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Control Building
Guide

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EXPERION ^{PKS[®]}
Process Knowledge System[®]

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Honeywell
Industry Solutions
2500 West Union Hills
Phoenix, AZ 85027
1-800 343-0228

About This Document

Revision Notes

The following list provides notes concerning all revisions of this document.

Doc ID	Rel ID	Date	Notes

References

The following list identifies all documents that may be sources of reference for material discussed in this publication.

Document Title	Doc ID

Contacts

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The following table lists those symbols used in this document to denote certain conditions.

Symbol	Definition
	ATTENTION: Identifies information that requires special consideration.
	TIP: Identifies advice or hints for the user, often in terms of performing a task.
	REFERENCE -EXTERNAL: Identifies an additional source of information outside of the bookset.
	REFERENCE - INTERNAL: Identifies an additional source of information within the bookset.
CAUTION	Indicates a situation which, if not avoided, may result in equipment or work (data) on the system being damaged or lost, or may result in the inability to properly operate the process.

Symbol	Definition
	CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. CAUTION symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death. WARNING symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	WARNING, Risk of electrical shock: Potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 VDC may be accessible.
	ESD HAZARD: Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices
	Protective Earth (PE) terminal: Provided for connection of the protective earth (green or green/yellow) supply system conductor.
	Functional earth terminal: Used for non-safety purposes such as noise immunity improvement. NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national local electrical code requirements.
	Earth Ground. Functional earth connection. NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	Chassis Ground: Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.

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Introduction

Overview

The procedures in this guide are intended to give you the ability to perform basic tasks within the Control Builder application such as configuring hardware devices, continuous control strategies, and sequential control strategies. No attempt is made in the guide to explain the functionality of Control Builder nor the many different options available when completing block configuration forms. Only representative forms are shown to illustrate a procedure/concept. The many different variations of forms and associated fields for every Function Block (FB) are not shown in this guide.



REFERENCE

For a detailed description of intended design use of container and basic blocks, refer to the *Experion PKS Control Builder Components Theory, Some Underlying Concepts* and the *Experion PKS Control Builder Components Reference, Component Categories and Types*.

Conventions

Terms and type representations

The following table summarizes the terms and type representation conventions used in this Guide.

Term/Type Representation	Meaning	Example
Click	Click left mouse button once. (Assumes cursor is positioned on object or selection.)	Click the Browse button.
Double-click	Click left mouse button twice in quick succession. (Assumes cursor is positioned on object or selection.)	Double click the Station icon.
Drag	Press and hold left mouse button while dragging cursor to new screen location and then release the button. (Assumes cursor is positioned on object or selection to be moved.)	Drag the PID function block onto the Control Drawing.
Right-click	Click right mouse button once. (Assumes cursor is positioned on object or selection.)	Right-click the AND function block.
<F1>	Keys to be pressed are shown in angle brackets.	Press <F1> to view the online Help.
<Ctrl>+<C>	Keys to be pressed together are shown with a plus sign.	Press <Ctrl>+<C> to close the window.
File->New	Shows menu selection as menu name followed by menu selection	Click File->New to start new drawing.
>D:\setup.exe<	Data to be keyed in at prompt or in an entry field.	Key in this path location >D:\setup.exe<.

