SubObjects can be auto-generated during instantiation or added manually by the user when the Library Object is brought into an ACM Project.

Functions

A Function is an argument that is not exposed to external access. The value of a Function is generated by user-defined logic created in the Library Designer plug-in and by conditions that apply during instantiation.

A Function can be either Conditional or Calculated:

- A Conditional Function returns one of multiple possible results generated by Expressions and based on IF/ELSE/ELSEIF logic. A Conditional Function allows for multiple branches and nesting.
- A Calculated Function generates a single value, based on a single Expression.

Both types of Function are created using the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

Functions can be copied between Library Objects and between Library Objects of different scope, as long as the decorative elements used in the Expressions are common to both Library Objects.

Functions can be saved within the Library Object Manager application. Saved Functions are available to all Projects opened in the Library Designer plug-in.

Substitutions

A Substitution is a user-defined rule which, during instantiation, replaces a text string in the name, description, instantiation location, or other attribute of a Library Object element with a Parameter value, calculation result, or referenced value.

IMPORTANT	Substitutions are applied globally based on a simple search-and-replace logic. Care should be taken in both the naming conventions and standards used when elements are created in the Logix Designer application, and in the text strings selected for substitution in the Library Object Manager application. Substitution which affects text strings in unexpected locations can make the Library Object function in unexpected ways or fail to validate.

Substitutions applied at one level of the Library Object hierarchy extend to all Objects at lower levels of the hierarchy, and to all elements that are contained within the Library Objects. For example, a substitution applied to a Project Library Object extends to the Controller Library Object and all Logix Object Library Objects in the same ACD file, as well as to all elements within all of these Library Objects.

Substitutions applied to a Library Object extend to all elements within the Library Object. Substitutions applied at a higher level in the hierarchy take precedence over substitutions applied directly to the Library Object.

Substitutions that are inherited by an element from the containing Library Object, or from a Library Object higher in the Library Object hierarchy (Base Library), can be overridden at the element level using the **Substitution Builder** (refer to The Substitution Builder on page 112).

Substitutions can be copied and pasted from one Library Object to another and can be copied and pasted between Library Objects of different scope.

Predefined Parameters

A Predefined Parameter is one of a set of Parameters that are automatically available to all Library Objects created in the Library Designer plug-in. They are defined and scoped by the program. They are the same for all Library Objects in the hierarchy, as well as for all elements of all Library Objects, and are available to all Substitutions, Expressions, and Functions. Users cannot create, modify, or delete Predefined Parameters.

IMPORTANT Predefined Parameters appear generically at all levels of the Project hierarchy. Care must be taken when applying a Predefined Parameter to verify that the use is properly scoped.

Predefined Parameters are populated during instantiation when a Library Object is added to an ACM Project.

Predefined Parameters cannot be copied or pasted, since they are defined by the Library Designer plug-in and are identical for all Library Objects.

External References

An External Reference makes the value of a Local Tag, Controller Tag, or Tag Member within a Library Object accessible to Parameters in other Library Objects. Used in conjunction with Parameters that have been assigned to accept values by reference, External References provide the points of contact between Library Objects in an ACM Project.

In an ACM Project, a user can link an External Reference to a Reference-type Parameter. The Parameter references the value of External Reference when the Project is in operation. Reference-type Parameters can be defined so that the External References that are accessible to them are limited to those that meet certain criteria (filters).

Any Tag or Tag Member can be added as an External Reference.

Expressions

An Expression is a one-line statement that generates a single calculated result. Expressions can return a string, numeric, or Boolean value. Expressions generate values automatically during instantiation.

An Expression can be as simple as a single decorative element token, or can involve one or more operations involving one or more decorative elements and operators.

Expressions can be used in any field in the Library Designer plug-in that accepts a calculated result. These fields display the **Ellipsis** (...) button to the right.

Expressions can incorporate any decorative element that is available to the current Library Object element, as well as a set of logical and mathematical operators.

Expressions can be entered manually or created in the **Expression Builder**. The Expression Builder is an intuitive, visually responsive environment to create, test, and save Expressions. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

Applying Decoration to Library Object Elements

Decoration is added to the Library Object in the Library Designer plug-in. The decoration can then be applied to any field of any element of the Library Object that accepts values from the **Expression Builder** or **Substitution Builder**. These fields display the **Ellipsis** (...) button to the right.

Design Automation Concept

The Library Object files are generated automatically by the Library Object Manager application. Each Library Object is assigned a sequential Version Number based on previous iterations of Objects with the same Catalog Number and are stored in the ACM Database as HSL4 files. The HSL4 files can be copied to other folders for distribution.

Notes:

Opening the Library Designer Plug-in

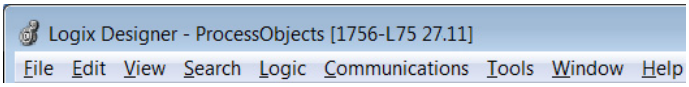
Chapter Objectives

This chapter provides information on the following topics:

Accessing the Library Designer Plug-in

The Library Designer plug-in can be accessed from either the Studio 5000 Logix Designer® application or from the Library Object Manager application. The Library Designer plug-in opens in a separate window. When you exit the Library Designer plug-in, either by saving or canceling the changes made, you return to the program of origin.

TIP When you open the Library Designer plug-in from the Logix Designer application, you must also save the ACD file in the Logix Designer application to write the changes to the ACD file. Changes saved in the Library Designer plug-in are only temporary. The ACD file name displayed at the top of the Logix Designer window shows an asterisk until the file is saved.

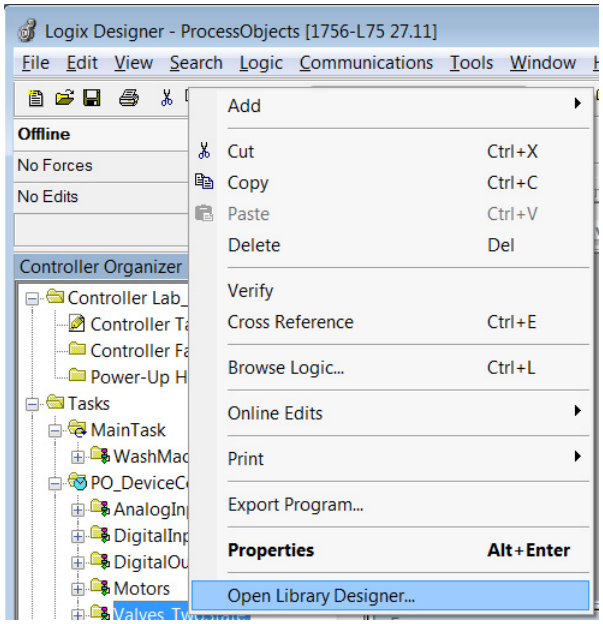


When you open the Library Designer plug-in from the Library Object Manager application, changes saved in the Library Designer plug-in are saved immediately to the ACD file when you return to the program.

Opening the Library Designer Plug-in from the Studio 5000 Logix Designer Application

Follow these steps to open the Library Designer plug-in from within the Logix Designer application.

1. Select the item in the **Controller Organizer** tree that you wish to decorate.
2. Right-click to open the contextual menu, then select **Open Library Designer**.

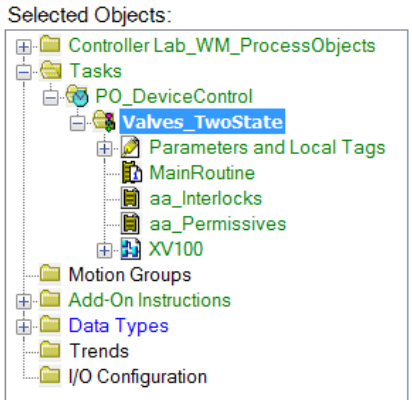


TIP You can select most items (object or element) at any level of the **Controller Organizer** tree. The selected object, plus all elements within the tree that reference the object or are referenced by it, are brought into the Library Designer plug-in. For example, a valve Object opens together with the Controller Tags, Add-On Instructions and Data Types that it references.

The following items are supported:

- Controllers
- Tags
- Modules
- Tasks, Programs, and Routines
- Elements contained in Function Block Diagrams, Sequential Function Charts, Ladder Logic Diagrams, and Structured Text Charts
- Data Types
- Add-On Instructions

3. The selected item and all referenced items open in the **Selected Objects** column at the left of the Library Designer window.

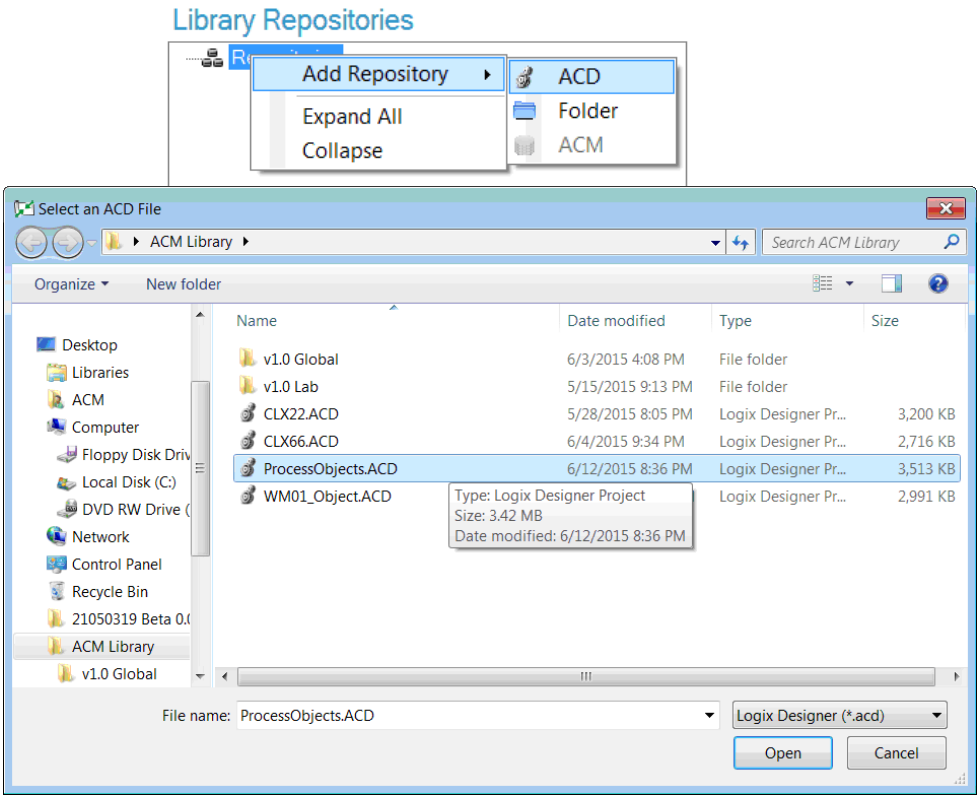


TIP Items in the Library Designer plug-in are color-coded as black, blue, or green. Green indicates that all elements contained by the object or element have been associated with an existing Library Object in the current Project. Blue indicates that some, but not all elements contained by the object or element have been associated with an existing Library Object. Black indicates that no elements have been associated with an existing Library Object.

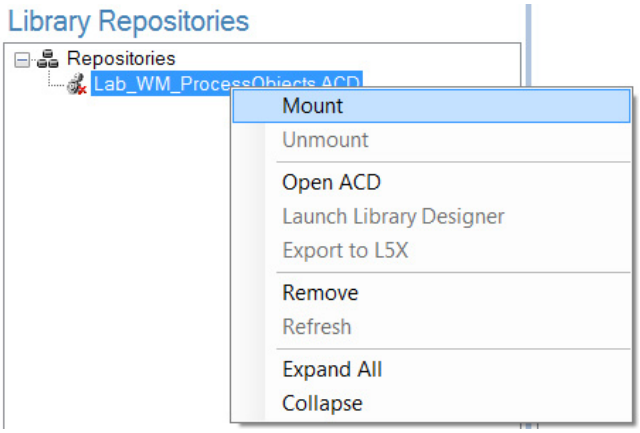
Opening the Library Designer Plug-in from the Library Object Manager Application

Follow these steps to open the Library Designer plug-in from within the Library Object Manager application.

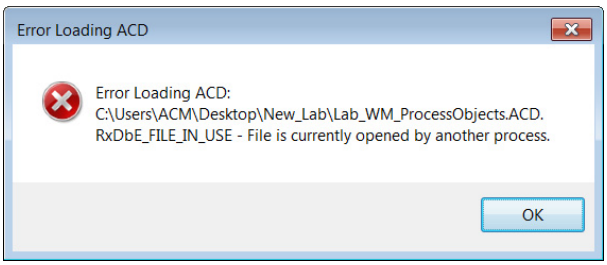
1. Right-click the **Repositories** item to open the contextual menu.
2. Mouse over **Add Repository** to open the submenu, then select ACD.
3. Navigate to the ACD file you wish to open and click **Open**.



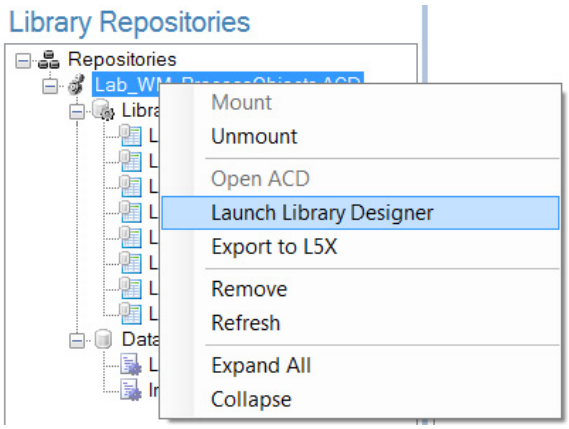
4. The ACD file opens in the Library Object Manager application and is added to the **Library Repository Tree View**. The red "X" next to the file icon indicates it is referenced, but not yet mounted.
5. Right-click the ACD item to open the contextual menu. Select **Mount**.



TIP You will not be able to mount the ACD file if it is open in the Logix Designer application. Close the file in the Logix Designer application to make it accessible to the Library Object Manager application.



6. The ACD file mounts, and the Library Objects contained in the file appear in the **Library Repositories** tree view.
7. Right-click the ACD file Repository to open the contextual menu, then select **Launch Library Designer**.



TIP You cannot select individual Library Objects in the ACD repository from within the Library Object Manager application. All Library Objects in the ACD file open in the Library Designer plug-in.

Notes:

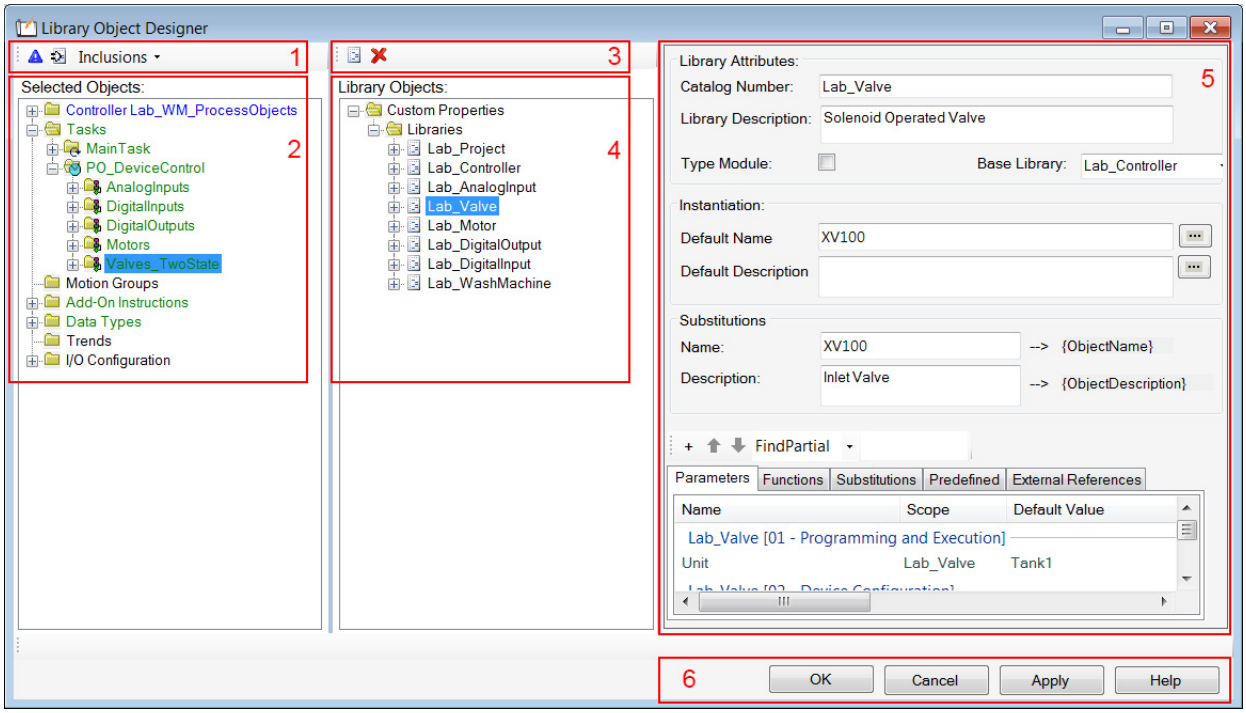
The Library Designer Plug-in Main Graphic User Interface

Chapter Objectives

This chapter provides information on the following topics:

The Main Graphic User Interface

This chapter describes the **Main Graphic User Interface** (Main GUI).



The following table describes the regions and controls on the **Main Graphic User Interface**.

Selected Objects Button Bar (1)	Refer to The Selected Objects Button Bar on page 32 for more information.
Selected Objects Tree View (2)	Refer to The Selected Objects Tree View on page 32 for more information.
Library Objects Button Bar (3)	Refer to The Library Objects Button Bar on page 33 for more information.
Library Objects Tree View (4)	Refer to The Library Objects Tree View on page 33 for more information.
Decorator Panel (5)	Refer to The Decorator Panel on page 34 for more information.
Main Button Bar (6)	Refer to Main Button Bar on page 39 for more information.

The Library Designer **Main Graphic User Interface** is divided into three columns.

The **Selected Objects** column displays all of the elements of the current Project or ACD file that were brought into the Library Designer plug-in when you opened the program. The **Selected Objects Tree View** follows the structure of the Controller Organizer view or the Logical Organizer view in the Studio 5000 Logix Designer® application. The display varies depending on what was selected when you opened the Library Designer plug-in. It includes the Object or Objects that were selected and all referenced elements from the Project.

The **Library Objects** column displays all existing Library Objects in the current Project or ACD file. Objects in the **Selected Objects** column become available for decoration when they are added to an existing Library Object, or used as the basis for a new Library Object, by copying them into this column.

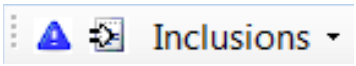
Objects in the **Selected Objects** column are color coded to indicate whether all, some, or none of the associations from the initial instance in the Logix Designer application have been replicated in the Library Objects added in the Library Designer plug-in. Objects which are fully associated within the Library Designer plug-in display as green. Objects where some, but not all, of the associations have been replicated display as blue. Objects which have no associations display as black.

An Object in the **Selected Objects** column may be associated with one or many Library Objects, depending on the ownership settings for the Project. For example, an Add-On Instruction may be associated with both a valve Library Object and a motor Library Object.

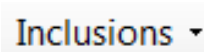
The **Decorator Panel** displays the fields and tools used to decorate the Library Objects. Once an Object has been added to a new or existing Library Object in the Library Objects column, it can be accessed and modified in the Decorator Panel.

The Selected Objects Button Bar

The **Selected Objects Button Bar** is shown below.

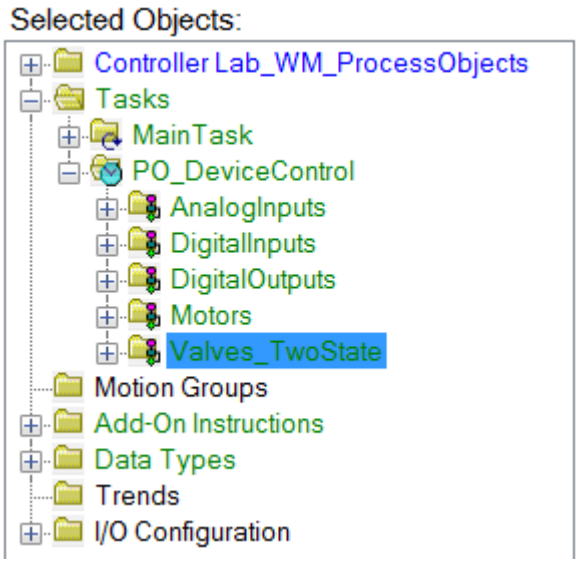


The following table describes the **Selected Objects Button Bar** commands.

	The **Show/Hide Decorated Elements** button toggles the display of items in the Selected Object Tree View which are associated with a Library Object. Default is for these items to display as blue or green. Click once to hide them and again to restore the display.
	The **Add selected elements to a Library** button opens the New Library window for the selected element. This is one of three ways an item in the Selected Object Tree View may be moved to the Library Objects column.
	The **Inclusions** pull-down menu allows you to select whether Child elements or Dependencies (elements referenced by the selected element) are included when the selected item is added to a new or existing Library Object. You can also select whether the Library Designer plug-in will restrict items to a single Library Object or allow them to be associated with multiple Library Objects.

The Selected Objects Tree View

The **Selected Objects Tree View** is shown below.



Click the + icon to the left of an item in the tree to display elements that are contained within it. Click the - icon to collapse the item.

The Library Objects Button Bar

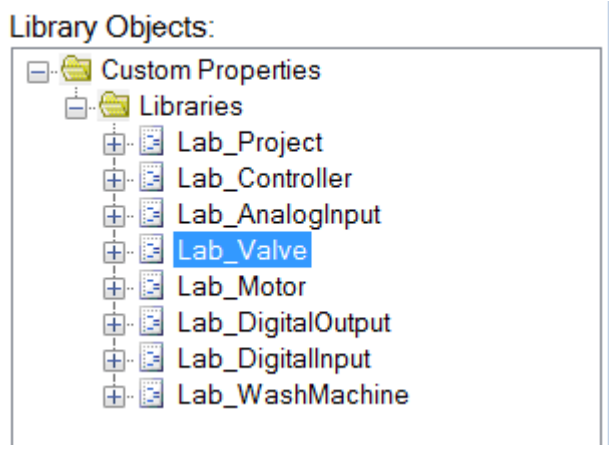
The **Library Objects Button Bar** is shown below.

The following table describes each of the **Library Objects Button Bar** commands.

	The **Create a New Library** button opens the New Library window to create a new empty Library Object.
	The **Delete Selected Objects** button deletes the selected Library Objects.

The Library Objects Tree View

The **Library Objects Tree View** is shown below.



This column displays all Library Objects that are included in the current Project or ACD file.

Library Objects are structured in a three-level hierarchy:

> Project Library Object
  > Controller Library Object
    > Logix Object Library Objects: Tasks, Programs, Modules

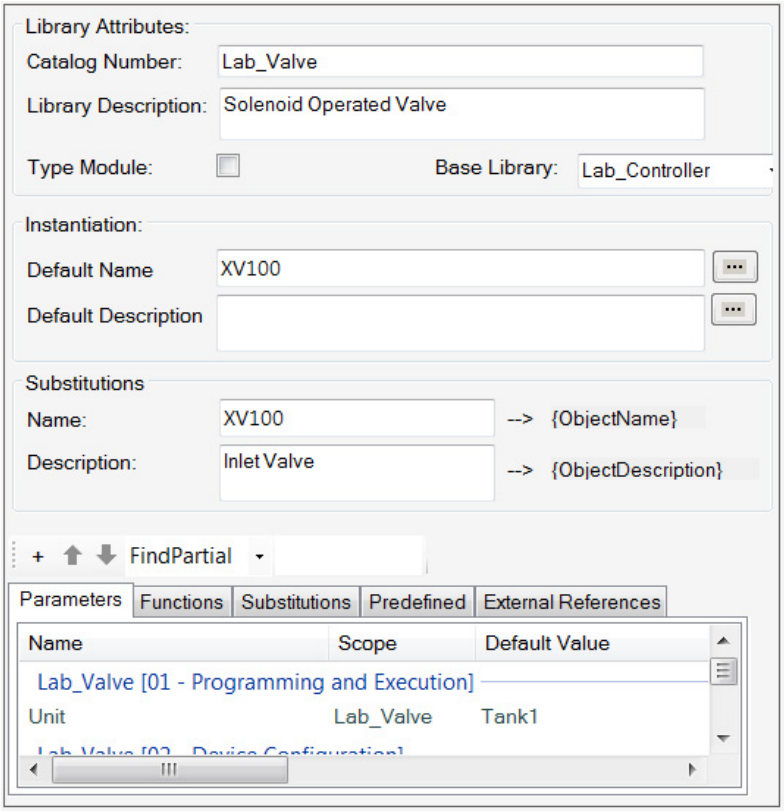
A Project can include one Project Library Object, one Controller Library Object, and multiple Logix Object Library Objects. Library Objects have a three-level structure:

> Catalog Number
  > Library Content Folder
    > Controller Tags
      Tasks
      Motion Groups
      Add-On Instructions
      Data Types
      I/O Configuration

The structure contained in each Library Object matches the structure of a Project created in the Logix Designer application, and all elements included in the Library Object are placed at the appropriate location in the Project hierarchy. This makes it possible for the Library Object of a valve that is dependent on Controller Tags, Add-On Instructions, and Data Types to include all of these required elements when it is instantiated in an ACM Project.

The Decorator Panel

The **Decorator Panel** is shown below.

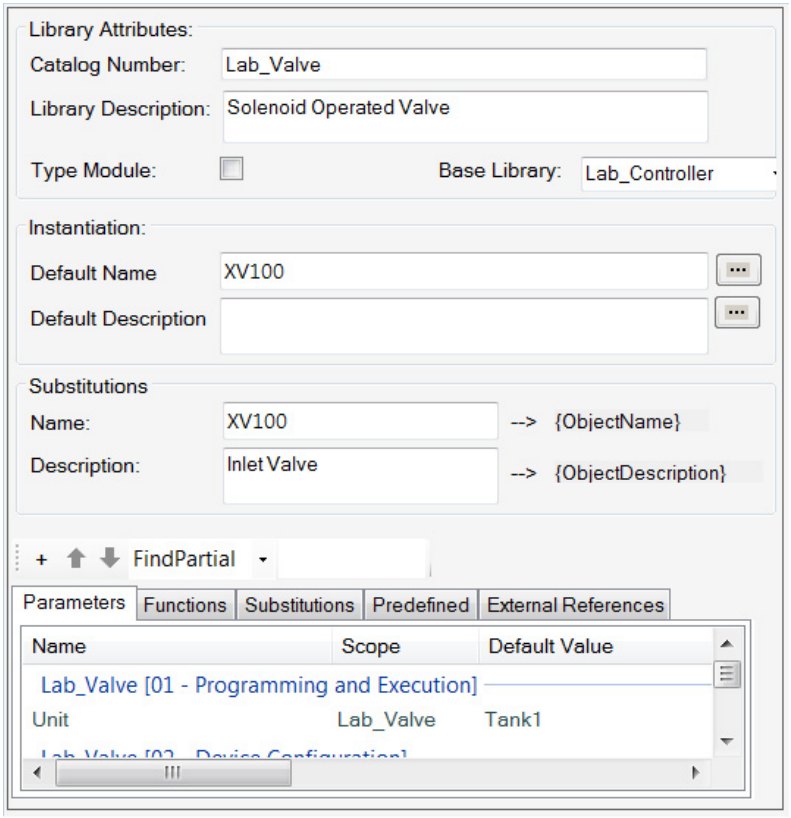


The **Decorator Panel** becomes active when an element within a Library Object is selected. The **Decorator Panel** displays the fields and functions available to add, modify, or delete decoration. The display changes based on the currently selected element and its location within the Library Object structure.

Fields that can be edited display with white backgrounds. Fields which are locked for editing appear dimmed. Fields which can accept calculated values show the **Ellipsis** (...) button to the right. Clicking this button opens the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

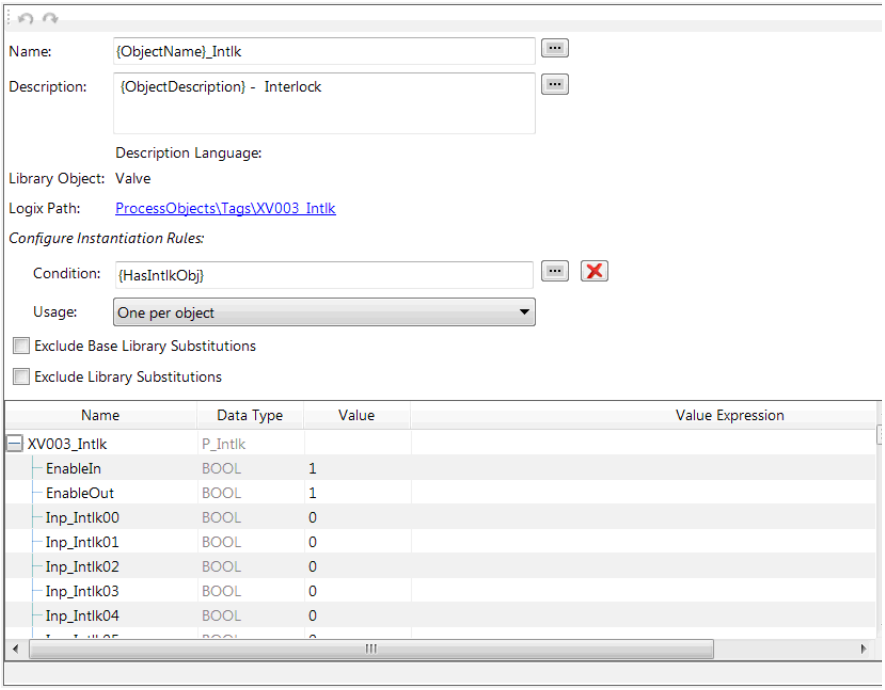
Decorator Panel: Library Object Selected

Refer to The Library Designer Plug-in: Decorating Library Objects on page 59.



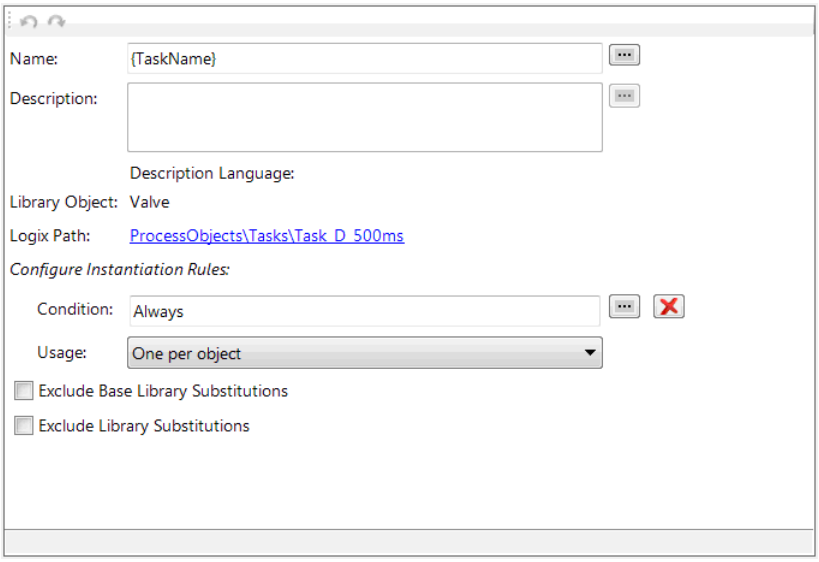
Decorator Panel: Controller or Local Tag Selected

Refer to Applying Decoration to a Tag on page 116.



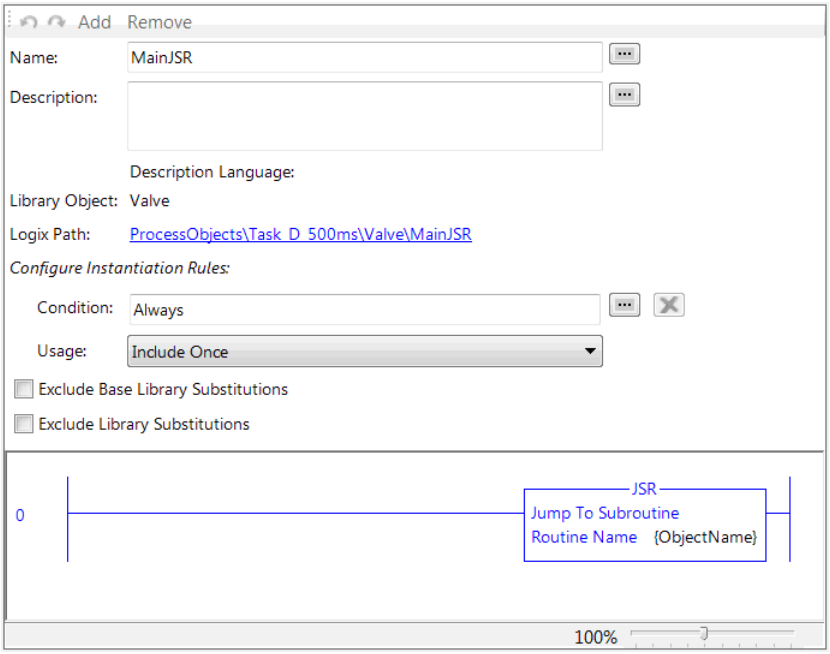
Decorator Panel: Task or Program Selected

Refer to Applying Decoration to a Task or Program on page 119.



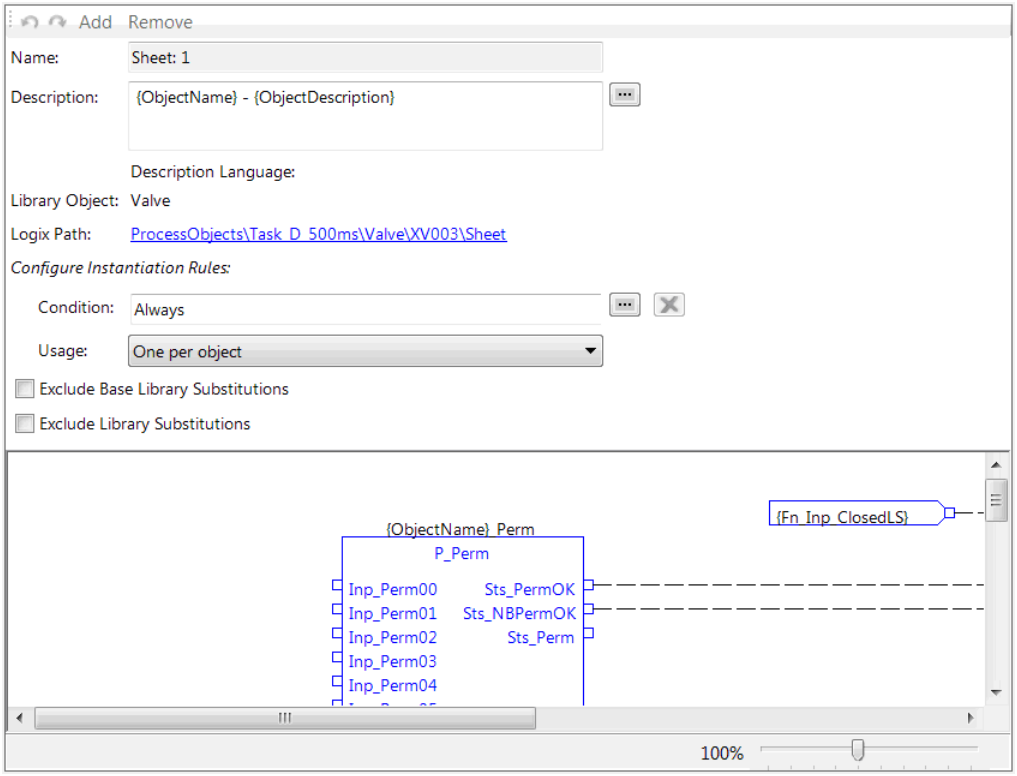
Decorator Panel: Routine Selected

Refer to Applying Decoration to a Routine on page 121.



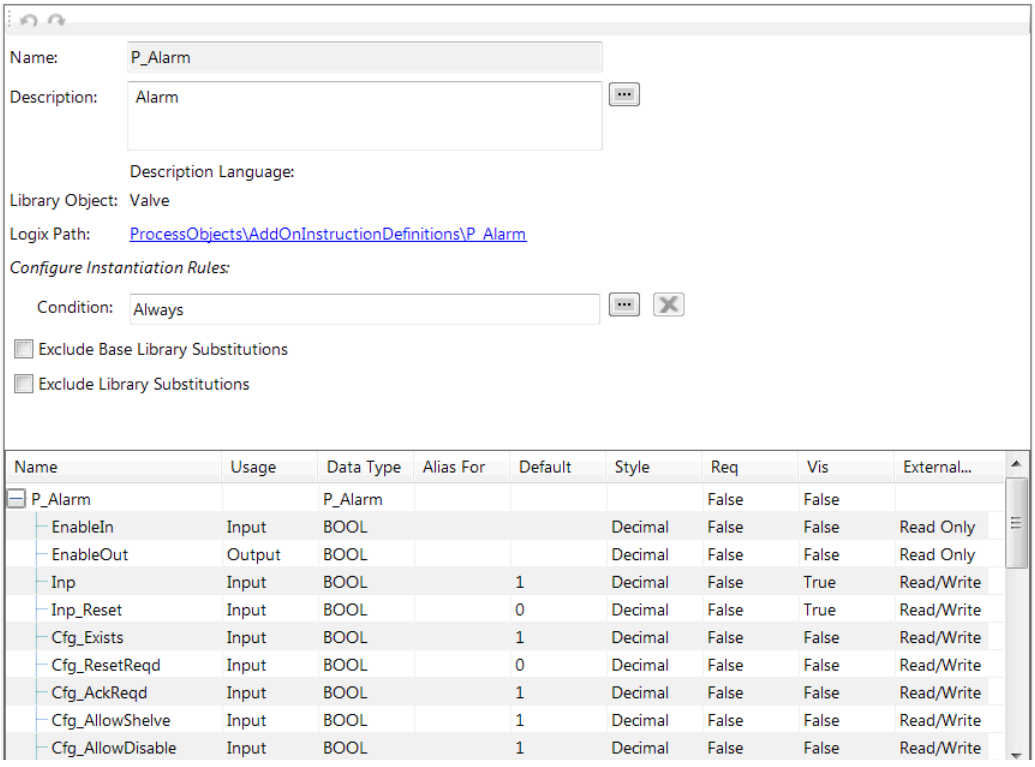
Decorator Panel: Function Block Sheet Selected

Refer to Applying Decoration to a Sheet on page 128.



Decorator Panel: Add-On Instruction Selected

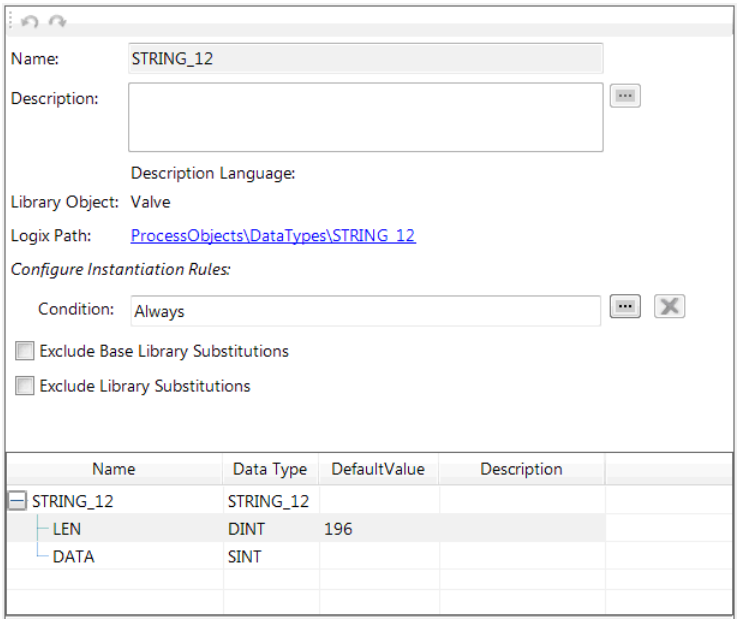
Refer to Applying Decoration to an Add-On Instruction on page 153.



Name	Usage	Data Type	Alias For	Default	Style	Req	Vis	External...
P_Alarm		P_Alarm				False	False	
EnableIn	Input	BOOL			Decimal	False	False	Read Only
EnableOut	Output	BOOL			Decimal	False	False	Read Only
Inp	Input	BOOL		1	Decimal	False	True	Read/Write
Inp_Reset	Input	BOOL		0	Decimal	False	True	Read/Write
Cfg_Exists	Input	BOOL		1	Decimal	False	False	Read/Write
Cfg_ResetReqd	Input	BOOL		0	Decimal	False	False	Read/Write
Cfg_AckReqd	Input	BOOL		1	Decimal	False	False	Read/Write
Cfg_AllowShelve	Input	BOOL		1	Decimal	False	False	Read/Write
Cfg_AllowDisable	Input	BOOL		1	Decimal	False	False	Read/Write

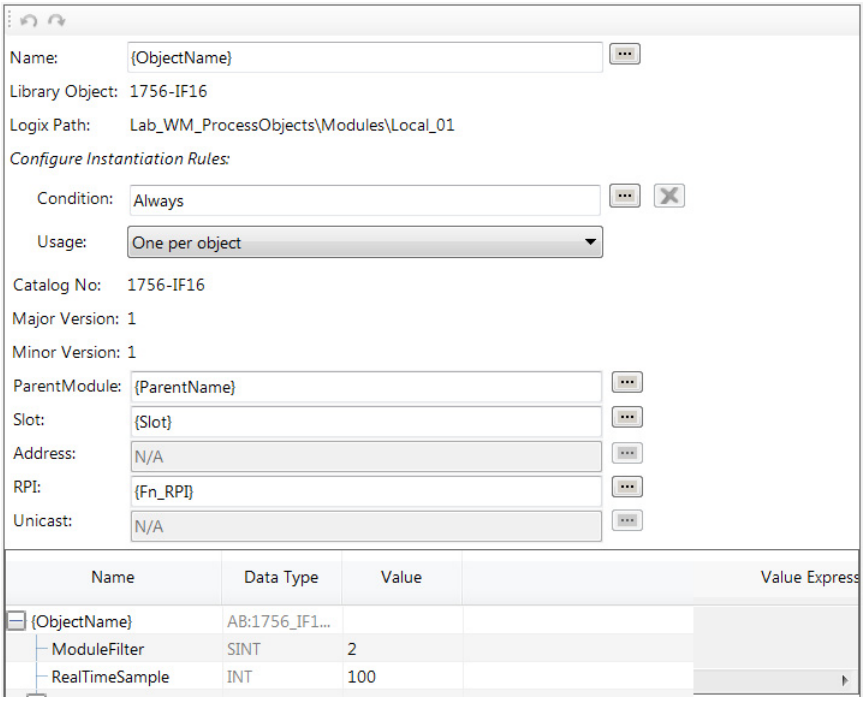
Decorator Panel: Data Type Selected

Refer to Applying Decoration to a Data Type on page 155.



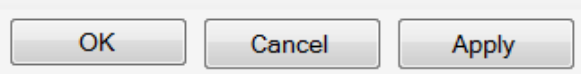
Decorator Panel: Module Selected

Refer to Applying Decoration to a Module on page 157.

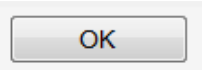
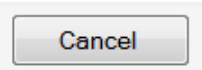
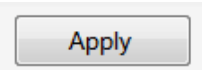


Main Button Bar

The **Main Button Bar** is shown below.



The following table describes the **Main Button Bar** commands.

	The **OK** button closes the Library Designer plug-in and saves all changes that have been made since the program was opened.
	The **Cancel** button closes the Library Designer plug-in without saving the changes.
	The **Apply** button updates all Library Objects in the **Selected Libraries** columns with the most recent changes applied in the **Decorator Panel**. It does not close the program.

Notes:

The Library Designer Plug-in: Adding a Selected Object to a Library Object

Chapter Objectives

This chapter provides information on the following topics:

Adding a Selected Object

Use one of the following procedures to add an item in the **Selected Objects** Tree View to a Library Object:

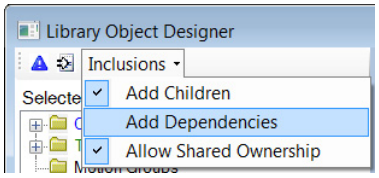
- Click **Add Selected objects to a Library**.
- Drag it from the **Selected Objects** column to the **Libraries** folder or to one of the Library Object folders in the **Library Objects** column.
- Right-click the item, select **Copy** from the contextual menu, then right-click a folder in the **Library Objects** column and select **Paste** from the contextual menu.

The Inclusions Pull-down Menu

The **Inclusions** pull-down menu on the **Selected Objects Button Bar** holds three menu commands that determine which elements are included when an item is added to a Library Object and which Library Objects the item may be added to. All three commands toggle on and off: select the menu command once to activate it, and select it again to deactivate it.

All three commands affect future selections, and have no effect on selections and inclusions that have already been made to existing Library Objects. Choices remain active until they are changed, and remain in effect when the Library Designer plug-in is closed and reopened.

Mouse over a menu item to make it active. Mouse over a second time to make it inactive. The pull-down menu must be reopened after each selection.



The following table describes each **Inclusions** pull-down menu command.

Add Children	When this command is active, all elements contained within the selected item in the Selected Object Tree View will be included when it is added to a Library Object.
Add Dependencies	When this command is active, all elements referenced by the selected item in the Selected Object Tree View will be included when it is added to a Library Object.
Allow Shared Ownership	When this command is active, the selected item in the Selected Object Tree View may be added to more than one Library Object. When it is inactive, the selected item may only be added to one Library Object.