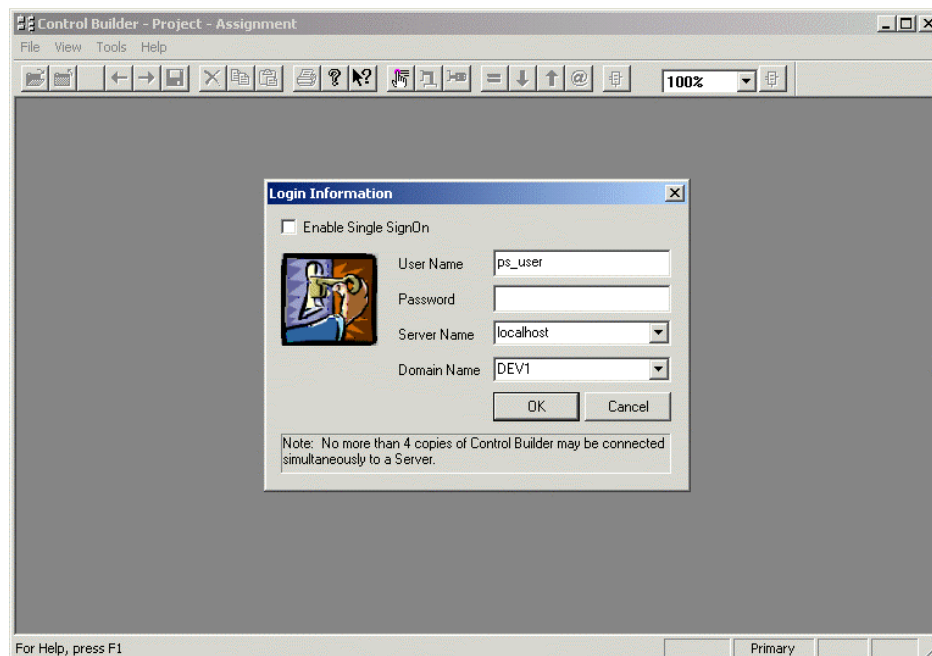
Functional Overview

Where to Start

If.....	Then.....
Unfamiliar with Control Builder,	Go to steps in Starting Control Builder
Designing a control strategy from the beginning using CMs,	Go to steps in Creating and Saving a Control Module
Designing a control strategy from the beginning using SCMs,	Go to steps in Creating and Saving a Sequential Control Module

Starting Control Builder

Step	Action	Result
1	Click Start -> Programs -> Experion PKS Engineering Tools -> Control Builder to launch the Control Builder application.	Control Builder launches and opens the Login Information dialog box.



ATTENTION

If the Control Builder icon  appears on the Windows Taskbar at the bottom of screen, the Control Builder program is already running. Click the Control Builder icon to view Control Builder. You can run multiple sessions of Control Builder simultaneously on the same computer, but it is not generally recommended.

2	Go to the next section <i>Login to Server</i> .	Must login to identify the user, the security level, and the Server that Control Builder is to connect to for this session.

Login to Server

Upon initial start-up of Control Builder and while attempting to access certain external tools (such as the Import Export tool), a Login Information dialog is presented which prompts you to enter standard login information – user name, password, Server and domain name. The security access for login now integrates Windows user accounts with Station operator based accounts. The following general considerations still apply.

- You must enter the proper password based on your user name and server name to gain access to Control Builder.
- To perform configuration tasks using Control Builder, you must have the proper security level to perform various configuration functions.
- To perform monitoring tasks in Control Builder, you must have the proper access level to write to the controller, and perform other monitoring tasks.

You may also decide to select FILE -> LOGIN TO SERVER to switch to a different server while the Control Builder is already running. Doing so brings up the same Login Information dialog that prompts you to enter the standard login information.



ATTENTION

- A password that is associated with your user name should have been assigned to you. An appropriate server name should also be identified. If necessary, contact your system administrator for the password and server name to be used with your system.
- User name and password come from Station operator-based security or the Windows user account for the computer logon.
- Since Experion PKS Server is providing user authentication, it needs to be running in order to be able to run Control Builder.



REFERENCE - INTERNAL

Please review the information in the Configuring Security and Access section of the *Server and Client Configuration Guide* in Knowledge Builder before attempting to login to Control Builder.

Step	Action	Result



TIP

You must first set up a corresponding Windows user account through Station's Configure->Operator->Operators before you attempt to login to Control Builder using a Windows user account. Be sure the Use Windows Account check box is checked and that Security Level is set to mngr and Control Level is set to 255. You must have an access level of manager to set up an operator account. .

The screenshot shows the 'Station - Default.stn - Operator Configuration (213)' window. The left sidebar lists various system configuration options, with 'Operator Security' and 'Operators' selected. The main area displays the 'Operator Definition' for 'Operator 2'. Fields include Username (ps_user), Full name (ps_user), Job title, Area, and Password. The 'Use Windows account' checkbox is checked, and the 'Security level' is set to 'Mngr'. The 'Control level' is set to '255'. There are also checkboxes for 'Multi-user' and 'Access Disabled', and a 'Change Password' button.

1	Do you want on enable the Single SignOn function?	• If the answer is Yes, go to Step 2. • If the answer is No, go to Step 4.
-

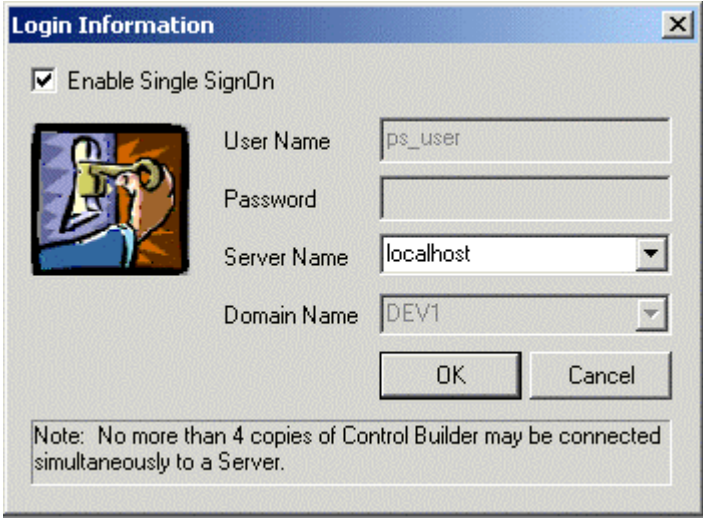
Step	Action	Result

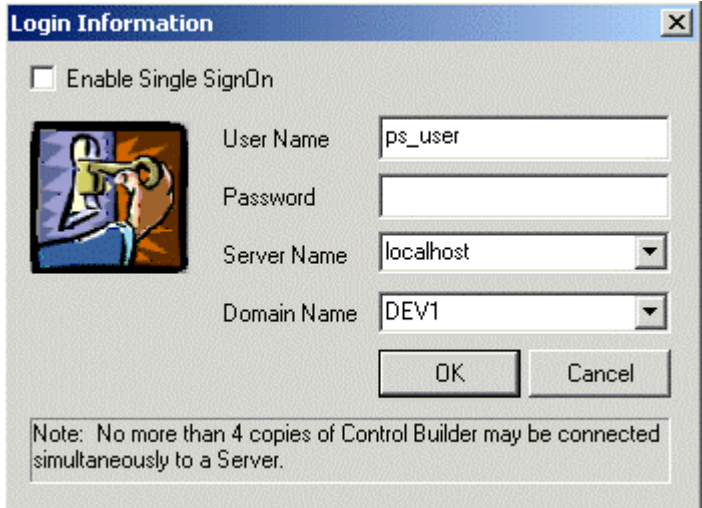


TIP

You must first enable the Allow Single Signon function through Station's Configure->Operators->SignOn Administration configuration form before you can enable this function through Control Builder. You must have an access level of manager to make this change.

2	Click the Enable Single SignOn check box.	Check mark appears in the check box, single signon function is enabled, and only the Server Name field is accessible. Login is based on current Windows user account logon to the named Server and the login dialog does not appear for subsequent logins.

Step	Action	Result
		
3	Click OK.	Launches Control Builder. Go to Step 8.
4	The default User Name is usually the one used for the Windows account logon. For example, ps_user. The Station operator based default name is >mngr< and it is case sensitive. Please key in your assigned user name, as applicable.	Identifies user and associated security level.

Step	Action	Result
		
4	Click and key in your login password in the Password field. You need an access level of at least Engineer to create a control strategy. Please check with your system administrator to get your assigned password, if required. The password is tied to your Windows account logon or the operator-based security for the Station application. The default password for operator-based security is >mngr1<, and it is case sensitive.	Confirms the identity of the user and associated security level.
5	The Server Name field lists the Server that this session of Control Builder is connected to. The name shown in the figure above is used for example purposes only. It is the default for a nonredundant Server. Key in the desired Server name or click the  down-arrow button to select it from the list.	Identifies the Engineering Repository Database (ERDB) where control strategies will be stored.

Introduction

Functional Overview

Step	Action	Result
6	The Domain Name field identifies the domain where the Server is located. For Station operator-based security logon, the Domain Name must be Experion PKS Security. Key in desired domain name or click the down-arrow button to select it from the list.	Identifies the Domain associated with the Server.
7	Click OK.	Launches Control Builder.
8	Go to the next section <i>Opening and Navigating a tree window</i> .	Must open tree windows to view database and library contents.

Opening and navigating a tree window

This procedure illustrates how to initialize the tree windows within Control Builder. If this is the first time Control Builder has been launched, there are no tree windows open. Otherwise, Control Builder opens with the same tree windows that were displayed when it was last closed.

There are three available trees or views within each tree window:

- Project tree
- Monitoring tree
- Library tree



ATTENTION

Only **two** tree windows may be opened at any one time.

Step	Action	Result
1	Click File -> Open Tree Window, or click the  Open Tree button in the toolbar. (This option will not be available, if two tree windows are already open.)	A tree window opens on the left side of the main Control Builder window.
2	Repeat Step 1 to open another tree window, if required. (This option will not be available, if two tree windows are already open.)	A second tree window opens, as shown in the following figure.