Inclusions

This example shows the elements included when a Two-State Valve Object (Program) is added to a Library Object under the following conditions:

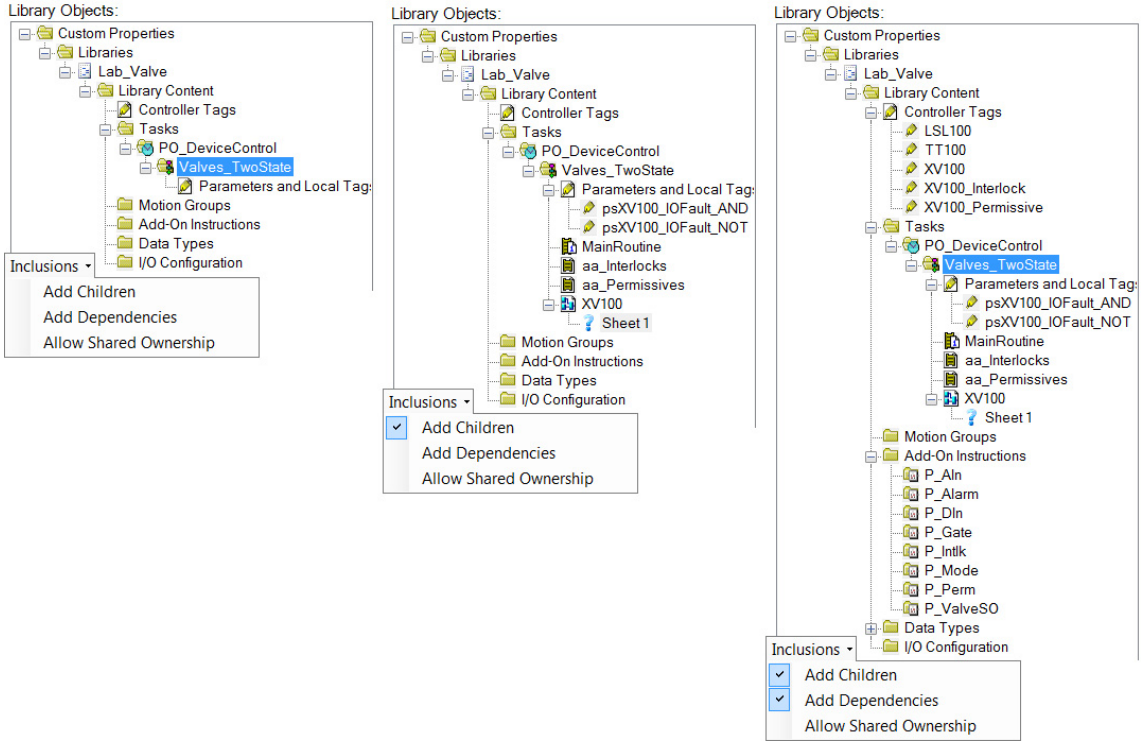
- **Add Children** and **Add Dependencies** deactivated
- **Add Children** activated
- **Add Children** and **Add Dependencies** both activated

With **Add Children** and **Add Dependencies** deactivated, the valve Program is the only element that is added to the Library Object.

With **Add Children** activated, the Local Tags and Routines contained within the valve Program are also added to the Library Object.

With **Add Children** and **Add Dependencies** activated, Controller Tags, Add-On Instructions, and Data Types that are referenced by the valve Program are also added to the Library Object.

The **Inclusion** commands allow you to add fully functional Objects or specific Object elements to a Library Object, as needs dictate.

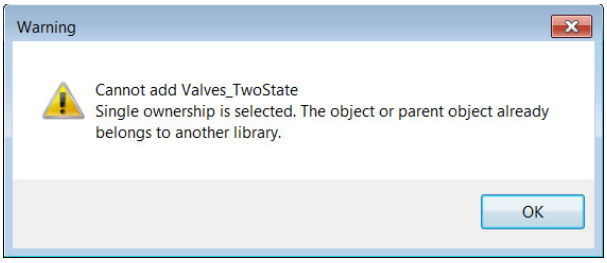


Ownership

The **Allow Shared Ownership** command determines whether an item in the Project hierarchy can be associated with multiple Library Objects or restricted to a single Library Object. The default is **Shared Ownership**, which allows for multiple associations.

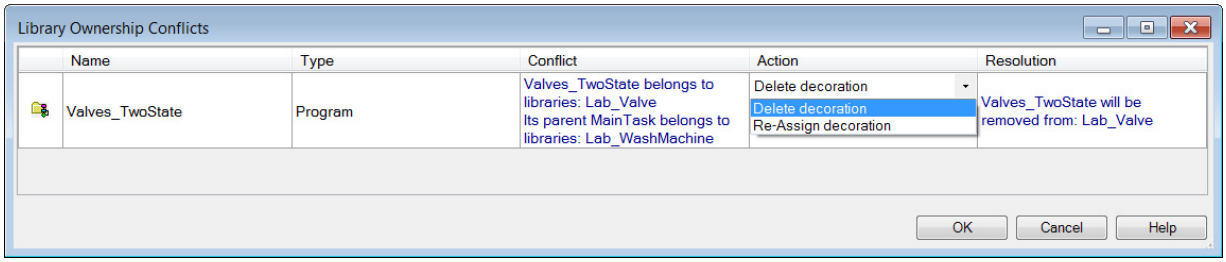
The setting for this command affects all associations made until it is changed. When the **Allow Shared Ownership** command is activated, items which were previously limited to a single Library Object may be added to other Library Objects.

When the **Allow Shared Ownership** command is deactivated, selected items may be added to one Library Object. If any of these items is selected and added to another Library Object, the Library Designer plug-in does not allow the association to take place and displays a warning.



Ownership is also tracked to verify that Parent and Child Objects remain associated with the same Library Object.

For example, if a Main Task and its child valve Program are associated with a Library Object in the Library Designer plug-in, and the valve Program is reassigned to a different Task within the Studio 5000 Logix Designer® application, the Library Designer plug-in displays the **Library Ownership Conflicts** window the next time it is opened.



There are two choices available in the **Action** pull-down menu:

Delete decoration	This command is always available. When selected, it removes the Child Object from the Library Object it is associated with. The Child Object can then be reassigned in the Library Designer plug-in.
Re-Assign decoration	This command is only available when the Parent and Child Objects are associated with different Library Objects. When selected, the Child Object is reassigned to the same Library Object as its Parent Object.

When you select **Delete decoration**, the Object is removed from all existing Library associations. The Object displays in the **Selected Object** column as black, indicating it is no longer decorated. The Object can be added to a different Library Object or used to create a new Library Object.

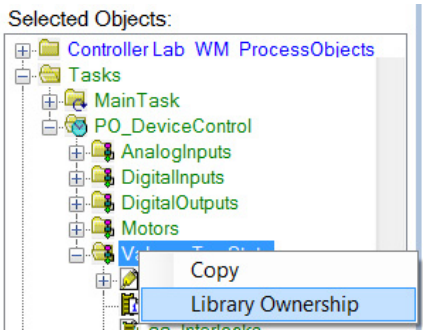
When you select **Re-assign decoration**, the Object is reassigned to the same Library Object that its Parent Object is associated with. All existing decoration is removed or replaced by decoration inherited from the Parent Object.

Listing Ownership for a Selected Object

The **Library Ownership** window displays all Library Object associations for items in the **Selected Objects** column.

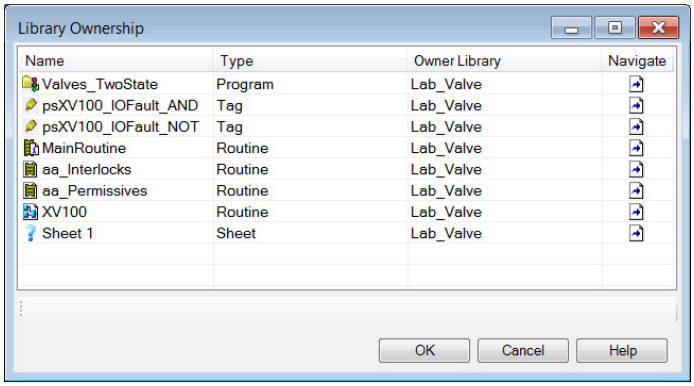
Follow these steps to see the Library Ownership for an item.

1. Select the item in the **Selected Objects** column.
2. Right-click to open the contextual menu. Select **Library Ownership**. The **Library Ownership** window opens.



TIP When an Object is selected that contains Child Objects, all of the Child Objects are listed as well in the Library Ownership window.

The **Library Ownership** window displays the selected item, together with any Child Objects. The listing includes the Object type and the Library Object or Objects the item is associated with (Owner Library). Items with multiple Library Object associations show multiple listings.



3. Click **Navigate** for a listing to open the Owner Library and display the **Decorator Panel** for the selected item. This allows you to see the specific association for the listed item, where it is located in the Library Object structure, and the context of its inclusion in the Library Object.

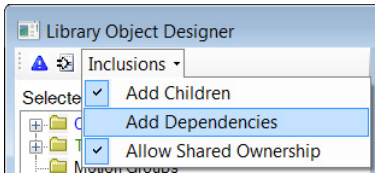
Adding a Selected Object to a Library Object

Use one of the following procedures to add an item in the **Selected Objects** Tree View to a Library Object.

Adding a Selected Object to a Library Object by Clicking the Add Selected Objects to a Library Button

Follow these steps to add a Selected Object by clicking **Add Selected Objects to a Library**.

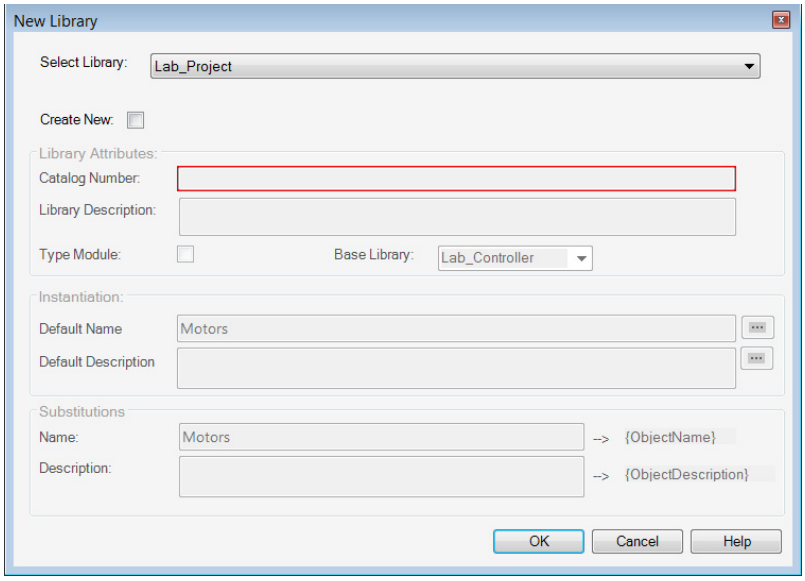
1. Click **Inclusions** to open the pull-down menu.



2. Select whether Children or Dependencies will be included when the item is added to the Library Object and whether the selected item will be exclusive to the Library Object or available for other Library Objects.
3. Select the item or items you want to add.

   TIP Hold down the SHIFT or CONTROL keys to select multiple items.

4. Click **Add selected objects to a library**. The **New Library** window opens.



5. Add the selection to an existing Library Object or create a new Library Object.
   a. To add the selection to an existing Library Object, select the Library Object from the **Select Library** pull-down menu and click **OK**. The selection is added to the Library Object.
   b. To add the selection to a new Library Object, check the **Create New** checkbox. The remaining fields in the window, which appear dimmed by default, become active.

When fully active, the **New Library** window has the following additional fields.

Name	Field Type	Description
Catalog Number	Text entry	The Library Object name, which appears when the Library Object is registered in the Application Code Manager application.
Library Object Description	Text entry	The description of the Library Object.
Type Module	Checkbox	This checkbox identifies the Library Object as a Module. A Module registers as Hardware rather than Software in the Application Code Manager application. Refer to Adding a Module to a Library Object on page 53.
Base Library	Checkbox	Allows you to select an existing Library Object in the Library Object hierarchy as a Base Library. When a Base Library is selected, the current Library Object inherits Substitutions from the Base Library, and the **Expression Builder** accesses all Custom Properties of the Base Library when used in the current Library Object. When "NONE" is selected, the current Library Object does not inherit Custom Properties.
Instantiation: Default Name	Text entry	Sets the default name for each instantiation of the Library Object. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Instantiation: Default Description	Text entry	Sets the default description for each instantiation of the Library Object. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Substitutions: Name	Text entry	Sets the default substitution for a text string in the Library Object name when the Library Object is instantiated. This string can be the complete name or a substring within the name. The substitution extends to the names of all elements within the Library Object. By default, the Library Object Manager application assigns the Predefined Parameter {ObjectName} as the Substitution for the entered string.
Substitutions: Description	Text entry	Sets the default substitution for a text string in the Library Object description when the Library Object is instantiated. This string can be the complete description or a substring within the description. The substitution extends to the descriptions of all elements within the Library Object. By default, the Library Object Manager application assigns the Predefined Parameter {ObjectDescription} as the Substitution for the entered string.

If you are creating a new Library Object, follow these steps.

6. Enter the **Catalog Number** (name) and **Description** of the Library Object in the respective fields.

   IMPORTANT The **Catalog Number** is the only required field and must be unique within the ACD file.

7. If the Library Object defines a Hardware component rather than a Software component, check the **Module** checkbox. Modules are identified as Hardware when the Library Object is added to an ACM Project.
8. Select a Base Library from the **Base Library** pull-down menu if you want the new Library Object to inherit substitutions from an existing Library Object. Select "NONE" if you do not want inheritance to take place.

9. Enter a default name and description in the **Instantiation** fields. These will be applied as the default name and description for each instantiation of the Library Object.

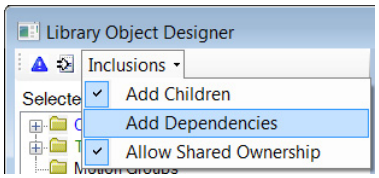
   TIP To use an Expression to generate the values, rather than entering a text string, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

10. Enter initial substitutions in the **Name** and **Description** fields. These substitutions extend to all elements within the objects, and begin the decoration process. Additional substitutions can be added once the Library Object has been created.
11. Click **OK** to save the new Library Object or **Cancel** to cancel the procedure.

Adding a Selected Object to a New Library Object by Dragging or Copying and Pasting

Follow these steps to add a selected Object to a new Library Object by dragging or copying and pasting.

1. Click **Inclusions** to open the pull-down menu.

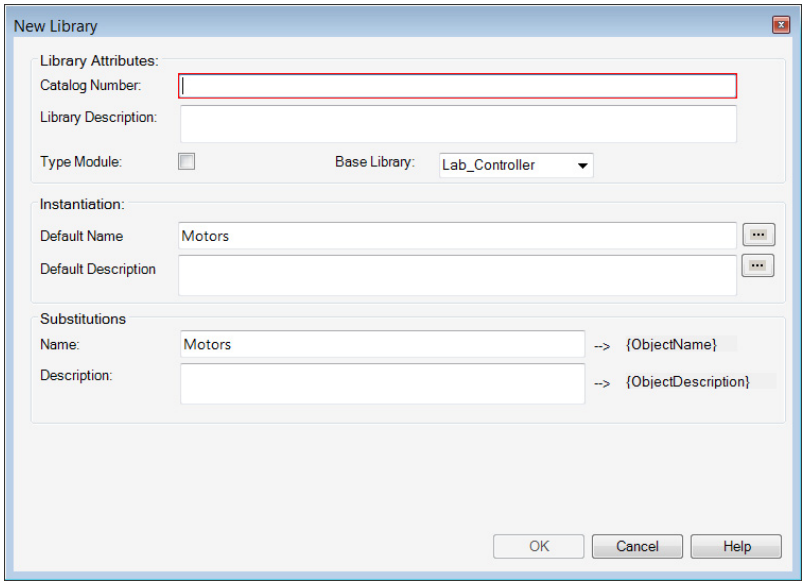


2. Select whether Children or Dependencies will be included in the Library Object and whether the selected item will be exclusive to the Library Object or available for other Library Objects.
3. Select the item or items you want to add.

   TIP Hold down the SHIFT or CONTROL keys to select multiple items.

4. Do one of the following.
   a. Drag the selection on top of the **Libraries** folder in the **Library Objects** column.
   b. Right-click the selection to open the contextual menu. Select **Copy**. Right-click the **Libraries** folder to open the contextual menu. Select **Paste**. The **New Library** window opens.

TIP You do not have the option to add the selected Object to an existing Library Object.



The **New Library** window has the following fields.

Name	Field Type	Description
Catalog Number	Text entry	The Library Object name, which appears when the Library Object is registered in the Application Code Manager application
Library Object Description	Text entry	The description of the Library Object.
Type Module	Checkbox	This checkbox identifies the Library Object as a Module. A Module registers as Hardware rather than Software in the Application Code Manager application.
Base Library	Checkbox	Allows you to select an existing Library Object in the Library Object hierarchy as a Base Library. When a Base Library is selected, the current Library Object inherits Substitutions from the Base Library, and the **Expression Builder** accesses all Custom Properties of the Base Library when used in the current Library Object. When "NONE" is selected, the current Library Object does not inherit Custom Properties.
Instantiation: Default Name	Text entry	Sets the default name for each instantiation of the Library Object. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Instantiation: Default Description	Text entry	Sets the default description for each instantiation of the Library Object. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

Name	Field Type	Description
Substitutions: Name	Text entry	Sets the default substitution for a text string in the Library Object name when the Library Object is instantiated. This string can be the complete name or a substring within the name. The substitution extends to the names of all elements within the Library Object. By default, the Library Object Manager application assigns the Predefined Parameter {ObjectName} as the Substitution for the entered string.
Substitutions: Description	Text entry	Sets the default substitution for a text string in the Library Object description when the Library Object is instantiated. This string can be the complete description or a substring within the description. The substitution extends to the descriptions of all elements within the Library Object. By default, the Library Object Manager application assigns the Predefined Parameter {ObjectDescription} as the Substitution for the entered string.

5. Enter the **Catalog Number** (name) and **Description** of the Library Object in the respective fields.

IMPORTANT The **Catalog Number** is the only required field and must be unique within the ACD file.

6. If the Library Object defines a Hardware component rather than a Software component, check the **Module** checkbox. Modules are identified as Hardware when the Library Object is added to an ACM Project.
7. Select a Base Library from the **Base Library** pull-down menu if you want the new Library Object to inherit substitutions from an existing Library Object. Select "NONE" if you do not want inheritance to take place.
8. Enter a default name and description in the **Instantiation** fields. These will be applied as the default name and description for each instantiation of the Library Object.

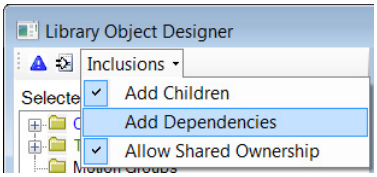
TIP To use an Expression to generate the values, rather than entering a text string, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

9. Enter initial substitutions in the **Name** and **Description** fields. These substitutions extend to all elements within the objects and begin the decoration process. Additional substitutions can be added once the Library Object has been created.
10. Click **OK** to save the new Library Object or **Cancel** to cancel the procedure.

Adding a Selected Object to an Existing Library Object by Dragging or Copying and Pasting

Follow these steps to add a selected Object to an existing Library Object by dragging or copying and pasting.

1. Click **Inclusions** to open the pull-down menu.



2. Select whether Children or Dependencies will be included in the Library Object, and whether the item will be exclusive to the Library Object or available for other Library Objects.
3. Select the item or items you want to add.

   TIP Hold down the SHIFT or CONTROL keys to select multiple items.

4. Do one of the following.
   a. Drag the selection on top of an existing Library Object in the **Library Objects** column.
   b. Right-click the selection to open the contextual menu. Select **Copy**. Right-click the **Library Object** folder to open the contextual menu. Select **Paste**.

The selection is added at the appropriate locations within the existing Library Objects structure. The new elements inherit all applicable substitutions from the Library Object.

IMPORTANT Default Substitutions are inherited automatically. Overrides to the default Substitutions, and all other decoration, must be applied manually to new elements of an existing Library Object.

Adding a Child Object or Dependency to an Existing Library Object

When an Object which has been added to a Library Object in the Library Designer plug-in is later modified in the Logix Designer application, the modifications must also be added to the Library Object in the Library Designer plug-in if you want the Library Object to include the new functionality. For example, if a valve Object has new rungs added to a contained Ladder Logic Diagram in the Logix Designer application, the new rungs must also be added to the valve Library Object in the Library Designer plug-in.

IMPORTANT Items in the **Selected Objects** column are color coded to indicate whether they are fully associated, partially associated, or not associated in the Library Designer plug-in.

Items which have been newly created in the Logix Designer application display as black.

Items which have newly added associations in the Logix Designer application which have not been replicated in the Library Designer plug-in display as blue.

Items which are fully associated display as green.

Follow these steps to add new Children or Dependencies to an existing Library Object.

1. Select the items you want to add in the **Selected Objects** column.

   TIP Hold down the SHIFT or CONTROL keys to select multiple items.

2. Do one of the following.
   a. Drag the selection on top of an existing Library Object in the **Library Objects** column.
   b. Right-click the selection to open the contextual menu. Select **Copy**. Right-click the **Library Object** folder to open the contextual menu. Select **Paste**.

The selection is added at the appropriate locations within the existing Library Objects structure. The new elements inherit all applicable Substitutions from the Library Object.

IMPORTANT Default Substitutions are inherited automatically. Overrides to the default Substitution, and all other decoration, must be applied manually to new elements of an existing Library Object.

Alternatively, a new Library Object can be created that includes the modified elements, since any Logix Object can be used to create multiple Library Objects. The two Library Objects will be saved with different Version Numbers when they are added to a Repository in the Library Object Manager application.

Adding a Module to a Library Object

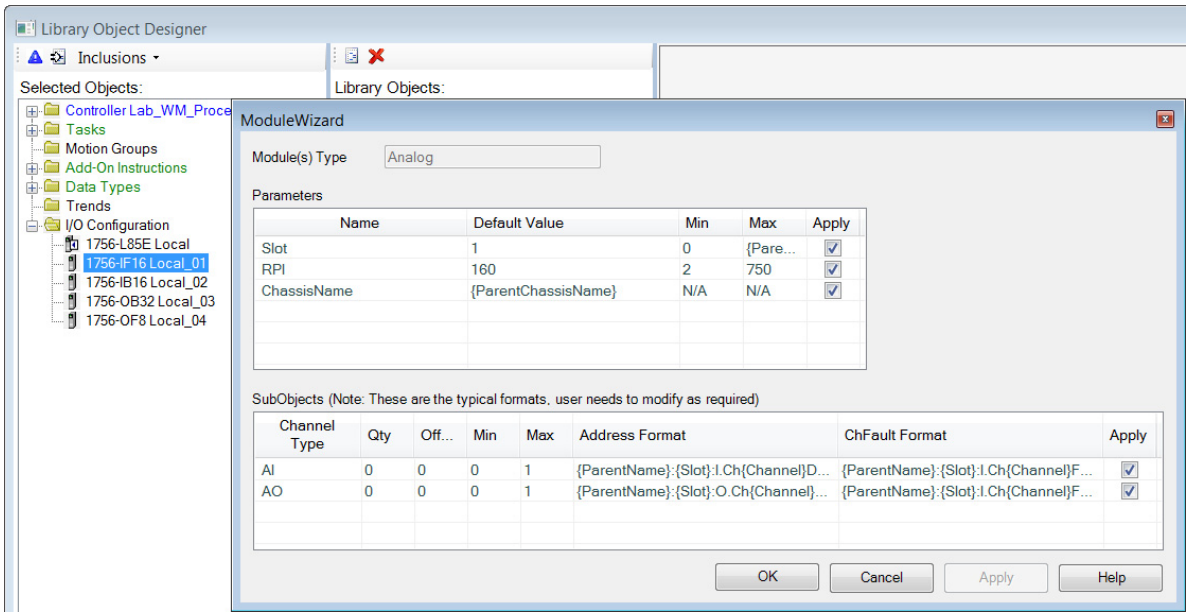
Module Objects are listed in the **Selected Object View Tree** under the **I/O Configuration** node. These Objects may be added to a Library Object using any of the three procedures. The Library Designer plug-in recognizes the selected Object as a Module and opens the **Module Wizard**.

The **Module Wizard** generates default Parameters and SubObjects for the Library Object based on the controller code for the Module. This decoration conforms to standards of the Studio 5000 Logix Designer design process. You can accept the defaults or edit them in the wizard.

The Module Wizard

Follow these steps to open the **Module Wizard**.

1. Select a Module Object in the **Selected Object Tree View**.
2. Add the Module Object to a Library Object using any of the three procedures described earlier. Refer to Adding a Selected Object to a Library Object on page 46. The Module is added to the Library Object and the **Module Wizard** opens.



The Library Designer plug-in automatically assigns the **Module Type**. This field cannot be edited.

The Library Designer plug-in generates an initial set of Parameters. The **Parameter Name** field cannot be edited. The **Default Value** field can be edited by double-clicking in the field. For Parameters with a data type of Integer, the **Min** and **Max** fields can also be edited by double-clicking in the field.

The **Apply** checkbox determines whether the Parameter will be included in the Library Object. All boxes are checked by default.

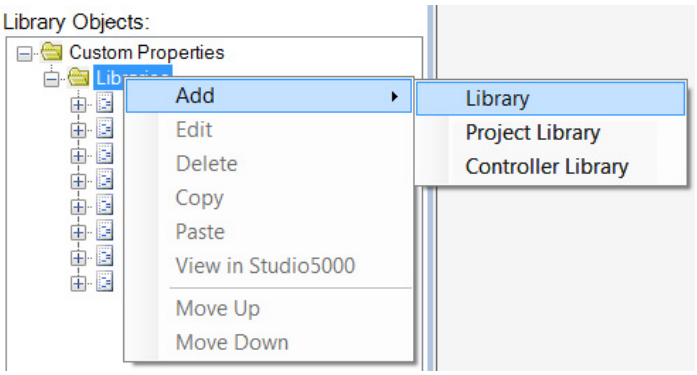
The Library Designer plug-in generates an initial set of SubObjects: for example, an analog input Module opens in the wizard with Analog Input (AI) and Analog Output (AO) SubObjects. The **Channel Type** field cannot be edited. Other fields can be edited; double-click in the field to open it for editing. Parameter names appear enclosed in angle brackets.

The **Apply** checkbox determines whether the SubObject will be included in the Library Object. All boxes are checked by default.

Creating a New Empty Library Object

Follow these steps to create a new empty Library Object.

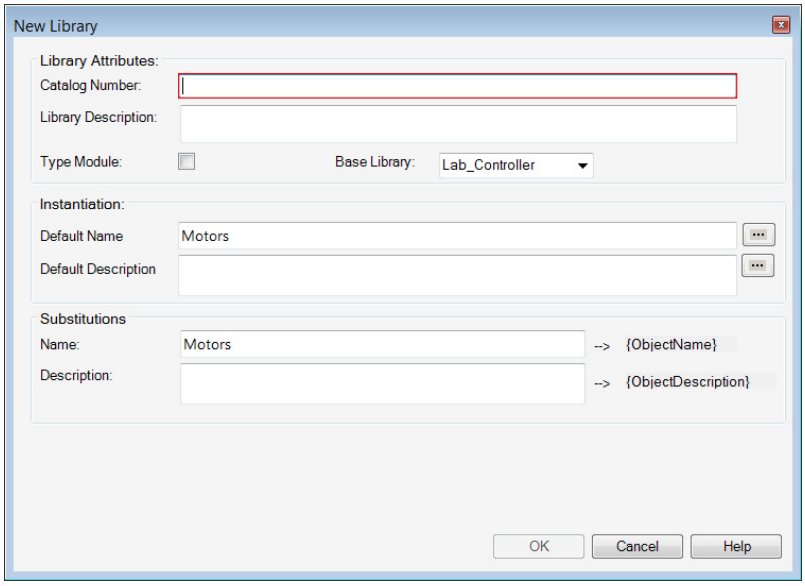
1. Do one of the following.
   a. Click **Create a New Library**.
   b. Right-click the **Libraries** folder in the **Library Objects** column to open the contextual menu. Select **Add**, then select **Library**.



TIP The **Libraries** contextual menu also allows you to create a new blank Project or Controller Library Object.

- Project and Controller Library Objects are placed higher in the **Library Object** hierarchy for the ACD file. Project Library Objects include default Parameters and Substitutions. Substitutions added to these Library Objects extend to other Library Objects.
- Only one Project and Controller Library Object can exist within an ACD file. If the ACD file already contains a Project or Controller Library Object, these commands will appear dimmed in the menu.

The **New Library** window opens.



The **New Library** window has the following fields.

Name	Field Type	Description
Catalog Number	Text entry	The Library Object name, which appears when the Library Object is registered in the Application Code Manager application.
Library Object Description	Text entry	The description of the Library Object.
Type Module	Checkbox	This checkbox identifies the Library Object as a Module. A Module registers as Hardware rather than Software in the Application Code Manager application.
Base Library	Checkbox	Allows you to select an existing Library Object in the Library Object hierarchy as a Base Library. When a Base Library is selected, the current Library Object inherits Substitutions from the Base Library, and the **Expression Builder** accesses all Custom Properties of the Base Library when used in the current Library Object. When "NONE" is selected, the current Library Object does not inherit Custom Properties.
Instantiation: Default Name	Text entry	Sets the default name for each instantiation of the Library Object. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Instantiation: Default Description	Text entry	Sets the default description for each instantiation of the Library Object. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

Name	Field Type	Description
Substitutions: Name	Text entry	Sets the default substitution for a text string in the Library Object name when the Library Object is instantiated. This string can be the complete name or a substring within the name. The substitution extends to the names of all elements within the Library Object. By default, the Library Object Manager application assigns the Predefined Parameter {ObjectName} as the Substitution for the entered string.
Substitutions: Description	Text entry	Sets the default substitution for a text string in the Library Object description when the Library Object is instantiated. This string can be the complete description or a substring within the description. The substitution extends to the descriptions of all elements within the Library Object. By default, the Library Object Manager application assigns the Predefined Parameter {ObjectDescription} as the Substitution for the entered string.

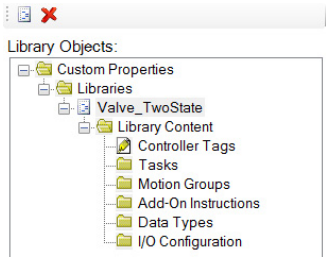
2. Enter the **Catalog Number** (name) and **Description** of the Library Object in the respective fields.

   IMPORTANT The **Catalog Number** is the only required field and must be unique within the ACD file.

3. If the Library Object defines a Hardware component rather than a Software component, check the **Module** checkbox. Modules are identified as Hardware when the Library Object is added to an ACM Project.
4. Select a Base Library from the **Base Library** pull-down menu if you want the new Library Object to inherit substitutions from an existing Library Object. Select "NONE" if you do not want inheritance to take place.
5. Enter a default name and description in the **Instantiation** fields. These will be applied as the default name and description for each instantiation of the Library Object.

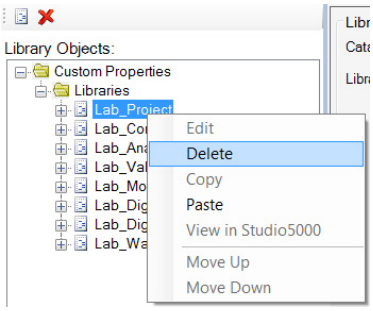
   TIP To use an Expression to generate the values, rather than entering a text string, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

6. Enter initial substitutions in the **Name** and **Description** fields. These substitutions extend to all elements within the objects and begin the decoration process. Additional substitutions can be added once the Library Object has been created.
7. Click **OK** to save the new Library Object or **Cancel** to cancel the procedure. The new blank Library Object is created.



Library Object Contextual Menu Commands

Right-clicking any item in the **Library Objects** menu brings up the **Library Object** contextual menu. Different commands are active based on where the item is located in the **Library Object** structure.



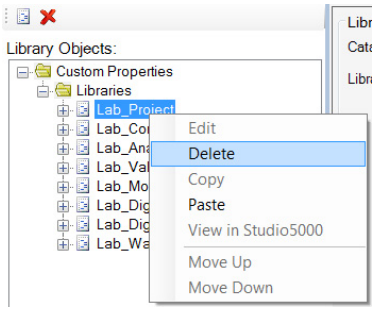
The **Library Object** contextual menu has the following commands.

Edit	Not applicable in this context.
Delete	Deletes the selected item.
Copy	Not applicable in this context.
Paste	Works with the Copy command in the Selected Objects column. Pastes the copied item(s) from the Selected Objects column into the selected Library Object.
View in Studio 5000	Highlights the selected item in the Studio 5000 Logix Designer tree view.
Move Up	Not applicable in this context.
Move Down	Not applicable in this context.

Deleting a Library Object

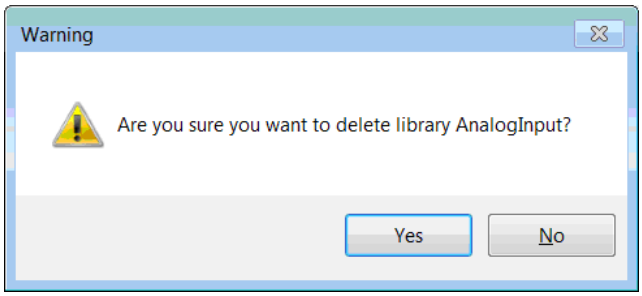
The **Delete** command can be applied to any item or items in the **Library Objects** column. Follow these steps to use the **Delete** command.

1. Select the items you want to delete.
2. Do one of the following.
   a. Right-click one of the selected items. The **Library Object** contextual menu opens. Select **Delete**.



   b. Click **Delete** in the **Library Object Button Bar**.

   The **Warning** window displays.



3. Select **Yes** to delete the selected items, or **No** to cancel the deletion.

The Library Designer Plug-in: Decorating Library Objects

Chapter Objectives

This chapter provides information on the following topics:

The Decorator Panel

The **Decorator Panel** becomes active when an element within a Library Object that accepts decoration (Custom Properties) is selected. The **Decorator Panel** displays the fields and functions available to add, modify, or delete decoration for the selected item. The display changes based on the decoration available for the selected element.

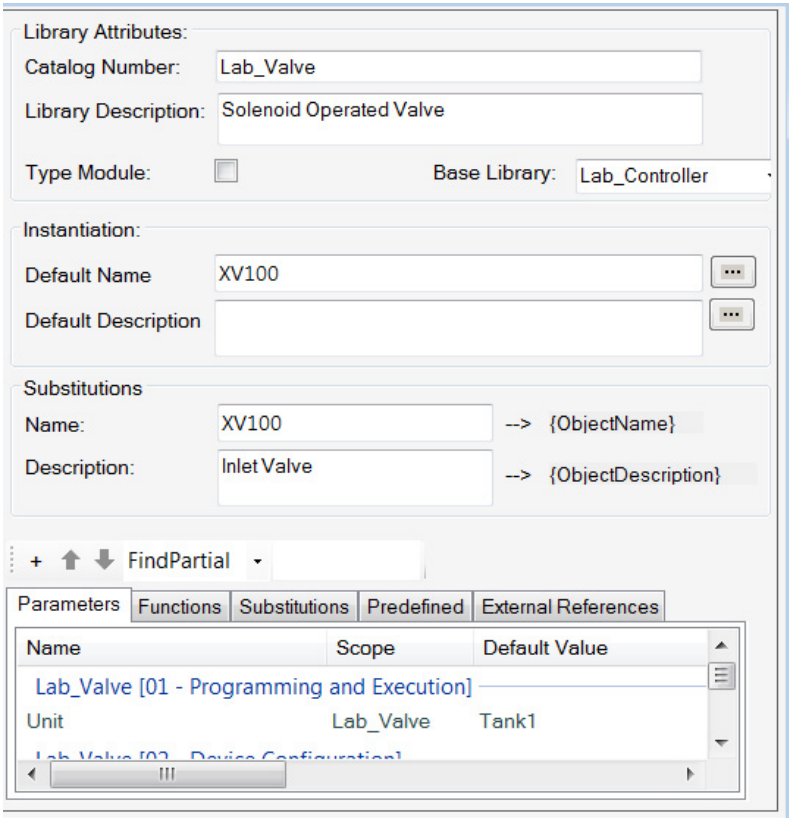
Fields that can be edited display with white backgrounds. Fields that are locked for editing appear dimmed. Fields that can accept calculated values show the **Ellipsis** (...) button to the right.

The **Decorator Panel** becomes inactive when organizational folders in a Library Object, or items in the **Selected Objects** column, are selected.

Adding Decoration to a Library Object

When a Library Object is selected, the **Decorator Panel** displays the fields from the **Add Library Object** window at the top, as well as five decorative element (Custom Property) tabs at the bottom:

- Parameters
- Functions
- Substitutions
- Predefined Parameters
- External References



The Decorator Panel Fields

When a Library Object is selected, the top half of the **Decorator Panel** has the following fields.

Name	Field Type	Description
Catalog Number	Text entry	The Library Object name, which appears when the Library Object is registered in the Application Code Manager application.
Library Description	Text entry	The description of the Library Object.
Type Module	Checkbox	This checkbox identifies the Library Object as a Module. A Module registers as Hardware rather than Software in the Application Code Manager application.
Base Library	Pull-down menu	Lets you select an existing Library Object in the Library Object hierarchy as a Base Library. When a Base Library is selected, the current Library Object inherits Substitutions from the Base Library, and the Expression Builder accesses all Custom Properties of the Base Library when used in the current Library Object. When "NONE" is selected, the current Library Object does not inherit Custom Properties.
Instantiation: Default Name	Text entry	Sets the default name for each instantiation of the Library Object. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Instantiation: Default Description	Text entry	Sets the default description for each instantiation of the Library Object. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Substitutions: Name	Text entry	Sets the default substitution for a text string in the Library Object name when the Library Object is instantiated. This string can be the complete name or a substring within the name. The substitution extends to the names of all elements within the Library Object. The Library Object Manager application assigns the Predefined Parameter {ObjectName} as the Substitution for the entered string.
Substitutions: Description	Text entry	Sets the default substitution for a text string in the Library Object description when the Library Object is instantiated. This string can be the complete description or a substring within the description. The substitution extends to the descriptions of all elements within the Library Object. The Library Object Manager application assigns the Predefined Parameter {ObjectDescription} as the Substitution for the entered string.

The values entered when the Library Object was created display by default. They are all available for editing.

The Decorative Elements Tabs

Decoration (Custom Properties) can only be added at the Library Object level.

Decoration added to a Library Object extends to all elements contained by the Library Object. Substitutions extend automatically unless they are specifically overridden. Parameters and Functions are available to Expressions created in the Expression Builder at all levels of the Library Object.

Substitutions added to Project or Controller Library Objects (Base Libraries) extend automatically to all elements contained within these Library Objects and to all Library Items that are lower in the hierarchy. Parameters and Functions added to Project or Controller Library Objects are available to Expressions created in the **Expression Builder** at all levels of these Objects and to all Library Objects that are lower in the hierarchy.

Decoration inherited from a Library Object or Base Library can be overridden at the element level.

Predefined Parameters are available to the **Expression Builder** at all levels of all Library Objects. They are a feature of the Library Designer plug-in and cannot be created, modified, or deleted by the user.

Parameters

A Parameter is an argument that is exposed for external access and that controls how the Library Object is instantiated.

Parameters have a simple data type: Boolean, string, integer, or real.

Parameters are set and modified by direct user input (immediate), calculation results, or references to other Parameters.

Parameters added as a decorative element are only accessible through the Application Code Manager application and are not accessible once the completed Project is exported to code.

Parameters created in the Library Designer plug-in have these functions:

- Storing information that is pertinent to the specific instance of the Library Object, but that is not functional: for example, the customer contact information for a Project
- Differentiating each instance of a Library Object in a Project: for example, the slot location of Module Object
- Configuring each instance of a Library Object in a Project: for example, to set whether a specific instance of a valve Object has Permissives or Interlocks
- Populating a Tag through user input or a specific external reference

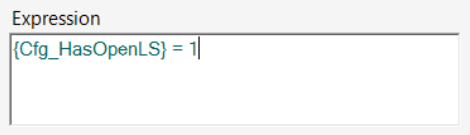
Parameters allow a single instance of base controller code to have many variations and to be used in a variety of different applications.

Parameters are instantiated once. A Parameter must be unique within a Library Object. A Parameter can be copied to other Library Objects and to Library Objects of different scope.

Parameters appear in fields, Functions, and Expressions in the Library Designer plug-in as tokens with the following format.

{ParameterName}

The Expression shown here includes the token for the Parameter Cfg_HasOpenLS.



Parameter names must begin with an alphabetic character and can contain only alphanumeric characters and underscores.

Parameters can be collected together into a SubObject. A SubObject is a grouped set of Parameters that can be instantiated multiple times. Examples include the channels of an analog input or the contact information for a Project team member. SubObjects can be auto-generated during instantiation or added manually by the user when the Library Object is brought into an ACM Project.

The Parameters Tab

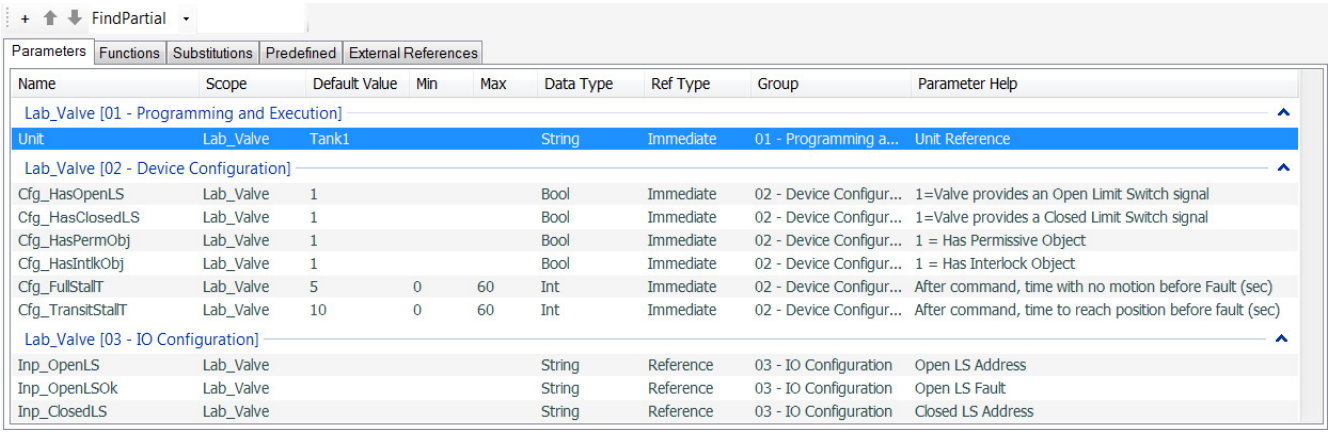
Parameters are listed alphabetically by default. Parameters can be grouped to make organization and access more intuitive.

Group names display in blue. Group names are displayed in this format.

Library Object Name [Group Name]

The Parameters in the valve Library Object shown here have been divided into three groups:

- Lab_Valve [01 - Programming and Execution]
- Lab_Valve [02 - Device Configuration]
- Lab_Valve [03 - IO Configuration]



Name	Scope	Default Value	Min	Max	Data Type	Ref Type	Group	Parameter Help
Lab_Valve [01 - Programming and Execution]								
Unit	Lab_Valve	Tank1			String	Immediate	01 - Programming a...	Unit Reference
Lab_Valve [02 - Device Configuration]								
Cfg_HasOpenLS	Lab_Valve	1			Bool	Immediate	02 - Device Configur...	1=Valve provides an Open Limit Switch signal
Cfg_HasClosedLS	Lab_Valve	1			Bool	Immediate	02 - Device Configur...	1=Valve provides a Closed Limit Switch signal
Cfg_HasPermObj	Lab_Valve	1			Bool	Immediate	02 - Device Configur...	1 = Has Permissive Object
Cfg_HasIntlkObj	Lab_Valve	1			Bool	Immediate	02 - Device Configur...	1 = Has Interlock Object
Cfg_FullStallT	Lab_Valve	5	0	60	Int	Immediate	02 - Device Configur...	After command, time with no motion before Fault (sec)
Cfg_TransitStallT	Lab_Valve	10	0	60	Int	Immediate	02 - Device Configur...	After command, time to reach position before fault (sec)
Lab_Valve [03 - IO Configuration]								
Inp_OpenLS	Lab_Valve				String	Reference	03 - IO Configuration	Open LS Address
Inp_OpenLSOk	Lab_Valve				String	Reference	03 - IO Configuration	Open LS Fault
Inp_ClosedLS	Lab_Valve				String	Reference	03 - IO Configuration	Closed LS Address

Groups can be collapsed and expanded using the arrow buttons on the right, or by double-clicking the group name. Parameters are displayed alphabetically within their groups, although the display order can be changed.

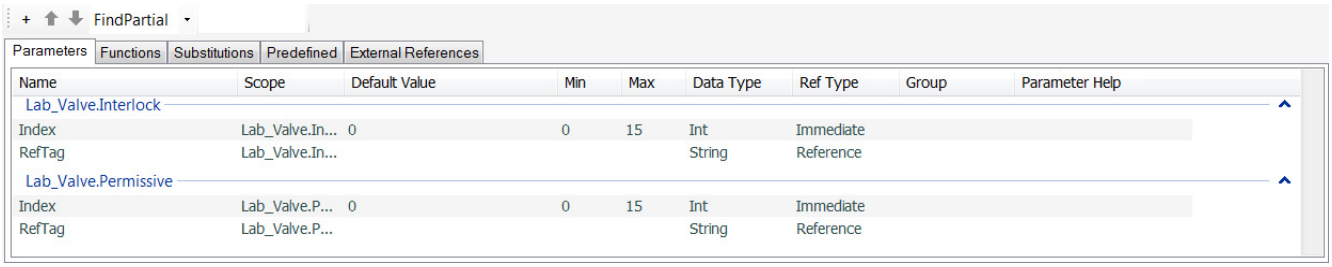
When a new Library Object is added, an initial group is created in the **Parameters Tab**. The group name matches the Library Object name. Additional groups can be added as Parameters are added to the Library Object. Refer to Adding a New Parameter on page 70.

SubObjects appear in the Parameters Tab as a type of group. SubObject names display in blue. SubObject names are displayed in this format.