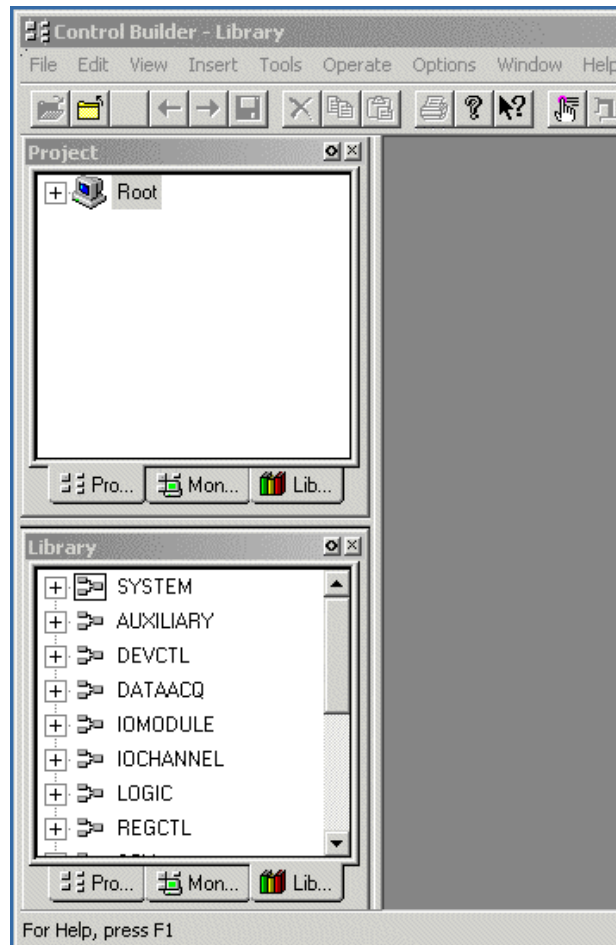
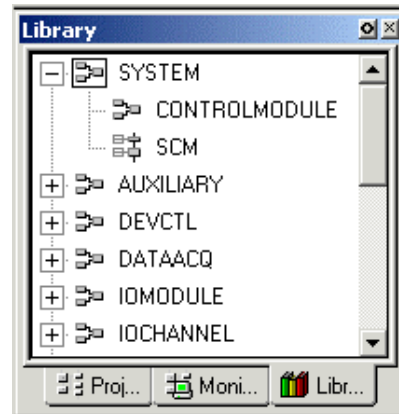


Figure 1 Control Builder with Two Tree Windows (Default Tree Position)

- 3 Click the appropriate tab (Project, Monitoring or Library) on the bottom of the tree window to select the desired tree view.

Selected tree is displayed.

- 4 Click on the  sign of the desired Library to expand and view the contents.



TIP

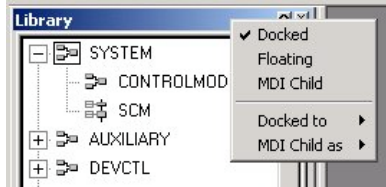
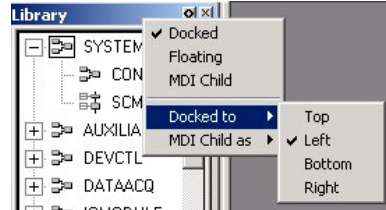
To expand the width of a tree window, move the cursor over its border until the cursor becomes a two-headed arrow, then drag to expand the window.

Changing the state of a tree window

Tree windows can exist in three different states:

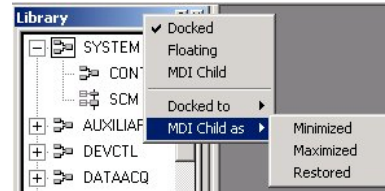
- **Docked** – the tree window is attached to one of the edges of the main Control Builder window. Tree windows in this state will not participate in normal child window cascades, sizing, or tiling operations.
- **Floating** – the tree window floats on top of or completely outside of the main Control Builder window. Tree windows in this state will not participate in normal child window cascade, sizing, or tiling operations.
- **MDI Child** – the tree window acts exactly like an open chart window. Tree windows in this state can be maximized, minimized, tiled and cascaded along with other Control Builder child windows (charts).

Perform the following procedure to change the state of a tree window.