Library Object Name.SubObject Type

The Parameters in the valve Library Object shown here are components of two SubObjects:

- Lab_Valve.Interlock
- Lab_Valve.Permissive



Changing the Columns Displayed in the Parameters Tab

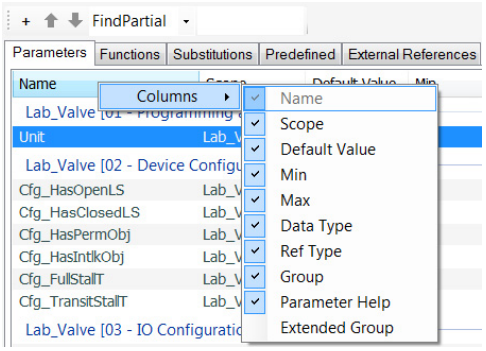
The **Parameters Tab** can display the following columns:

- Name
- Scope
- Default Value
- Min
- Max
- Data Type
- Ref Type
- Group
- Parameter Help
- Extended Group

Refer to Adding a New Parameter on page 70 for a full description of these fields.

Follow these steps to change the columns displayed.

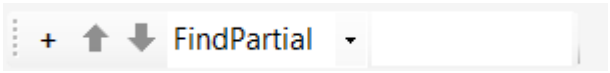
1. Right-click the column heading. The contextual menu appears.
2. Select **Columns** to display the submenu listing all columns.
3. Mouse over an inactive column to add it to the display. Mouse over an active column to remove it from the display.



TIP Columns can be resized horizontally by mousing over the right side of the column until the pointer changes to a double arrow, then by clicking and dragging.

The Parameters Tab Button Bar

The **Parameters Tab Button Bar** is shown below.



The following table describes each **Parameters Tab Button Bar** command.

	The **Add New** button opens the Add New Parameter window.
	The **Move Up/Move Down** buttons change the position of a selected Parameter item in the tab listing. Parameters are listed in alphabetical order by default. Parameters may be moved up or down within their group but cannot be moved between groups using these buttons.
	The **Find** pull-down menu initiates a search for Parameters that match a text string you enter in the field.

Using the Find Feature

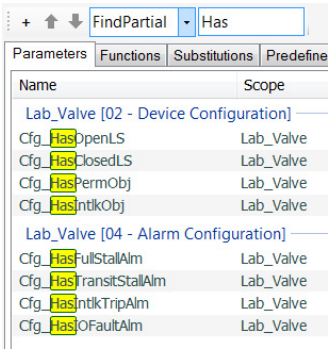
The **Find** feature limits the display in the **Parameters Tab** to Parameters that match the text string entered in the field. All columns currently being displayed are searched.

The following table describes the two options in the **Find** pull-down menu.

FindPartial	Searches for the text string in any part of an entry.
FindPrefix	Searches for the text string at the beginning of an entry.

Follow these steps to limit the display based on a text string.

1. Select the Search option in the **Find** pull-down menu.
2. Type the text string to search for in the entry field to the right.



The **Parameters Tab** display reacts dynamically to the text string entered, returning a shorter list of matching Parameters as the text string grows.

TIP You must delete the text in the entry field to return the display to all Parameters.

Adding a New Group to the Parameters Tab

All groups other than the default group must contain at least one Parameter. Parameter groups are added, modified, and deleted through the **Group** field in the **Add new Parameter** and **Edit Parameter** windows. Refer to Adding a New Parameter on page 70 and Editing a Parameter on page 75.

Follow these steps to add a new group.

1. Add a new Parameter, or edit an existing Parameter.
2. Enter a new name in the **Group** field.
3. Click **OK**. A new group is created, and the Parameter is included in the new group.

Deleting a Group from the Parameters Tab

To delete a group from the **Parameters Tab**, edit all of the Parameters in the group and assign them to other groups.

TIP

- You must type the group name exactly as it appears in the **Parameter Tab**. Otherwise, you will create a new group and assign the Parameter to it.
- The default group cannot be deleted.

Renaming a Group

To rename a group, you must first create a new group with a new name, then reassign all the grouped Parameters to the new group. Edit one of the Parameters in the group and assign it to a group with a new name. Then edit the other Parameters in the group and assign them to the new group.

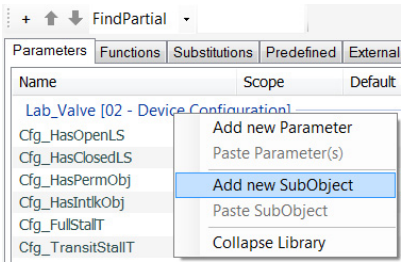
TIP

- You must type the new group name exactly as it appears in the **Parameter Tab**. Otherwise, you will create another new group and assign the Parameter to it.
- The default group can be renamed. When the first Parameter is added to the Library Object, any text entered in the **Group** field will be added to the default group name.

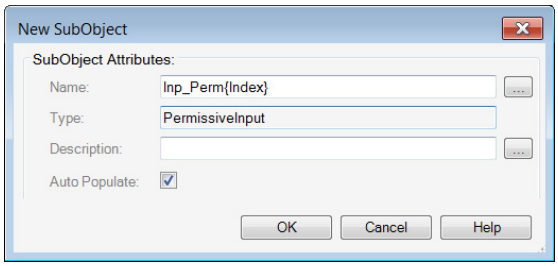
Adding a SubObject to the Parameters Tab

Follow these steps to add a SubObject to the **Parameters** tab.

1. Right-click any group name to open the contextual menu. Select **Add new SubObject**.



   The **New SubObject** window opens.



The following table describes the fields in the **New SubObject** window.

Name	Field Type	Description
Name	Text entry	The name that will be applied to the SubObject when it is added to an ACM Project. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Type	Text entry	The identity for the SubObject group in the **Parameters Tab**. This is a required field. The name must be unique for the Library Object.
Description	Text entry	A description of the SubObject that appears at the bottom of the ACM window when the SubObject is active. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Auto Populate	Checkbox	When checked, automatically creates multiple instances of the SubObject during instantiation. The following steps must be followed for Auto Populate to take place: There must be a Parameter contained in the SubObject with the **Data Type** field set to INT. This field generates sequential identity numbers for each instance of the SubObject. A value must be entered in the **Min** and **Max** fields for the Parameter. The **AutoIncrement** field must be set to TRUE.

2. Enter the values for the new SubObject.
3. Click **OK** to add the new SubObject or **Cancel** to cancel.

Moving a Parameter within a Group

Follow these steps to move a Parameter within a group.

1. Select the Parameter.
2. Do one of the following.
   a. Click **Move Up** or **Move Down**.
   b. Right-click the Parameter to display the contextual menu. Select **Move Up** or **Move Down**.

      TIP You cannot move a Parameter outside of its group.

Copying a Parameter

A Parameter can be copied to a different Library Object or can be used as a template for a new Parameter.

Follow these steps to copy a Parameter to a different Library Object.

1. Select the Parameter.

   TIP You can select multiple Parameters using the SHIFT or CONTROL keys.
2. Right-click the Parameter to open the contextual menu. Select **Copy**.
3. Open the Library Object where you wish to add the Parameter.
4. Right-click the name of the group in the **Parameters Tab** where you wish to add the new Library Object to open the contextual menu. Select **Paste Parameter**.

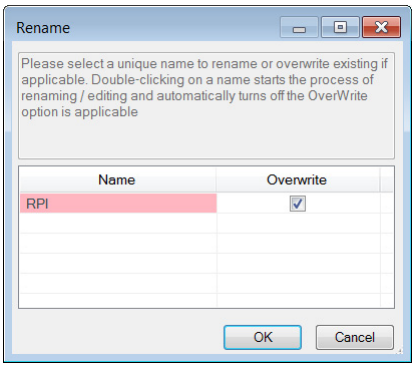
   The Parameter is added to Library Object.

   TIP The Parameter retains its original group name.

Follow these steps to use a Parameter as the template for a new Parameter in the same Library Object.

1. Select the Parameter.

   TIP You can select multiple Parameters using the SHIFT or CONTROL keys.
2. Right-click the Parameter to open the contextual menu. Select **Copy**.
3. Right-click the group name, or a different group name within the same Library Object, to open the contextual menu. Select **Paste Parameter(s)**. The **Rename** window opens.



4. Enter a new Parameter name to replace the highlighted name. The **Overwrite** checkbox is deselected.
5. Click **OK**. The new Parameter is created with the same settings as the original.

Moving a Parameter to a Different Group

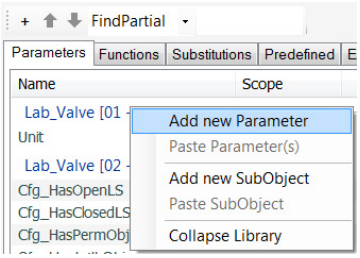
Follow these steps to move a Parameter to a different group.

1. Double-click the Parameter. The **Edit Parameter** window opens.
2. Enter the name of the group where you want to add the Parameter in the **Group** field.
3. Click **OK**.

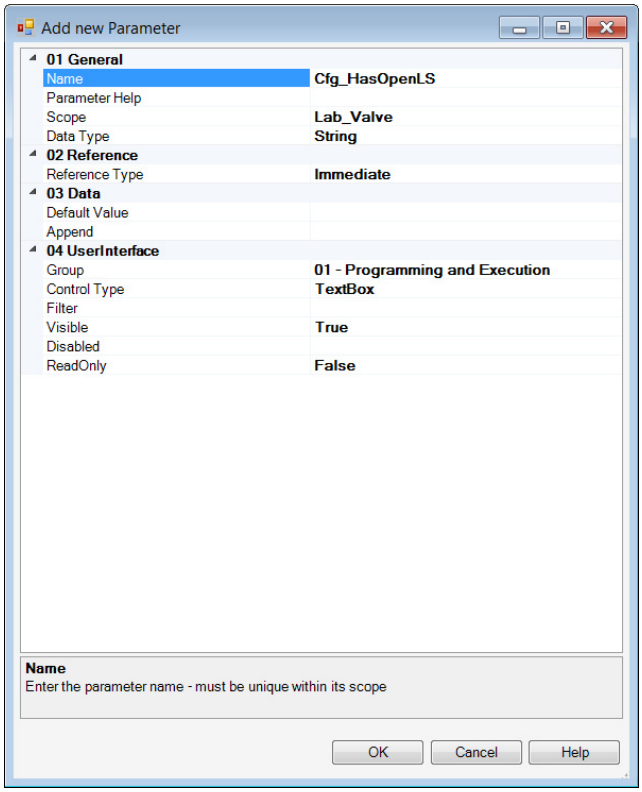
Adding a New Parameter

Follow these steps to add a Parameter.

1. Do one of the following.
   a. Click **Add New**.
   b. Right-click a group name to open the contextual menu. Select **Add new Parameter**.



The **Add new Parameter** window opens.



The entry fields in the window are functionally grouped. Some fields appear conditionally based on selections made in other fields.

The following table describes the fields in the **Add new Parameter** window.

Name	Field Type	Description
01 General		
Name	Text entry	The name of the Parameter. This is a required field.
Parameter Help	Text entry	Help text to explain the function of the Parameter and the result when specific values are entered. Appears at the bottom of the Parameter window when the Parameter is selected in the Application Code Manager application.
Scope	Pull-down menu	The Library Object that contains the Parameter. The list includes all Library Objects in the Library Object tree. Default value is the current Library Object. Parameters can be moved to a different Library Object by changing the selection here.
Data Type	Pull-down menu	The data type of the Parameter. Options are: • Boolean • String This option is only available if Reference or Calculated is selected in the **Reference Type** field. • Integer • Real

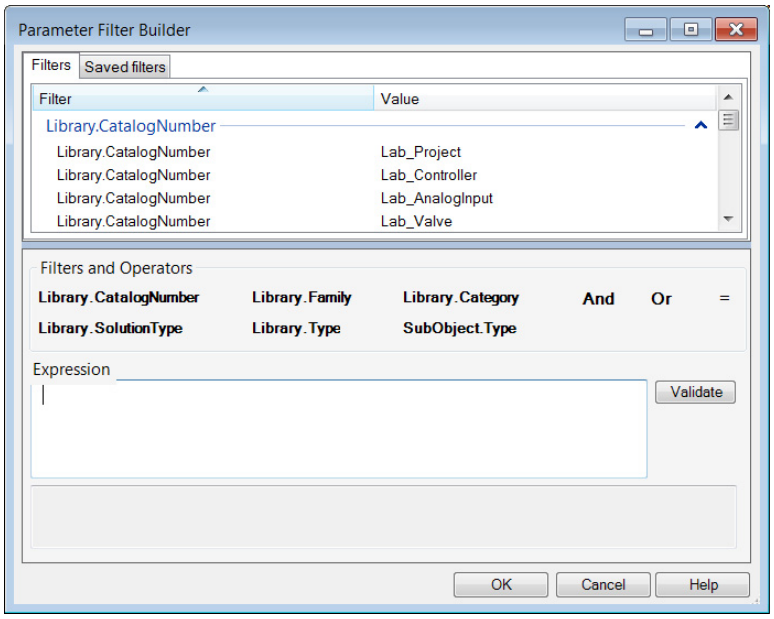
Name	Field Type	Description
02 Reference		
Reference Type	Pull-down menu	Determines whether the Parameter is accessible to user input as an entry field, is populated automatically by a calculation, or references other Parameters. The options are: • **Immediate**: Parameter is accessible to user input as an entry field. • **Calculated**: Parameter is not accessible to user input. Value is set to the name or description of the selected Parameter. The **Use Custom** field allows you to set a condition which, if true at instantiation, makes the Parameter accessible to user input. • **Reference**: Parameter references an External Reference. The Parameter and the External Reference function as a Consumed and a Produced Tag. User links the Parameter to the External Reference following instantiation. The **Filter** field can be used to set criteria for the External Reference that can be referenced. Refer to External References on page 98.
*These fields appear if Calculated is selected in the **Reference Type** field.*		
Reference Linked Parameter	Pull-down menu	Returns a list of Parameters within the Library Object where the **Reference Type** field has been set to "Reference". This is a required field.
Reference Field	Pull-down menu	Returns a list of fields. The options are the **Name** and **Description** field. This is a required field.
Use Custom	Text entry	Allows you to set a condition which, if true at instantiation, overrides the default and opens the field to user input. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
03 Data		
Default Value	Text entry	The default value for the Parameter. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Append	Text entry	A text string that will be added to the end of the value of the Parameter.
*These fields appear if Integer or Real is selected in the **Data Type** field.*		
Min	Text entry	The minimum value for the Parameter. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103. This is a required field.
Max	Text entry	The maximum value for the Parameter. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103. This is a required field.
Engineering Unit	Text entry	A unit of measure added to the value of the parameter to provide additional context.
Invalid	Text entry	An additional condition for validation of Parameter values. The condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
*This field appears if Integer is selected in the **Data Type** field.*		
Padding	TRUE-FALSE pull-down menu	When TRUE is selected, single-digit integer values will be padded with zeros.

Name	Field Type	Description
*This field appears if Integer is selected in the **Data Type** field and the Parameter is being added to a SubObject.*		
AutoIncrement	TRUE-FALSE pull-down menu	When TRUE is selected, the Parameter will be populated automatically and the value incremented every time a new SubObject is added to an ACM Project. For example, multiple channel SubObjects will be numbered sequentially as they are added.
04 UserInterface		
Group	Text entry	The group in the **Parameters Tab** where the Parameter will appear. If the value entered matches an existing group name, the Parameter will appear in this group. If the value entered does not match an existing group name, a new group will be created.
Filter	Text entry	When Reference has been selected as the **Reference Type** for the new Parameter, this field allows you to create a filter expression to limit which External References the Parameter can reference. For example, an input Parameter for a valve can be limited to an input channel that is a SubObject of a Module. The filter expression can be entered manually or generated by the **Filter Builder**. To create a filter expression, click **Ellipsis** to the right of the field to open the **Filter Builder** window.
Visible	Text entry	Allows you to create a condition to control whether the user sees the Parameter when the Library Object is added to an ACM Project. The condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Disabled	Text entry	Allows you to create a condition to disable the Parameter during instantiation. The condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103. This field only affects Parameters which are included in a SubObject.
Read Only	TRUE-FALSE pull-down menu	Determines whether the user will be able to enter values for the Parameter in the ACM application, or only read values that have been generated.
*This field appears if Immediate is selected in the **Reference Type** field and String, Integer, or Real is selected in the **Data Type** field.*		
Control Type	Pull-down menu	Determines whether the user will be presented with a text entry field or a pull-down menu to enter values into the Parameter.
*This field appears if DropDownList is selected in the **Control Type** field.*		
Control Values	Text entry	Allows you to populate the pull-down menu the user can select. Options are entered as a comma-separated string. This is a required field when it appears.

2. Enter the values for the new Parameter.
3. Click **OK** to add the new Parameter or **Cancel** to cancel.

The Parameter Filter Builder

The **Filter** field can be used to limit the External References available to a Parameter where the **Reference Type** is set to Reference. The **Parameter Filter Builder** opens when you click **Ellipsis** to the right of the field.



From top to bottom, the **Parameter Filter Builder** is divided into four functional areas.

Name	Description
Filters/Saved Filters Tabs	The **Filters** tab lists Objects and elements within the current hierarchy of Library Objects, as well as their current values. They are grouped, in descending order, by the four classification levels applied when the Library Object is saved in the Library Object Manager application: • Catalog Number • Category • Family • Library Type The **Saved Filters** tab displays filters which were previously created for the current ACD file.
Filters and Operators	The most commonly-used elements are listed here for quick access, as well as the logical AND, logical OR, and equals (=) functions.
Expression	The parameter filter appears here as elements are added to it. There is also a button to validate the filter. The validation bar at the bottom displays a color-coded response when the filter is validated.
Button Bar	The **OK**, **Cancel**, and **Help** buttons for the **Parameter Filter Builder** window.

1. To add an Object to a filter expression, double-click its listing. The Object is added in this format.

   Library.[Classification Level] = '[Object Name]'

2. To add a logical operator to the expression, do one of the following.
   a. Click the operator listing once.
   b. Enter text manually.

3. Click **Validate** to validate the filter. The filter is validated for internal syntax and data type. The validation bar displays green for a passed validation and red, with an error message, for a failed validation.
4. Click **OK** to accept the filter expression or **Cancel** to cancel.

Editing a Parameter

Follow these steps to edit a Parameter.

1. Do one of the following.
   a. Double-click the Parameter.
   b. Right-click the Parameter to open the contextual menu. Select **Edit**.
2. The **Edit Parameter** window opens.

TIP Refer to Adding a New Parameter on page 70 for a list of the fields in the **Edit Parameter** window. The two windows display the same fields.

Listing a Parameter's References

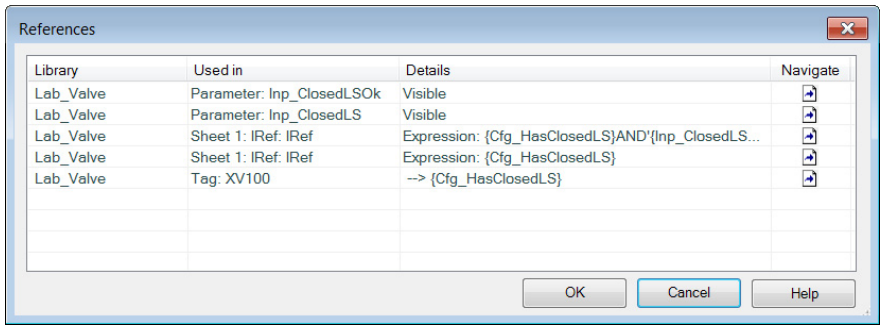
Once it has been added, a Parameter may be referenced multiple times within a Library Object. Parameters added to a Project or Controller Library Object may be referenced from within multiple Library Objects.

These are examples of ways a Parameter can be referenced:

- As a part of a field value for other Parameters or SubObject Parameters
- As part of an Expression
- As part of a Substitution
- As part of a Function

The **References** window lists all references to a Parameter and gives one-click navigation to the referencing entities.

To open the **References** window for a Parameter, right-click the Parameter to open the contextual menu. Select **Show References**. The **References** window opens.



The following table describes the fields in the **References** window.

Name	Description
Library	The Library Object for the element that references the Parameter.
Used in	The element that references the Parameter. The value is displayed in this format: *Element Type:SubObject Name*
Details	The specific reference point within the element. Examples: a field in the **Edit Parameter** window, a conditional inclusion, or the **Value Expression** for a Controller or Local Tag.
Navigate	Jump button that opens the **Decorator Panel** for the element where the reference is located.

Follow these steps to view a Parameter reference.

1. Click **Navigate** for the reference listing. The **Decorator Panel** opens for that element.
2. Click **OK** to close the **References** window.

   TIP You must close the **References** window before you can access the fields in the **Decorator Panel**.

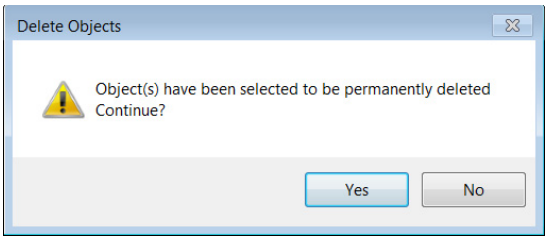
Deleting a Parameter

Follow these steps to delete a Parameter.

1. Right-click the Parameter. Select **Delete**.

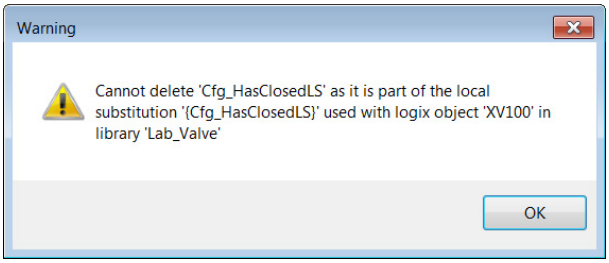
   TIP Use the **Show References** command to list references to the Parameter before using the **Delete** command.

   The **Delete Objects** window opens.



2. To finish the deletion, click **Yes**. To cancel the deletion, click **No**.

   TIP You will not be able to delete the Parameter if it is referenced. A warning displays:



   You will need to remove all references before the Library Designer plug-in will allow the Parameter to be deleted.

Functions

A Function is an argument that is not exposed to external access. The value of a Function is generated by user-defined logic created in the Library Designer plug-in and by conditions that apply during instantiation.

A Function can be either Conditional or Calculated:

- A Conditional Function returns one of multiple possible results generated by Expressions and based on IF/ELSE/ELSEIF logic. A Conditional Function allows for multiple branches and nesting.
- A Calculated Function generates a single value, based on a single Expression.

Both types of Function are created using the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

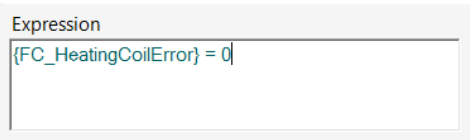
Functions can be copied between Library Objects and between Library Objects of different scope, as long as the decorative elements used in the Expressions are common to both Library Objects.

Functions can be saved within the Library Object Manager application. Saved Functions are available to all Projects opened in the Library Designer plug-in.

Functions appear in fields, other Functions, and Expressions as tokens with the following format.

{FunctionName}

The Expression shown here includes the token for the Function FC_HeatingCoilError.

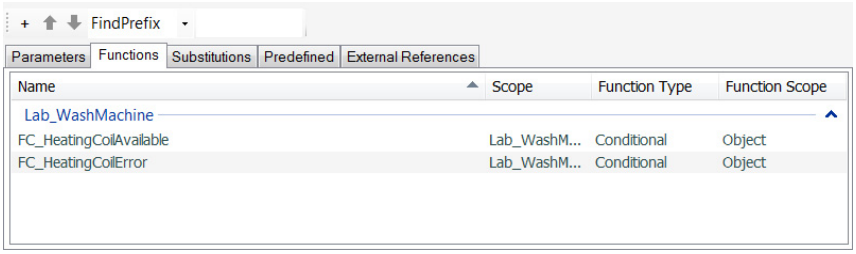


TIP It is considered a best practice to precede Function names with a prefix such as "FC_" or "Fn_" so that tokens are easily recognized as Functions when they are placed in an Expression.

Function names must begin with an alphabetic character and can contain only alphanumeric characters and underscores.

The Functions Tab

Functions are listed alphabetically under a single group heading named by the Library Object.



All of the columns in the **Functions Tab** are sortable. Follow these steps to sort the Functions by a column.

1. Mouse over the column heading to make it active. The heading displays a graduated blue fill.
2. Click once to activate the sort feature for the tab. The Functions are sorted in ascending order for the values in the column.
3. Click a second time to toggle the sort to descending order.
4. Click once in the **Name** column to revert to the default alphabetic listing.

Changing the Columns Displayed in the Functions Tab

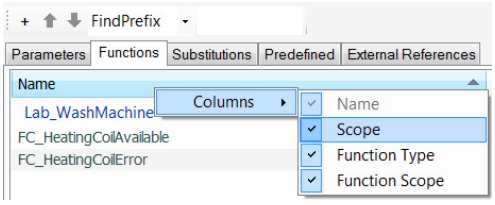
The **Functions Tab** can display the following columns:

- Name
- Scope
- Function Type
- Function Scope

Refer to Adding a New Function on page 82 for a full description of these fields.

Follow these steps to change the columns displayed.

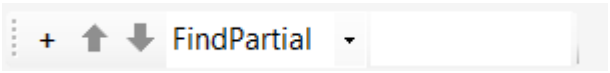
1. Right-click the column heading. The contextual menu appears.
2. Select **Columns** to display the submenu listing all columns.
3. Mouse over an inactive column to add it to the display. Mouse over an active column to remove it from the display.



TIP Columns can be resized horizontally by mousing over the right side of the column until the pointer changes to a double arrow, then clicking and dragging.

The Functions Tab Button Bar

The **Functions Tab Button Bar** is shown below.



The following table describes each **Functions Tab Button Bar** command.

+	The **Add New** button opens the **Functions Builder**.
	The **Move Up/Move Down** buttons are deactivated for this tab.
FindPartial	The **Find** pull-down menu initiates a search for Functions that match a text string you enter in the field.

Using the Find Feature

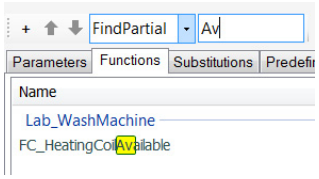
The **Find** feature limits the display in the **Functions Tab** to Functions that match the text string entered in the field. All columns currently being displayed are searched.

The following table describes the options in the **Find** pull-down menu.

FindPartial	Searches for the text string in any part of an entry.
FindPrefix	Searches for the text string at the beginning of an entry.

Follow these steps to limit the display based on a text string.

1. Select the Search option in the **Find** pull-down menu.
2. Type the text string to search for in the entry field to the right.



The **Functions Tab** display reacts dynamically to the text string entered, returning a shorter list of matching Functions as the text string grows.

TIP You must delete the text in the entry field to return the display to all Functions.

Copying a Function

A Function can be copied to a different Library Object or can be used as a template for a new Function.

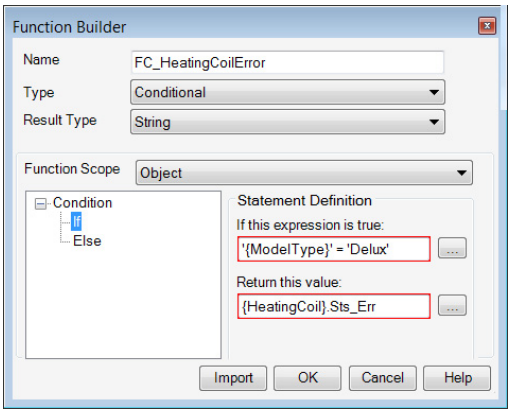
Follow these steps to copy a Function to a different Library Object.

1. Select the Function.

   TIP You can select multiple Functions using the SHIFT or CONTROL keys.

2. Right-click the Function to open the contextual menu. Select **Copy**.
3. Open the Library Object where you wish to add the Function.
4. Right-click anywhere in the **Functions Tab** for the new Library Object to open the contextual menu. Select **Paste Function(s)**. The Function is added to Library Object.

IMPORTANT If the Library Object does not contain all of the decorative elements referenced by the Function, the **Function Builder** window opens with any statements that contain missing elements outlined in red.



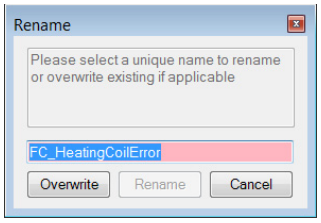
The Function will be pasted into the Library Object even if the missing elements are not resolved.

Follow these steps to use a Function as the template for a new Function in the same Library Object.

1. Select the Function.

   TIP You can select multiple Functions using the SHIFT or CONTROL keys.

2. Right-click the Function to open the contextual menu. Select **Copy**.
3. Right-click the group name, or a different group name within the same Library Object, to open the contextual menu. Select **Paste Function(s)**. The **Rename** window opens.

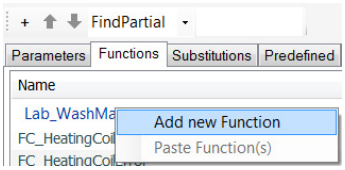


4. Enter a new Function name to replace the highlighted name. The **Overwrite** checkbox is deselected.
5. Click **OK**. The new Function is created with the same settings as the original.

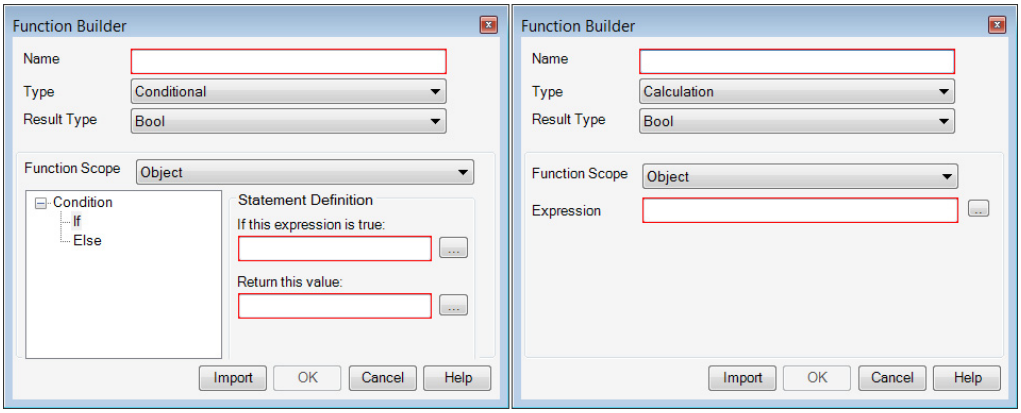
Adding a New Function

Follow these steps to add a new Function.

1. Do one of the following.
   a. Click **Add New**.
   b. Right-click the group name to open the contextual menu. Select **Add new Function**.



The **Function Builder** window opens. The window for a Function with the **Type** field set to Conditional is shown on the left, and a Function with the **Type** field set to Calculation is shown on the right.



The following table describes the fields and buttons in the **Function Builder** window.

Name	Field Type	Description
Name	Text entry	The name of the Function. This is a required field.
Type	Pull-down menu	Determines whether the Function generates a single value or uses IF/ELSE logic to generate one of multiple possible values: • **Conditional**: Function uses IF/ELSE logic to generate one of multiple possible values. • **Calculated**: Function generates a single value based on a single statement.
Result Type	Pull-down menu	The data type of the Function. Options are: • Boolean • String • Numeric
Function Scope	Pull-down menu	The Library Object that contains the Function. Default value is the current Library Object.
*This field appears if Calculated is selected in the **Type** field.*		
Expression	Pull-down menu	A single statement that determines the value generated by the function. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. This is a required field when Calculated has been selected in the **Type** field.

Name	Field Type	Description
*These fields appear if Conditional is selected in the **Type** field.*		
Statement Definition		
Condition	Menu	This field provides a visual representation of the Conditional Statement in menu form. **Click a menu item** to make its statement field active. The **Function Builder** window can display, at most, one **If this expression is true:** and one **Return this value:** field at a time. You must select each line in the Conditional Statement menu to access the statement fields for that line. Click the **Plus Icon** to the left of a menu item to expand the listing. This icon appears when there are nested statements within the item. Click the **Minus Icon** to the left of a menu item to collapse the listing. This icon appears when there are nested statements within the item. **Use the scroll bar** to access additional menu items if the Conditional Statement menu has grown too large to fit in the window.
If this expression is true:	Text entry	The condition being tested. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. This is a required field when Conditional has been selected in the **Type** field.
Return this value:	Text entry	The value used if the condition returns TRUE. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. This is a required field when Conditional has been selected in the **Type** field.
Else:	Text entry	The value used if the condition returns FALSE. The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. This is a required field when Conditional has been selected in the **Type** field.
These buttons appear at the bottom of the window for both Calculated and Conditional Functions.		
Import	Button	Opens the Saved Functions window, which gives access to all functions previously created in the current ACD file.
OK	Button	Saves the current Functions and inserts the Function token as the value of the current field.
Cancel	Button	Returns to the current field without saving the Function.
Help	Button	Opens the help screens.

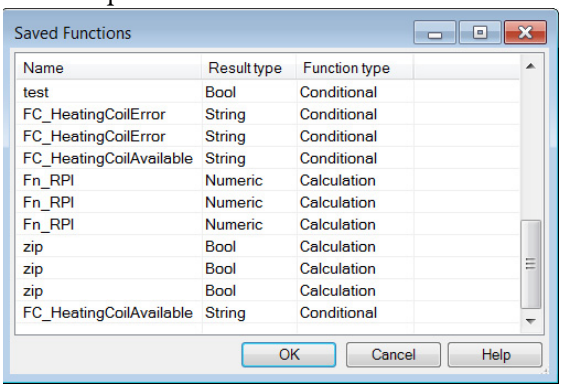
2. Enter the values for the new Function.
3. Click **OK** to add the new Function or **Cancel** to cancel.

Using a Previously Created Function

The **Import** button allows you to reuse a previously created Function, either to populate the current field or as a template to create a new Function.

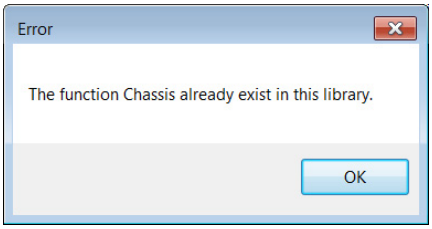
Follow these steps to use a previously created Function.

1. In the Function Builder window, click **Import**. The **Saved Functions** window opens.



2. The saved Functions window lists all Functions that were previously created in the current ACD File. Columns list the Function name, result type, and Function type. Select a saved Function and click **OK**.
3. The saved Function populates the Function Builder. Click **OK** to reuse the Function or edit the fields to create a new Function.

IMPORTANT Function names must be unique within a Library Object. If you are reusing a saved Function and the Function name matches the name of an existing Function in the current Library Object, a warning displays.

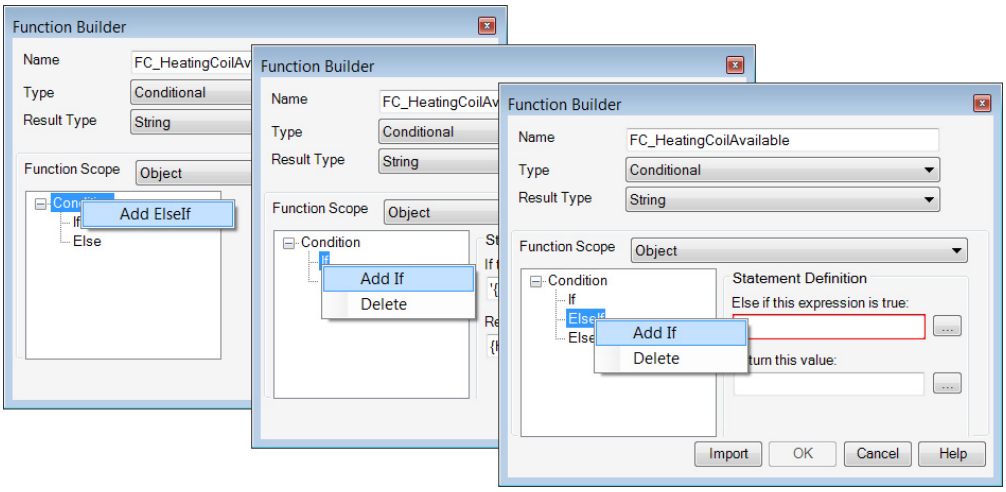


Click **OK**, rename the Function, then click **OK** in the **Function Builder**.

Adding Branches to a Conditional Statement

Follow these steps to add branches to a conditional statement.

1. Select an item in the Conditional Statement menu tree. Right-click to open the contextual menu.



2. Select the root **Condition** item to add an ELSEIF statement to the root level of the statement. The **Function Builder** adds an **Else if this expression is true:** and a **Return this value:** field.

   TIP Adding ELSEIF statements to the Conditional Statement causes it to function like a CASE statement.

3. Select an IF or an ELSEIF item to nest an IF statement within it. The **Function Builder** adds an **If this expression is true:**, a **Return this result:,** and an **Else:** field.

   TIP There is no limit to the number of branches or the number of nested levels you can add to a Conditional Statement.

Deleting Branches from a Conditional Statement

Follow these steps to delete branches from a conditional statement.

1. Select an item in the Conditional Statement menu tree. Right-click to open the contextual menu.
2. Select **Delete**.

   TIP You can delete ELSEIF and nested IF statements, but you cannot delete the root IF or ELSE statements.

Editing a Function

Follow these steps to edit a Function.

1. Do one of the following.
   a. Double-click the Function.
   b. Right-click the Function to open the contextual menu. Select **Edit**.

   The **Function Builder** window opens.
2. Edit the Function. Refer to Adding a New Function on page 82 for a list of the fields in the **Function Builder**.

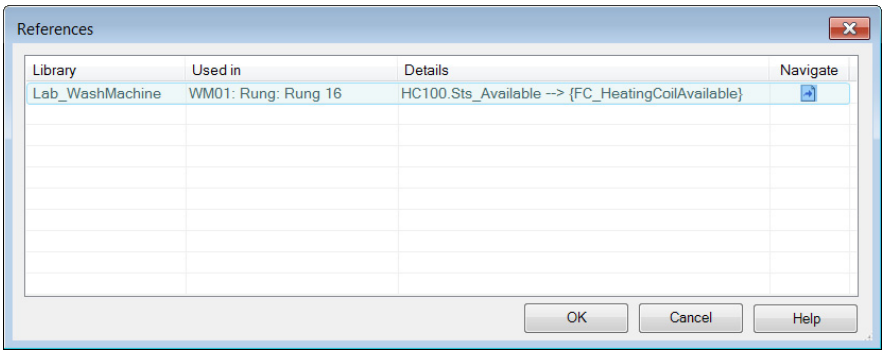
Listing a Function's References

Once it has been added, a Function may be referenced multiple times within a Library Object. Functions added to a Project or Controller Library Object may be referenced from within multiple Library Objects. Examples include the following:

- As a field value for a Parameter or Library Object element
- As part of an Expression
- As part of a Substitution
- As part of another Function

The **References** window lists all references to a Function and gives one-click navigation to the referencing entities.

To open the **References** window for a Function, right-click the Function to open the contextual menu. Select **Show References**. The **References** window opens.



The following table describes the fields in the **References** window.

Name	Description
Library	The Library Object for the element that references the Function.
Used in	The element that references the Function. The value is displayed in this format: SubObject Type:SubObject Name:
Details	The specific reference point within the element. Examples: a field in the **Edit Parameter** window, a conditional inclusion, the **Value Expression** for a Controller or Local Tag.
Navigate	Jump button that opens the **Decorator Panel** for the element where the reference is located.

Follow these steps to view a Function reference.

1. Click **Navigate** for the reference listing. The **Decorator Panel** opens for that element.
2. Click **OK** to close the **References** window.

   TIP You must close the **References** window before you can access the fields in the **Decorator Panel**.

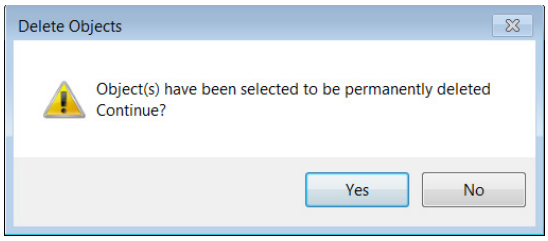
Deleting a Function

Follow these steps to delete a Function.

1. Right-click the Function. Select **Delete**.

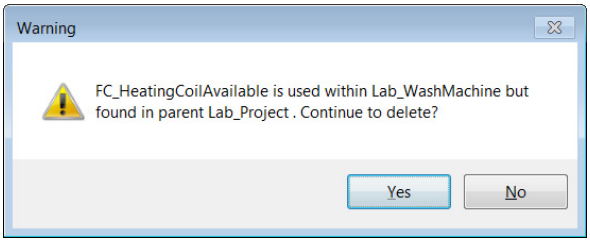
   TIP Use the **Show References** command to list references to the Function before using the **Delete** command.

   The **Delete Objects** window opens.



2. To finish the deletion, click **Yes**. To cancel the deletion, click **No**.

IMPORTANT The **Warning** window displays if the Function is referenced. You will not, however, be prevented from deleting the Function.



Substitutions

A Substitution is a user-defined rule which, during instantiation, replaces a text string in the name, description, instantiation location, or other attribute of a Library Object element with a Parameter value, calculation result, or referenced value. Substitutions can be set to search all text in the Library Object, or restricted to text in operands, which are the instructions in Routines.

IMPORTANT	Substitutions are applied globally based on a simple search-and-replace logic. Care should be taken in both the naming conventions and standards used when elements are created in the Studio 5000 Logix Designer® application, and in the text strings selected for substitution in the Library Object Manager application. Substitution which affects text strings in unexpected locations can make the Library Object function in unexpected ways or fail to validate.

Substitutions applied at one level of the Library Object hierarchy extend to all Objects at lower levels of the hierarchy, and to all elements that are contained within the Library Objects. For example, a substitution applied to a Project Library Object extends to the Controller Library Object and all Logix Object Library Objects in the same ACD file, as well as to all elements within all of these Library Objects.

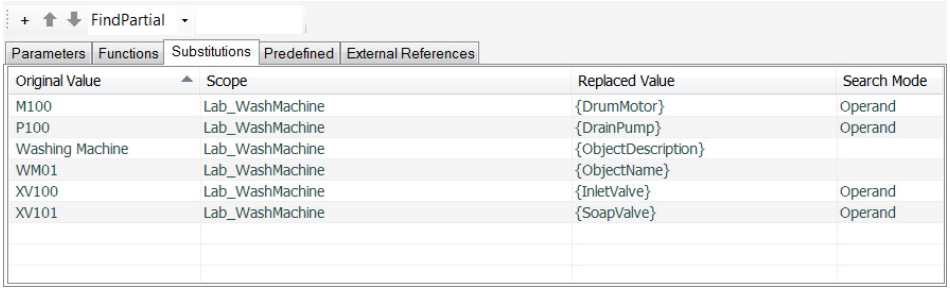
Substitutions applied to a Library Object extend to all elements within the Library Object. Substitutions applied at a higher level in the hierarchy take precedence over substitutions applied directly to the Library Object.

Substitutions that are inherited by an element from the containing Library Object, or from a Library Object higher in the Library Object hierarchy (Base Library), can be overridden at the element level using the **Substitution Builder**. Refer to The Substitution Builder on page 112.

Substitutions can be copied and pasted from one Library Object to another and can be copied and pasted between Library Objects of different scope.

The Substitutions Tab

Substitutions are listed alphabetically. They are not grouped.



All of the columns in the **Substitutions Tab** are sortable.

Follow these steps to sort the Substitutions by a column.

1. Mouse over the column heading to make it active. The heading displays a graduated blue fill.
2. Click once to activate the sort feature for the tab. The Substitutions are sorted in ascending order for the values in the column.
3. Click a second time to toggle the sort to descending order.
4. Click once in the **Name** column to revert to the default alphabetic listing.

Changing the Columns Displayed in the Substitutions Tab

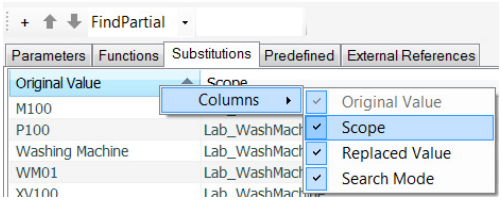
The **Substitutions Tab** can display the following columns:

- Original Value
- Scope
- Replacement Value
- Search Mode

Refer to Adding a New Substitution on page 92 for a full description of these fields.

Follow these steps to change the columns displayed.

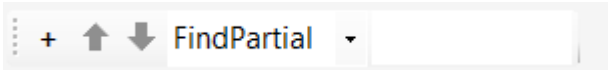
1. Right-click the column heading. The contextual menu appears.
2. Select **Columns** to display the submenu listing all columns.
3. Mouse over an inactive column to add it to the display. Mouse over an active column to remove it from the display.



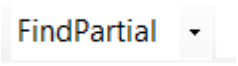
TIP Columns can be resized horizontally by mousing over the right side of the column until the pointer changes to a double arrow, then by clicking and dragging.

The Substitutions Tab Button Bar

The **Substitutions Tab Button Bar** is shown below.



The following table describes each **Substitutions Tab Button Bar** command.

	The **Add New** button opens the **Add New Substitution** window.
	The **Move Up/Move Down** buttons change the position of a selected Substitution item in the tab listing. Substitutions are listed in alphabetical order by default.
	The **Find** pull-down menu initiates a search for Substitutions that match a text string you enter in the field.

Changing a Substitution's Location in the Tab

Follow these steps to change a Substitution's location.

1. Select the Substitution.
2. Do one of the following.
   a. Click **Move Up** or **Move Down**.
   b. Right-click the Substitution to display the contextual menu. Select **Move Up** or **Move Down**.

      TIP To return a Substitution to its default alphabetic location, click the **Name** column to resort the **Substitutions Tab** alphabetically.

Using the Find Feature

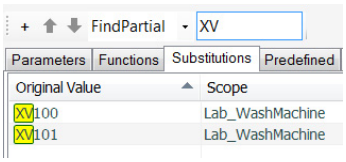
The **Find** feature limits the display in the **Substitutions Tab** to Substitutions that match the text string entered in the field. All columns currently being displayed are searched.

The following table describes the options in the **Find** pull-down menu.

FindPartial	Searches for the text string in any part of an entry.
FindPrefix	Searches for the text string at the beginning of an entry.

Follow these steps to limit the display based on a text string.

1. Select the Search option in the **Find** pull-down menu.
2. Type the text string to search for in the entry field to the right.



The **Substitutions Tab** display reacts dynamically to the text string entered, returning a shorter list of matching Substitutions as the text string grows.

TIP You must delete the text in the entry field to return the display to all Substitutions.

Copying a Substitution

A Substitution can be copied to a different Library Object or can be used as a template for a new Substitution.

Follow these steps to copy a Substitution to a different Library Object.

1. Select the Substitution.

   TIP You can select multiple Substitutions using the SHIFT or CONTROL keys.

2. Right-click the Substitution to open the contextual menu. Select **Copy**.
3. Open the Library Object where you wish to add the Substitution.
4. Right-click anywhere in the **Substitutions Tab** for the new Library Object to open the contextual menu. Select **Paste**. The Substitution is added to Library Object.

IMPORTANT The Substitution will only take effect in the new location if the text string to be replaced and all decorative elements used in the Substitution are contained in the Library Object.

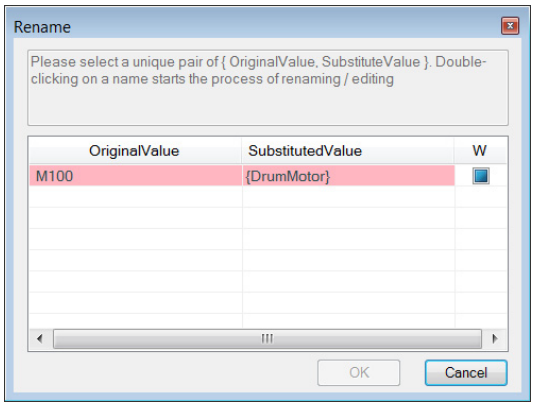
Follow these steps to use a Substitution as the template for a new Substitution in the same Library Object.

1. Select the Substitution.

   TIP You can select multiple Substitutions using the SHIFT or CONTROL keys.

2. Right-click the Substitution to open the contextual menu. Select **Copy**.

3. Right-click the group name, or a different group name within the same Library Object, to open the contextual menu. Select **Paste Substitution(s)**. The **Rename** window opens.

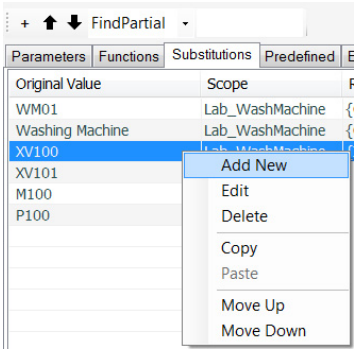


4. Enter a new Substitution name to replace the highlighted name. The **Overwrite** checkbox is deselected.
5. Click **OK**. The new Substitution is created with the same settings as the original.

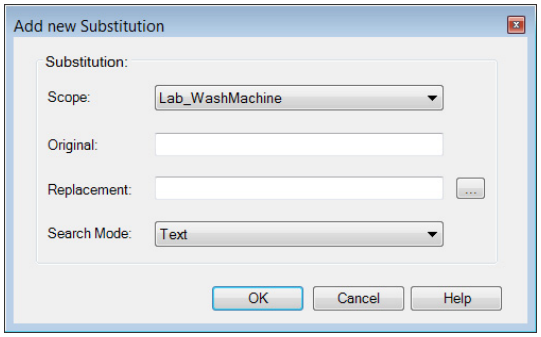
Adding a New Substitution

Follow these steps to add a new Substitution.

1. Do one of the following.
   a. Click **Add New**.
   b. Right-click anywhere in the Substitutions Tab to open the contextual menu. Select **Add New**.



The **Add new Substitution** window opens.



All fields are required. The following table describes the fields in the **Add new Substitution** window.

Name	Field Type	Description
Scope	Pull-down menu	The Library Object that will contain the Substitution. The default is the current Library Object. All Library Objects within the ACD file are available to select.
Original	Text entry	The text string to be replaced. The value must be entered manually. The text string may be as short as a single character. There is no maximum string limit.
Replacement	Text entry	The value used to replace the text string entered in **Original** field. The value can be entered manually or generated by an decorative element. To select a decorative element, click **Ellipsis** to the right of the field to open the **Member Selector**. Refer to The Member Selector on page 93.
Search Mode	Pull-down menu	Determines whether the Substitution search feature is searching for a text string or numeric value. **Text**: searches for a text string in all locations. **Operand**: limits the search to text strings within the name or description of an instruction that is part of a Routine.

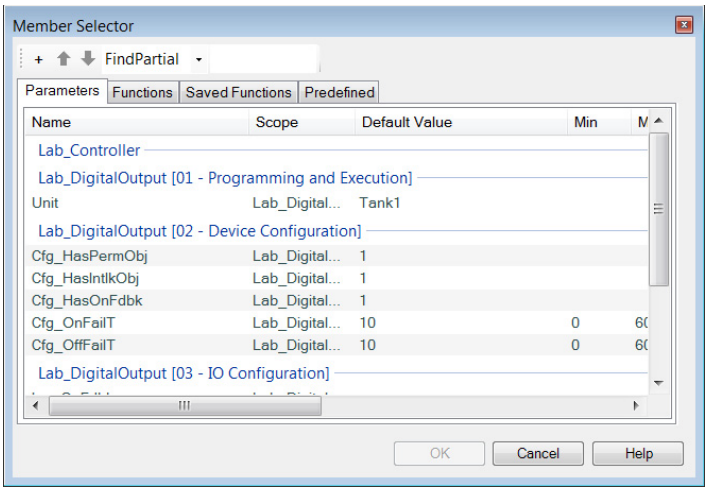
2. Enter the values for the new Substitution.
3. Click **OK** to add the new Substitution or **Cancel** to cancel.

The Member Selector

To open the **Member Selector** window, click **Ellipsis** to the right of the **Replacement** field in the **Add new Substitution** window. The **Member Selector** window opens.

The **Member Selector** window gives quick access to all decorative elements available as replacements. All Parameters and Functions added to the current Library Object, as well as Parameters and Functions added to Library Objects higher in the Library Object hierarchy, are displayed in the window. Saved Functions and Predefined Parameters are also displayed.

The decorative elements are organized in tabs, with the same features as the tabs in the **Decorator Panel**. Refer to The Parameters Tab on page 63, The Functions Tab on page 77, and The Predefined Tab on page 96.



IMPORTANT New Parameters and Functions can be added to the Project directly from the tabs in the **Member Selector**. Refer to Adding a New Parameter on page 70 and Adding a New Function on page 82.

To add a decorative element to the **Replacement** field, double-click the listing.

To add an additional decorative element, click **Ellipsis** to the right of the **Replacement** field to reopen the **Member Selector** window, locate the element, and double-click.

The **Replacement** field can also be edited manually. Strings, numeric characters, and tokens can all be used in the replacement string.

Editing a Substitution Directly in the Substitutions Tab

Follow these steps to edit a Substitution directly.

1. Double-click the **Original Value** or **Replaced Value** column for the Substitution. The field becomes active for editing.
2. Enter a new value manually.

Editing a Substitution in the Edit Substitutions Window

Follow these steps to edit a Substitution in the **Edit Substitution** window.

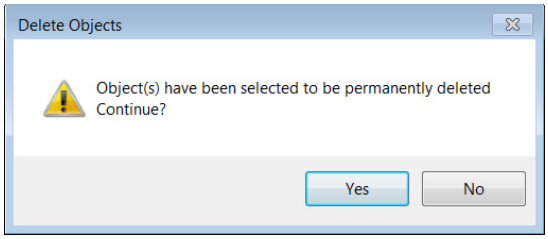
1. Do one of the following:
   a. Double-click the **Scope** or **Search Mode** column for the Substitution.
   b. Right-click the Substitution to open the contextual menu. Select **Edit**.

   The **Edit Substitution** window opens.
2. Edit the Substitution. Refer to Adding a New Substitution on page 92 for a list of the fields in the **Edit Substitution** window. They are the same as the fields in the **Add new Substitution** window.

Deleting a Substitution

1. Right-click the Substitution. Select **Delete**.

   The **Delete Objects** window opens.



2. To finish the deletion, click **Yes**. To cancel the deletion, click **No**.

IMPORTANT	The **Warning** window does not display for Substitutions.

Predefined Parameters

A Predefined Parameter is one of a set of Parameters that are automatically available to all Library Objects created in the Library Designer plug-in. They are defined and scoped by the program. They are the same for all Library Objects in the hierarchy, as well as for all elements of all Library Objects, and are available to all Substitutions, Expressions, and Functions. Users cannot create, modify, or delete Predefined Parameters.

IMPORTANT	All Predefined Parameters are available to the **Expression Builder** regardless of the scope of the current element. A Predefined Parameter used to supply a field value to an Object or element of higher scope will return no value. Care should be taken to scope Predefined Parameters correctly when they are used to populate field values.

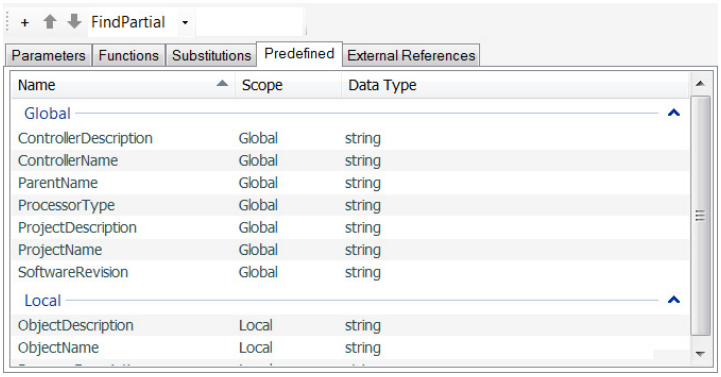
Predefined Parameters are populated during instantiation when a Library Object is added to an ACM Project.

Predefined Parameters cannot be copied or pasted, since they are defined by the Library Designer plug-in and are identical for all Library Objects.

The Predefined Tab

Predefined Parameters are listed alphabetically. They are grouped by scope.

Group names display in blue. Groups can be collapsed and expanded using the arrow buttons on the right or by double-clicking the group name. Parameters are displayed alphabetically within their groups. All of the columns are sortable. Predefined Parameters sort within their groups.

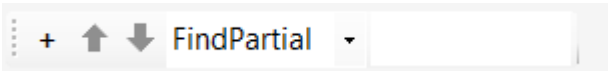


The following table describes the Predefined Parameters.

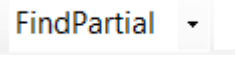
Name	Data Type	Description
Global		
ControllerDescription	String	The description of the Controller for the current Project.
ControllerName	String	The name of the Controller for the current Project.
ParentName	String	The name of the Object or element that contains the current element.
ProcessorType	String	The processor type of the Controller for the current Project.
ProjectDescription	String	The description of the current Project.
ProjectName	String	The name of the current Project.
SoftwareRevision	String	The software revision number of the Controller for the current Project.
Local		
ObjectDescription	String	The description of the current Library Object.
ObjectName	String	The name of the current Library Object.
ProgramDescription	String	The description of the Program that contains the current element.
ProgramName	String	The name of the Program that contains the current element.
SubObject Description	String	The description of the SubObject that contains the current element.
SubObjectName	String	The name of the SubObject that contains the current element.
TaskDescription	String	The description of the Task that contains the current element.
TaskName	String	The name of the Task that contains the current element.
Modules		
ParentChassisName	String	**For Module Library Objects only:** The chassis name of the current Library Object.
ParentChassisSize	Integer	**For Module Library Objects only:** The chassis size of the current Library Object.
ParentChassisSlot	Integer	**For Module Library Objects only:** The chassis slot of the current Library Object.

The Predefined Tab Button Bar

The **Predefined Tab Button Bar** is shown below.



The following table describes each **Predefined Tab Button Bar** command.

	The **Add New** button is deactivated for this tab.
	The **Move Up/Move Down** buttons are deactivated for this tab.
	The **Find** pull-down menu initiates a search for Substitutions that match a text string you enter in the field.

Using the Find Feature

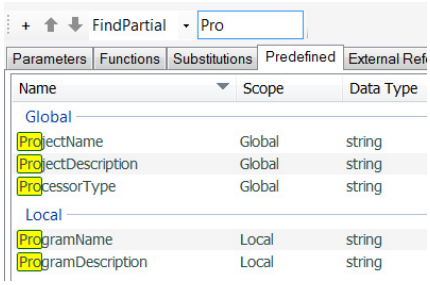
The **Find** feature limits the display in the **Predefined Tab** to Predefined Parameters that match the text string entered in the field. All columns currently being displayed are searched.

The following table describes the options in the **Find** pull-down menu.

FindPartial	Searches for the text string in any part of an entry.
FindPrefix	Searches for the text string at the beginning of an entry.

Follow these steps to limit the display based on a text string.

1. Select the Search option in the **Find** pull-down menu.
2. Type the text string to search for in the entry field to the right.



The **Predefined Tab** display reacts dynamically to the text string entered, returning a shorter list of matching Predefined Parameters as the text string grows.

TIP You must delete the text in the entry field to return the display to all Predefined Parameters.

External References

An External Reference makes the value of a Local Tag, Controller Tag, or Tag Member within a Library Object accessible to Parameters in other Library Objects. Used in conjunction with Parameters that have been assigned to accept values by reference, External References provide the points of contact between Library Objects in an ACM Project.

In an ACM Project, a user can link an External Reference to a Reference-type Parameter. The Parameter references the value of the External Reference when the Project is in operation. Reference-type Parameters can be defined so that the External References that are accessible to them are limited to those that meet certain criteria (filters).

Any Tag or Tag Member can be added as an External Reference.

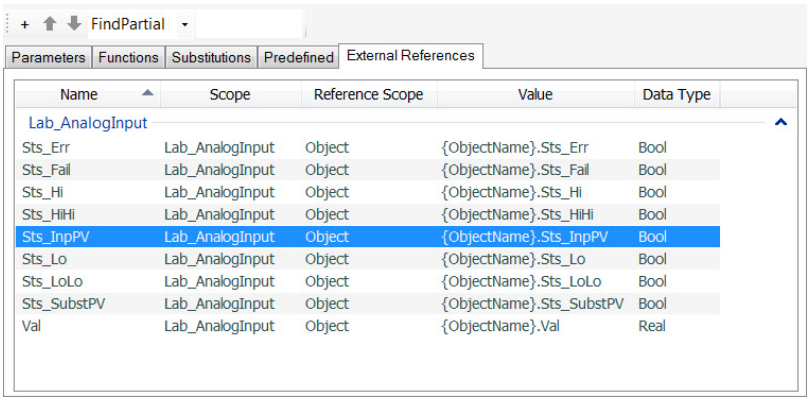
An External Reference can be copied to other Library Objects and to Library Objects of different scope.

IMPORTANT	Check that the Library Object contains the referenced Tag before copying and pasting an External Reference.

External References are not available to the **Expression Builder**.

The External References Tab

External References are listed alphabetically. They are grouped based on the value in the **Scope** field for the External Reference.



Name	Scope	Reference Scope	Value	Data Type
Lab_AnalogInput				
Sts_Err	Lab_AnalogInput	Object	{ObjectName}.Sts_Err	Bool
Sts_Fail	Lab_AnalogInput	Object	{ObjectName}.Sts_Fail	Bool
Sts_Hi	Lab_AnalogInput	Object	{ObjectName}.Sts_Hi	Bool
Sts_HiHi	Lab_AnalogInput	Object	{ObjectName}.Sts_HiHi	Bool
Sts_InpPV	Lab_AnalogInput	Object	{ObjectName}.Sts_InpPV	Bool
Sts_Lo	Lab_AnalogInput	Object	{ObjectName}.Sts_Lo	Bool
Sts_LoLo	Lab_AnalogInput	Object	{ObjectName}.Sts_LoLo	Bool
Sts_SubstPV	Lab_AnalogInput	Object	{ObjectName}.Sts_SubstPV	Bool
Val	Lab_AnalogInput	Object	{ObjectName}.Val	Real

Changing the Columns Displayed in the External References Tab

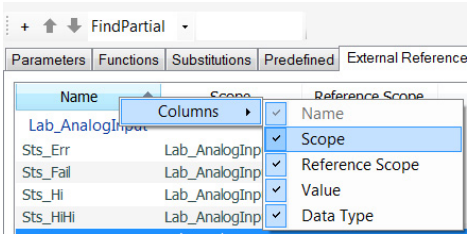
The **External References Tab** can display the following columns:

- Name
- Scope
- Reference Scope
- Value
- Data Type

Refer to Adding a New External Reference on page 100 for a full description of these fields.

Follow these steps to change the columns displayed.

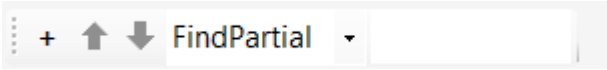
1. Right-click the column heading. The contextual menu appears.
2. Select **Columns** to display the submenu listing all columns.
3. Mouse over an inactive column to add it to the display. Mouse over an active column to remove it from the display.



TIP Columns can be resized horizontally by mousing over the right side of the column until the pointer changes to a double arrow, then clicking and dragging.

The External References Tab Button Bar

The **External References Tab Button Bar** is shown below.



The following table describes each **External References Tab Button Bar** command.

+	The **Add New** button opens the **Reference Builder**.
	The **Move Up/Move Down** buttons are deactivated for this tab.
FindPartial	The **Find** pull-down menu initiates a search for Functions that match a text string you enter in the field.

Using the Find Feature

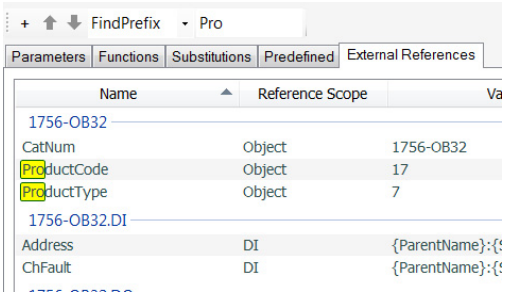
The **Find** feature highlights the External References that match the text string entered in the field. All columns currently being displayed are searched.

The following table describes the options in the **Find** pull-down menu.

FindPartial	Searches for the text string in any part of an entry.
FindPrefix	Searches for the text string at the beginning of an entry.

Follow these steps to limit the display based on a text string.

1. Select the Search option in the **Find** pull-down menu.
2. Type the text string to search for in the entry field to the right.



The **Functions Tab** display reacts dynamically to the text string entered.

TIP You must delete the text in the entry field to return the display to its default.

Adding a New External Reference

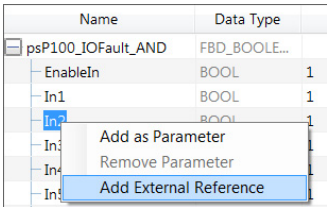
IMPORTANT While all of the fields in the Reference Builder are open to manual editing, it is recommended that you follow this procedure and allow the Library Designer plug-in to enter values automatically.

Follow these steps to add a new External Reference.

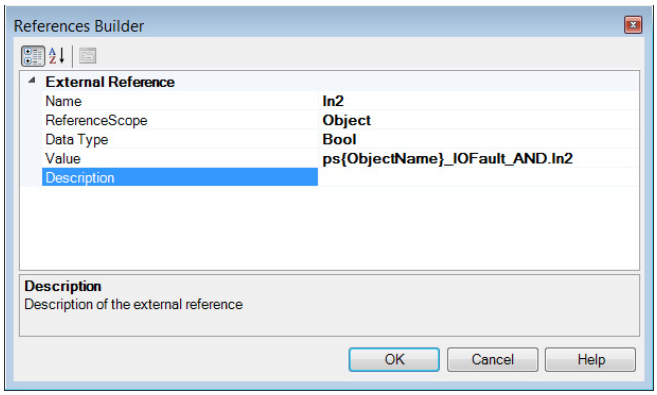
1. Locate the Tag within the Library Object that you wish to add as an External Reference.

   TIP Controller Tags and Local Tags are open for use as External References.

2. Double-click the Tag name. The name highlights to indicated it has been selected.
3. Right-click the selected Tag name to open the contextual menu. Select **Add External Reference**.



The **References Builder** window opens.



The following table describes the fields in the **References Builder** window.

Name	Field Type	Description
Name	Text entry	The name of the External Reference. This is a required field. This field is populated automatically when you follow this procedure.
ReferenceScope	Pull-down menu	Determines the scope of the External Reference within the current Library Object. If the Library Object contains SubObjects, these will appear as options on the list, and the External Reference can be scoped to them. If the Library Object has no SubObjects, **Object** will be the only option in the list. This field is populated automatically when you follow this procedure.
Data Type	Pull-down menu	The data type of the External Reference. Options are: • String • Integer • Real • Boolean This field is populated automatically when you follow this procedure.
Value	Text entry	The specific location of the External Reference once the Library Object has been instantiated. By default, uses the Predefined Parameter {ObjectName}. Displays in the format: {ObjectName}.Tag Name The value can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. This field is populated automatically when you follow this procedure.
Description	Text entry	The description of the External Reference that appears when it is highlighted in ACM. This must be entered manually.

4. Enter the values for the new External Reference or accept the default values generated by the Library Object Manager application.
5. Click **OK** to add the new Function or **Cancel** to cancel.

Editing an External Reference

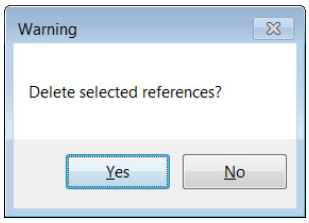
To edit an External Reference, right-click the External Reference to open the contextual menu. Select **Edit**. The **References Builder** window opens.

TIP Refer to Adding a New External Reference on page 100 for a list of the fields in the **References Builder**.

Deleting an External Reference

Follow these steps to delete an External Reference.

1. Right-click the External Reference. Select **Delete**. The **Warning** window opens.



2. To finish the deletion, click **Yes**. To cancel the deletion, click **No**.

The Library Designer Plug-in: The Expression Builder

Chapter Objectives

This chapter provides information on the following topics:

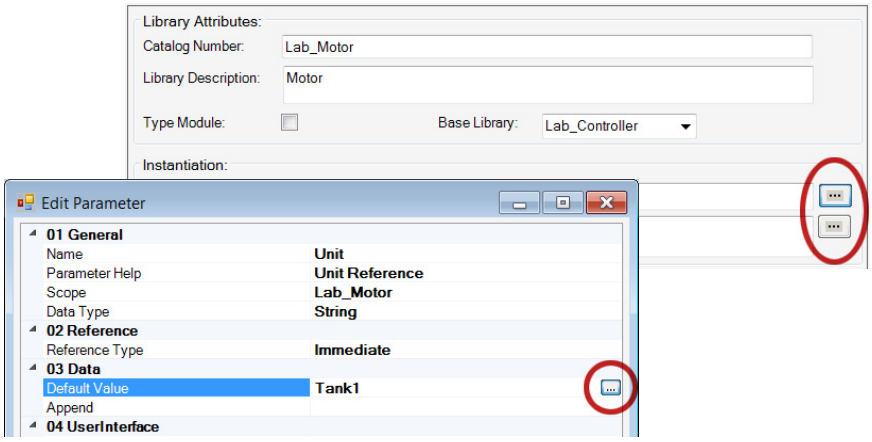
The Expression Builder

An Expression is a one-line statement that generates a single, calculated result. Expressions can return a string, numeric, or Boolean value, and generate values automatically during instantiation.

Expressions can incorporate any decorative element that is available to the current Library Object element, as well as a set of logical and mathematical operators, text strings, and numeric characters. Decorative elements and functions display as tokens with the following format.

{Element Name}

Expressions can be used in any field in the Library Designer plug-in that accepts a calculated result. These fields display an **Ellipsis** (...) button to the right. The **Expression Builder** opens when the **Ellipsis** button is clicked.



Expressions can be entered manually or created in the **Expression Builder**.

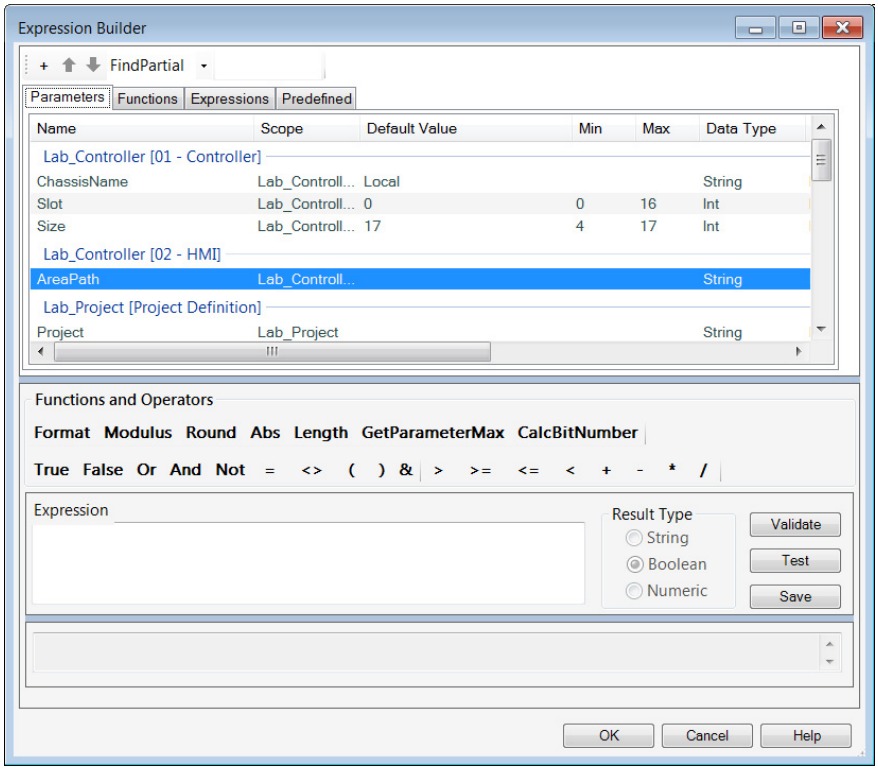
IMPORTANT When an Expression is entered manually, decorative element and function tokens must be entered in the correct format:

- The token must be enclosed in curly brackets.
- The name must contain only alphanumeric characters and underscores.
- The name must match the capitalization of the original.
- Tokens which return a string value must be enclosed in single quotes (apostrophes).

Text entered into an Expression which is to be evaluated as a string value must also be enclosed in single quotes (apostrophes).

The Expression Builder Window

The **Expression Builder** is an intuitive, visually responsive environment to create, test, and save Expressions.



From top to bottom, the Expression Builder is divided into four functional areas.

Name	Description
Decorative Elements Tabs	The Decorative elements available to the current Expression. These include all elements added to the current Library Object and all elements added to Library Objects that are higher in scope. These elements include: • Parameters • Functions • Predefined Parameters Functions and Expressions can also be saved within the Library Designer plug-in and used in future Projects. These appear in the **Expressions** and **Saved Functions** tabs.
Predefined Functions and Operators	A collection of logical and mathematical operators that can be used to manipulate the values generated by the decorative elements.
Expression Box	The Expression appears here as elements are added to it. There are also fields and buttons to set the data type of the Expression result, and to validate, test, and save the Expression. The validation bar at the bottom displays a color-coded response when the Expression is validated.
Button Bar	The **OK**, **Cancel,** and **Help** buttons for the **Expression Builder** window.

The Decorative Elements Tabs

The Decorative Elements Tabs hold all decorative elements that are available to the current element. All decorative elements added to the current Library Object are available, as well as all decorative elements added to Library Objects that are higher in the Library Object hierarchy.

IMPORTANT New Parameters and Functions can be added to the current Project directly from the tabs in the **Expression Builder**. Refer to The Library Designer Plug-in: Decorating Library Objects on page 59 for the procedures to add new Parameters and Functions.

Refer to The Parameters Tab on page 63 for a complete description of the features of the **Parameters Tab**.

Refer to The Functions Tab on page 77 for a complete description of the features of the **Functions Tab**.

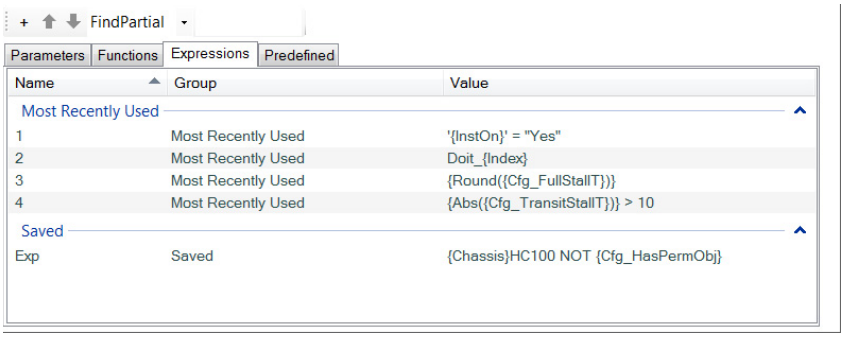
Refer to The Predefined Tab on page 96 for a complete description of the features of the **Predefined Tab**.

TIP The Expression Builder window that opens for the **Instantiation:Default Name** and **Instantiation:Default Description** fields for a Library Object also includes the External References Tab for that Library Object. Refer to The External References Tab on page 98.

The Expressions Tab

The **Expressions Tab** gives quick access to saved and recently used Expressions. This eliminates repetitive Expression coding when multiple fields use the same Expression, or when an existing Expression can be used as a template.

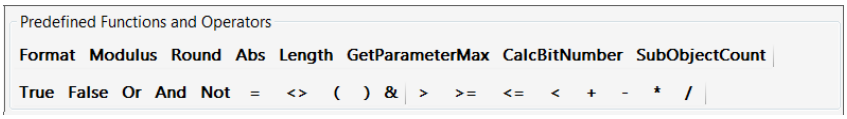
The Library Objects Designer plug-in saves a running list of the last ten Expressions created in the **Expression Builder**. Saved Expressions are available to all Projects opened in the Library Designer plug-in. Refer to Saving an Expression on page 110.



IMPORTANT Saved and Recently Used Expressions are carried over from previous Projects. The decorative elements in these Expressions may not be present in the current Project.

The Predefined Functions and Operators

The functions and operators available in the **Expression Builder** give you the ability to test and manipulate the values returned by the decorative elements.

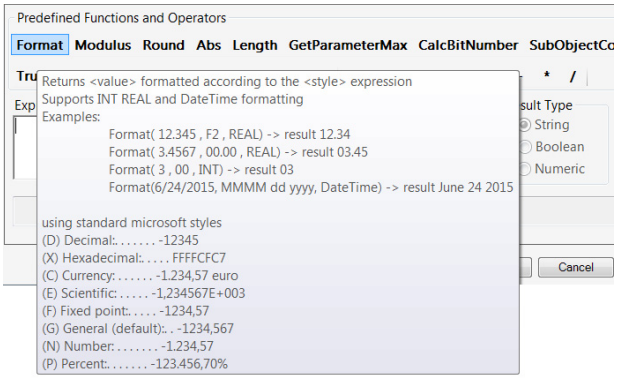


The following table describes the functions and operators in the **Expression Builder**.

Name	Description
Functions Elements are inserted into these functions to replace the <*value*> token.	
Format	Inserts: {Format(<value>,<style>,<valueDataType>)} Returns the value entered in <value> using the numeric format entered in <style>. Style options are: • Decimal • Hexadecimal • Currency • Scientific • Fixed point • General • Number • Percent Data type options are: • Int • Real • DateTime

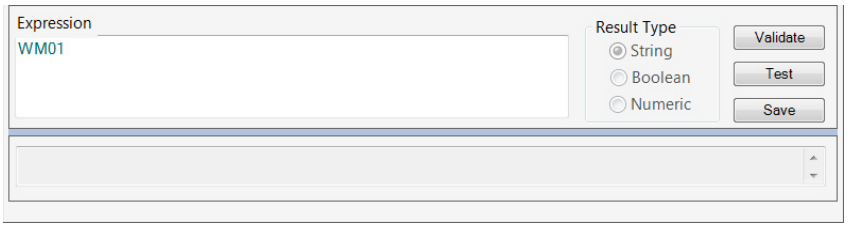
Name	Description
Modulus	Inserts: {Modulus(<value1>,<value2>)} Returns the remainder after the value of the decorative element inserted as <value1> is divided by the value of the decorative element inserted as <value2>.
Round	Inserts: {Round(<value>)} Returns the rounded value of the decorative element inserted as <value>.
Abs	Inserts: {Abs(<value>)} Returns the absolute value of the decorative element inserted as <value>.
Length	Inserts: {Length(<value>)} Returns the text string length of the decorative element inserted as <value>.
GetParameterMax	Inserts: {GetParameterMax({ObjectName},{SubObjectName},<parameter>)} Applies to Parameters that are included in a SubObject. Returns the maximum value for the Parameter inserted as <parameter> from within all SubObjects that match the **Predefined Parameter** {SubObjectName} within the Library Object that matches {ObjectName}.
CalcBitNumber	Inserts: {CalcBitNumber({ObjectName},<SubobjectType>,<parameter>,<subobjectIndex>,<resultDataType>)} Applies to Parameters that are included in a SubObject. Returns the 2^N value of all instances of the Parameter inserted as <parameter> in the SubObject inserted as <subobjectType> based on the value inserted as <subobjectIndex>.
SubObjectCount	Inserts: {SubObjectCount({ObjectName},<subobjectType>} Returns the number of SubObject instances for the SubObject inserted as <subobjectType> within the Library Object that matches the **Predefined Parameter** {ObjectName}.
Logical and Mathematical Operators	
True	Logical TRUE: used to test value returned by a decorative element.
False	Logical FALSE: used to test value returned by a decorative element.
Or	Logical OR
And	Logical AND
Not	Logical NOT
= <>	Equal to, not equal to
( )	Parentheses, used to set order of operation for complex expressions
&	Mathematical AND
> >= <= <	Greater than, greater than or equal to, less than or equal to, less than
+ - * /	Plus, minus, multiplied by, divided by

TIP When you mouse over a predefined function or operator, a tooltip appears displaying input options for that function or operator.



The Expression Box

The Expression Box displays the Expression statement as it is created. Elements of the statement can be entered manually or by clicking items in the **Decorative Elements Tab** or the **Functions and Operators** area.



The Expression Box has the following fields and buttons.

Name	Description
Expression Window	The Expression appears here as elements are added to it.
Result Type	Sets the data type of the Expression result to one of three choices: • String • Boolean • Numeric
Validate	Validates the current Expression for syntax and data type. Refer to Validating and Testing an Expression on page 109.
Test	Tests the current Expression and return the result. Refer to Validating and Testing an Expression on page 109.
Save	Saves the Expression. The Expression is added to the Saved Expressions Tab and becomes available to any Project opened in the Library Designer plug-in. The saved Expression is not applied to the current field until you click **OK** in the **Expression Builder Button Bar**.

The Button Bar

The **Expression Builder Button Bar** has the following buttons:

Name	Description
OK	Applies the Expression to the current field and closes the **Expression Builder**.
Cancel	Closes the **Expression Builder** without applying the Expression.
Help	Opens the Help screens for the **Expression Builder**.

Creating an Expression

The Expression Box displays the Expression as elements are added to it:

- To add a decorative element to an Expression, double-click the listing.
- To add a function or operator to an Expression, click it once.
- To insert a decorative element into a function, drag across the "<value>" token to select it, then double-click the element.
- To manually edit an Expression, click within the Expression Box.

Setting the Result Type of an Expression

To set the result type of an Expression, click the String, Boolean, or Numeric radio button in the **Result Type** field.

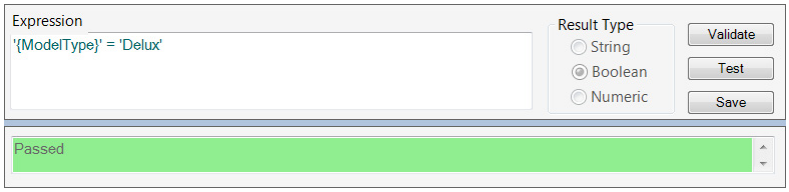
IMPORTANT	If the current field where the Expression will be applied has a predefined data type, the **Result Type** field will be set to match this data type and will appear dimmed.

Validating and Testing an Expression

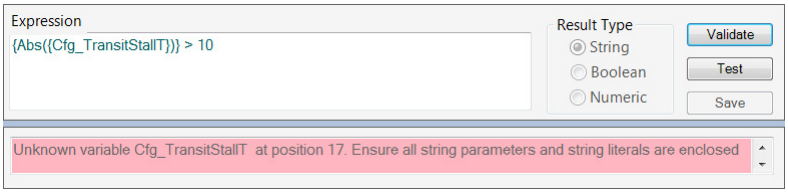
The Validate and Test buttons allow you to validate an Expression for internal syntax and data type and to test an Expression for the result returned.

To validate an Expression, click **Validate**. The validation bar displays the result of the validation:

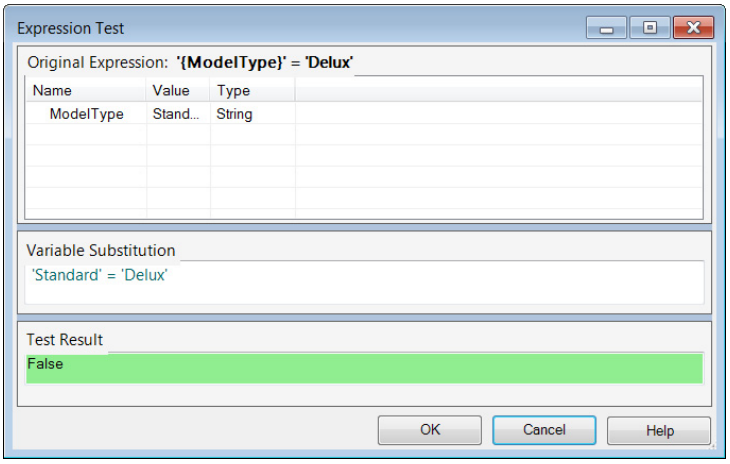
- If the validation passes, the validation bar displays with a green background.



- If the validation fails, the validation bar displays an error message with a red background.



To test the Expression, click **Test**. The **Expression Test** window opens and displays the current result of the Expression.



TIP The Expression must pass validation before it can be tested.

Saving an Expression

To save an Expression, click **Save**. The Expression is added to the **Saved Expressions Tab** and becomes available to any Project opened in the Library Designer plug-in.

TIP Clicking **Save** does not apply the Expression to the current field. You must click **OK** in the **Expression Builder Button Bar** to apply the Expression.

Applying an Expression

To apply an Expression to the current field, click **OK**, or click **Cancel** to delete the Expression without applying.

The Library Designer Plug-in: Decorating Library Object Elements

Chapter Objectives

This chapter provides information on the following topics:

The Decorator Panel

Any element within a Library Object that accepts decoration opens the **Decorator Panel** when it is selected in the **Library Objects** column. The **Decorator Panel** displays the fields for the element where decoration can be applied. The display changes based on the decoration available for the selected element.

Fields in the **Decorator Panel** that can be edited display with white backgrounds. Fields that are locked for editing appear dimmed. Fields that can accept calculated values show the **Ellipsis** (...) button to the right. Clicking the button opens one of the **Expression Builder** windows.

In a typical application, Substitutions added to the Library Object extend to names and descriptions for all elements contained within the Library Object. This allows for consistent identification of all elements within each instance of the Library Object that is added to an ACM Project.

Parameters, Functions, and Expressions can be applied as conditions for instantiation, to populate Tags, and to configure Programs.

Substitutions added to the Library Object, as well as Substitutions added to Library Objects higher in the Library Object hierarchy, are applied automatically. Substitutions can be overridden through the **Substitutions Builder**. All other decorative elements are accessed through the **Expression Builder**.

Adding Tags as Parameters or External References

The **Decorator Panel** also allows you to quickly and accurately turn static instances of Controller Tags, Local Tags, and Tag Members into Parameters or External References. Adding a Tag as a Parameter opens the Tag to values set by the user, or by calculations or references set after the Library Object has been added to an ACM Project. Adding a Tag as an External Reference makes the value of the Tag available to other Library Objects after the Library Object has been added to an ACM Project.

The Substitution Builder

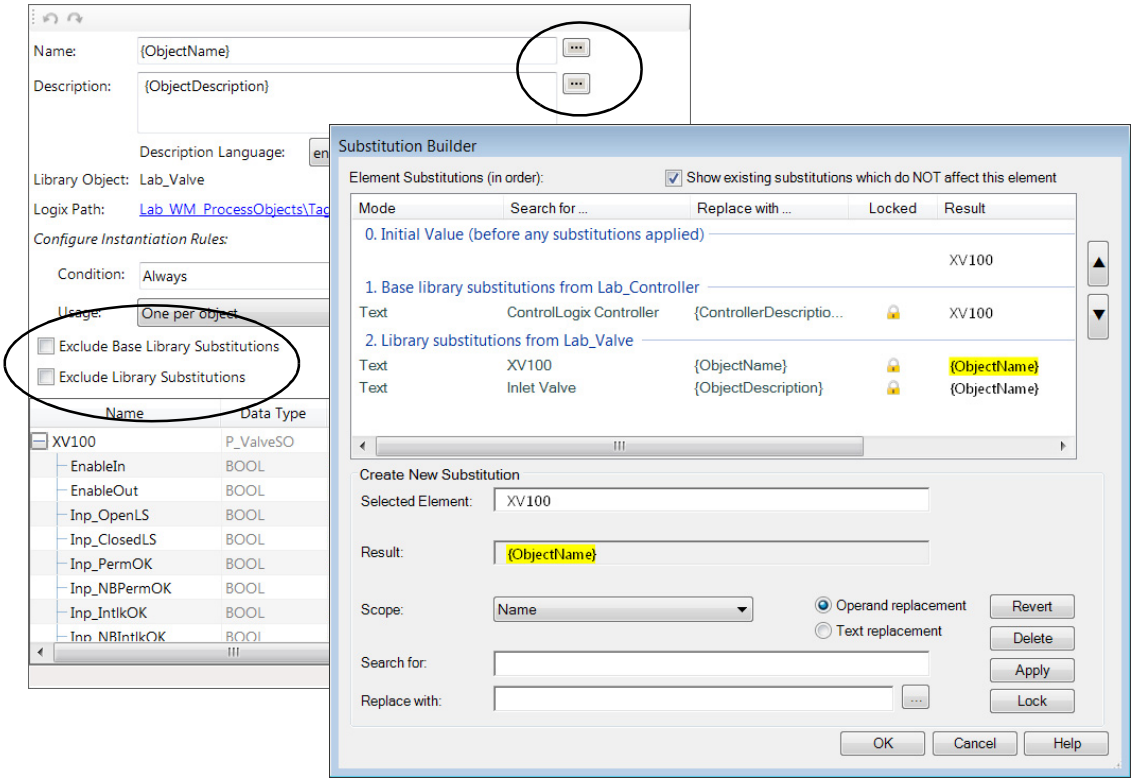
Regardless of which element has been selected, the top two fields displayed by the **Decorator Panel** are the **Name** and **Description** fields for the element. If Substitutions have been added to the containing Library Object or to Library Objects that are higher in the Project hierarchy, they are applied by default.

To remove Substitutions that have been inherited from the Library Object, check the **Exclude Library Substitutions** checkbox. The field reverts to the original value for the element.

To remove Substitutions that have been inherited from the Base Library Object for the current Library Object, check the **Exclude Base Library Substitutions** checkbox:

- If Substitutions have also been added to the Library Object, the field switches to the Library Object Substitution.
- If no Substitutions have been added to the Library Object, the field reverts to the original value for the element.

To edit the value of either field, click **Ellipsis** to the right of either field. The **Substitution Builder** window opens.



The **Substitution Builder** allows you to create Substitutions that are specific to the current element. You can create one or many Substitutions based on the text strings contained in the original field value.

Top to bottom, the **Substitution Builder** has two functional areas: the Element Substitutions window and the Create New Substitutions panel.

The Element Substitutions (in order) Window

The top of the **Substitution Builder** displays a list of Substitutions and their effect on the value of the current field:

- If the **Show existing substitutions which do NOT affect this element** checkbox is not checked, the window limits the display to Substitutions which include text strings that are part of the original value of the current field.
- If the **Show existing substitutions which do NOT affect this element** checkbox is checked, the window displays all Substitutions that have been added to the current Library Object and to Library Objects that are higher in the Project hierarchy.

TIP Displaying all Substitutions shows potential conflicts and unexpected replacements for Substitutions you add to the element.

The display traces the field value from its initial value through any Substitutions that have been applied. The display is grouped as follows:

- **0. Initial Value** displays the original value of the field.
- **1. Library substitution for [Base Library Object Name]** displays the Substitution applied from the Base Library Object, if one exists.
- **2. Library substitution for {Library Object Name]** displays the Substitution applied from the Library Object, if one exists.
- **3. [Field Name] substitution** displays Substitutions created for the current field.

TIP Depending on where in the hierarchy Substitutions have been added, Groups 1, 2, or 3 may not appear.

Substitutions appear highlighted in yellow.

The **Element Substitution** window allows you to track the current Substitutions for the current field and trace them back to their source.

The Create New Substitution Panel

The bottom half of the **Substitution Builder** holds the fields and commands for creating a new Substitution. The following table describes the fields and commands in the **Substitution Builder**.

Name	Field Type	Description
Selected Element	Read only	The original text string entered in the **Search For** field.
Result	Read only	The result generated when the **Apply** button is clicked to test the Substitution.
Scope	Pull-down menu	The scope for the new Substitution. There are three options: • [Current Field] • Library Object • Base Library Object If Library Object or Base Library Object are selected, the new Substitution will replace previous Substitutions added to that Library Object for the same text string.
Search For	Text entry	The text string to replace.
Replace With	Text entry	The replacement text. This can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**.
Operand replacement/ Text replacement	Radio buttons	Sets the condition under which the current Tag is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 117.
Revert	Button	Reverts to the current Substitution for the field.

Name	Field Type	Description
Delete	Button	Deletes the currently selected line in the Element Substitutions window. **IMPORTANT:** Deleting a Substitution removes it from the Library Object.
Apply	Button	Tests the current Substitution and adds it to the Element Substitution window.
Unlock/Lock	Button	Unlocks an existing Substitution, allowing it to be edited, or locks a Substitution, preventing it from being edited.

Creating a New Substitution

Follow these steps to create a new Substitution.

1. Review the Substitutions listed in the **Element Substitution** window to trace the origin of the current Substitution, if one exists.