Step	Action	Result
1	Right-click in the title bar area of the tree window. Alternate method: Hold the left-mouse button down with the cursor on top of the “diamond” button in the title bar.	A context menu pops up which enables you to change the state of the tree window. 
2	Select the desired state for the tree window.	Tree window assumes the desired state.
2A	For a docked tree window, select the sub-menu titled Docked to on the Context Menu to select a desired docking position (top, left, bottom, right).	Tree window assumes the desired docking position. 

- 2B** For an MDI Child tree window, select the sub-menu titled **MDI Child as** on the Context Menu to select a desired window size (minimized, maximized, restored).

Tree window assumes the desired MDI Child window size.



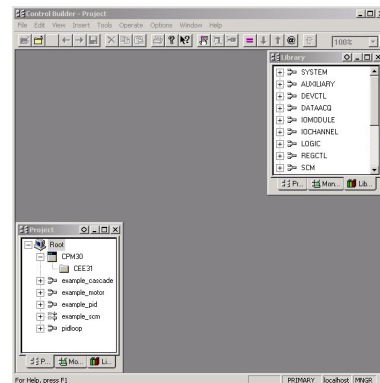
TIP

The following shortcuts can also be used for changing the state of a tree window:

- Double-click on the tree window title bar to change a docked window to a floating window and vice versa.
- Click on the “diamond” button in the tree window title bar to toggle between a docked window and a regular MDI child window.
- Drag a docked or floating tree window near the edge of the main Control Builder window to dock the window in the selected position.
- Hold down the <Ctrl> key while dragging a docked or floating tree window to force the window to float.

Moving a docked tree window

Step	Action	Result
1	Click and drag the title bar of the appropriate tree window to another border of the main Control Builder window.	Tree window assumes the desired position. For example, if you drag the tree window near the right edge, it will “dock” on the right-hand side.



Closing a tree window

Step	Action	Result
1	Select either tree window by clicking on one of the tree window tabs or the title bar.	Window is highlighted.
2	Click File -> Close, or you can click the  Close tree button in the toolbar.	The selected tree window closes.

Steps to Configure a Control Strategy

Recommended Control Strategy Steps

The following tables list the recommended steps that should be followed when developing a control strategy. Each step references a section to see for detailed information. The table assumes that the Experion PKS Server has already been set-up and configured.

Creating Hardware and Control Module Instances

Step	Action	See
1	Start Control Builder and open two tree windows.	Starting Control Builder and Opening and navigating a tree window
2	Create Hardware Blocks.	Creating a CPM and CEE , Creating an ACE and CEE , Creating an External Server , Creating an IOLIM and IOLINK , Creating Redundancy Modules , and Creating an Instance of Input/Output Modules .
3	Configure chassis I/O Modules	Configuring Chassis Analog I/O Module , Configuring Chassis Digital I/O Module , Configuring Chassis Diagnostic I/O Module , Configuring the Serial Interface Module , and Configuring the Pulse Input Module .

Steps to Configure a Control Strategy
Recommended Control Strategy Steps

Step	Action	See
4	Create Input/Output Processor	Creating PM I/O High Level Analog Input IOP, Creating PM I/O HART High Level Analog Input IOP, Creating PM I/O Low Level Analog Multiplexer Input IOP, Creating PM I/O Analog Output IOP, Creating PM I/O HART Analog Output IOP, Creating PM I/O Digital Input IOP, Creating PM I/O Digital Output IOP, and Creating PM I/O STIMV IOP
5	Create a Control Module (CM).	Creating and Saving a Control Module
6	Add Function Blocks to the CM.	Creating an Instance of a Basic Function Block
7	Configure the Function Blocks.	Using the Parameters Configuration Form
8	Connect the Function Blocks.	Connecting Blocks with Insert Wire and Connecting Blocks with Parameter Connector Option
9	Assign IOMs and CMs to the Control Execution Environment (CEE).	Assigning CMs and IOMs to CEE
10	Associate I/O Channels to I/O Modules.	Associating I/O Channels to I/O Modules (IOMs)
11	Assign I/O Processors (IOPs) to I/O Link (IOLINK)	Assigning IOPs to IOLINK
12	Assign Process Manager I/O, Input/Output Channel (IOC) block to I/O Processor (IOP)	Assigning PMIO IOC Block to IOP

Steps to Configure a Control Strategy
Recommended Control Strategy Steps

Step	Action	See
13	Load the Control Strategy.	Loading Control Strategy Components
14	Activate the Control Strategy.	Activating the CEE and Setting I/O Active

Creating Sequential Control Module instances

SCMs can be used in conjunction with CMs to control the actions of CM FBs. Parameters, such as the mode of a block or block-input conditions, can be monitored and/or changed based on expressions specified in the SCM.