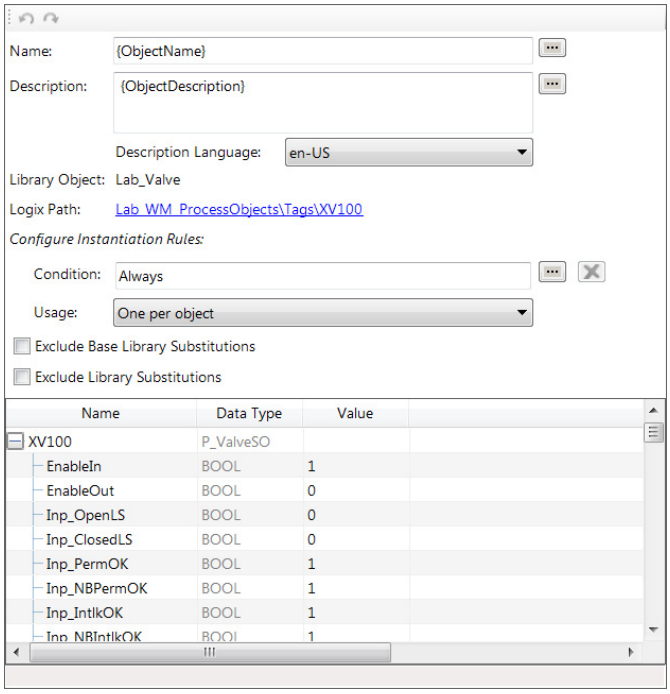
   TIP Check **Show existing substitutions which do NOT affect this element** to see all current Substitutions. This shows potential conflicts and unexpected replacements for new Substitutions you create.

2. Select a scope in the **Scope** field.
3. Enter an initial text string to be replaced in the **Search For**: field.
4. Enter a replacement string in the **Replace With**: field or click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
5. Select a scope for the text search. **Operand replacement** limits the search to the tokens for operands, so it should only be selected if this is where the substitution should take place. **Text replacement** limits the search to text strings not in tokens.
6. Click **Apply** to test the Substitution. The new Substitution appears under Group 3 in the **Element Substitutions** window.
7. Click **OK** to exit the Substitution Builder or **Cancel** to cancel.
8. If necessary, check the **Exclude Base Library Substitutions** or **Exclude Library Substitutions** checkbox so the new Substitution takes precedence.

Applying Decoration to a Tag

When a Controller or Local Tag is selected, the **Decorator Panel** display has two functional areas.

The bottom half of the panel displays the Tag and its members.



The following table describes the fields in the top half of the **Decorator Panel** when a Tag is selected.

Name	Field Type	Description
Name	Text entry	The name that will be applied to the Tag when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Tag name, these are applied by default. Refer to Changing the Tag Name or Description on page 117.
Description	Text entry	The description that will be applied to the Tag when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Tag description, these are applied by default. Refer to Changing the Tag Name or Description on page 117.
Description Language	Pull-down menu	The language used for the description. The default is English.
Library Object	Read only	The Library Object that contains the Tag.
Logix Path	Read-only link	A link to the **Monitor Tag** screen for the Tag in the Studio 5000 Logix Designer® application. Click the link to open the screen. You will need to close the Library Designer plug-in to access the Logix Designer application.
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current Tag is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 121.

Name	Field Type	Description
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the Tag will be instantiated. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option "Once per sub object [SubObject name]" for each SubObject. Default value is "One per Object".
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to The Substitution Builder on page 112.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to The Substitution Builder on page 112.

Changing the Tag Name or Description

In a typical development process, Tag names are structured when the elements are added in the Logix Designer application to allow Substitutions to be added once, to the Library Object, and then extend consistently to all Tag elements contained within the Library Object.

For example, a motor Library Object with an identifying string of MX001 in the Library Object name, and with the Predefined Parameter {ObjectName} applied as a Substitution, might have Tags named MX001_Permissives, MX001_Interlock, and MX001_IOFault.

Substitutions can also be added to the Project Library Object or Controller Library Object. These will extend throughout the Project hierarchy and will take precedence over Substitutions added to the Library Object, unless the **Base Library** field for the Library Object has been set to "NONE".

The **Decorator Panel** allows the default Substitution to be overridden for individual Tags. Refer to The Substitution Builder on page 112.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to "One per object" or select "Include Once" to limit the element to a single instance in the Project.

To revert to the default condition, click **Revert** (red X) to the right of the **Condition** field.

Adding a Tag as a Parameter

Adding a Tag or Tag Member as a Parameter makes the Tag value accessible to the Application Code Manager (ACM) application.

Follow these steps to add a Tag as a Parameter.

1. Click the Tag name to highlight it.
2. Right-click the highlighted name to open the contextual menu. Select **Add as Parameter**. The **Add new Parameter** window opens.
3. Edit the Parameter. Some fields will be filled with default values based on the Tag settings. Refer to Adding a New Parameter on page 70 for fields and settings available in the window.
4. Click **OK** to add the Parameter. The new Parameter is added to the **Parameters** tab for the Library Object. The token for the new Parameter appears in the Value Expression column for the Tag, indicating that the Tag will now accept values from the Parameter. Decoration tokens appear as blue.

Adding a Tag as an External Reference

Adding a Tag or Tag Member as an External Reference makes the Tag value accessible to reference-type Parameters in the ACM application.

Follow these steps to add a Tag as an External Reference.

1. Click the Tag name to highlight it.
2. Right-click the highlighted name to open the contextual menu. Select **Add External Reference**. The **Reference Builder** window opens.

   TIP All fields other than the **Description** field are filled in by default. In a typical application, the default values should not be changed. Refer to Adding a New External Reference on page 100.

3. Click **OK** to add the External Reference. The new External Reference is added to the **External References** tab for the Library Object.

Applying Decoration to Tag Values

Follow these steps to apply decoration to a Tag value.

1. Click within the **Value Expression** column for the Tag listing.
2. Right-click to open the contextual menu. Select **Add/Edit Expression**. The **Expression Builder** window opens.
3. Edit the Expression. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

4. Click **OK** to add the Expression. The Expression token appears in the Value Expression column for the Tag, indicating that the Tag will now use the Expression to generate values. Decoration tokens appear as blue.

Follow these steps to edit the decoration applied to a Tag.

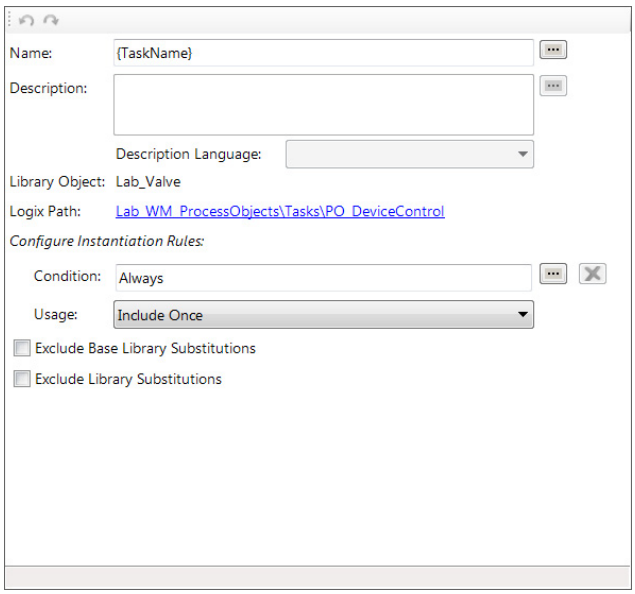
1. Click within the Value Expression column for the Tag listing.
2. Right-click to open the contextual menu. Select **Add/Edit Expression**. The **Expression Builder** window opens.
3. Edit the Expression. Refer toThe Library Designer Plug-in: The Expression Builder on page 103.
4. Click **OK**.

Follow these steps to delete the decoration applied to a Tag.

1. Click within the Value Expression column for the Tag listing.
2. Right-click to open the contextual menu. Select **Remove Expression**. The Expression is deleted from the column.

Applying Decoration to a Task or Program

When a Task or Program is selected, the **Decorator Panel** display has a single functional area.



The following table describes the fields in the **Decorator Panel** when a Task or Program is selected.

Name	Field Type	Description
Name	Text entry	The name that will be applied to the Task or Program when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Task or Program name, these are applied by default. Refer to Changing the Task or Program Name or Description on page 120.
Description	Text entry	The description that will be applied to the Task or Program when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Task or Program description, these are applied by default. Refer to Changing the Task or Program Name or Description on page 120.
Description Language	Pull-down menu	The language used for the description. The default is English.
Library Object	Read only	The Library Object that contains the Task or Program.
Logix Path	Read-only link	A link to the **Edit** screen for the Task or Program in the Logix Designer application. Click the link to open the screen. You will need to close the Library Designer plug-in to access the Logix Designer application.
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current Task or Program is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 121.
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the Task or Program will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option “Once per sub object [SubObject name]” for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to The Substitution Builder on page 112.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to The Substitution Builder on page 112.

Changing the Task or Program Name or Description

In a typical application, Task and Program names and descriptions have a user-accessible Parameter applied as a Substitution to the original text string. This allows the user to assign instance-specific identification to the Task or Program when it is added to an ACM Project.

Substitutions can also be inherited from the Library Object, the Project Library Object, or the Controller Library Object.

The **Decorator Panel** allows you to create Substitutions which can be applied directly to the **Name** and **Definition** fields of a Task or Program element. Refer to The Substitution Builder on page 112.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

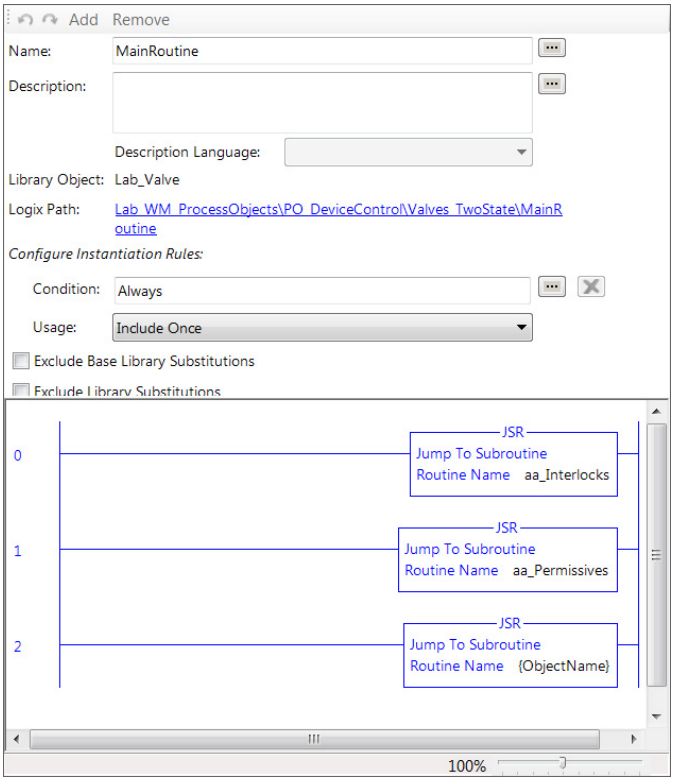
1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to "One per object" or select "Include Once" to limit the element to a single instance in the Project.

To revert to the default condition, click **Revert** (red X) to the right of the **Condition** field.

Applying Decoration to a Routine

When a Routine is selected, the **Decorator Panel** display has two functional areas.

The bottom half of the panel displays the Routine. Every instruction and Directive in the Routine can be selected, and all operands are open to decoration. When an operand is selected, the top half of the **Decorator Panel** changes to display the fields available to the currently selected operand.



Refer to Applying Decoration to the Elements in a Ladder Logic Diagram on page 123 for the decoration available to a Ladder Logic Diagram.

Refer to Applying Decoration to the Elements in a Function Block Diagram on page 128 for the decoration available to a Function Block Diagram.

Refer to Applying Decoration to a Sequential Function Chart on page 134 for the decoration available to a Sequential Function Chart.

Refer to Applying Decoration to a Structured Text Chart on page 141 for the decoration available to a Structured Text Chart.

The following table describes the fields in the top half of the **Decorator Panel** when a Routine is selected.

Name	Field Type	Description
Name	Text entry	The name that will be applied to the Routine when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Routine name, these are applied by default. Refer to Changing the Routine Name or Description on page 123.
Description	Text entry	The description that will be applied to the Routine when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Routine description, these are applied by default. Refer to Changing the Routine Name or Description on page 123.
Description Language	Pull-down menu	The language used for the description. The default is English.
Library Object	Read only	The Library Object that contains the Routine.
Logix Path	Read-only link	A link to the **Edit** screen for the Routine in the Logix Designer application. Click the link to open the screen. You will need to close the Library Designer plug-in to access the Logix Designer application.
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current Routine is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 123.
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the Routine will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option “Once per sub object [SubObject name]” for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to Changing the Routine Name or Description on page 123.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to Changing the Routine Name or Description on page 123.

Changing the Routine Name or Description

In a typical application, the main Routine for a Program is named Main Routine. Other Routine names are structured when the elements are added in the Logix Designer application to allow Substitutions to be added once, to the Library Object, and then extend consistently to these Routine elements contained within the Library Object.

For example, a motor Library Object with an identifying string of MX001 in the Library Object name, and with the Predefined Parameter {ObjectName} applied as a Substitution, might have Routines named MX001, MX001_permissives, and MX001_interlocks.

The **Decorator Panel** allows you to create Substitutions which can be applied directly to the **Name** and **Definition** fields of a Routine element. Refer to The Substitution Builder on page 112.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to “One per object”, or select “Include Once” to limit the element to a single instance in the Project.

To revert to the default condition, click **Revert** (red X) to the right of the **Condition** field.

Applying Decoration to the Elements in a Ladder Logic Diagram

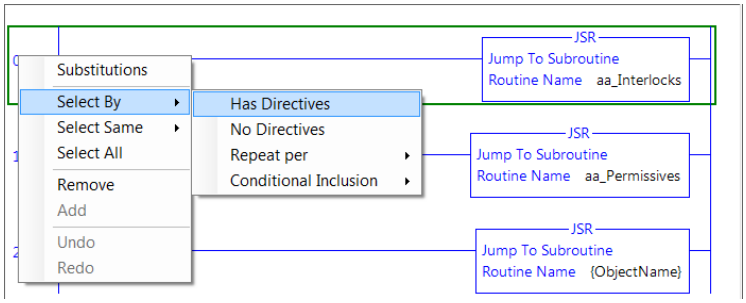
Decoration can be applied to a Rung or a Directive.

Applying Decoration to a Rung

When a Rung is selected, a few fields in the top half of the **Decorator Panel** become active. Substitutions can be applied to the Rung using the contextual menu.

The following table describes the fields in the top half of the **Decorator Panel** when a Rung is selected.

Name	Field Type	Description
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current Rung is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 125.
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the Rung will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option "Once per sub object [SubObject name]" for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 125.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 125.



To select a Rung for decoration, click a Rung name to select the Rung. Right-click to open the contextual menu.

TIP If necessary, use the resize slider at the bottom of the ladder logic diagram window to show more of the diagram.

The following table describes the commands in the contextual menu.

Substitutions	Opens the **Substitution Builder**.
Select By: Has Directives	Selects all Rungs that include Directives.
Select By: No Directives	Selects all Rungs that do not include Directives.
Select By: Repeat per: Object	Selects all Rungs where the **Usage** field has been set to "Include Once per Object".
Select By: Repeat per: SubObject	Selects all Rungs where the **Usage** field has been set to "Include Once per SubObject".
Select By: Repeat per: Include Once	Selects all Rungs where the **Usage** field has been set to "Include Once".

Select By: Conditional Inclusion	Selects all Rungs where the **Condition** field matches the option selected in the submenu. Submenu displays all conditional inclusions rules for the current diagram.
Select Same: Repeat Per	Selects additional Rungs that match the **Usage** field for the currently selected Rung.
Select Same: Conditional Inclusion	Selects additional Rungs that match the **Condition** field for the currently selected Rung.
Select Same: Both of the Above	Selects additional Rungs that match both the **Usage** field and the **Condition** field for the currently selected Rung.
Select Same: Tag	Selects additional Rungs that reference the same Tag as the currently selected Rung.
Select All	Selects all Rungs.
Remove	Deactivates the selected Rungs.
Add	Not Available
Undo	Undoes the last action.
Redo	Redoes the last action.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to “One per object”, or select “Include Once” to limit the element to a single instance in the Project.

To revert to the default condition, click **Revert** (red X) to the right of the **Condition** field.

Excluding Inherited Substitutions

To remove Substitutions that have been inherited from the Library Object, check the **Exclude Library Substitutions** checkbox. The field reverts to the original value for the element.

To remove Substitutions that have been inherited from the Base Library Object for the current Library Object, check the **Exclude Base Library Substitutions** checkbox.

- If Substitutions have also been added to the Library Object, the field switches to the Library Object Substitution.
- If no Substitutions have been added to the Library Object, the field reverts to the original value for the element.

Applying a Substitution to a Rung

Rung names are applied sequentially and cannot be changed. If inherited Substitutions have been excluded, Substitutions applied to the Rung will extend to Directives contained by the Rung.

Follow these steps to apply a Substitution to a Rung.

1. Select **Substitution**.

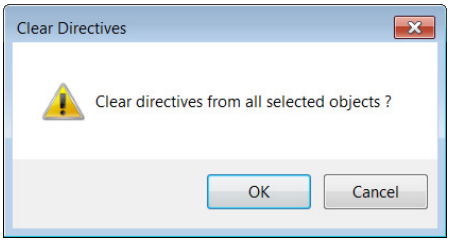
   TIP The **Substitution** command does not respond if more than one Rung is selected.

2. Refer to The Substitution Builder on page 112.

Activating and Deactivating Rungs

Follow these steps to deactivate one or more Rungs.

1. Use the menu commands to select the Rungs to deactivate. You can also select multiple Rungs by holding down the CONTROL key.
2. Right-click again on one of the selected Rung names to open the contextual menu.
3. Select **Remove,** or click **Remove** at the top of the **Decorator Panel**. The **Clear Directives** window opens.



4. Click **OK** to deactivate the Rungs or **Cancel** to cancel. The selected Rungs appear dimmed.

Follow these steps to reactivate one or more deactivated Rungs.

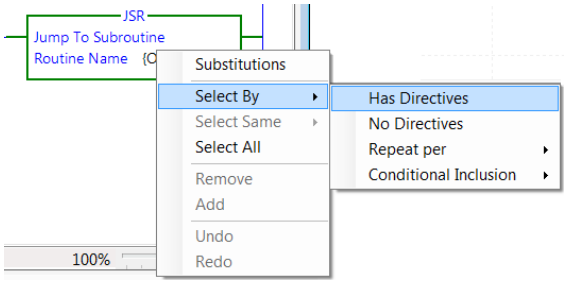
1. Select the Rung name. Right-click to open the contextual menu.
2. If necessary, use the menu commands to select additional Rungs.
3. Select **Undo**.

Follow these steps to reapply a deactivation to one or more Rungs.

1. Select the Rung name. Right-click to open the contextual menu.
2. If necessary, use the menu commands to select additional Rungs.
3. Select **Redo**.

Applying Decoration to a Directive

When a Directive is selected, the only active field in the **Decorator Panel** is the **Name** field. A Substitution can be applied using the **Name** field of the contextual menu for the Directive.



To select a Directive for decoration, click the Directive name to select it. Right-click to open the contextual menu.

The following table describes the commands in the contextual menu.

Substitutions	Opens the **Substitution Builder**.
Select By: Has Directives	Selects all Rungs in the diagram that include Directives.
Select By: No Directives	Selects all Rungs in the diagram that do not include Directives.
Select By: Repeat per: Object	Selects all Directives where the **Usage** field has been set to "Include Once per Object".
Select By: Repeat per: SubObject	Selects all Directives where the **Usage** field has been set to "Include Once per SubObject".
Select By: Repeat per: Include Once	Selects all Directives where the **Usage** field has been set to "Include Once".
Select By: Conditional Inclusion	Selects all Directives where the **Condition** field matches the option selected in the submenu. Submenu displays all conditional inclusions rules for the current diagram.
Select Same:	Not Available
Select All	Selects all Rungs.
Remove	Not Available
Add	Not Available
Undo	Not Available
Redo	Not Available

Applying a Substitution to a Directive

Follow these steps to apply a Substitution to a Directive.

1. Select **Substitution**.
2. Refer to The Substitution Builder on page 112.

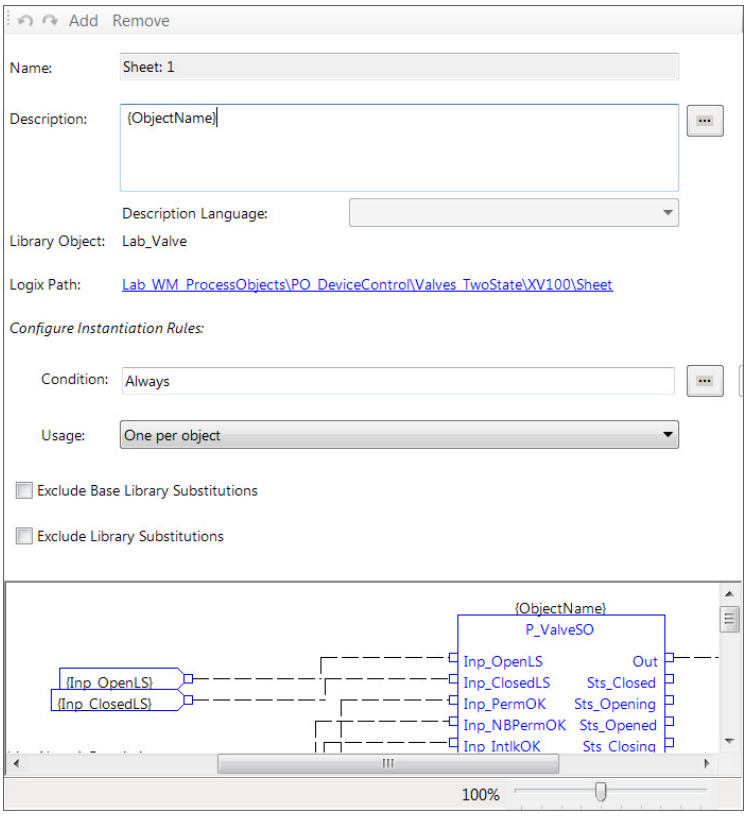
Applying Decoration to the Elements in a Function Block Diagram

Decoration can be applied to a Sheet or to individual Function Block elements.

Applying Decoration to a Sheet

When a Sheet is selected, the **Decorator Panel** display has two functional areas.

The bottom half of the panel displays the Function Block Diagram. Every instruction in the Sheet can be selected, and all are open to decoration. When an element is selected, the top half of the **Decorator Panel** changes to display the fields available to the currently selected element.



The following table describes the fields in the top half of the **Decorator Panel** when a Sheet is selected.

Name	Field Type	Description
Name	Text entry	This field is not available for editing.
Description	Text entry	The description that will be applied to the Sheet when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Sheet description, these are applied by default. Refer to Changing the Sheet Description on page 129.
Description Language	Pull-down menu	The language used for the description. The default is English.
Library Object	Read only	The Library Object that contains the Sheet.
Logix Path	Read-only link	A link to the **Edit** screen for the Sheet in the Logix Designer application. Click the link to open the screen. You will need to close the Library Designer plug-in to access the Logix Designer application.
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current Sheet is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 129.
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the Sheet will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option “Once per sub object [SubObject name]” for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 130.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 130.

Changing the Sheet Description

Sheets are identified by sequential numbering. The name cannot be changed.

The **Decorator Panel** allows you to create Substitutions which can be applied directly to the **Definition** field of a Sheet element. Refer to The Substitution Builder on page 112.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to “One per object”, or select “Include Once” to limit the element to a single instance in the Project.

To revert to the default condition, click **Revert** (red X) to the right of the **Condition** field.

Excluding Inherited Substitutions

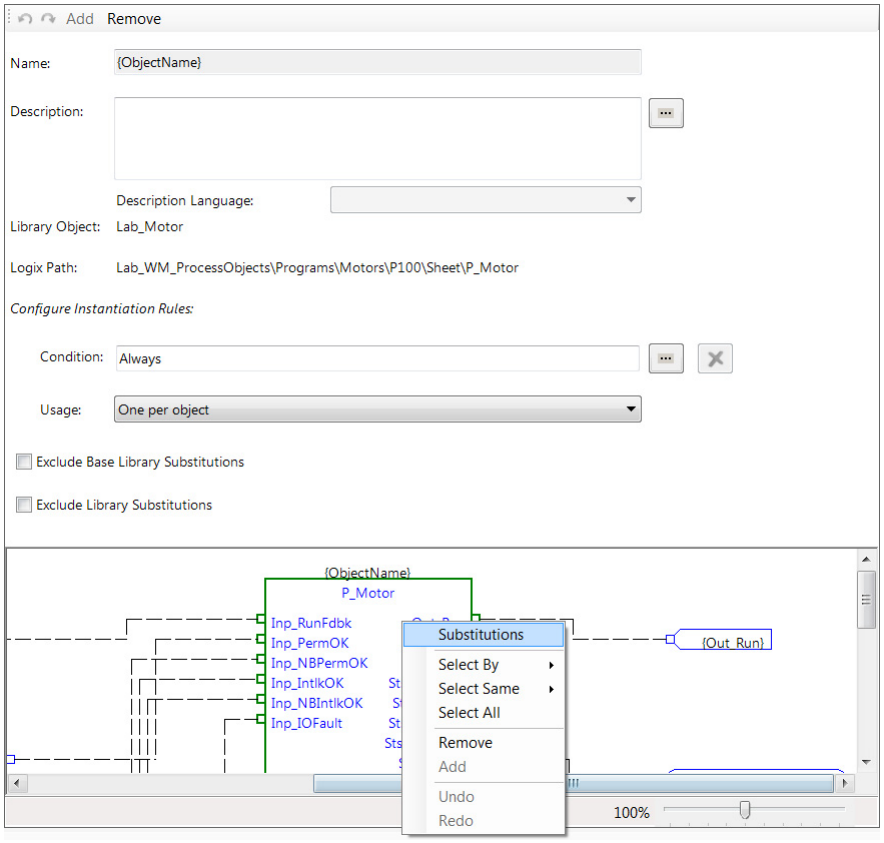
To remove Substitutions that have been inherited from the Library Object, check the **Exclude Library Substitutions** checkbox. The field reverts to the original value for the element.

To remove Substitutions that have been inherited from the Base Library Object for the current Library Object, check the **Exclude Base Library Substitutions** checkbox.

- If Substitutions have also been added to the Library Object, the field switches to the Library Object Substitution.
- If no Substitutions have been added to the Library Object, the field reverts to the original value for the element.

Applying Decoration to a Function Block Diagram Element

When a Function Block Diagram element is selected, most fields in the top half of the **Decorator Panel** become active. Substitutions can be applied to the element using the contextual menu.



The following table describes the fields in the **Decorator Panel** that are active when a Function Block Diagram element is selected.

Name	Field Type	Description
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current element is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 132.
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the element will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option "Once per sub object [SubObject name]" for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 132.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 132.

The following table describes the commands in the contextual menu.

Substitutions	Opens the **Substitution Builder**.
Select By: Has Directives	Selects all elements in the diagram.
Select By: No Directives	Deselects all elements in the diagram.
Select By: Repeat per: Object	Selects all elements where the **Usage** field has been set to "Include Once per Object".
Select By: Repeat per: SubObject	Selects all elements where the **Usage** field has been set to "Include Once per SubObject".
Select By: Repeat per: Include Once	Selects all elements where the **Usage** field has been set to "Include Once".
Select By: Conditional Inclusion	Selects all elements where the **Condition** field matches the option selected in the submenu. Submenu displays all conditional inclusions rules for the current diagram.
Select Same: Repeat Per	Selects additional elements that match the **Usage** field for the currently selected element.
Select Same: Conditional Inclusion	Selects additional elements that match the **Condition** field for the currently selected element.
Select Same: Both of the Above	Selects additional elements that match both the **Usage** field and the **Condition** field for the currently selected element.
Select Same: Tag	Selects additional elements that reference the same Tag as the currently selected element.
Select All	Selects all elements.
Remove	Deactivates the selected elements.
Add	Activates the selected elements. Only available when the selected elements have been added to an existing Library Object, or when the selected elements have been previously deactivated.
Undo	Undoes the last action.
Redo	Redoes the last action.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to "One per object", or select "Include Once" to limit the element to a single instance in the Project.

To revert to the default condition, click **Revert** (red X) to the right of the **Condition** field.

Excluding Inherited Substitutions

To remove Substitutions that have been inherited from the Library Object, check the **Exclude Library Substitutions** checkbox. The field reverts to the original value for the element.

To remove Substitutions that have been inherited from the Base Library Object for the current Library Object, check the **Exclude Base Library Substitutions** checkbox.

- If Substitutions have also been added to the Library Object, the field switches to the Library Object Substitution.
- If no Substitutions have been added to the Library Object, the field reverts to the original value for the element.

Applying a Substitution to a Function Block Diagram Element

Follow these steps to apply a Substitution to a Function Block Diagram element.

1. Click the element to select it. Right-click to open the contextual menu.

   TIP If necessary, use the resize slider at the bottom of the ladder logic diagram window to show more of the diagram.

2. Click **Substitution**.
3. Refer to The Substitution Builder on page 112.

Activating a New Function Block Diagram Element

When modifications are made in the Logix Designer application to a Function Block Diagram which has been added to a Library Object in the Library Designer plug-in, the Function Block Diagram must be updated in the Library Designer plug-in to include the modifications. New elements will appear in the Function Block Diagram, but must be activated so that they are recognized by the Library Designer plug-in.

TIP The connection wires appear dimmed for Elements that must be activated.

Follow these steps to activate an element.

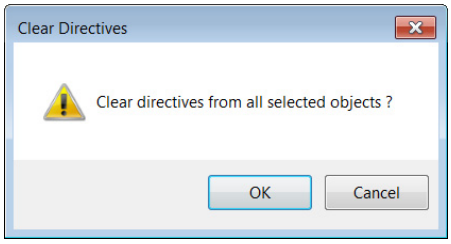
1. Click the connection wire to select it. Right-click to open the contextual menu.
2. Select **Add,** or click **Add** at the top of the **Decorator Panel**. The wire displays as black.

IMPORTANT Default substitutions are inherited automatically. Overrides to the default substitution, and all other decoration, must be applied manually to new elements of an existing Library Object.

Activating and Deactivating Function Block Diagram Elements

Follow these steps to deactivate one or more elements.

1. Use the menu commands to select the elements to deactivate. You can also select multiple elements by holding down the CONTROL key.
2. Right-click again on one of the selected elements to open the contextual menu.
3. Select **Remove,** or click **Remove** at the top of the **Decorator Panel**. The **Clear Directives** window opens.



4. Click **OK** to deactivate the elements or **Cancel** to cancel. The selected elements appear dimmed.

Follow these steps to reactivate one or more deactivated elements.

1. Select the element name. Right-click to open the contextual menu.
2. If necessary, use the menu commands to select additional elements.
3. Select **Add** or **Undo**.

   TIP You can also click **Add** at the top of the **Decorator Panel**.

To reapply a deactivation to one or more elements:

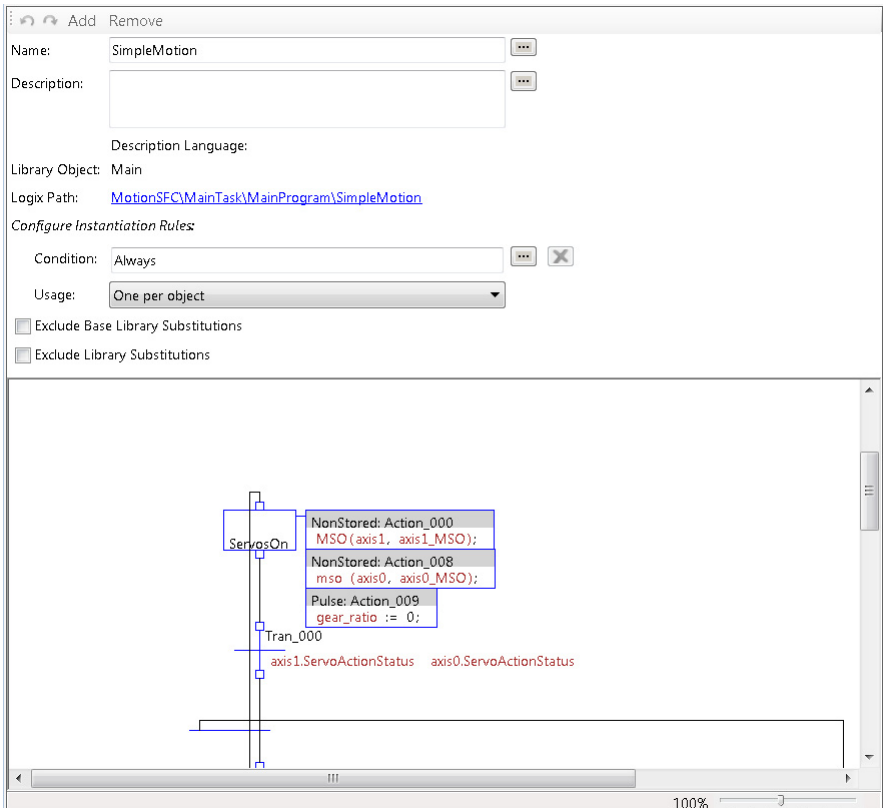
1. Select the element name. Right-click to open the contextual menu.
2. If necessary, use the menu commands to select additional elements.
3. Select **Remove** or **Redo**.

   TIP You can also click **Remove** at the top of the **Decorator Panel**.

Applying Decoration to a Sequential Function Chart

When a Sequential Function Chart is selected, the **Decorator Panel** display has two functional areas.

The bottom half of the panel displays the Sequential Function Chart. Every element in the chart can be selected, and all are open to decoration. When an element is selected, the top half of the **Decorator Panel** changes to display the fields available to the currently selected element.



The following table describes the fields in the top half of the **Decorator Panel** when a Sequential Function Chart is selected.

Name	Field Type	Description
Name	Text entry	The name that will be applied to the Sequential Function Chart when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Sequential Function Chart name, these are applied by default. Refer to Changing the Sequential Function Chart Name or Description on page 135.
Description	Text entry	The description that will be applied to the Sequential Function Chart when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Sequential Function Chart description, these are applied by default. Refer to Changing the Sequential Function Chart Name or Description on page 135.
Description Language	Pull-down menu	The language used for the description. The default is English.
Library Object	Read only	The Library Object that contains the Sequential Function Chart.
Logix Path	Read-only link	A link to the **Edit** screen for the Sequential Function Chart in the Logix Designer application. Click the link to open the screen. You will need to close the Library Designer plug-in to access the Logix Designer application.
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current Sequential Function Chart is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 136.
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the Sequential Function Chart will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option “Once per sub object [SubObject name]” for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 136.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 136.

Changing the Sequential Function Chart Name or Description

In a typical application, Sequential Function Chart names are function-based or are structured when the charts are created in the Logix Designer application to allow Substitutions to be added once, to the Library Object, and then extend consistently to the charts contained within the Library Object.

The **Decorator Panel** allows you to create Substitutions which can be applied directly to the **Name** and **Definition** fields of a Structured Text Chart. Refer to The Substitution Builder on page 112.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to "One per object", or select "Include Once" to limit the element to a single instance in the Project.

To revert to the default condition, click **Revert** (red X) to the right of the **Condition** field.

Excluding Inherited Substitutions

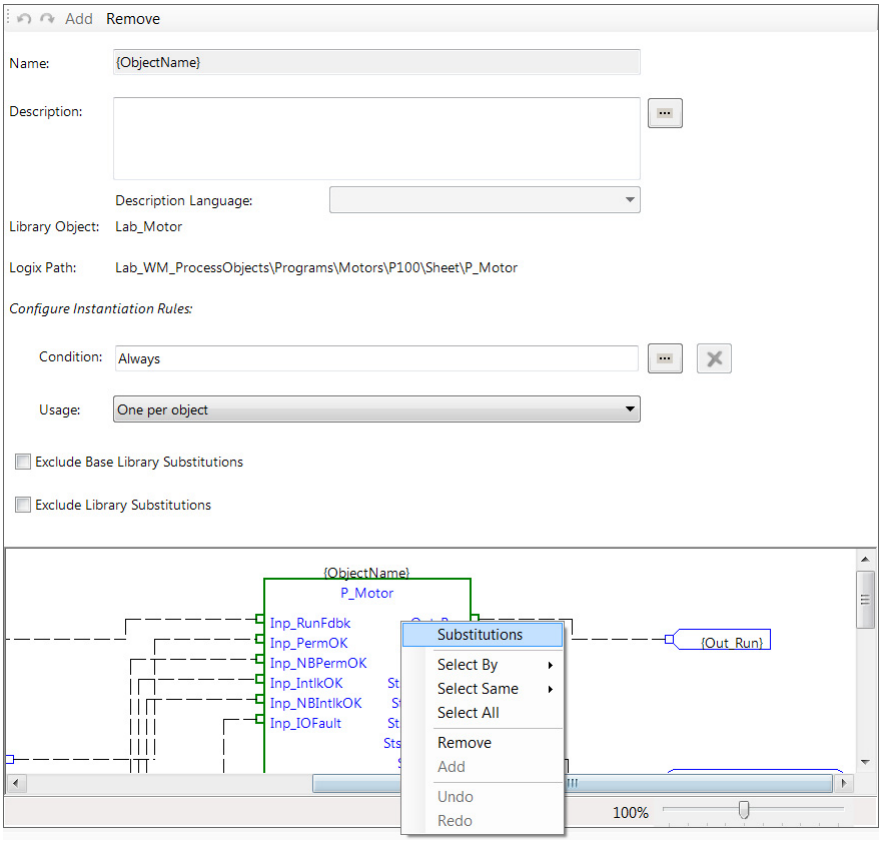
To remove Substitutions that have been inherited from the Library Object, check the **Exclude Library Substitutions** checkbox. The field reverts to the original value for the element.

To remove Substitutions that have been inherited from the Base Library Object for the current Library Object, check the **Exclude Base Library Substitutions** checkbox.

- If Substitutions have also been added to the Library Object, the field switches to the Library Object Substitution.
- If no Substitutions have been added to the Library Object, the field reverts to the original value for the element.

Applying Decoration to a Sequential Function Chart Element

When a Sequential Function Chart element is selected, most of the fields in the top half of the **Decorator Panel** remain active. Substitutions can be applied directly to the element using the contextual menu.



The following table describes the fields in the **Decorator Panel** that are active when a Sequential Function Chart element is selected.

Name	Field Type	Description
Description	Text entry	The description that will be applied to the element when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Sequential Function Chart description, these are applied by default. Refer to Changing the Sequential Function Chart Element Description on page 139.
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current element is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 136.

Name	Field Type	Description
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the element will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option "Once per sub object [SubObject name]" for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 139.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 139.

Right-click to open the contextual menu. The following table describes the commands in the contextual menu.

Substitutions	Opens the **Substitution Builder**.
Select By: Has Directives	Selects all elements in the chart.
Select By: No Directives	Deselects all elements in the chart.
Select By: Repeat per: Object	Selects all elements where the **Usage** field has been set to "Include Once per Object".
Select By: Repeat per: SubObject	Selects all elements where the **Usage** field has been set to "Include Once per SubObject".
Select By: Repeat per: Include Once	Selects all elements where the **Usage** field has been set to "Include Once".
Select By: Conditional Inclusion	Selects all elements where the **Condition** field matches the option selected in the submenu. Submenu displays all conditional inclusions rules for the current diagram.
Select Same: Repeat Per	Selects additional elements that match the **Usage** field for the currently selected element.
Select Same: Conditional Inclusion	Selects additional elements that match the **Condition** field for the currently selected element.
Select Same: Both of the Above	Selects additional elements that match both the **Usage** field and the **Condition** field for the currently selected element.
Select Same: Tag	Selects additional elements that reference the same Tag as the currently selected element.
Select All	Selects all elements.
Remove	Deactivates the selected elements.
Add	Activates the selected elements. Only available when the selected elements have been added to an existing Library Object, or when the selected elements have been previously deactivated.
Undo	Undoes the last action.
Redo	Redoes the last action.

Changing the Sequential Function Chart Element Description

The **Decorator Panel** allows you to create Substitutions which can be applied directly to the **Definition** field of a Sequential Function Chart element. Refer to The Substitution Builder on page 112.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to "One per object", or select "Include Once" to limit the element to a single instance in the Project.

To revert to the default condition, click **Revert** (red X) to the right of the **Condition** field.

Excluding Inherited Substitutions

To remove Substitutions that have been inherited from the Library Object, check the **Exclude Library Substitutions** checkbox. The field reverts to the original value for the element.

To remove Substitutions that have been inherited from the Base Library Object for the current Library Object, check the **Exclude Base Library Substitutions** checkbox.

- If Substitutions have also been added to the Library Object, the field switches to the Library Object Substitution.
- If no Substitutions have been added to the Library Object, the field reverts to the original value for the element.

Applying a Substitution to a Sequential Function Chart Element

Follow these steps to apply a Substitution to a Sequential Function Chart element.

1. Click the element to select it. Right-click to open the contextual menu.

   TIP If necessary, use the resize slider at the bottom of the ladder logic diagram window to show more of the diagram.

2. Click **Substitution**.
3. Refer to The Substitution Builder on page 112.

Activating a New Sequential Function Chart Element

When modifications are made in the Logix Designer application to a Sequential Function Chart that has been added to a Library Object in the Library Designer plug-in, the chart must be updated in the Library Designer plug-in to include the modifications. New elements will appear in the Sequential Function Chart, but must be activated so that they are recognized by the Library Designer plug-in.

TIP The connection wires appear dimmed for Elements that must be activated.

Follow these steps to activate an element.

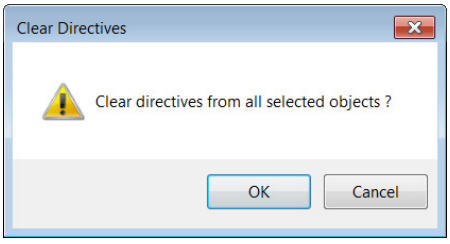
1. Click the connection wire to select it. Right-click to open the contextual menu.
2. Select **Add,** or click **Add** at the top of the **Decorator Panel**. The wire displays as black.

IMPORTANT Default substitutions are inherited automatically. Overrides to the default substitution, and all other decoration, must be applied manually to new elements of an existing Library Object.

Activating and Deactivating Sequential Function Chart Elements

Follow these steps to deactivate one or more elements.

1. Use the menu commands to select the elements to deactivate. You can also select multiple elements by holding down the CONTROL key.
2. Right-click again on one of the selected elements to open the contextual menu.
3. Select **Remove,** or click **Remove** at the top of the **Decorator Panel**. The **Clear Directives** window opens.



4. Click **OK** to deactivate the elements or **Cancel** to cancel. The selected elements appear dimmed.

Follow these steps to reactivate one or more deactivated elements.

1. Select the element name. Right-click to open the contextual menu.
2. If necessary, use the menu commands to select additional elements.
3. Select **Add** or **Undo**.

   TIP You can also click **Add** at the top of the **Decorator Panel**.

Follow these steps to reapply a deactivation to one or more elements.

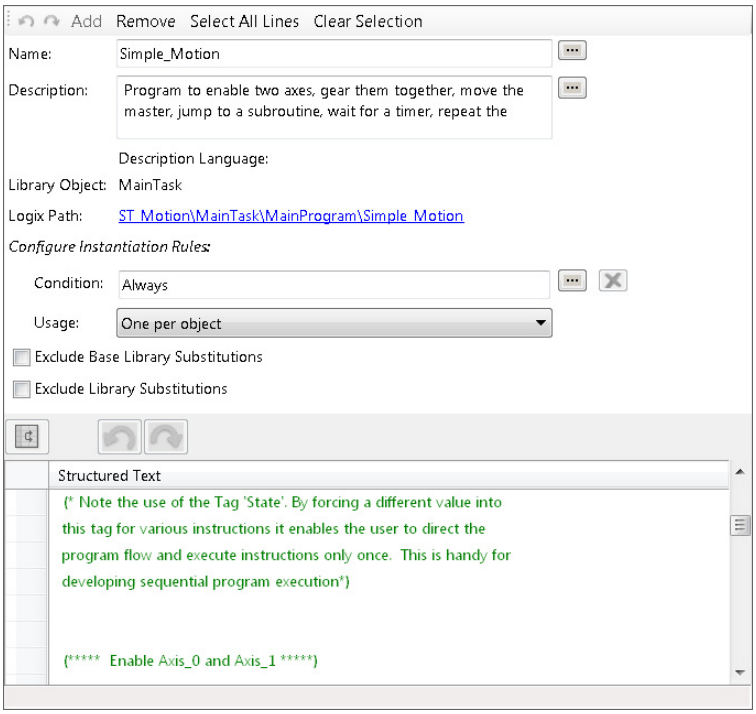
1. Select the element name. Right-click to open the contextual menu.
2. If necessary, use the menu commands to select additional elements.
3. Select **Remove** or **Redo**.

   TIP You can also click **Remove** at the top of the **Decorator Panel**.

Applying Decoration to a Structured Text Chart

When a Structured Text Chart is selected, the **Decorator Panel** display has two functional areas.

The bottom half of the panel displays the Structured Text Chart. Every line in the Chart can be selected, and all are open to decoration. Additional commands at the top of the display allow you to select all or deselect all lines.



The following table describes the fields in the top half of the **Decorator Panel** when a Structured Text Chart is selected.

Name	Field Type	Description
Name	Text entry	The name that will be applied to the Structured Text Chart when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Structured Text Chart name, these are applied by default. Refer to Changing the Structured Text Chart Name or Description on page 142.
Description	Text entry	The description that will be applied to the Structured Text Chart when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Structured Text Chart description, these are applied by default. Refer to Changing the Structured Text Chart Name or Description on page 142.
Description Language	Pull-down menu	The language used for the description. The default is English.
Library Object	Read only	The Library Object that contains the Structured Text Chart.
Logix Path	Read-only link	A link to the **Edit** screen for the Structured Text Chart in the Logix Designer application. Click the link to open the screen. You will need to close the Library Designer plug-in to access the Logix Designer application.
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current Structured Text Chart is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 143.
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the Structured Text Chart will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option "Once per sub object [SubObject name]" for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to Setting a Rule for Instantiation on page 143.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to Setting a Rule for Instantiation on page 143.

Changing the Structured Text Chart Name or Description

In a typical application, Structured Text Chart names are function-based or are structured when the charts are created in the Logix Designer application to allow Substitutions to be added once, to the Library Object, and then extend consistently to the charts contained within the Library Object.

The **Decorator Panel** allows you to create Substitutions which can be applied directly to the **Name** and **Definition** fields of a Structured Text Chart. Refer to The Substitution Builder on page 112.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer toThe Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to "One per object", or select "Include Once" to limit the element to a single instance in the Project.

To revert to the default condition, click **Revert** (red X) to the right of the **Condition** field.

Excluding Inherited Substitutions

To remove Substitutions that have been inherited from the Library Object, check the **Exclude Library Substitutions** checkbox. The field reverts to the original value for the element.

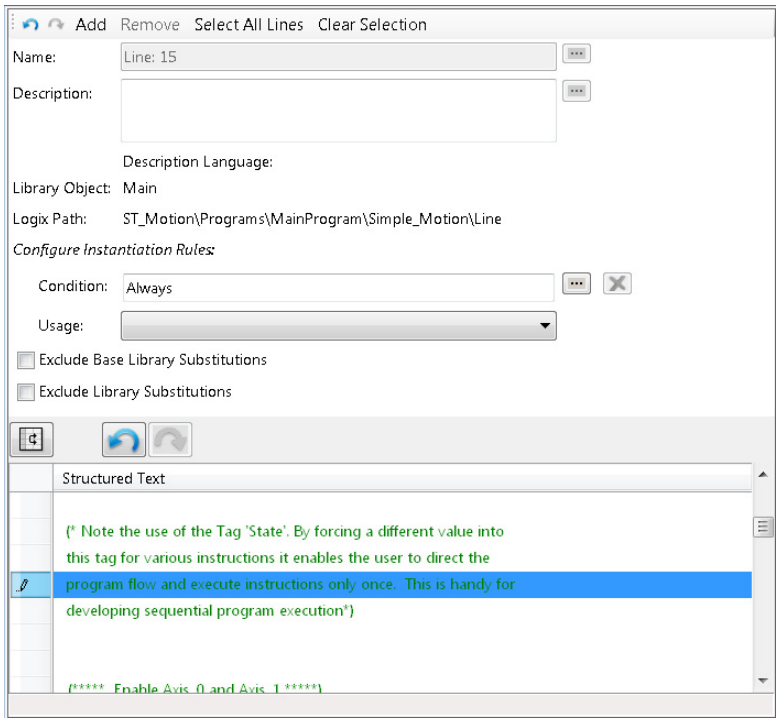
To remove Substitutions that have been inherited from the Base Library Object for the current Library Object, check the **Exclude Base Library Substitutions** checkbox.

- If Substitutions have also been added to the Library Object, the field switches to the Library Object Substitution.
- If no Substitutions have been added to the Library Object, the field reverts to the original value for the element.

Applying Decoration to a Structured Text Chart Line

Click a line to select it. Hold down the SHIFT or CONTROL key to select multiple lines. You can also click the **Select All Lines** command to select all the lines in the chart.

When a line is selected, most of the fields in the top half of the **Decorator Panel** remain active. Substitutions can be applied directly to the line using the contextual menu.



The following table describes the fields in the **Decorator Panel** that are active when a Structured Text Chart line is selected.

Name	Field Type	Description
Name	Read only	This field is not available for editing.
Description	Text entry	The description that will be applied to the line when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original description, these are applied by default. Refer to Changing the Structured Text Chart Line Description on page 145.
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current line is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 145.

Name	Field Type	Description
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the line will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option "Once per sub object [SubObject name]" for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 145.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 145.

Changing the Structured Text Chart Line Description

The **Decorator Panel** allows you to create Substitutions which can be applied directly to the **Definition** fields of a Structured Text Chart line. Refer to The Substitution Builder on page 112.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to "One per object", or select "Include Once" to limit the element to a single instance in the Project.

To revert to the default condition, click **Revert** (red X) to the right of the **Condition** field.

Excluding Inherited Substitutions

To remove Substitutions that have been inherited from the Library Object, check the **Exclude Library Substitutions** checkbox. The field reverts to the original value for the element.

To remove Substitutions that have been inherited from the Base Library Object for the current Library Object, check the **Exclude Base Library Substitutions** checkbox.

- If Substitutions have also been added to the Library Object, the field switches to the Library Object Substitution.
- If no Substitutions have been added to the Library Object, the field reverts to the original value for the element.

Applying a Substitution to a Structured Text Chart Line

Follow these steps to apply a Substitution to a Structured Text Chart line.

1. Double-click the selected line. The **Substitution Builder** opens.
2. Refer to The Substitution Builder on page 112.

Activating and Deactivating Structured Text Chart Lines

Follow these steps to deactivate a line.

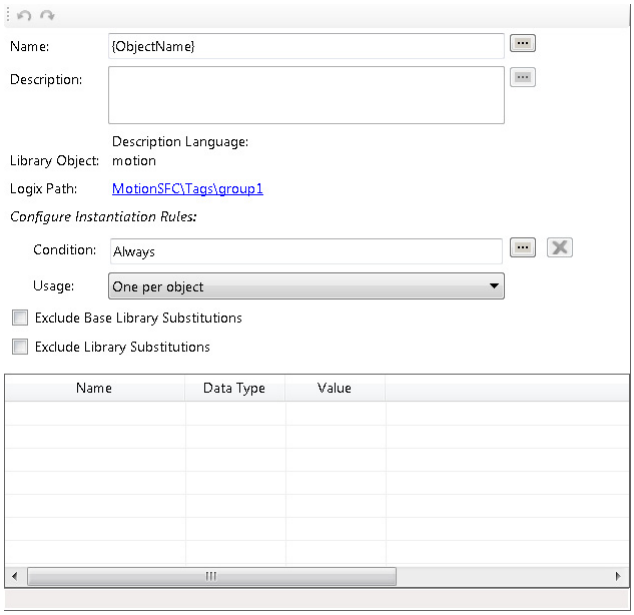
1. Select the line. Hold down the SHIFT or CONTROL key to select multiple lines.
2. Click **Remove** at the top of the **Decorator Panel**. The selected line appears dimmed.

Follow these steps to reactivate a line.

1. Select the line. Hold down the SHIFT or CONTROL key to select multiple lines.
2. Click **Add** at the top of the **Decorator Panel**.

Applying Decoration to a Motion Group

When Motion Group is selected, the **Decorator Panel** display has one functional area.



The following table describes the fields in the top half of the **Decorator Panel** when a Motion Group is selected.

Name	Field Type	Description
Name	Text entry	The name that will be applied to the Motion Group when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Motion Group name, these are applied by default. Refer to Changing the Motion Group Name or Description on page 147
Description	Text entry	The description that will be applied to the Motion Group when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Motion Group description, these are applied by default. Refer to Changing the Motion Group Name or Description on page 147.
Description Language	Read only	The language used for the description. The default is English.
Library Object	Read only	The Library Object that contains the Motion Group.
Logix Path	Read-only link	A link to the **Edit** screen for the Motion Group in the Logix Designer application. Click the link to open the screen. You will need to close the Library Designer plug-in to access the Logix Designer application.
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current Motion Group is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 148.
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the Motion Group will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option “Once per sub object [SubObject name]” for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 148.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 148.

Changing the Motion Group Name or Description

In a typical application, Motion Group names and descriptions have a user-accessible Parameter applied as a Substitution to the original text string. This allows the user to assign instance-specific identification to the Motion Group when it is added to an ACM Project.

Substitutions can also be inherited from the Library Object, the Project Library Object, or the Controller Library Object.

The **Decorator Panel** allows you to create Substitutions which can be applied directly to the **Name** or **Definition** field of a Motion Group. Refer to The Substitution Builder on page 112.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to "One per object", or select "Include Once" to limit the element to a single instance in the Project.

To revert to the default condition, click Revert (red X) to the right of the Condition field.

Excluding Inherited Substitutions

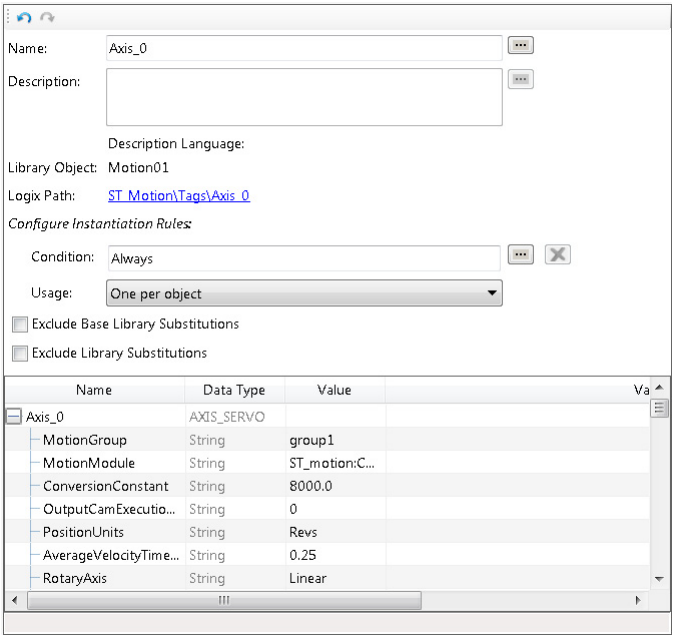
To remove Substitutions that have been inherited from the Library Object, check the **Exclude Library Substitutions** checkbox. The field reverts to the original value for the element.

To remove Substitutions that have been inherited from the Base Library Object for the current Library Object, check the **Exclude Base Library Substitutions** checkbox.

- If Substitutions have also been added to the Library Object, the field switches to the Library Object Substitution.
- If no Substitutions have been added to the Library Object, the field reverts to the original value for the element.

Applying Decoration to a Motion Group Axis

When Motion Group Axis is selected, the **Decorator Panel** display has two functional areas. The bottom half of the panel displays the Tag and Tag Members for the Motion Group Axis.



The following table describes the fields in the top half of the **Decorator Panel** when a Motion Group Axis is selected.

Name	Field Type	Description
Name	Text entry	The name that will be applied to the Motion Group Axis when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Motion Group Axis name, these are applied by default. Refer to Changing the Motion Group Axis Name or Description on page 150
Description	Text entry	The description that will be applied to the Motion Group Axis when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Motion Group Axis description, these are applied by default. Refer to Changing the Motion Group Axis Name or Description on page 150.
Description Language	Read only	The language used for the description. The default is English.
Library Object	Read only	The Library Object that contains the Motion Group Axis.
Logix Path	Read-only link	A link to the **Edit** screen for the Motion Group Axis in the Logix Designer application. Click the link to open the screen. You will need to close the Library Designer plug-in to access the Logix Designer application.
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current Motion Group Axis is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 150.

Name	Field Type	Description
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the Motion Group Axis will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option "Once per sub object [SubObject name]" for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 151.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 151.

Changing the Motion Group Axis Name or Description

In a typical application, Motion Group Axis names and descriptions have a user-accessible Parameter applied as a Substitution to the original text string. This allows the user to assign instance-specific identification to the Motion Group Axis when it is added to an ACM Project.

Substitutions can also be inherited from the Library Object, the Project Library Object, or the Controller Library Object.

The **Decorator Panel** allows you to create Substitutions which can be applied directly to the **Name** or **Definition** field of a Motion Group Axis. Refer to The Substitution Builder on page 112.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to "One per object", or select "Include Once" to limit the element to a single instance in the Project.

To revert to the default condition, click Revert (red X) to the right of the Condition field.

Excluding Inherited Substitutions

To remove Substitutions that have been inherited from the Library Object, check the **Exclude Library Substitutions** checkbox. The field reverts to the original value for the element.

To remove Substitutions that have been inherited from the Base Library Object for the current Library Object, check the **Exclude Base Library Substitutions** checkbox.

- If Substitutions have also been added to the Library Object, the field switches to the Library Object Substitution.
- If no Substitutions have been added to the Library Object, the field reverts to the original value for the element.

Adding a Motion Group Tag as a Parameter

Adding a Tag or Tag Member as a Parameter makes the Tag value accessible to the Application Code Manager (ACM) application.

1. Click the Tag name to highlight it.
2. Right-click the highlighted name to open the contextual menu. Select **Add as Parameter**. The **Add new Parameter** window opens.
3. Edit the Parameter. Some fields will be filled with default values based on the Tag settings. Refer to Adding a New Parameter on page 70 for fields and settings available in the window.
4. Click **OK** to add the Parameter. The new Parameter is added to the **Parameters** tab for the Library Object. The token for the new Parameter appears in the Value Expression column for the Tag, indicating that the Tag will now accept values from the Parameter. Decoration tokens appear as blue.

Adding a Motion Group Tag as an External Reference

Adding a Tag or Tag Member as an External Reference makes the Tag value accessible to reference-type Parameters in ACM.

Follow these steps to add a Tag as an External Reference.

1. Click the Tag name to highlight it.
2. Right-click the highlighted name to open the contextual menu. Select **Add External Reference**. The **Reference Builder** window opens.

   TIP All fields other than the **Description** field are filled in by default. In a typical application, the default values should not be changed. Refer to Adding a New External Reference on page 100.

3. Click **OK** to add the External Reference. The new External Reference is added to the **External References** tab for the Library Object.

Applying Decoration to Motion Group Tag Values

Follow these steps to apply decoration to a Tag value.

1. Click within the **Value Expression** column for the Tag listing.
2. Right-click to open the contextual menu. Select **Add/Edit Expression**. The **Expression Builder** window opens.
3. Edit the Expression. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
4. Click **OK** to add the Expression. The Expression token appears in the Value Expression column for the Tag, indicating that the Tag will now use the Expression to generate values. Decoration tokens appear as blue.

Follow these steps to edit the decoration applied to a Tag.

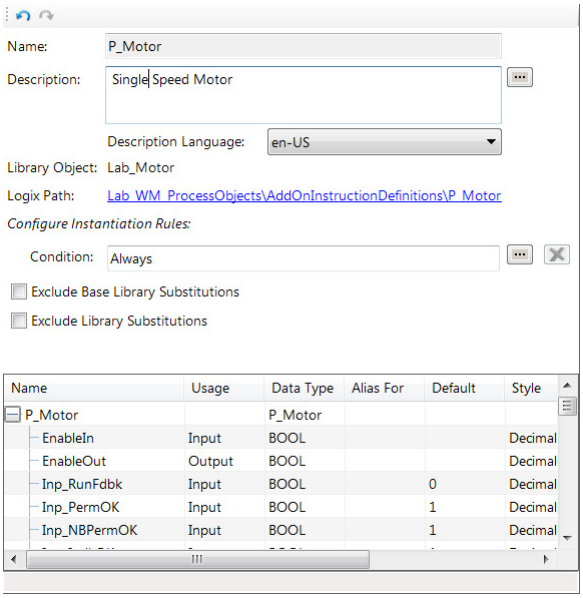
1. Click within the Value Expression column for the Tag listing.
2. Right-click to open the contextual menu. Select **Add/Edit Expression**. The **Expression Builder** window opens.
3. Edit the Expression. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
4. Click **OK**.

Follow these steps to delete the decoration applied to a Tag.

1. Click within the Value Expression column for the Tag listing.
2. Right-click to open the contextual menu. Select **Remove Expression**. The Expression is deleted from the column.

Applying Decoration to an Add-On Instruction

When an Add-On Instruction is selected, the **Decorator Panel** display has one functional area. The bottom half of the panel displays the Tag and Tag Members for the Add-On Instruction, but these cannot be edited or decorated.



The following table describes the fields in the top half of the **Decorator Panel** when an Add-On Instruction is selected.

Name	Field Type	Description
Name	Read only	This field is not available for editing.
Description	Text entry	The description that will be applied to the Add-On Instruction when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Add-On Instruction description, these are applied by default. Refer to Changing the Add-On Instruction Description on page 154.
Description Language	Read only	The language used for the description. The default is English.
Library Object	Read only	The Library Object that contains the Add-On Instruction.
Logix Path	Read-only link	A link to the **Edit** screen for the Add-On Instruction in the Logix Designer application. Click the link to open the screen. You will need to close the Library Designer plug-in to access the Logix Designer application.
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current Add-On Instruction is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 154.
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the Add-On Instruction will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option “Once per sub object [SubObject name]” for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 154.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 154.

Changing the Add-On Instruction Description

In a typical application, Add-On Instruction descriptions have a user-accessible Parameter applied as a Substitution to the original text string. This allows the user to assign instance-specific identification to the Add-On Instruction when it is added to an ACM Project.

Substitutions can also be inherited from the Library Object, the Project Library Object, or the Controller Library Object.

The **Decorator Panel** allows you to create Substitutions which can be applied directly to the **Definition** field of an Add-On Instruction. Refer to The Substitution Builder on page 112.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to “One per object”, or select “Include Once” to limit the element to a single instance in the Project.

To revert to the default condition, click **Revert** (red X) to the right of the **Condition** field.

Excluding Inherited Substitutions

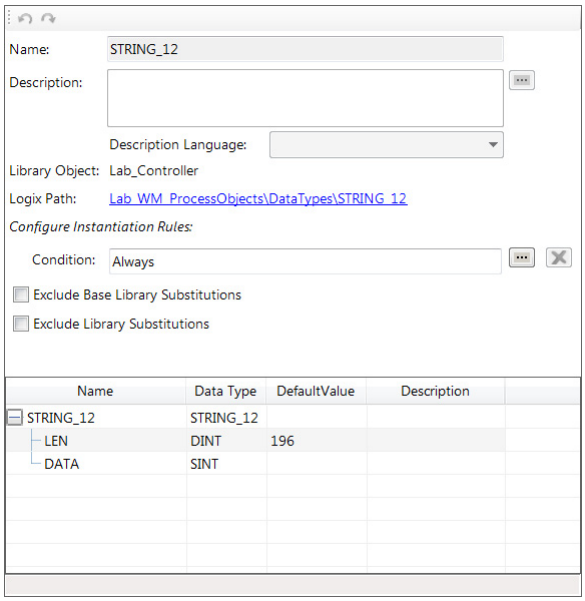
To remove Substitutions that have been inherited from the Library Object, check the **Exclude Library Substitutions** checkbox. The field reverts to the original value for the element.

To remove Substitutions that have been inherited from the Base Library Object for the current Library Object, check the **Exclude Base Library Substitutions** checkbox.

- If Substitutions have also been added to the Library Object, the field switches to the Library Object Substitution.
- If no Substitutions have been added to the Library Object, the field reverts to the original value for the element.

Applying Decoration to a Data Type

When a Data Type is selected, the **Decorator Panel** display has one functional area. The bottom half of the panel displays the Tag and Tag Members for the Data Type, but these cannot be edited or decorated.



The following table describes the fields in the top half of the **Decorator Panel** when a Data Type is selected.

Name	Field Type	Description
Name	Read only	This field is not available for editing.
Description	Text entry	The description that will be applied to the Data Type when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Data Type description, these are applied by default. Refer to Changing the Data Type Description on page 156.
Description Language	Read only	The language used for the description. The default is English.
Library Object	Read only	The Library Object that contains the Data Type.
Logix Path	Read-only link	A link to the **Edit** screen for the Data Type in the Logix Designer application. Click the link to open the screen. You will need to close the Library Designer plug-in to access the Logix Designer application.
Configure Instantiation Rules: Condition	Text entry	Sets the condition under which the current Data Type is instantiated. Default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to Setting a Rule for Instantiation on page 156.
Configure Instantiation Rules: Usage	Pull-down menu	The number of times the Data Type will be instantiated. Default is Once per Object. Default options are: • One per Object • Include Once If the containing Library Object has SubObjects, there will also be an option “Once per sub object [SubObject name]” for each SubObject.
Exclude Base Library Substitutions	Checkbox	If checked, allows Substitutions added to the Base Library Object for the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 156.
Exclude Library Substitutions	Checkbox	If checked, allows Substitutions added to the current Library Object to be overridden. Refer to Excluding Inherited Substitutions on page 156.

Changing the Data Type Description

In a typical application, Data Type descriptions have a user-accessible Parameter applied as a Substitution to the original text string. This allows the user to assign instance-specific identification to the Add-On Instruction when it is added to an ACM Project.

Substitutions can also be inherited from the Library Object, the Project Library Object, or the Controller Library Object.

The **Decorator Panel** allows you to create Substitutions which can be applied directly to the **Definition** field of an Add-On Instruction. Refer to The Substitution Builder on page 112.

Setting a Rule for Instantiation

By default, elements are set to instantiate under all conditions, and to instantiate once every time the Library Object is added to an ACM Project.

Follow these steps to set a rule for instantiation.

1. Enter a value in the **Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
2. Set the **Usage** field to "One per object", or select "Include Once" to limit the element to a single instance in the Project.

To revert to the default condition, click **Revert** (red X) to the right of the **Condition** field.

Excluding Inherited Substitutions

To remove Substitutions that have been inherited from the Library Object, check the **Exclude Library Substitutions** checkbox. The field reverts to the original value for the element.

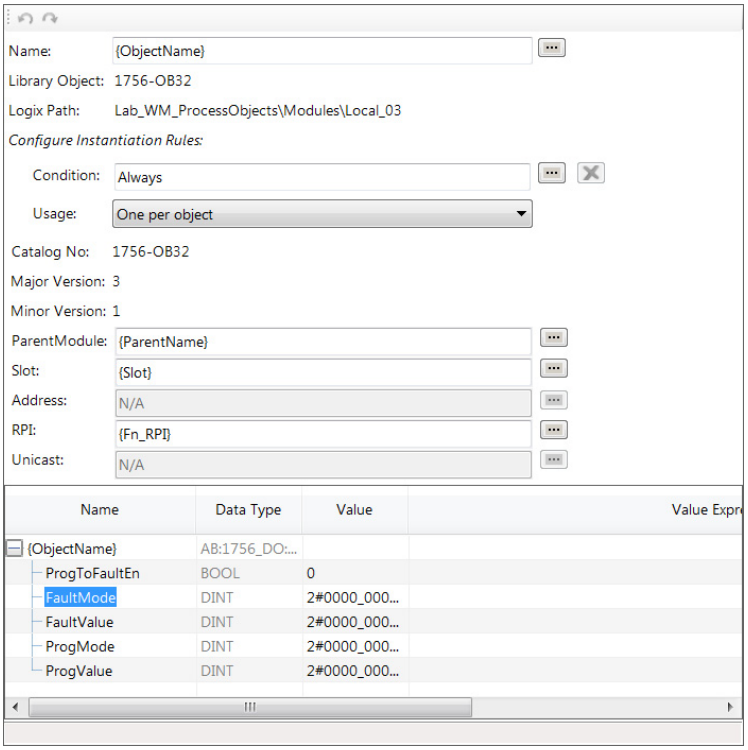
To remove Substitutions that have been inherited from the Base Library Object for the current Library Object, check the **Exclude Base Library Substitutions** checkbox.

- If Substitutions have also been added to the Library Object, the field switches to the Library Object Substitution.
- If no Substitutions have been added to the Library Object, the field reverts to the original value for the element.

Applying Decoration to a Module

Module Library Objects include a node for input/output configuration, including fields that are not found in other Library Object elements. When a Module is selected, the **Decorator Panel** display has two functional areas.

The bottom half of the panel displays the Configuration Tags and Tag Members for the Module.



The following table describes the fields in the top half of the **Decorator Panel** when a Module is selected.

Name	Field Type	Description
Name	Text entry	The name that will be applied to the Module when the Library Object is instantiated. If Substitutions have been added that replace strings that appear in the original Module name, these are applied by default. Refer to Changing the Module Name, Parent Module, Slot, Address, RPI, or Unicast on page 158.
Library Object	Read only	The Module Library Object that contains the Module.
Major Version	Read only	The major version for the Library Object.
Minor Version	Read only	The minor version for the Library Object.
Parent Module	Text entry	The name that will be applied to the Module when the Library Object is instantiated. A **Predefined Parameter** is assigned by default.
Slot	Text entry	The Module slot. A **Predefined Parameter** is assigned by default.
Address	Text entry	For Ethernet-enabled Modules, the IP Address.
RPI	Text entry	The Requested Packet Interval (RPI) for the Module. A **Predefined Parameter** is assigned by default.
Unicast	Text entry	For Ethernet-enabled Modules, the Unicast Address.

Changing the Module Name, Parent Module, Slot, Address, RPI, or Unicast

When Module Library Objects are added, default Substitutions are applied throughout the Library Object by the **Module Wizard**. Refer to The Module Wizard on page 53.

The **Decorator Panel** allows you to change the default Substitution for any of the active fields in a Module. Refer to The Substitution Builder on page 112.

Adding a Module Tag as a Parameter

Adding a Tag or Tag Member as a Parameter makes the Tag value accessible to the Application Code Manager (ACM) application.

Follow these steps to add a Tag as a Parameter.

1. Click the Tag name to highlight it.
2. Right-click the highlighted name to open the contextual menu. Select **Add as Parameter**. The **Add new Parameter** window opens.
3. Edit the Parameter. Some fields will be filled with default values based on the Tag settings. Refer to Adding a New Parameter on page 70 for fields and settings available in the window.
4. Click **OK** to add the Parameter. The new Parameter is added to the **Parameters** tab for the Module Library Object. The token for the new Parameter appears in the Value Expression column for the Tag, indicating that the Tag will now accept values from the Parameter. Decoration tokens appear as blue.

Adding a Module Tag as an External Reference

Adding a Tag or Tag Member as an External Reference makes the Tag value accessible to reference-type Parameters in ACM.

Follow these steps to add a Tag as an External Reference.

Follow these steps to add a Tag as an External Reference.

1. Click the Tag name to highlight it.
2. Right-click the highlighted name to open the contextual menu. Select **Add External Reference**. The **Reference Builder** window opens.

   TIP All fields other than the **Description** field are filled in by default. In a typical application, the default values should not be changed. Refer to Adding a New External Reference on page 100.

3. Click **OK** to add the External Reference. The new External Reference is added to the **External References** tab for the Library Object.

Applying Decoration to Module Tag Values

Follow these steps to apply decoration to a Tag value.

1. Click within the **Value Expression** column for the Tag listing.
2. Right-click to open the contextual menu. Select **Add/Edit Expression**. The **Expression Builder** window opens.
3. Edit the Expression. Refer toThe Library Designer Plug-in: The Expression Builder on page 103.
4. Click **OK** to add the Expression. The Expression token appears in the Value Expression column for the Tag, indicating that the Tag will now use the Expression to generate values. Decoration tokens appear as blue.

Follow these steps to edit the decoration applied to a Tag.

1. Click within the Value Expression column for the Tag listing.
2. Right-click to open the contextual menu. Select **Add/Edit Expression**. The **Expression Builder** window opens.
3. Edit the Expression. Refer toThe Library Designer Plug-in: The Expression Builder on page 103.
4. Click **OK**.

Follow these steps to delete the decoration applied to a Tag.

1. Click within the Value Expression column for the Tag listing.
2. Right-click to open the contextual menu. Select **Remove Expression**. The Expression is deleted from the column.

Notes:

The Library Object Manager Application

Chapter Objectives

This chapter provides information on the following topics:

Features of the Library Object Manager Application

The Library Object Manager application allows a Librarian to perform these tasks:

- Saving Library Objects as individual files or entities in a database
- Adding non-Logix components to Library Objects, including FactoryTalk® View SE/ME Symbols, FactoryTalk Historian Tags and FactoryTalk Alarms and Events (FTAE) Digital Alarms
- Creating Repositories for storing and distributing Library Object files

Opening the Library Object Manager Application

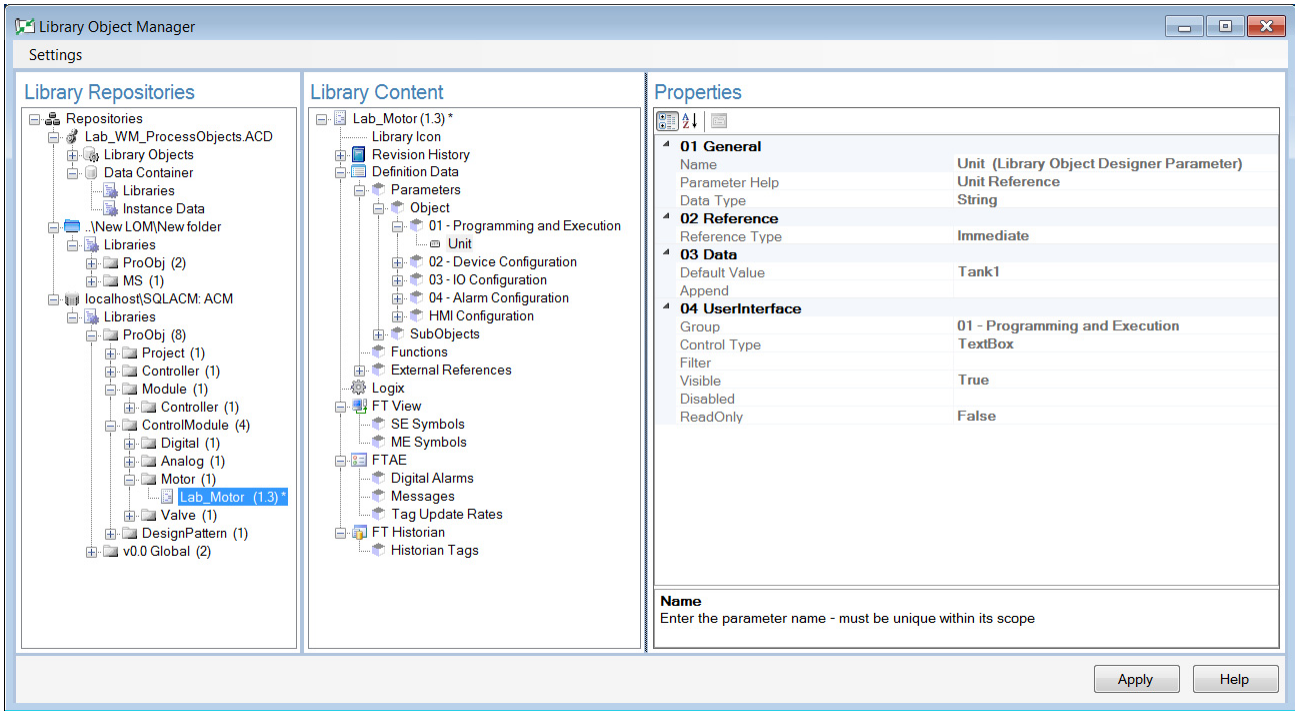
To open the Library Object Manager application, do one of the following:

- Click the Library Object Manager application shortcut on the desktop, if a shortcut has been installed.
- From the **Start** menu, select:

  All Programs ->Rockwell Automation->Application Code Manager ->Library Object Manager.

The Main Graphic User Interface

This chapter describes the **Main Graphic User Interface** (Main GUI) for the Library Object Manager application.



The following table describes the regions and controls on the **Main Graphic User Interface**.

Settings Command	Refer to Setting the Default Options for Library Object Classification on page 164
Library Repositories Tree View	Refer to The Library Repositories Tree View on page 165 for more information.
Library Content Tree View	Refer to The Library Content Tree View on page 166 for more information.
Properties Panel	Refer to The Properties Panel on page 167 for more information.
Main Button Bar	Refer to Main Button Bar on page 169 for more information.

The Library Object Manager **Main Graphic User Interface** is divided into three columns.

The **Library Repositories** column displays collections of Library Objects (repositories). There are three kinds of repositories that can be added to the display:

- **ACD**: An ACD base controller code file that includes Library Objects created in the Library Designer plug-in. These Library Objects are still part of the ACD file and must be published to a Folder or Application Code Manager (ACM) database before they can be added to an ACM Project. ACD files are first added to the Library Object Manager application, then mounted to make the Library Objects accessible to the program.

- **Folder**: A new or existing Windows folder. Individual Library Object files can be copied into Folders for remote distribution.

- **ACM**: An instance of the ACM Database.

When a Library Object is copied into a Folder or the ACM Database, the Library Object Manager application generates an HLS4 file for the Library Object.

Library Objects may be copied multiple times. Each time a Library Object is copied, a distinct version of the Library Object is created and a distinct HLS4 file is generated.

The **Library Content** column displays a tree view of the content of a Library Object that has been selected in the Library Repositories column. The Library Content column becomes active when a Library Object that has been copied to a Folder or to the ACM Database is selected.

By default, the column displays Library Object content as a read-only display in the **Properties** panel under these headings:

- **Revision History**: The information entered when the current version of the Library Object was created.
- **Definition Data**: The decoration added in the Library Designer plug-in.
- **Logix**: The actual logix code for the Library Object, displayed as XML.

You can also use the **Library Content** column to add these features to a selected Library Object:

- **FactoryTalk® View SE/ME**: A Human Machine Interface (HMI) element. Refer to Adding FactoryTalk View SE/ME Content to a Library Object on page 191.
- **FactoryTalk Alarms and Events (FTAE)**: A FactoryTalk Alarm and Events element. Refer to Adding FactoryTalk Alarms and Events (FTAE) Content to a Library Object on page 200.
- **FactoryTalk Historian SE**: A FactoryTalk Historian element. Refer to Adding FactoryTalk Historian Content to a Library Object on page 207.

These features can only be added after a Library Object has been copied to a Folder or the ACM Database. They are included in the individual HSL4 Library Object file, but are not added to the original ACD file.

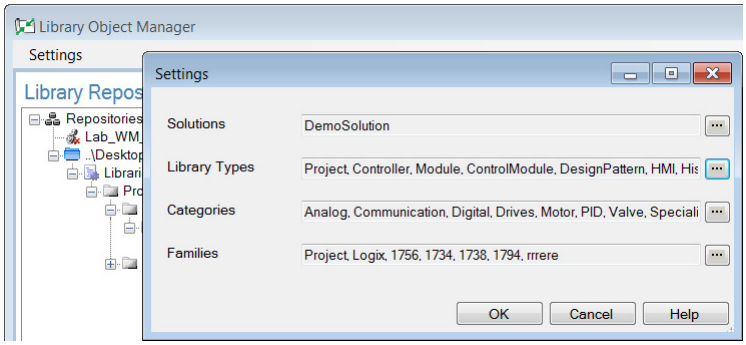
The **Properties** panel displays the fields for the Revision History, Decoration, and Logix code of the selected Library Object. It also displays the fields and controls available when an element that can be actively edited is selected.

Setting the Default Options for Library Object Classification

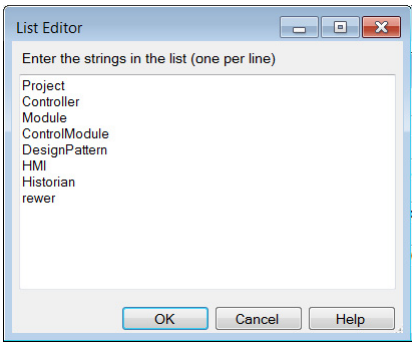
The **Settings** window allows you to set default options for the **Library Type**, **Category** and **Family** fields in the **Properties** panel. These options display in the pull-down menus for these fields, although the fields also accept direct text entry.

Follow these steps to set the default options.

1. Click the **Settings** command at the top of the Library Object Manager window. The **Settings** window opens.



2. Click **Ellipsis** for one of the fields listed. The **List Editor** window opens.



3. Enter the options for the field, one per line.
4. Click **OK** to accept the options or **Cancel** to cancel.
5. Click **OK** in the **Settings** window to save the changes.

Resizing the Main Graphic User Interface

Follow these steps to resize the interface.

1. Click and hold on a border or a corner of the window.
2. Drag to resize.
   a. If you have selected the top or bottom border, the resize will be limited to vertical.
   b. If you have selected the left or right border, the resize will be limited to horizontal.
   c. If you have selected a corner, the window will resize in all directions.

Resizing the Columns in the Interface

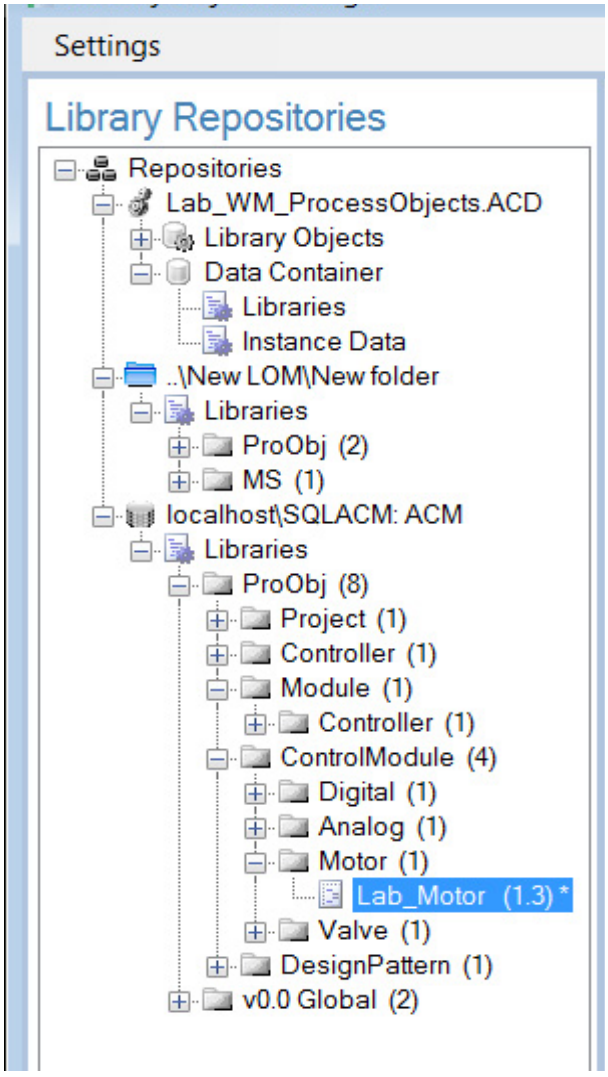
Follow these steps to resize individual columns.

1. Click and hold on the blue bar that separates the columns.
2. Drag to resize.

TIP The overall window size remains the same, so all columns will resize to accommodate the change.

The Library Repositories Tree View

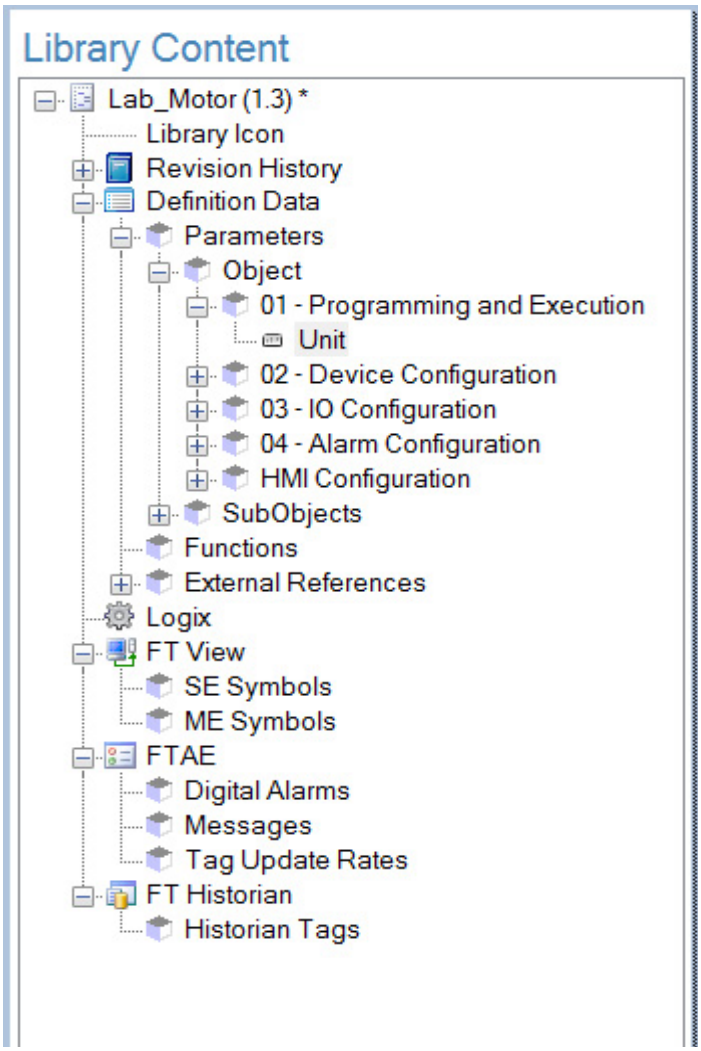
The **Library Repositories Tree View** is displays the open Repositories.



Click the + icon to the left of an item in the tree to display elements that are contained within it. Click the - icon to collapse the element display.

The Library Content Tree View

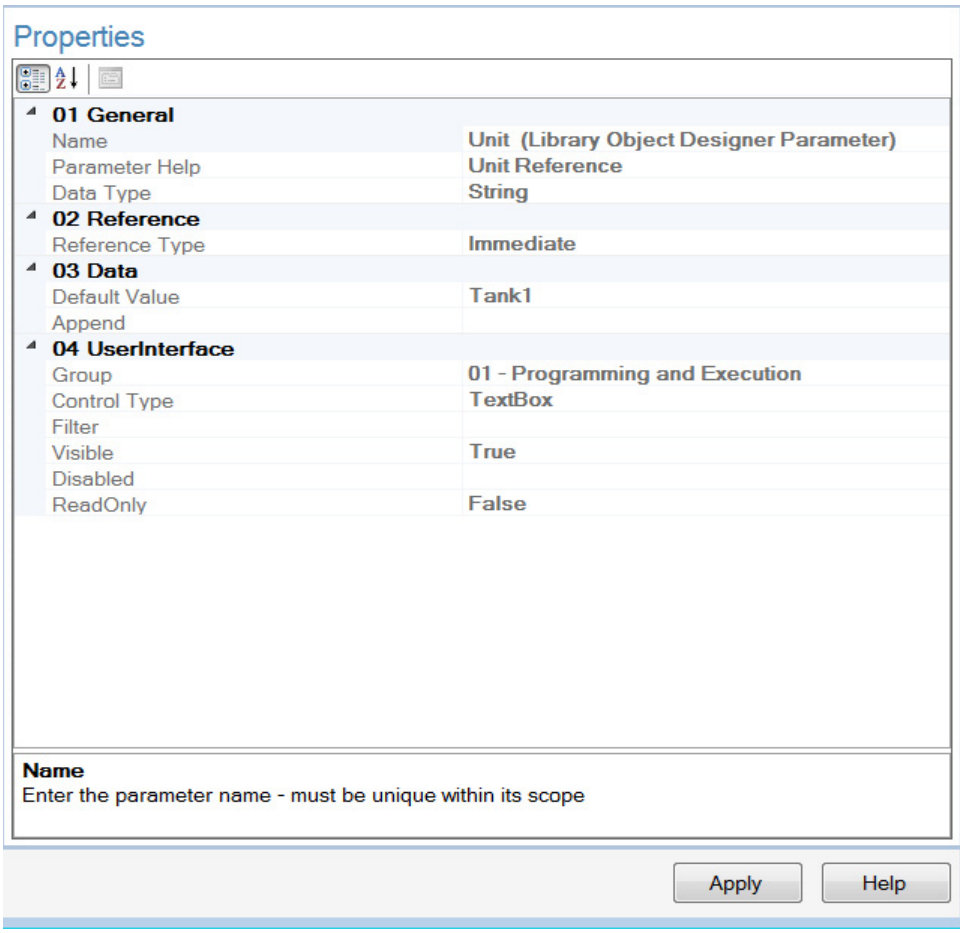
The **Library Content Tree View** displays the content of the currently selected Library Object.



Object elements generated by the Studio 5000 Logix Designer® application and the Library Designer plug-in display with read-only fields in the **Properties** panel. Elements generated by the Library Object Manager application display with editable fields in the **Properties** panel.

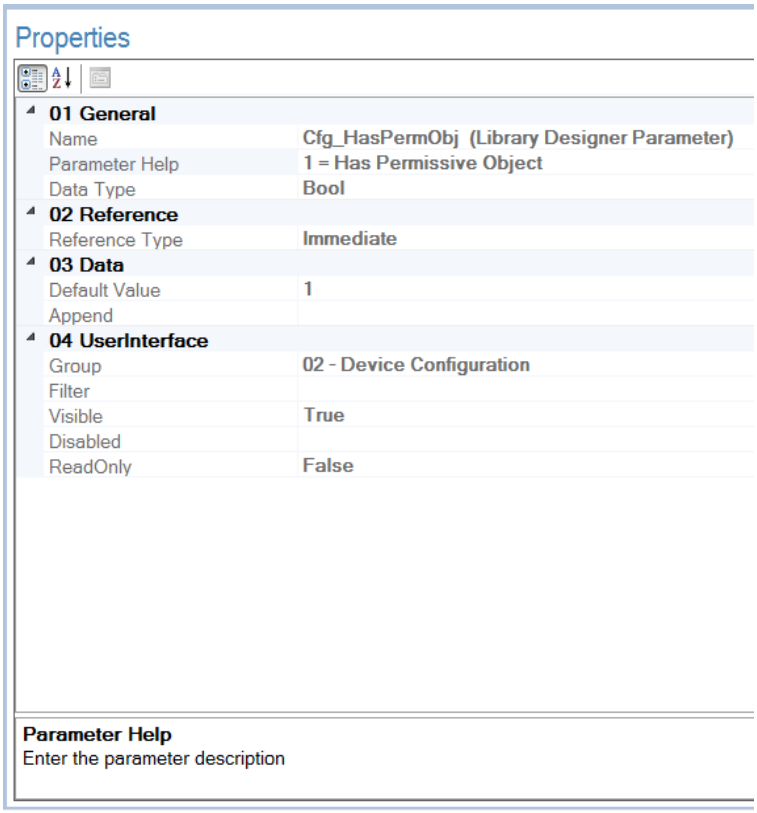
The Properties Panel

The **Properties** panel becomes active when an element within a Library Object is selected. It displays the fields and functions available to that element. The display changes based on the currently selected element.