Step	Action	See
1	Start Control Builder and open two tree windows.	Starting Control Builder and Opening and navigating a tree window
2	Create a Sequential Control Module (SCM).	Creating and Saving a Sequential Control Module
3	Create a Step.	Creating Instances of Steps and Transitions and/or Configuring the Step/Transition Parameter Configuration Form
4	Add any required Step Outputs.	Adding Transition Conditions and Step Outputs and Adding Step Stop and Interrupt conditions
5	Create a Transition.	Creating Instances of Steps and Transitions and/or Configuring the Step/Transition Parameter Configuration Form
6	Create any required Transition conditions.	Adding Transition Conditions
7	Repeat Steps 4 through 7 to satisfy the strategy you are building.	

Steps to Configure a Control Strategy
Recommended Control Strategy Steps

Step	Action	See
8	Connecting the Steps and Transitions.	Connecting and Disconnecting SCM Blocks
9	Add additional Handlers.	Adding Additional Handlers
10	Assign SCM to the Control Execution Environment (CEE).	Assigning SCM to CEE
11	Load the SCM.	Loading the SCM
12	Operate the SCM.	Operating an SCM

Hardware Module Creation

Creating a CPM and CEE

Use the following procedure to create a Control Processor Module (CPM) and associated Control Execution Environment (CEE) blocks in the Project Tree that will represent an installed C200 CPM. The CEE supports execution of a set of Function Blocks for solving control applications. It runs in the CPM as a software layer built on top of the control software infrastructure.



TIP

You can configure a CPM block in the Control Builder Project tab without the CPM hardware being installed. However, it is good idea to have the communications driver and hardware that is going to be used for the system installed, configured, and running. The CPM needs the name of the communications driver specified on its configuration form to complete its configuration data. The CPM represents a hardware module and the block configuration specifies the communication path to the hardware.

The following procedure assumes that Control Builder is running and two tree windows are open. All illustrations used in the procedure are for example purposes only.

Hardware Module Creation

Creating a CPM and CEE

Step	Action	Result
1	Click File -> New -> Controllers -> CPM200 – Control Processor.	Calls up the CPM200 Block configuration form with Name field highlighted.



SYSTEM:CPM200 Block, CPM200171 - Parameters [Project]

Main | Server History | Server Displays

Name:

Network Type:

Driver Name:

Supervisory MAC Address:

Supervisory Slot Number:

CPM Slot Number:

Command:

Status: OK

Time Zone:

Year Format:

☐ Daylight Savings Time

Weekday Format:

☐ This controller is redundant

Redundancy Capability: OFF

Secondary CPM:

Synchronization State: NOTINSYNC

☐ Show Parameter Names

OK Cancel Help

- 2** Key in desired name of up to 16 characters or accept the default. Press <Tab>

Moves cursor to Network Type field.

Network Type:



TIP

All communications drivers must be installed and running before they will appear in the Driver Name selection list.

- 3** Accept default or click  down-arrow button and select from list. Press <Tab>.

Moves cursor to Driver Name field.

Driver Name:

- 4** Click  down-arrow button and select installed ControlNet or Ethernet driver from the list. Press <Tab>.

Moves cursor to Supervisory MAC Address field.

Supervisory MAC Address:

- 5** Click  down-arrow button and select Address of the CNI (ControlNet Interface) card in the chassis that is connected to the communications adapter card in the server. Press <Tab>.

Moves cursor to Supervisory Slot Number field.

Supervisory Slot Number:

- 6** Click  down-arrow button and select slot number where supervisory CNI card is installed in the chassis. CNI card takes up one slot in the chassis and slots are numbered from left starting at 0. Press <Tab>.

Moves cursor to CPM Slot Number field.
(The Command field is not accessible in Project mode.)

CPM Slot Number:

- 7** Click  down-arrow button and select slot number where CPM is installed in the chassis from the list. CPM takes up 2 slots in the chassis and slots are numbered from left starting at 0. Only odd-numbered slot is selected. Press <Tab>.

Moves cursor to This Controller is Redundant check box.

☐ This controller is redundant

Hardware Module Creation

Creating a CPM and CEE

- 8** Leave the box unchecked, if non-redundant CPM configuration is intended. Check the box, if CPM is part of a Redundant Chassis Pair (RCP). Press <Tab>.