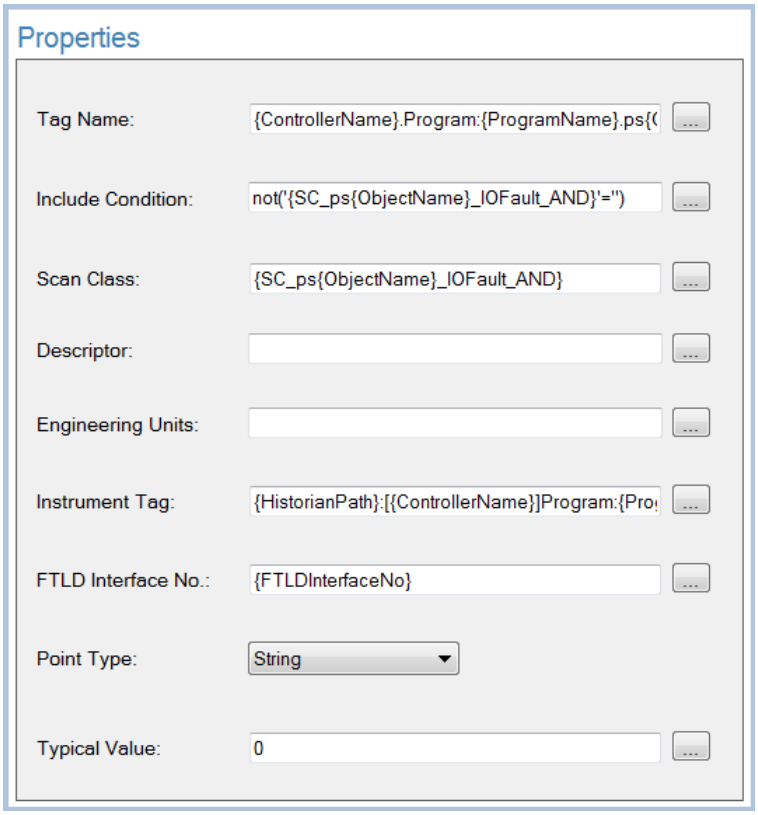


Editable fields display within an active editing widget, such as a text box of a pull-down menu. Fields which are locked for editing display with a white background. Fields which can accept calculated values show the **Ellipsis** (...) button to the right. Clicking this button opens the **Expression Builder** or the **Tag Browser**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

Properties Panel with a Parameter selected. Fields are read-only.



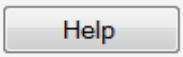
Properties Panel with a Historian Tag selected. Fields are editable.



Main Button Bar

The **Main Button Bar** is shown below.

The following table describes the **Main Button Bar** commands.

	The **Apply** button updates the selected Library Object with the most recent changes applied in the **Properties** panel. It does not close the program.
	The **Help** button opens the help screens for the Library Object Manager application.

Notes:

The Library Object Manager Application: Adding Repositories and Copying Library Objects

Chapter Objectives

This chapter provides information on the following topics:

The Library Object Manager Application Functions

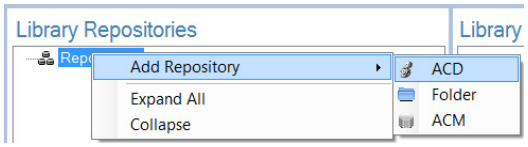
The design process begun with the creation of a single instance of ACD controller code continues in Library Object Manager application with these steps.

1. An ACD repository is opened and mounted.
2. A Folder, or an instance of the Application Code Manager (ACM) Database, is opened.
3. Library Objects from the ACD repository are copied to the Folder or to the ACM Database.
4. FactoryTalk® View, FactoryTalk Alarms and Events (FTAE), or FactoryTalk Historian features are added to the Library Object.
5. The Library Object file is saved as a new, distinct version of the Library Object and becomes available for use in an ACM Project.

Adding and Mounting an ACD Repository

Follow these steps to add and mount an ACD repository.

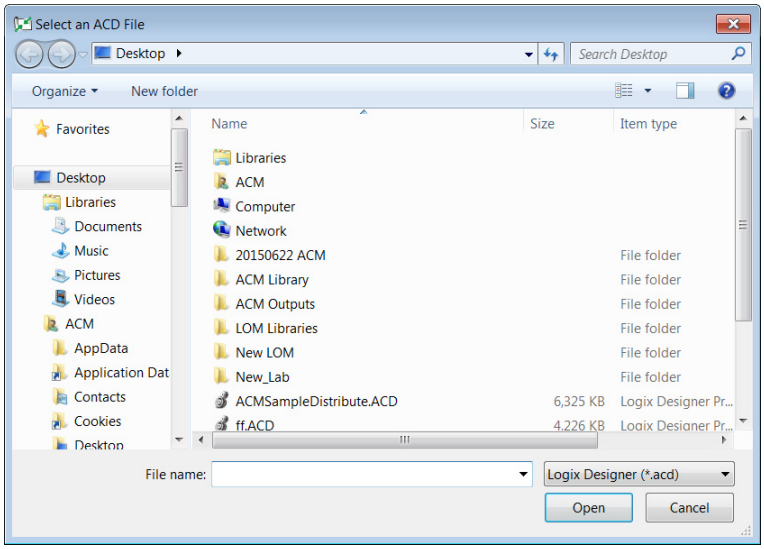
1. In the **Library Repositories** column, click a Repositories item to make it active. Right-click to open the contextual menu.



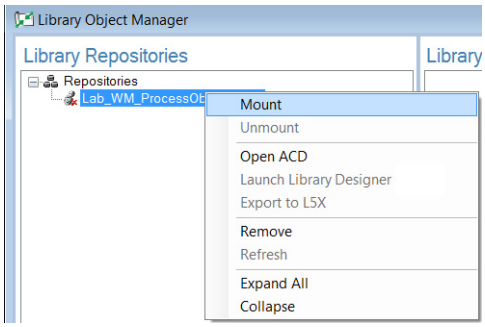
The following table describes each command in the menu.

Add Repository	Opens an explorer window to locate an ACD file, an ACD file folder, or a connection to the local ACM Database.
Expand All	Expands all collapsed elements in the Library Repositories column.
Collapse	Collapses all elements in the Library Repositories column.

2. Select **Add Repository** -> **ACD**. The **Select an ACD File** window opens.



3. Navigate to the ACD file you wish to add and double-click the listing or click **Open**.
4. The ACD file opens. Note that the file displays with a red "X" next to the name, and that the Library Objects are not accessible. To make the Library Objects accessible, the ACD file must be mounted.



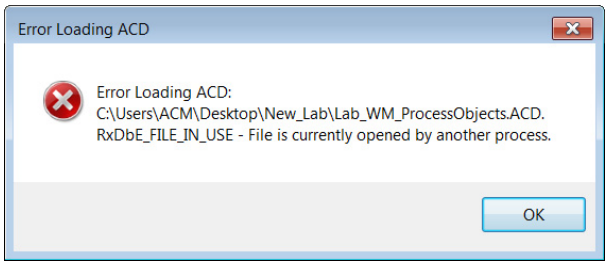
5. Select the ACD file to make it active. Right-click to open the contextual menu.

The following table describes each command in the menu.

Mount	Mounts the ACD file.
Unmount	Unmounts the ACD file. The listing becomes inactive but remains in the Library Repositories column.
Open ACD	Opens the ACD file in the Studio 5000 Logix Designer® application. This command is only available if the ACD file is not mounted.
Launch Library Designer	Opens the ACD file in the Library Designer plug-in. This command is only available if the ACD file is mounted.
Export to L5X	Exports the ACD file to L5X format. This command is only available if the ACD file is mounted.
Remove	Remove the ACD file from the **Library Repositories** column.
Refresh	Refreshes the display.
Expand All	Expands all collapsed elements contained within the ACD file.
Collapse	Collapses all elements contained within the ACD file.

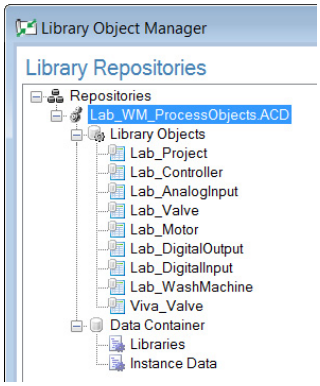
6. Select **Mount**.

IMPORTANT You will not be able to mount the ACD file if it is currently open in the Logix Designer application. An error window displays:



To make the ACD file accessible to the Library Object Manager application, close it in the Logix Designer application.

7. The Red "X" no longer displays and the Library Objects are added to the repository.



Unmounting an ACD Repository

Follow these steps to unmount an ACD Repository.

1. Click the repository to make it active. Right-click to open the contextual menu.
2. Select **Unmount**. The repository remains in the **Library Repositories** column, but the Library Objects are no longer accessible.

Editing an ACD Repository in the Studio 5000 Logix Designer Application

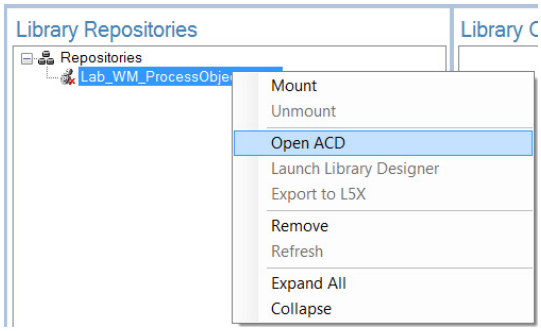
You can move directly between the Library Object Manager application, the Library Designer plug-in, and the Logix Designer application when working with a file.

Follow these steps to move from the Library Object Manager application to the Logix Designer application.

1. Click the repository to make it active. Right-click to open the contextual menu.
2. Select **Unmount**.

IMPORTANT	You must unmount the ACD file before you will be able to open it in the Logix Designer application. When the ACD file is mounted, the **Open ACD File** command appears dimmed.

3. Select **Open ACD**. The file opens in the Logix Designer application.



4. When you have completed modifications to the file, close it in the Logix Designer application. You will then be able to mount it in the Library Object Manager application.

IMPORTANT	Modifications to the ACD file are saved to the file, but are not saved to Library Objects that have already been published to Folders or the ACM Database. You will need to generate new versions of the Library Object to incorporate the most recent modifications.

Editing an ACD Repository in the Library Designer Plug-in

You can move directly between the Library Object Manager application, the Library Designer plug-in, and the Logix Designer application when working with a file.

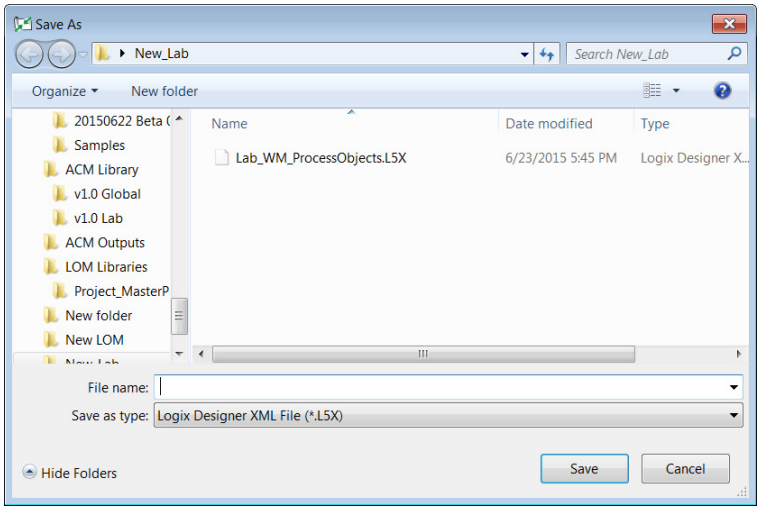
Follow these steps to move from the Library Object Manager application to the Library Designer plug-in.

1. Click the repository to make it active. If necessary, mount the repository.
2. Right-click to open the contextual menu. Select **Launch Library Designer**.
3. The file opens in the Library Designer plug-in. When you have completed modifications to the file, close the Library Designer plug-in. You will return to the Library Object Manager application with the modifications saved.

Exporting an ACD Repository to L5X Format

Follow these steps to export an ACD Repository to L5X.

1. Click the repository to make it active. Right-click to open the contextual menu.
2. Select **Export to L5X**.
3. The **Save As** window opens. Navigate to the folder location where you wish to save the file and click **Save** to save or **Cancel** to cancel.



Removing an ACD Repository from the Library Object Manager Application

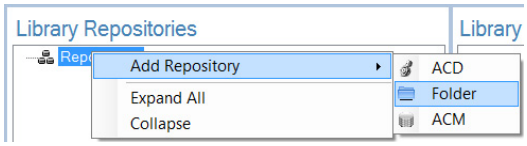
Follow these steps to remove an ACD Repository.

1. Click the repository to make it active. Right-click to open the contextual menu.
2. Select **Remove**. The repository is closed in the Library Object Manager application and its listing is removed from the **Library Repositories** column.

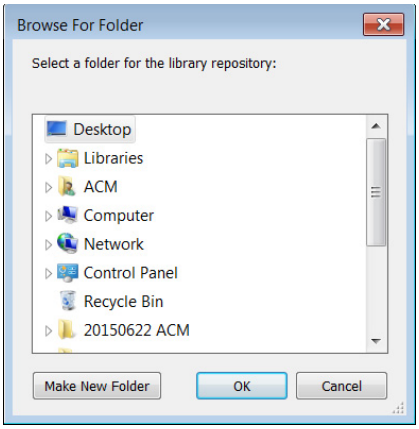
Adding a Folder Repository

Follow these steps to add a Folder Repository.

1. In the **Library Repositories** column, click the Repositories item to make it active. Right-click to open the contextual menu.



2. Select **Add Repository** -> **Folder**. The **Browse For Folder** window opens.

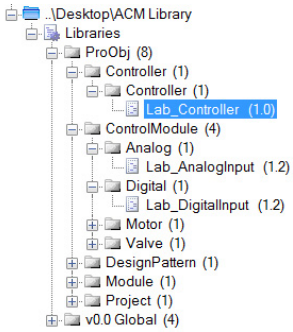


3. Select an existing folder or create a new one.
   a. To select an existing folder, navigate to the folder and double-click the listing. Click **OK**.
   b. To create a new folder, click **Make New Folder**. A new folder is added to the current directory in the window. The name is highlighted. Change the name and click **OK**. The Folder opens.

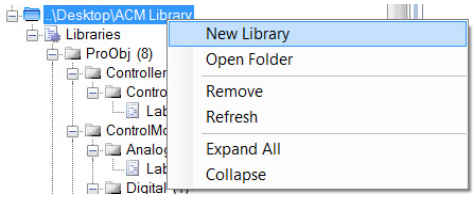
   If the Folder contains Library Objects, they are added to the tree view. Library Objects are classified within a four-level hierarchy:

   Solution -> Library Type -> Category -> Catalog Number

   Library Objects in a repository Folder are organized according to this hierarchy, with the Catalog Number and Version Number uniquely identifying the Library Object.



4. Right-click the Folder icon to open the contextual menu.



The following table describes each command in the menu.

New Library	Creates a new, empty Library Object. Refer to Creating a New Library Object on page 182.
Open Folder	Opens the repository folder in Windows Explorer.
Remove	Remove the Folder from the **Library Repositories** column.
Refresh	Refreshes the display.
Expand All	Expands all collapsed elements contained within the ACD file.
Collapse	Collapses all elements contained within the ACD file.

Removing a Folder Repository from the Library Object Manager Application

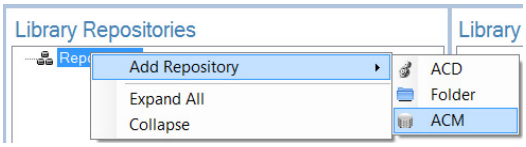
Follow these steps to remove a Folder Repository.

1. Click the Folder to make it active. Right-click to open the contextual menu.
2. Select **Remove**. The Folder is closed in the Library Object Manager application and its listing is removed from the **Library Repositories** column. All Library Objects added to the Folder are saved to the folder location and can be registered in ACM.

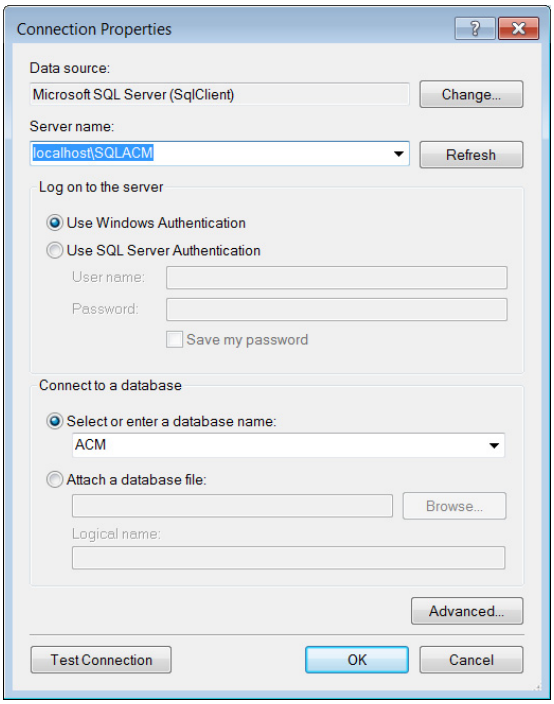
Adding the ACM Database as a Repository

Follow these steps to add the ACM Database.

1. In the **Library Repositories** column, click the Repositories item to make it active. Right-click to open the contextual menu.



2. Select **Add Repository** -> **ACM**. The **Connection Properties** window opens.

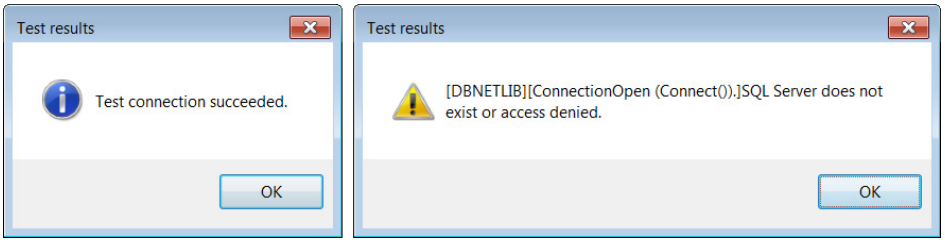


The following table describes the fields and controls on the **Connection Properties** window.

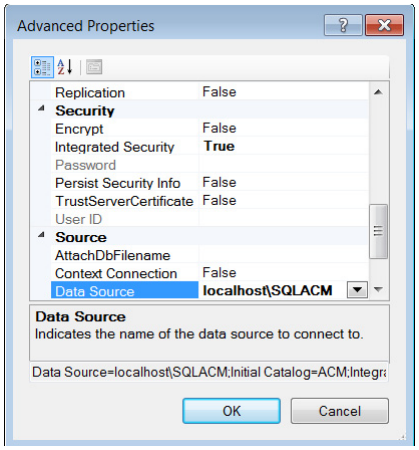
Name	Field Type	Description
Data Source	Read-only	Displays the current data source in the following format: **<Database> (<Client>)**
Change	Button	Allows you to select a different data source.
Server name	Text entry	Selects a computer name and SQL server instance from a pull-down menu. You can enter a computer name and SQL server instance in the following format: **<Computer Name> \ <SQL Server Instance>**
Refresh	Button	Refreshes the Server name selections.
Log on to the server		
Use Windows Authentication	Radio Button	When this is selected, username and password will be provided through the current Windows user information.
Use SQL Server Authentication	Radio Button	When this is selected, username and password must be entered manually.

Username:	Text entry	SQL server username entered during ACM Database creation. *Refer to the ACM manual* for more information. The default username is "sa".
Password:	Text entry	SQL server password entered when SQL Server Express was installed. *Refer to the ACM manual* for more information.
Save my password	Checkbox	When this is checked, the username and password are saved and entered by default in future sessions.
Connect to a database		
Select or enter a database name	Radio Button/Pull-down menu	Selects a database name from a pull-down menu. The default ACM Database name is displayed (ACM). The list includes all databases on the currently selected server.
Attach a database file	Radio Button/Text entry	Allows you to use a different data file. Click **Browse** to open a navigation window to select the file.
Logical Name	Text entry	Becomes active when **Attach a database file** is selected. Allows you to enter a name for the database file.
Advanced	Button	Click to open the **Advanced Properties** window.
Test Connection	Button	Click to test the connection to the currently selected database without opening it.
OK	Button	Click to open the selected database in the Library Object Manager application.
Cancel	Button	Click to cancel.

3. You can select the default ACM Database or use a different data file.
   a. To select the default ACM Database, click **OK**.
   b. To select a different data server, select from the pull-down menu in the **Server name** field, or enter a different server name and SQL server instance. Then click **Refresh**. When the refresh is complete, click **OK**.
   c. To select a different database from the current server, select from the **Select or enter a database name** pull-down menu. Then click **OK**.
   d. To select a data file from outside the server, select **Attach a database file** and click **Browse**. Navigate to the data file. Click **OK** to load it, then enter a name in the **Logical name** field. Click **OK**.
4. To test the database connection, click **Test Connection**. The **Test results** window opens to display whether or not the connection was successful. If the connection is not successful, the OK button is deactivated until a successful connection is made.



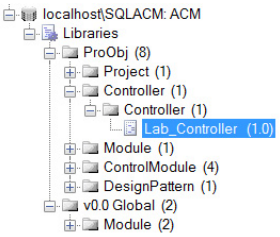
5. To see detailed information about the data connection, click **Advanced**. The **Advanced Properties** window opens.



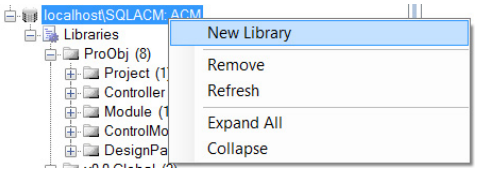
The ACM Database, or the selected database or file, opens. The Library Objects in the database are added to the tree view. Library Objects are classified within a four-level hierarchy:

Solution -> Library Type -> Category -> Catalog Number

Library Objects in the ACM Database are organized according to this hierarchy, with the Catalog Number and Version Number uniquely identifying the Library Object.



6. Right-click the ACM Database icon to open the contextual menu.



The following table describes each command in the menu.

New Library	Creates a new, empty Library Object. Refer to Creating a New Library Object on page 182.
Remove	Remove the Folder from the **Library Repositories** column.
Refresh	Refreshes the display.
Expand All	Expands all collapsed elements contained within the ACD file.
Collapse	Collapses all elements contained within the ACD file.

Removing the ACM Database from the Library Object Manager Application

Follow these steps to remove the ACM Database.

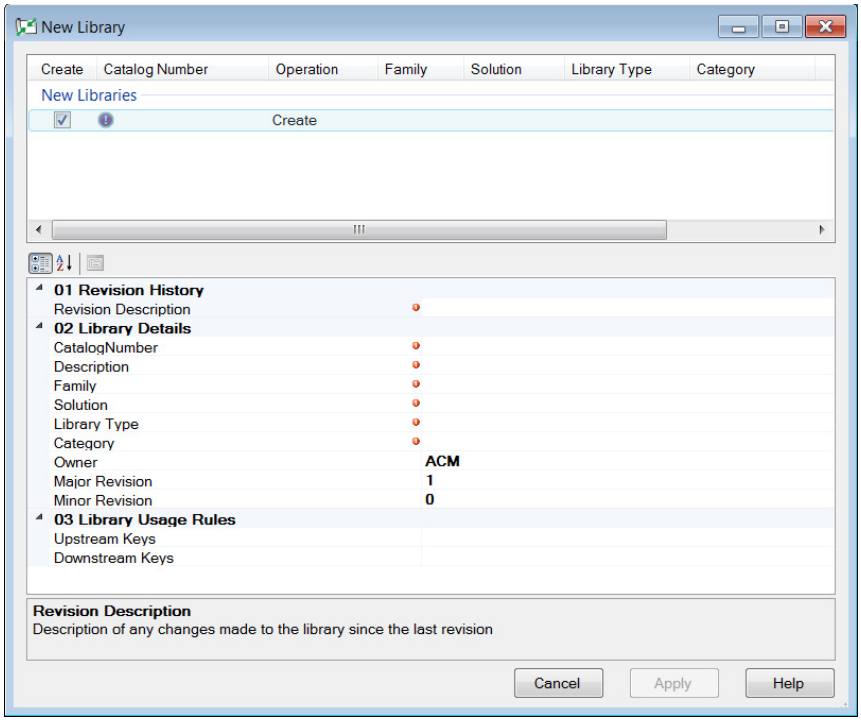
1. Click the ACM Database icon to make it active. Right-click to open the contextual menu.
2. Select **Remove**. The ACM Database is closed in the Library Object Manager application and its listing is removed from the **Library Repositories** column.

Creating a New Library Object

You can create a new Library Object from within a Folder Repository or the ACM Database. This Library Object will have no CLX content.

Follow these steps to create a new, empty Library Object.

1. Click the Folder or Database icon to make it active. Right-click to open the contextual menu.
2. Select **New Library**. The **New Library** window opens.



The **New Library** window has the following fields.

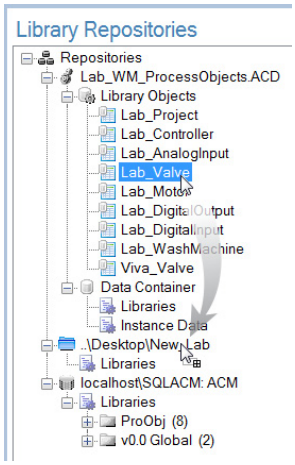
Name	Field Type	Description
01 Revision History		
Revision Description	Text entry	A description of the updates made to the current Library Object, compared to previous versions of the Library Object. Appears in the **Revision History** screen when the Object is registered in the Application Code Manager (ACM) application. This is entered manually. This is a required field.
02 Library Details		
CatalogNumber	Text entry	The Library Object name, which appears together with the revision number in the Library Object listing when the Library Object is registered in ACM. This is entered manually. This is a required field.
Library Object Description	Text entry	The description of the Library Object. This is a required field.
Family	Pull-down menu	The Family for the Library Object. This is a required field.
Solution	Pull-down menu	The Solution for the Library Object. Refer to The Library Management Workflow on page 13 for more information on the naming conventions for Library Objects. This is a required field.
Library Type	Pull-down menu	The Library Type for the Library Object. Refer to The Library Management Workflow on page 13 for more information on the naming conventions for Library Objects. This is a required field.
Category	Pull-down menu	The Category for the Library Object. Refer to The Library Management Workflow on page 13 for more information on the naming conventions for Library Objects. This is a required field.
Owner	Text entry	The user or entity that originally published the Library Object. This is a required field.
Major Revision	Text entry (integer)	The major revision number for the Library Object. For a new Library Object, this defaults to 1.
Minor Revision	Text entry (integer)	The minor revision number for the Library Object. For a new Library Object, this defaults to 0.
03 Library Usage Rules		
Upstream Keys	Text entry	For Module Library Objects: a rule that limits the upstream Hardware components that will be made accessible to the Library Object when it is added to an ACM Project. Rule is entered manually as a logical expression.
Downstream Keys	Text entry	For Module Library Objects: a rule that limits the downstream Hardware components that will be made accessible to the Library Object when it is added to an ACM Project. Rule is entered manually as a logical expression.

3. Enter the information for the new Library Object.
4. Click **Apply** to create the Library Object or **Cancel** to cancel.

Copying a Library Object from the ACD Repository to a Folder Repository or the ACM Database

Follow these steps to copy a Library Object.

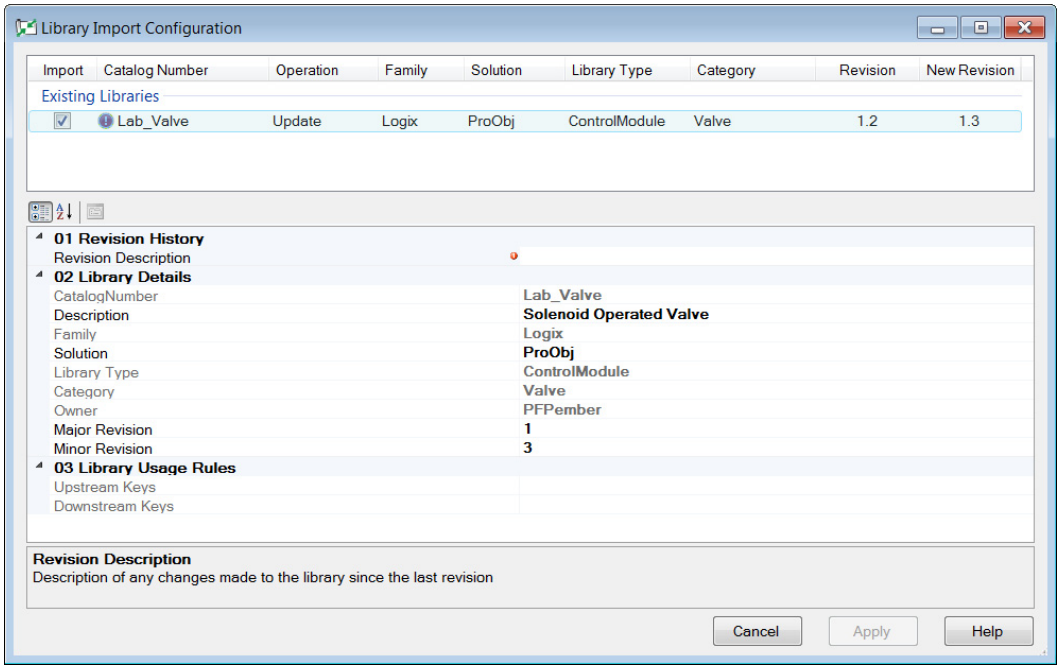
1. Select the Library Object in the ACD Repository and drag it on top of the icon for the Folder Repository or ACM Database.



TIP The pointer changes to the "unavailable" icon until you drag on top of a Repository icon.

The **Library Import Configuration** window opens.

IMPORTANT If you are copying the Library Object into the ACM Database, the new Library Object will be compared to all Library Objects with the same CatalogNumber that are currently stored in the database, and many of the fields in the Library Import Configuration window will be filled in by the database. You will not be able to edit these fields.



The **Library Import Configuration** window has the following fields.

Name	Field Type	Description
01 Revision History		
Revision Description	Text entry	A description of the updates made to the current Library Object, compared to previous versions of the Library Object. Appears in the **Revision History** screen when the Object is registered in the Application Code Manager (ACM) application. This is entered manually. This is a required field.
02 Library Details		
CatalogNumber	Text entry	The Library Object name, which appears together with the revision number in the Library Object listing when the Library Object is registered in ACM. This is entered manually. This is a required field. If you are copying into the ACM Database, the field value is generated by the database and cannot be edited.
Library Object Description	Text entry	The description of the Library Object. This is a required field. If you are copying into the ACM Database, the field value is generated by the database and cannot be edited.
Family	Pull-down menu	The family of the Library Object. This is a required field. If you are copying into the ACM Database, the field value is generated by the database and cannot be edited.
Solution	Pull-down menu	The Solution for the Library Object. Refer to The Library Management Workflow on page 13 for more information on the naming conventions for Library Objects. This is a required field.
Library Type	Pull-down menu	The Library Type for the Library Object. Refer to The Library Management Workflow on page 13 for more information on the naming conventions for Library Objects. This is a required field.
Category	Pull-down menu	The Category for the Library Object. Refer to The Library Management Workflow on page 13 for more information on the naming conventions for Library Objects. This is a required field.
Owner	Text entry	The user or entity that originally published the Library Object. This is a required field. If you are copying into the ACM Database, the field value is generated by the database and cannot be edited.
Major Revision	Text entry (integer)	The major revision number for the Library Object. For a new Library Object, this defaults to 1. If you are copying into the ACM Database, the database generates a default entry based on existing Library Objects with the same CatalogNumber.
Minor Revision	Text entry (integer)	The minor revision number for the Library Object. For a new Library Object, this defaults to 0. If you are copying into the ACM Database, the database generates a default entry based on existing Library Objects with the same CatalogNumber.

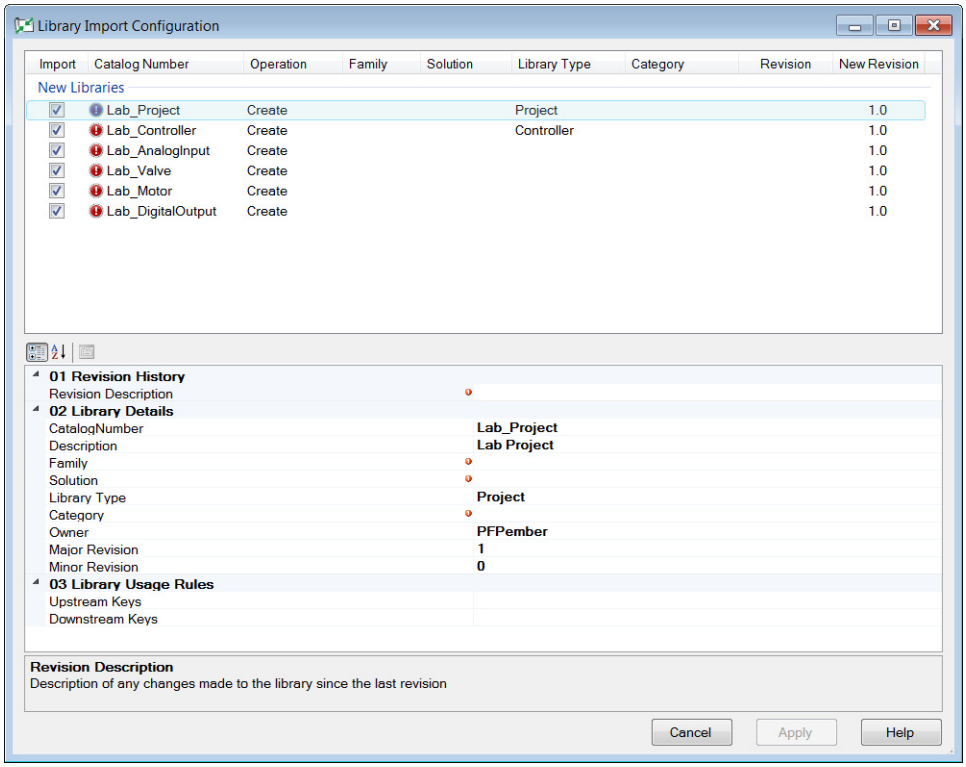
Name	Field Type	Description
03 Library Usage Rules		
Upstream Keys	Text entry	For Module Library Objects: a rule that limits the upstream Hardware components that will be made accessible to the Library Object when it is added to an ACM Project. Rule is entered manually as a logical expression.
Downstream Keys	Text entry	For Module Library Objects: a rule that limits the downstream Hardware components that will be made accessible to the Library Object when it is added to an ACM Project. Rule is entered manually as a logical expression.

2. Enter the information for the Library Object.
3. Click **Apply** to add the Library Object to the Repository or **Cancel** to cancel.

Copying Multiple Library Objects from the ACD Repository to a Folder Repository or the ACM Database

Follow these steps to copy multiple Library Objects from the ACD Repository at the same time.

1. Select multiple Library Objects.
   a. Hold down the SHIFT key to select a contiguous block of Library Objects.
   b. Hold down the CONTROL key to select individual Library Objects that are not contiguous.
2. Place the mouse within one of the selected items and drag all of the Library Objects on top of the Folder Repository or the ACM Database. The **Library Import Configuration** window opens.



IMPORTANT If you are copying the Library Objects into the ACM Database, the new Library Objects will be compared to all Library Objects with the same CatalogNumber that are currently stored in the database, and many of the fields in the Library Import Configuration window will be filled in by the database. You will not be able to edit these fields.

All of the selected Library Objects are listed under the **New Libraries** heading. You can select each item on the list to display its fields, enter the information for the Library Object, then click **Apply** once when all items have been entered to add all of the Library Objects at the same time.

IMPORTANT Any Library Object in the list that has required fields that have not been filled in displays with the red warning icon .

You will not be able to add that Library Object until all required fields are filled. You can uncheck a listing to skip it when the **Apply** button is clicked.

Refer to Copying a Library Object from the ACD Repository to a Folder Repository or the ACM Database on page 184 for a description of the fields in the **Library Object Configuration** window.

Copying Library Objects Between Folder Repositories and the ACM Database

Follow these steps to copy multiple Library Objects between Folder Repositories and the ACM Database.

1. Select multiple Library Objects.
   a. Hold down the SHIFT key to select a contiguous block of Library Objects.
   b. Hold down the CONTROL key to select individual Library Objects that are not contiguous.
   c. Select a Solution, Library Type, or Category listing to select all of the contained Library Objects, or select the **Libraries** listing to select all of the Library Objects in the Repository.
2. Place the mouse within one of the selected items and drag all of the Library Objects on top of the Folder Repository or the ACM Database. The **Library Import Configuration** window opens.

   IMPORTANT Library Objects copied from a Repository are copied intact. You will not be able to edit any information for the Library Objects.

3. Click **Apply** to complete the copy or **Cancel** to cancel.

Notes:

The Library Object Manager Application: Adding Library Content to a Library Object

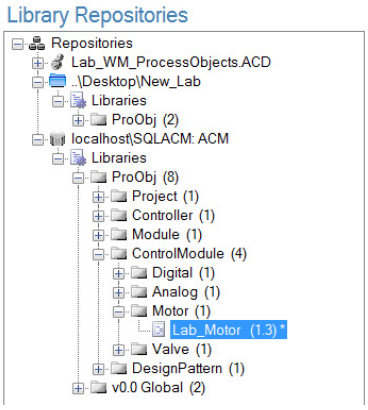
Chapter Objectives

This chapter provides information on the following topics:

Overview

Librarians can add and configure non-Logix HMI content to Library Objects in the Library Object Manager application, including FactoryTalk® View SE/ME Symbols, FactoryTalk Historian Tags, and FactoryTalk Alarms and Events Digital Alarms. Refer to the FactoryTalk documentation for more information on configuring these components.

TIP Library Objects which have been modified in the Library Object Manager application display with an asterisk next to their name until their Repository is removed. When the Repository is removed from the Library Object Manager application, updates are saved to the HLS4 file.



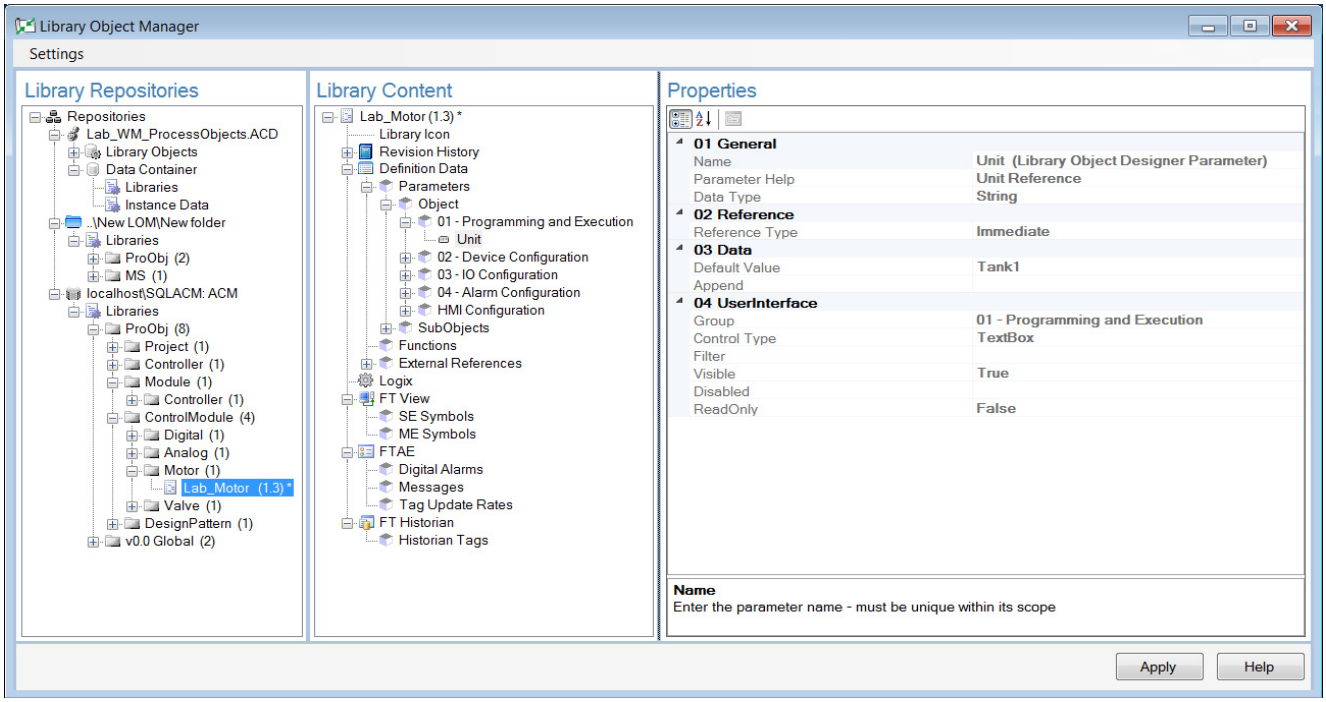
Viewing the Decoration Settings of a Library Object

The **Library Content** column displays all Parameters, Functions, and External References added to a Library Object in the Library Designer plug-in. All settings for decorative elements can be reviewed but not edited in the Library Object Manager application, although new Functions can be added.

Refer to Editing an ACD Repository in the Library Designer Plug-in on page 175 for information on moving between the Library Object Manager application and the Library Designer plug-in.

Follow these steps to review the decoration for a Library Object.

1. Select a Library Object in a Folder or Database Repository. The **Library Content** column and **Properties** panel activate.

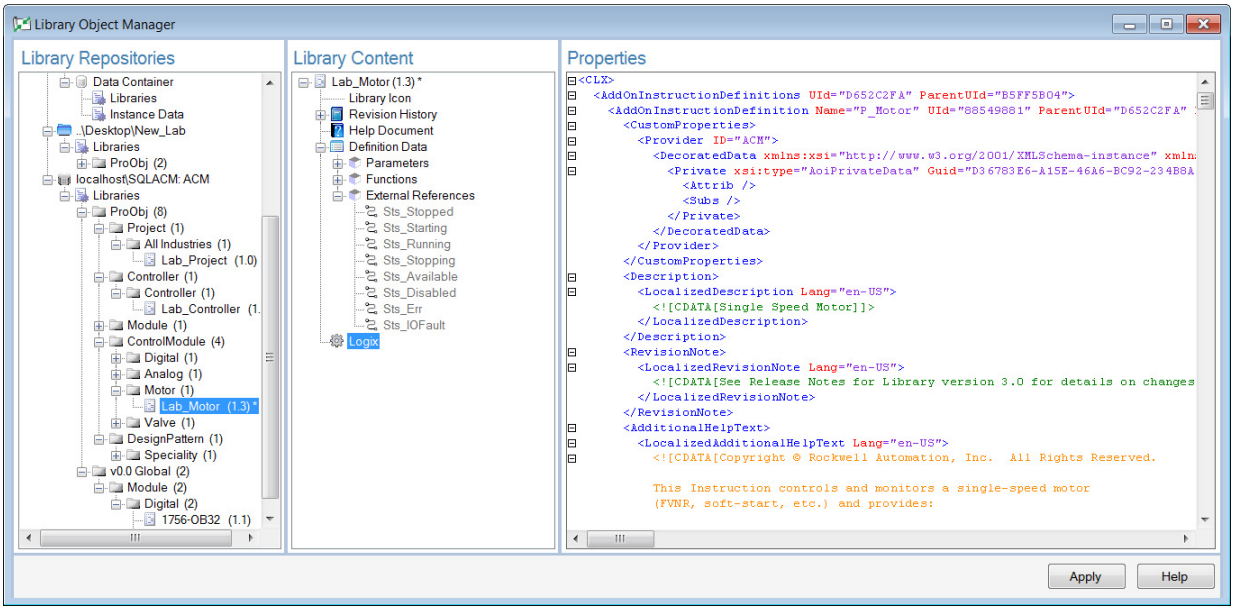


2. Click the Definition Data listing to select it. Right-click to open the contextual menu. Select **Expand All**. The column displays listings for all Parameters, Functions, and External References added to the Library Object.
3. Click a listing for a decorative element to review its settings in the **Properties** panel.

Viewing the Logix Code of a Library Object

Follow these steps to view the Logix code for a Library Object.

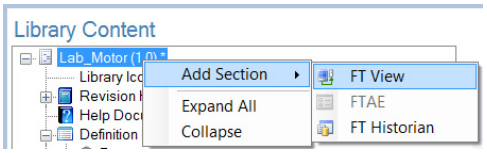
1. Select a Library Object in a Folder or Database Repository. The **Library Content** column and **Properties** panel activate.
2. Click the Logix listing in the **Library Content** column. The complete, line-by-line code for the Library Object displays in the **Properties** panel.



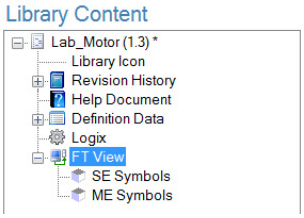
Adding FactoryTalk View SE/ME Content to a Library Object

Follow these steps to add FactoryTalk View SE/ME content.

1. Click the Library Object in the **Library Content** column to select it. Right-click to open the contextual menu.



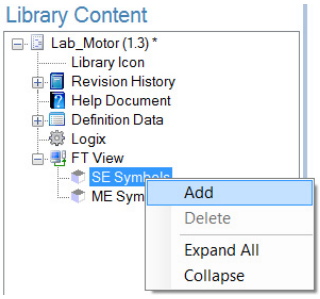
2. Select **Add Section -> FT View**. An FT View folder, with subfolders for SE Symbols (Site Edition) and ME Symbols (Machine Edition), is added to the Library Object.



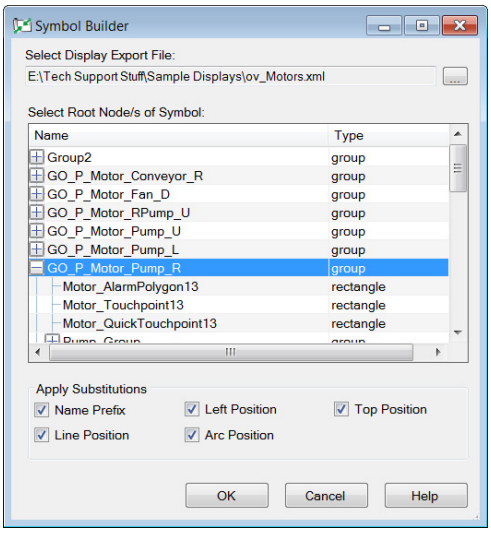
Adding a Symbol to a Library Object

Follow these steps to add a Symbol.

1. Click the **SE Symbols** or **ME Symbols** folder to select it. Right-click to open the contextual menu.



2. Select **Add**. The **Symbol Builder** window opens.



The following table describes the fields and commands in the **Symbol Builder** window.