If the box is unchecked, cursor moves to Year Format field. Go to Step 10.

If the box is checked, cursor moves to Secondary CPM field.

Secondary CPM:

- 9** A name consisting of that of primary CPM followed by "SEC" will be assigned to secondary CPM. Accept default name or key in desired name of up to 16 characters. Press <Tab>.

Moves cursor to the Year Format field.

Year Format:

- 10** Accept default or click  down-arrow button and select desired format from the list. Press <Tab>.

Moves cursor to Weekday Format field.

Weekday Format:



TIP

The time zone represents the offset value from the Greenwich Mean Time (GMT) based on your geographical location. For example, the time zone value for a CPM located in the Eastern time zone of the United States that is currently not observing daylight savings time would be -05.0 or -5. Always use the offset value that is not adjusted for daylight savings time as the entry for the Time Zone field. For example, the adjusted offset value for the Eastern time zone of the United States is -04.0, but use the unadjusted value of -5 instead.

You may want to visit the <http://www.worldtimeserver.com/> website, if you have a question about the appropriate offset value for your given location.

- 11** Accept default or click  down-arrow button and select desired format from the list. Press <Tab>.

Moves cursor to Time Zone field.

Time Zone:

- 12** Key in the appropriate time zone offset value for the location where the CPM is installed. Press <Tab>.

Moves cursor to Daylight Savings Time check box.

☐ Daylight Savings Time

- 13**
- Leave box unchecked, if Daylight Savings Time is not currently being observed at your location. Or,
 - Check the box, if Daylight Savings time is currently being observed at your location.
 - Click Server History tab.
- Calls up the Server History configuration form.

The screenshot shows a software window titled "SYSTEM:CPM200 Block, CPM200171 - Parameters [Project]". It has three tabs: "Main", "Server History" (which is selected), and "Server Displays".

Under the "Server History" tab, there are two main sections:

- Access Levels:** Contains a "Control Level" text box with the value "200" and a "Control Area" text box.
- History Configuration:** Contains a "Number of History Parameters" text box with the value "10". Below this is a table with 10 rows and 8 columns.

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Below the table is a button labeled "Create New or Edit Existing Server Scripts".

At the bottom of the window, there is a checkbox labeled "Show Parameter Names" (which is unchecked) and three buttons: "OK", "Cancel", and "Help".

Hardware Module Creation

Creating a CPM and CEE



TIP

If you have a Distributed Server Architecture (DSA), you must enter the Control Area assignment for this Server. (Note that area code assignments are made through the Station application.) If you do not have a DSA, you can skip this field if areas is not enabled through the Station application.

- 14** Use the on-line help as a guide to complete the configuration entries on this tab. Click the Server Displays tab. Calls up the Server Displays configuration form.

SYSTEM:CPM200 Block, CPM200171 - Parameters [Project]

Main | Server History | **Server Displays**

Point Detail Display Associated Display

Group Detail Display

Trends

Number of Trends

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups

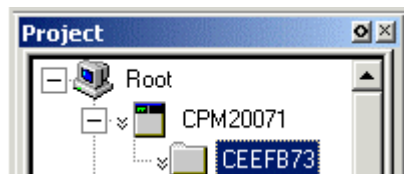
	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

☐ Show Parameter Names

OK Cancel Help

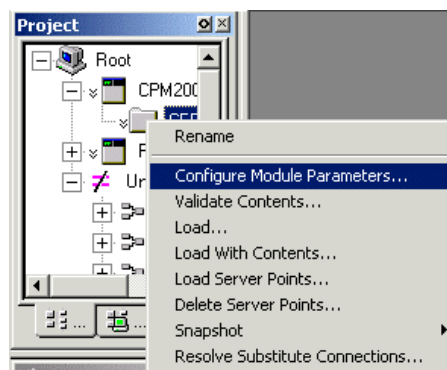
- 15** Use the on-line help as a guide to complete the configuration entries on this tab. Click the OK button.

Closes the form and creates CPM/CEE block icons in Project tab.



- 16** Right-click CEE block icon.

Calls up shortcut menu.



- 17** Click Configure Module Parameters.

Calls up CEE Block configuration form.