Name	Field Type	Description
Select Display Export File	Text entry	Enter the name of the exported FactoryTalk View Symbol file that holds the Symbols you wish to import, or click **Ellipsis** to open Windows Explorer.
Select Root Node of Symbol	List	A list of all Symbols in the file. Symbols may be selected individually or as a group. Only one Symbol or group may be selected for each import.
Apply Substitutions	Checkboxes	Leave boxes checked to apply default Substitutions to these Symbol attributes.
OK	Button	Click to import the selection.
Cancel	Button	Click to cancel the import.
Help	Button	Opens the Help screens.

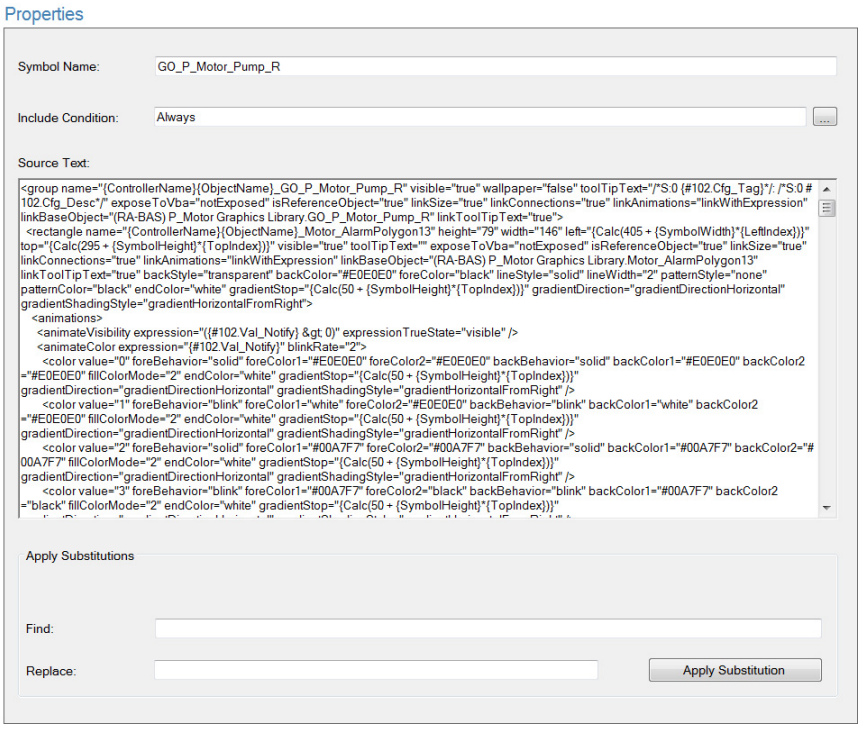
3. Enter the file location for the exported FactoryTalk View Symbol file in the **Select Display Support File** field, or click **Ellipsis** to open Windows Explorer and navigate to the file. The Symbols contained in the file display in the **Select Root Node of Symbol** field.
4. Select the Symbol or group to import.

   TIP In a typical application, it is not necessary to uncheck any of the boxes in the **Apply Substitutions** area.

5. Click **OK** to import the Symbol.
6. Repeat for all Symbols needed for the Library Object.

Configuring a Symbol

The **Properties** panel displays these fields when a Symbol is selected.



The following table describes the fields in the **Properties** panel when a Symbol is selected.

Name	Field Type	Description
Name	Text entry	The name that will be applied to the Symbol when the Library Object is instantiated.
Include Condition	Text entry	Sets the condition under which the current Symbol is instantiated. The default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

Name	Field Type	Description
Source Text	Text entry	The editable XML code of the Symbol. The XML code includes all Substitutions applied by the **Apply Substitutions** checkboxes when the Symbol was imported.
Apply Substitutions: Find	Text entry	A text string to replace with a Substitution.
Apply Substitutions: Replace	Text entry	The text that will replace the text string in the **Find** field.
Apply Substitution	Button	Applies the Substitution.

IMPORTANT Default Substitutions in the XML code include the Name attribute and the Left and Top attributes.

Changing the Symbol Name

In a typical application, the default name should be used. Alternatively, a name can be entered manually in the **Name** field.

Setting a Rule for Instantiation

By default, Symbols are set to instantiate under all conditions and to instantiate once every time the Library Object is added to an ACM Project. With FactoryTalk View Symbols, there may be several options which are appropriate for different applications. In this case, you can add a Parameter which allows the end user to select the Symbol that best meets their need.

Follow these steps to set a rule for instantiation.

1. Enter a new Parameter token in the **Include Condition** field, as well as the condition (example: "{symbolstyle} = 1") for inclusion of the Symbol.
2. Repeat the process for all other Symbol options.

Configuring the Object Tag and Path Parameters for a Symbol

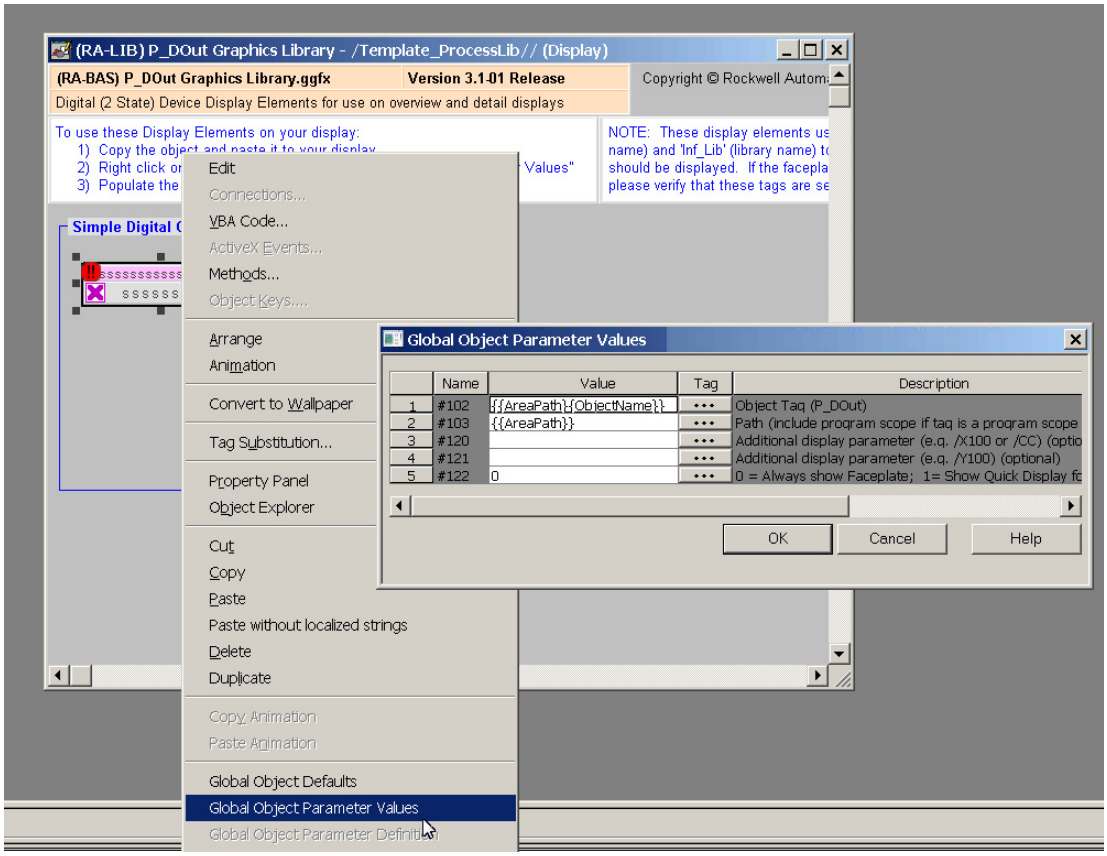
The Object Tag and Path Parameters must be set for correct substitution when the Symbol is instantiated in an ACM Project. This can be done in the FactoryTalk View Studio application, before the Symbol is exported, or in the Application Code Manager application after the Symbol has been added.

Follow these steps to configure the Parameters in the FactoryTalk View Studio application.

TIP A Global Object is used in this example. The same procedure applies to other Objects, although the display screens, Object Tag name, and XML code may be different.

1. Open the Symbol Object. Right-click the Object to open the contextual menu.

2. Select Global Object Parameter Values. The **Global Object Parameter Values** window opens.



3. Enter the following value in the **Object Tag** Parameter.
   {{AreaPath}{ObjectName}}

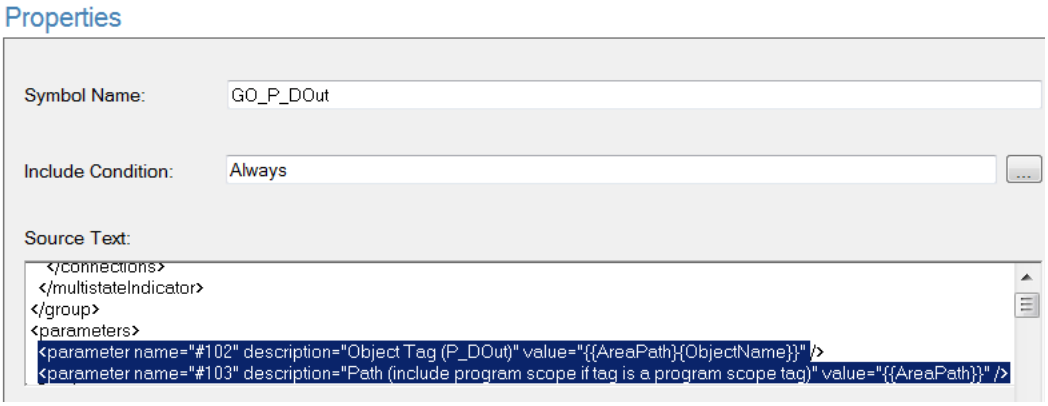
IMPORTANT	The value entered must include the second pair of curly brackets enclosing the {AreaPath} and {ObjectName} tokens. Note that the the **Path** Parameter is also a part of the **Object Tag** Parameter.

4. Enter the following value in the **Path** Parameter.
   {{AreaPath}}

IMPORTANT	The value entered must include the second pair of curly brackets enclosing the {AreaPath} token.

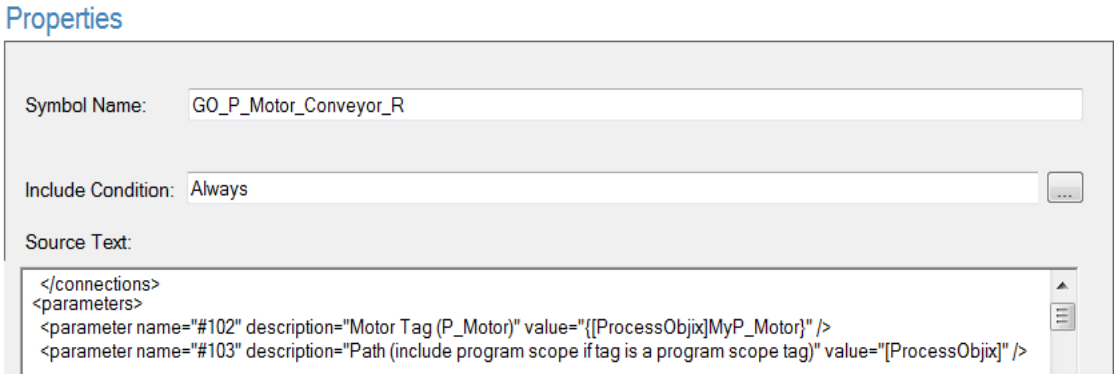
5. Export the Symbol Object.

6. Review the XML code for the Symbol after it is added to a Library Object. Find the Parameters list and locate the values for the **Object Tag** and **Path** Parameters. The values set in the FactoryTalk View Studio application are correct and should not be edited. These tokens can be modified by user input in the Application Code Manager application.



Follow these steps to configure the Parameters in the Library Object Manager application.

1. After the Symbol has been added, review the XML code. Find the Parameters list and locate an instance of the current value for the **Path** Parameter. In this example, the current value is "[ProcessObjix]".



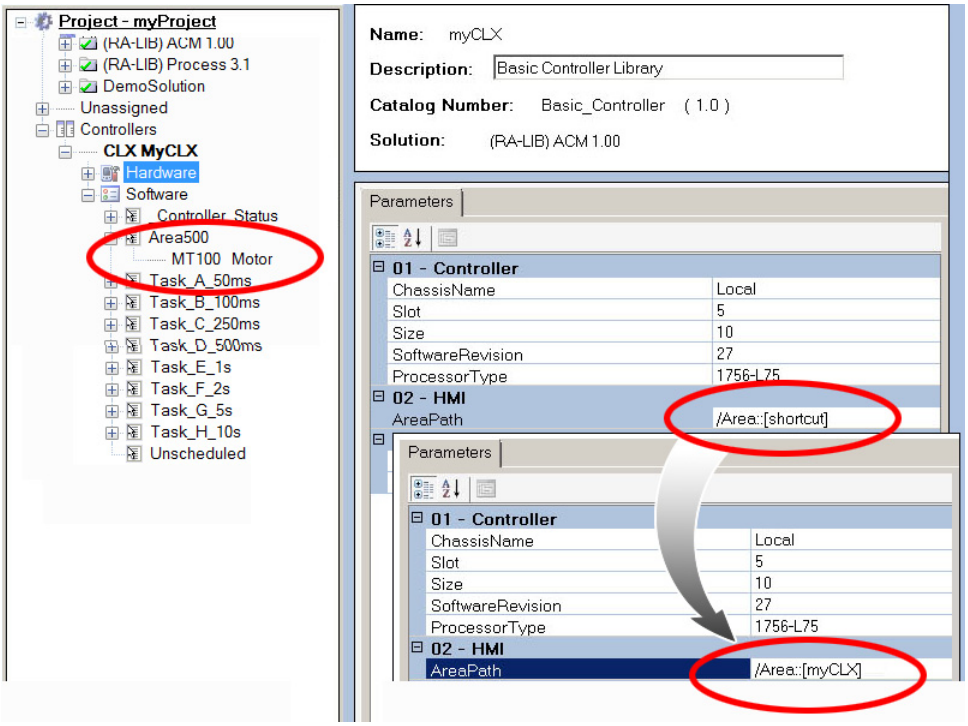
2. Enter the text string in the **Find** field.
3. Enter the Predefined Parameter token "{ControllerName}" in the **Replace** field.
4. Click **Apply Substitution**.
5. Enter the current value for the **Object Tag** Parameter from the XML code in the **Find** field. In this example, the current value is "MyP_Motor". Note that in this example the Parameter is named "Motor Tag (P_Motor)" rather than "Object Tag".
6. Enter the Predefined Parameter "{ObjectName}" in the **Replace** field.
7. Click **Apply Substitution**.

TIP If Controller references are created in the FactoryTalk View Studio application as FactoryTalk View parameters (example: #1103) rather than direct references, the reference functionality will be handled by the FactoryTalk View application during actual operation, and these substitutions will not be necessary.

When the Library Object is instantiated in the ACM application, the name that the Project Engineer applies to the instance substitutes for the Symbol's {ObjectName} token. The {AreaPath} token substitution takes place when the Project Engineer enters a value in the AreaPath Parameter for the Controller.

In the example shown here, a motor Library Object has been added to the myCLX Controller and given the name MT100. The default value for the AreaPath Parameter, "/Area::[shortcut]", has been changed to "/Area::[myCLX]".

The Object Tag for this Symbol is {/Area::[myCLX]MT100}.



Configuring the Location for a Symbol

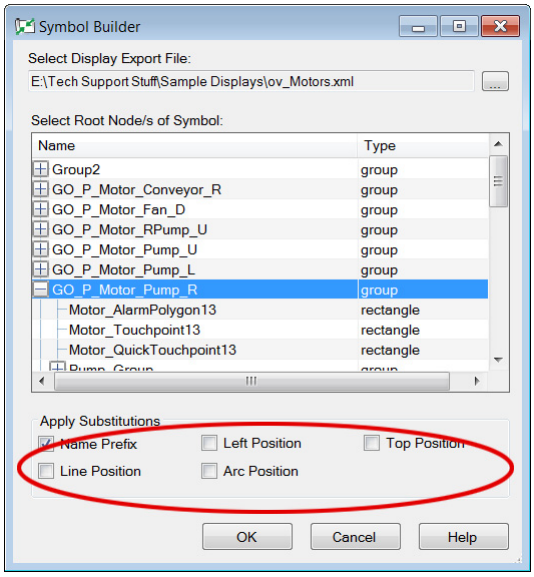
The **Top** and **Left** Parameters for each Symbol should be checked and, if necessary, modified in the **Properties** panel.

Symbols are positioned within a display based on the coordinates of their top left corner. The positioning can be absolute, in which case the Symbol is positioned relative to the top left corner of the screen, or relative, in which case the Symbol is positioned based on an offset from its individual bounding box.

Absolute positioning guarantees that the overall configuration of the Symbols in a display will match the original configuration created in FactoryTalk View Studio.

Follow these steps to apply absolute positioning to a Symbol.

1. Click the **SE Symbols** or **ME Symbols** folder to select it. Right-click to open the contextual menu.
2. Select **Add**. The **Symbol Builder** window opens.
3. Locate the Symbol you wish to add. Uncheck all of the Position options in the **Apply Substitutions** area. Leave the **Name Prefix** option checked.



4. After the Symbol has been added, review the XML code.
5. Locate the **Left** and **Top** Parameters in the code. The values for both are numeric. Check that they match the desired display position for the Symbol, or modify if necessary.

Relative positioning adds Symbols to a display starting at the top left corner, moving left to right, then down one row when horizontal space requires. Each symbol is positioned within a bounding box that includes the Symbol's height, width, and x and y offsets. Symbols are added to the display in the same order as they were added to the Library Object in the Library Object Manager application.

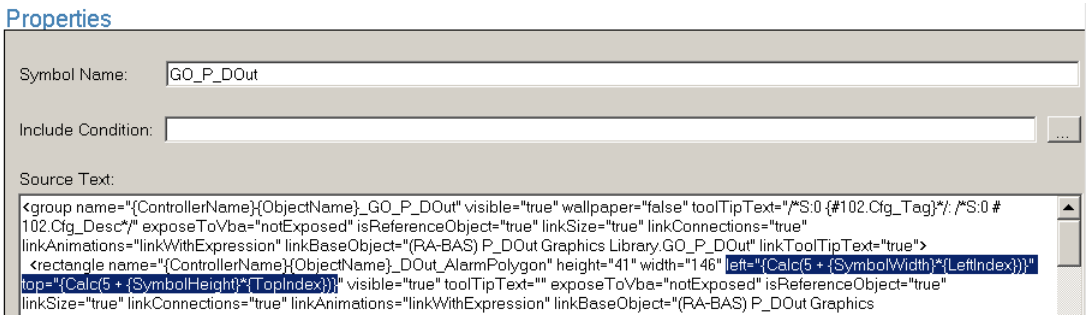
Relative positioning is required if multiple instances of a Symbol will appear in a display; absolute positioning would cause all instances to be stacked on top of each other.

Follow these steps to apply relative positioning to a Symbol.

1. Click the **SE Symbols** or **ME Symbols** folder to select it. Right-click to open the contextual menu.
2. Select **Add**. The **Symbol Builder** window opens.
3. Locate the Symbol you wish to add. Check all of the Position options in the **Apply Substitutions** area.
4. After the Symbol has been added, review the XML code.
5. Locate the **Left** and **Top** Parameters in the code. The values are Expressions using the following formats.

   left = “{Calc([bounding box offset] + {SymbolWidth}*{LeftIndex})}”

   top = “{Calc([bounding box offset] + {SymbolHeight}*{TopIndex})}”



6. Check that the left and top offsets are consistent with other Symbols in the Library Object. Modify if necessary.

   TIP A small offset value of 5...10 provides the most efficient use of screen space and the most predictable configuration of multiple Symbols in a display.

Deleting a Symbol from a Library Object

Follow these steps to delete a Symbol from a Library Object.

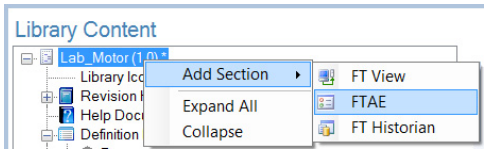
1. Click the Symbol to highlight it. Right-click to open the contextual menu.
2. Select **Delete**.

Adding FactoryTalk Alarms and Events (FTAE) Content to a Library Object

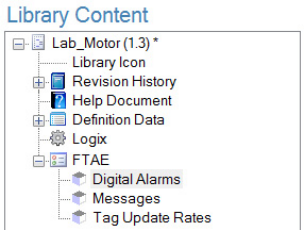
IMPORTANT Refer to Publication FTAE-RM001H-EN-E for more information on the screens and fields associated with FTAE content.

Follow these steps to add FTAE content.

1. Click the Library Object in the **Library Content** column to select it. Right-click to open the contextual menu.



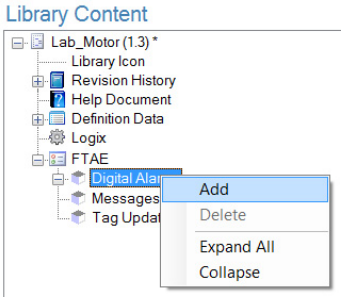
2. Select **Add Section -> FTAE**. An FTAE folder, with subfolders for Digital Alarms, Messages, and Tag Update Rates, is added to the Library Object.



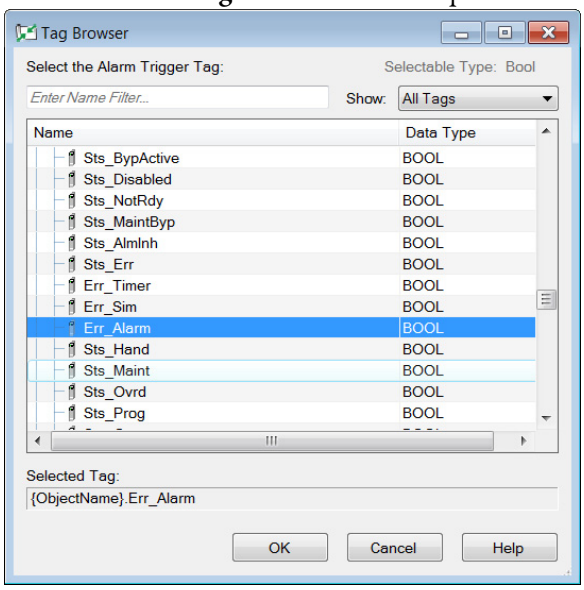
Adding a Digital Alarm to a Library Object

Follow these steps to add a Digital Alarm.

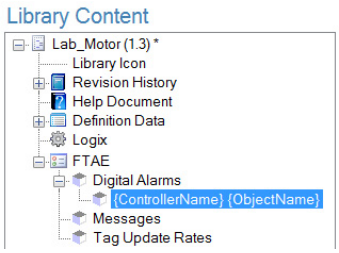
1. Click the **Digital Alarms** subfolder to select it. Right-click to open the contextual menu.



2. Select **Add**. The **Tag Browser** window opens.



3. Scroll to select the Tag that the Digital Alarm will reference. Click **OK**. The Tag is added.



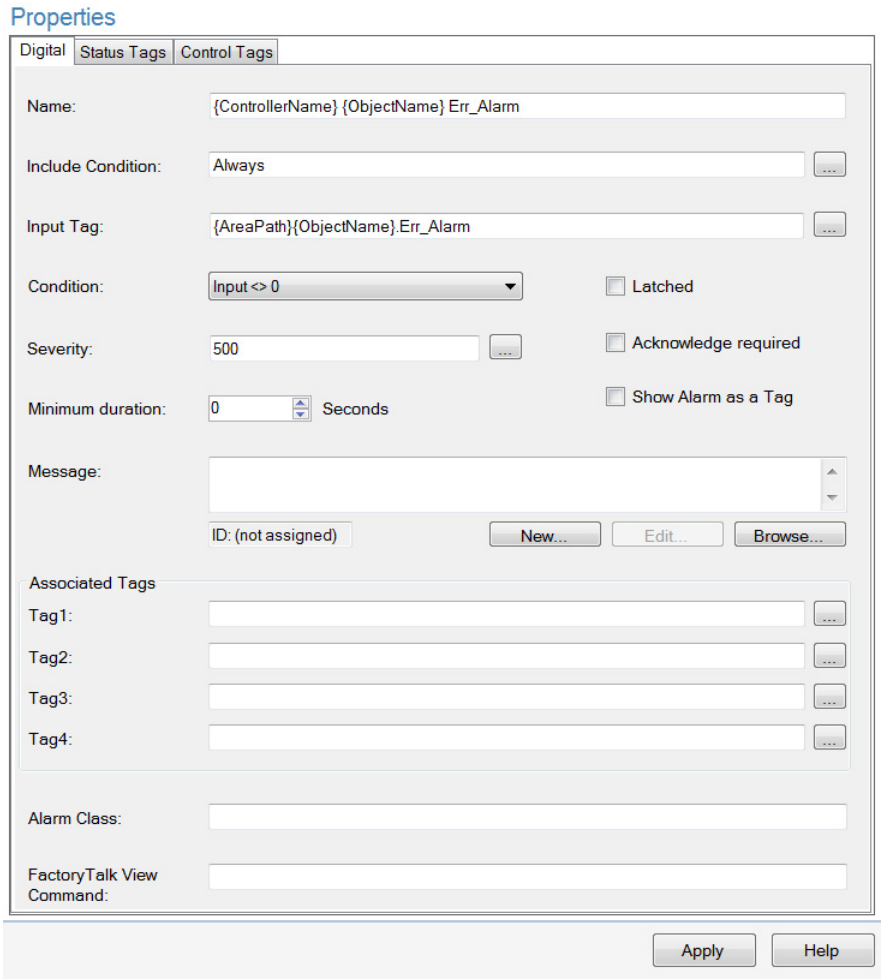
Configuring a Digital Alarm

When a Digital Alarm is selected, the **Properties** panel displays three tabbed screens.

The **Status Tags** and **Control Tags** tabs match tabs in the Factory Talk Alarms and Events application. Refer to the FactoryTalk Alarms and Events documentation for more information on these screens.

Click **Apply** to apply changes made in these screens.

The **Digital** tab has some fields that are exclusive to the Library Object Manager application. These will be described here.



The following table describes the fields in the **Digital** tab of the **Properties** panel when a Digital Alarm is selected.

Name	Field Type	Description
Name	Text entry	The name that will be applied to the Digital Alarm when the Library Object is instantiated. This name will appear in Application Code Manager screens. The field is populated with a default name based on the Tag name and Library Object for the selected Tag.
Include Condition	Text entry	Sets the condition under which the current Digital Alarm is instantiated. The default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103. Refer to Setting a Rule for Instantiation on page 204.
Input Tag	Text entry	The ItemID that will be applied to the Digital Alarm when the Library Object is instantiated. The field is populated with a default name based on the Tag name and Library Object for the selected Tag.
Condition	Pull-down menu	The condition that activates the alarm. Refer to FTAE documentation.
Severity	Text entry	The severity required for the event to activate the alarm. Refer to FTAE documentation.
Minimum duration	Text entry	The minimum duration required for the event to activate the alarm. Refer to FTAE documentation.
Latched	Checkbox	Determines whether the alarm remains in effect if the condition is no longer met. Refer to FTAE documentation.
Acknowledge required	Checkbox	Determines whether an acknowledgement is required to turn off the alarm. Refer to FTAE documentation.
Show Alarm as Tag	Checkbox	Determines whether the alarm is shown as a Tag. Refer to FTAE documentation.
Message	Text entry	The text displayed when the Digital Alarm is triggered.
ID	Read only	The unique numeric ID for the message in the **Message** field.
New	Button	Opens the **Message Editor** to create a new message.
Edit	Button	Opens the **Message Editor** to edit an existing message.
Browse	Button	Opens the **Message Browser**.
Associated Tags	Text entry	Up to four Tags that may be included in the text of the Digital Alarm message.
Alarm Class	Text entry	The Class for the Digital Alarm. Refer to FTAE documentation.
FactoryTalk View Command	Text entry	The FactoryTalk command that is executed when the alarm is triggered. Refer to FTAE documentation.

Changing the Digital Alarm Name

In a typical application, the default name should be used. Alternatively, a name can be entered manually in the **Name** field.

Setting a Rule for Instantiation

By default, Digital Alarms are set to instantiate under all conditions and to instantiate once every time the Library Object is added to an ACM Project.

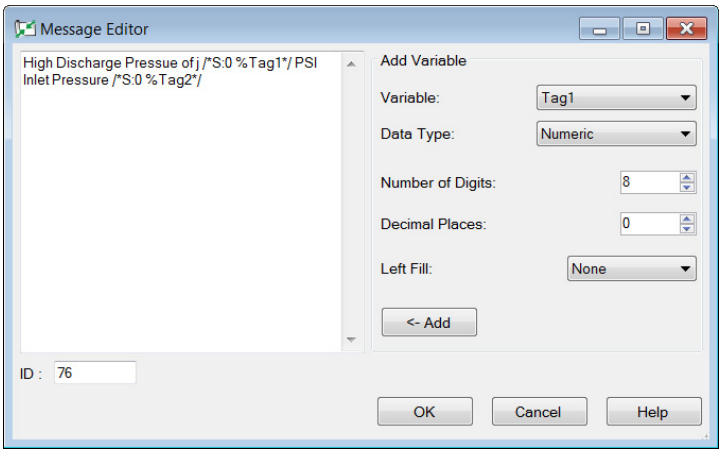
Follow these steps to set a rule for instantiation.

1. Enter a value in the **Include Condition** field, or click **Ellipsis** to the right of the field to open the Expression Builder.
2. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

Adding a New Message to a Digital Alarm

Follow these steps to add a new Message.

1. Click the **New** button. The **Message Editor** opens.



The following table describes the fields in the **Message Editor**.

Name	Field Type	Description
Editor Window	Text entry	The message appears here as it is compiled. Text can be entered directly in this field. Tags are added when **Add** is clicked.
Add Variable: Variable	Pull-down menu	A list of Tags that can be added to the message. This includes a number of default variables, as well as up to four variables added using the **Associated Tags** fields in the **Properties** panel.
Data Type	Pull-down menu	Where applicable based on the Tag selected, offers a choice of numeric or string for the data type of the Tag value within the message.
*These fields appear if String is selected in the **Data Type** field.*		
Use Fixed Width	Checkbox	For use on displays with fixed display parameters. Limits the entry in the **Editor Window** to the value entered in the **Number of Characters** field.
Number of Characters	Text entry	For use in displays with fixed display parameters. Sets the maximum number of characters for a message line.

Name	Field Type	Description
*These fields appear if Numeric is selected in the **Data Type** field.*		
Number of Digits	Text entry	When the **Data Type** field is set to Numeric, sets the number of digits to display for the Tag value within the message.
Decimal Places	Text entry	When the **Data Type** field is set to Numeric, sets the number of decimal places to display for the Tag value within the message.
Left Fill	Pull-down menu	When the **Data Type** field is set to Numeric, determines whether values will be filled in to match the value set in the **Number of Digits** field.
Add	Button	Adds the currently selected Tag to the message in the **Editor Window**.
ID	Text entry	The unique numeric ID for the Message.
OK	Button	Applies the message to the **Message** field and closes the **Message Editor.**
Cancel	Button	Closes the **Message Editor** without applying the message.
Help	Button	Opens the Help screens.

2. Enter the text, including Tag tokens, in the **Editor Window**.
3. Enter an ID for the message in the ID field.

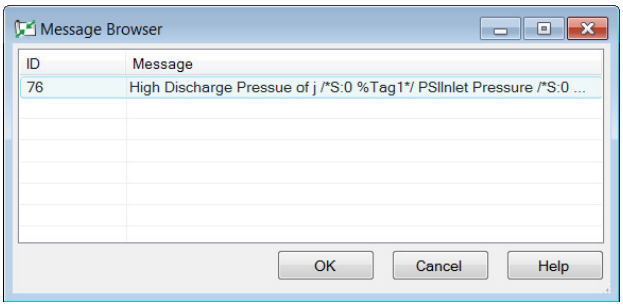
> **IMPORTANT** The value within the ID field for each message must be unique for all Digital Alarm messages within a Project. Blocks of ID numbers should be reserved for each Library Object and used exclusively for that Library Object.

4. Click **OK** to apply the completed message or **Cancel** to Cancel.

Adding an Existing Message to a Digital Alarm

Follow these steps to add an existing Message.

1. Click the **Browse** button. The **Message Browser** opens.



2. The Message Browser displays all messages that have been created within the current ACD file. Select a listing and click **OK** to apply it or **Cancel** to cancel.

> **IMPORTANT** The value within the ID field for each message must be unique for all Digital Alarm messages within a Project. Messages added using the **Message Browser** retain their original ID.

Editing an Existing Message

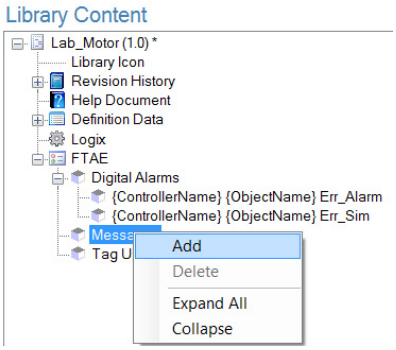
Follow these steps to edit an existing Message.

1. Click the **Edit** button. The **Message Browser** opens.
2. Edit the text in the Editor Window.
3. Click **OK** to apply the changes or Cancel to cancel.

Adding Message Content to a Library Object

Follow these steps to add Message content.

1. Click the **Message** subfolder to select it. Right-click to open the contextual menu.



2. Select **Add**. The **Message Editor** window opens.
3. The Properties panel displays a listing of all existing messages when the Messages subfolder is selected. You can also open the Message Editor window by right-clicking within the panel to open the contextual menu. Select **Add**.
4. Refer to Adding a New Message to a Digital Alarm on page 204.

Deleting Message Content from a Library Object

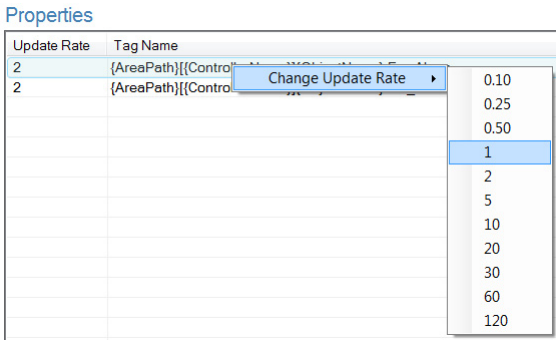
Follow these steps to delete a Message.

1. Click the **Message** subfolder to select it.
2. The Properties panel displays a listing of all existing messages when the Messages subfolder is selected. Select a message listing to highlight it.
3. Right-click the listing to open the contextual menu. Select **Delete**.

Changing the Tag Update Rate for a Digital Alarm

Follow these steps to change the Tag update rate.

1. Click the **Tag Update** subfolder to select it.
2. The Properties panel displays a listing of the default tag update rate for all existing Digital Alarms. Select a Digital Alarm listing to highlight it.
3. Right-click to open the contextual menu. Mouse over Change Update Rate to display the pull-down list of update values. Select a new value.



Deleting a Digital Alarm from a Library Object

Follow these steps to delete a Digital Alarm.

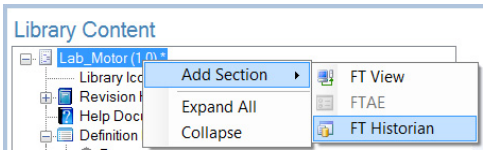
1. Click the Digital Alarm to highlight it. Right-click to open the contextual menu.
2. Select **Delete**.

Adding FactoryTalk Historian Content to a Library Object

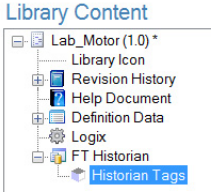
Follow these steps to add FactoryTalk Historian content.

IMPORTANT Refer to the documentation on FactoryTalk Historian for more information on the screens and fields associated with FactoryTalk Historian content.

1. Click the Library Object in the **Library Content** column to select it. Right-click to open the contextual menu.



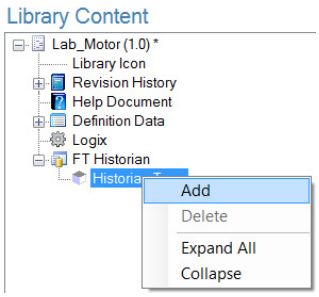
2. Select **Add Section -> FT Historian**. An FT Historian folder, with a subfolder for Historian Tags, is added to the Library Object.



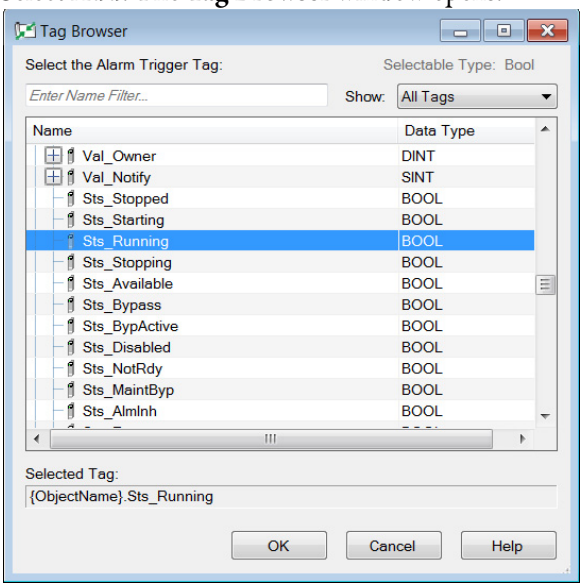
Adding a Historian Tag to a Library Object

Follow these steps to add a Historian Tag.

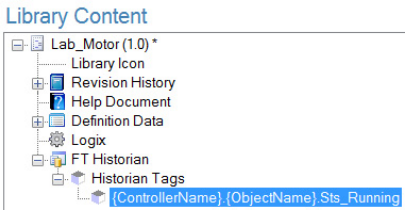
1. Click the **Historian Tags** subfolder to select it. Right-click to open the contextual menu.



2. Select **Add**. The **Tag Browser** window opens.



3. Scroll to select the Tag that the Historian Tag will reference. Click **OK**. The Tag is added.

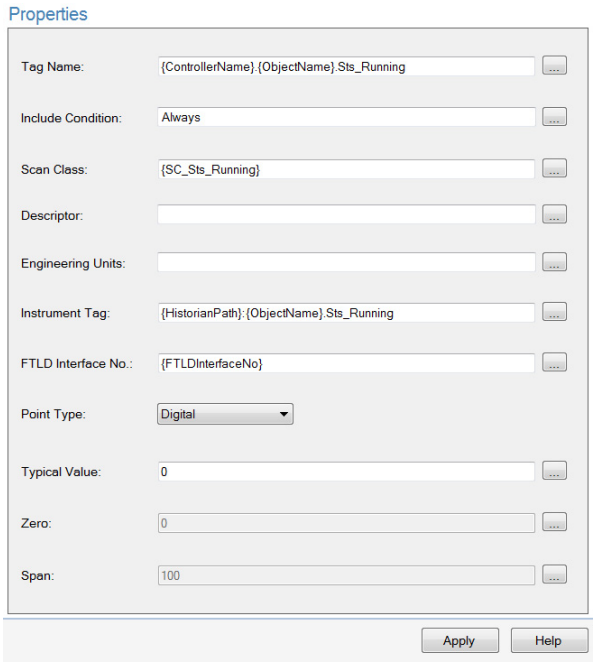


Configuring a Historian Tag

Follow these steps to configure a Historian Tag.

1. Click the Historian Tag to select it.

When a Historian Tag is selected, the **Properties** panel displays these fields.



A number of the fields in the **Properties** panel are populated with default values. In a typical application, it is not necessary to change these values.

The following table describes the fields in the **Properties** panel when a Historian Tag is selected.

Name	Field Type	Description
Tag Name	Text entry	The name that will be applied to the Historian Tag when the Library Object is instantiated. This name will appear in Application Code Manager screens. The field is populated with a default name based on the Tag name and Library Object for the selected Tag. Can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Include Condition	Text entry	Sets the condition under which the current Historian Tag is instantiated. The default is Always. A condition can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Scan Class	Text entry	The scan class for the Historian Tag. The field is populated with a default value based on the Tag name for the selected Tag. Can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Descriptor	Text entry	A description for the Tag. Can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.

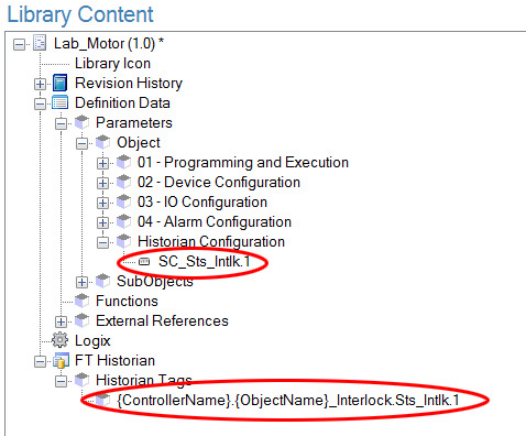
Name	Field Type	Description
Engineering Units	Text entry	The engineering unit for the Tag. Can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Instrument Tag	Text entry	The ItemID that will be applied to the Historian Tag when the Library Object is instantiated. The field is populated with a default name based on the Tag name and Library Object for the selected Tag. Can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
FTLD Interface Number	Text entry	The FactoryTalk Historian Live Data (FTLD) Interface number for the Historian Tag. The field is populated with a default value based on the selected Tag. Can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Point Type	Pull-down menu	The data type for the Historian point. Options are: • Digital • Float16 • Float32 • Float64 • Int16 • Int32 • String • Timestamp • Blob
Typical Value	Text entry	The Typical Value for the Historian Tag. Can be entered manually or generated by an Expression. To create an Expression, click **Ellipsis** to the right of the field to open the **Expression Builder**. Refer to The Library Designer Plug-in: The Expression Builder on page 103.
Zero	Text entry	The Zero Value for the Historian Tag. This field is only active if a Float or Int option has been selected in the **Point Type** Field.
Span	Read only	The Span for the Historian Tag. This field is only active if a Float or Int option has been selected in the **Point Type** Field.

2. Make edits to the fields, either manually or using the **Expression Builder**.
3. Click **Apply** to apply the changes or **Cancel** to cancel.

TIP When a Historian Tag is added to a Library Object, a corresponding Parameter is also added to this subfolder in the **Library Content** column:

Definition Data -> Parameters -> Object -> Historian Configuration

This Parameter is used by the Project Engineer to configure the Historian Tag in the ACM application.



Deleting a Historian Tag from a Library Object

Follow these steps to delete a Historian Tag.

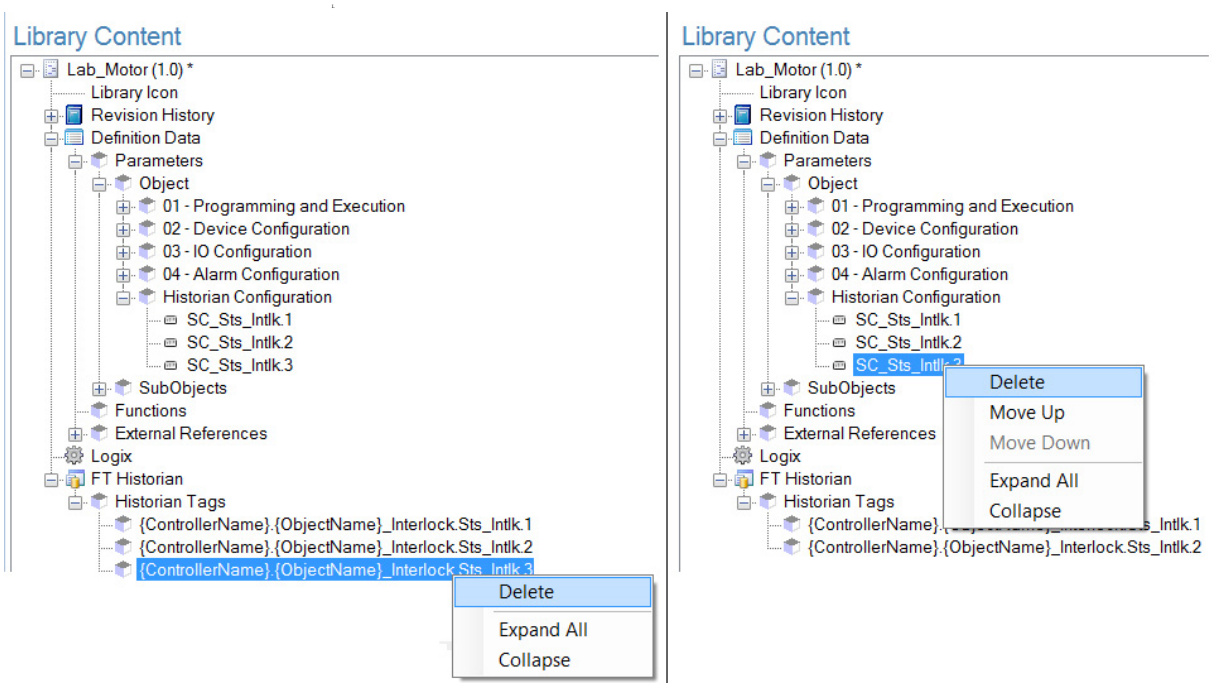
1. Click the Historian Tag to highlight it. Right-click to open the contextual menu.
2. Select **Delete**.

IMPORTANT	When a Historian Tag is added to a Library Object, a corresponding Parameter is also added. This Parameter is used by the Project Engineer to configure the Historian Tag in the ACM application. When a Historian Tag is deleted, the corresponding Library Object Parameter must be deleted as well.

3. Locate the Parameter for the deleted Historian Tag in this subfolder in the **Library Content** column:

   Definition Data -> Parameters -> Object -> Historian Configuration

4. Click the Parameter to highlight it. Right-click to open the contextual menu.
5. Select **Delete**.



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Notes:

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support you can find technical and application notes, sample code, and links to software service packs. You can also visit our Support Center at https://rockwellautomation.custhelp.com/ for software updates, support chats and forums, technical information, FAQs, and to sign up for product notification updates.

In addition, we offer multiple support programs for installation, configuration, and troubleshooting. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/services/online-phone.

Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/rockwellautomation/support/overview.page, or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to help ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication RA-DU002, available at http://www.rockwellautomation.com/literature/.

Rockwell Automation maintains current product environmental information on its website at http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page.

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Publication LOGIX-UM006A-EN-P - October 2015