Hardware Module Creation

Creating a CPM and CEE

SYSTEM:CEEFB Block, CEEFB73 - Parameters [Project]

Main | Statistics | CPU Loading | CPU Overruns | Server History | Server Displays

Name:

Base Execution Period:

Peer Defaults:

Default of Subsc Period:

Default of Peer StrResp:

Command/State:

CEE Command:

CEE State:

☐ In Alarm Flag

Number of Peer Envs:

Peer Environment Table

	Peer Envs of this EE	Peer Subscription Period	Peer Store Response Tim	Avg Peer Get Request	Avg Peer Str Request
1		500MS	15	0	0

☐ Show Parameter Names

OK Cancel Help

- 18** Key in desired name of up to 16 characters or accept the default. Press <Tab>

Moves cursor to Base Execution Period field.

Base Execution Period:

- 19** Accept the default or click  down-arrow button and select desired period. Press <Tab>.

Moves cursor to Default of Subsc Period field.

Default of Subsc Period:

- 20** Accept the default or click  down-arrow button and select desired period. Press <Tab>.

Moves cursor to Default of Peer StrReponse field.

Default of Peer StrResp

- 21** Accept the default or key in desired value. Press <Tab>.

Moves cursor to Number of Peer Envs field, since CEE Command field is unavailable in Project mode and the CEE State field is read only.

Number of Peer Envs



TIP

The Number of Peer Envs and Peer Environment Table are interactive. The value entered for the Number of Peer Envs determines how many rows appear in the Peer Environment Table.

- 22** Key in number of peer environments for this CPM. Press <Tab>.

Or, skip this field, if no peer environments will be used. Click Server History tab.

If peer environments will be used, cursor moves to the Peer Envs of this EE column in the Peer Environment Table.

Peer Environment Table		
	Peer Envs of this EE	Peer Sub
1		2SEC

If no peer environments exist, go to Step 26.

- 23** Key in valid name for existing peer environment. Press <Tab>.

Moves cursor to Peer Subscription Period column.

Peer Subscription Period

500MS

Hardware Module Creation

Creating a CPM and CEE

- 24** Accept default or click  down-arrow button to select another value specific to the given environment. Press <Tab>. Moves cursor to Peer Store Response Time column.
- 
- 25** Accept the default or key in desired value. Click Server History tab. Calls up the Server History configuration form.
- 26** Repeat Steps 14 and 15. Completes CEE configuration and closes the form.
- 27** This completes the CPM/CEE creation procedure.
-



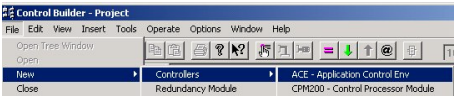
REFERENCE - INTERNAL

See the *Experion PKS Control Builder Components Reference, Component Categories and Types* and the *Experion PKS Planning Guide, Planning Your ControlNet Addressing* for details on setting MAC addresses and determining correct slot numbers for your system.

Creating an ACE and CEE

Use the following procedure to create an Application Control Environment (ACE) supervisory controller and associated Control Execution Environment (CEE) blocks in the Project Tree that will represent an installed ACE supervisory controller. The CEE supports execution of a set of Function Blocks for solving control applications. It runs in the ACE supervisory controller as a software layer built on top of the control software infrastructure.

The following procedure assumes that Control Builder is running and two tree windows are open. All illustrations used in the procedure are for example purposes only.

Step	Action	Result
1	Click File -> New -> Controllers -> ACE – Application Control Environment.	Calls up the ACE Block configuration form with Name field highlighted.
		

Hardware Module Creation

Creating an ACE and CEE

SYSTEM:ACE Block, ACE183 - Parameters [Project]

Main | Statistics | Server History | Server Displays

Name: ACE183

ACE Location

Host IP Address: 0 . 0 . 0 . 0

Host Name

☐ ControlNet Connection

ACE Mac Address

Command/State

ACE Command: NONE

ACE State: OK

CEE Command: IDLE

CEE State: IDLE

☐ In Alarm Flag

☒ Alarming Enabled

Time Info

Time Zone: 0

☐ Daylight Savings Time

Year Format: YYYY

Weekday Format: 1SUNDAY

☐ Show Parameter Names

OK Cancel Help



TIP

Host name and Host IP Address are interactive entries. We recommend that you key in the Host IP Address first and let the system determine the Host Name automatically. This is especially true if you are configuring the ACE block with the ACE node offline. In this case, entering the Host IP address first generates a Warning message, but entering the Host Name first generates an error message.

When keying in an IP address, use the mouse or the left and right arrow keys to move the cursor to locations within the field. Do not press the <Tab> key until the complete address is keyed in.

- 2 Key in desired name of up to 16 characters or accept the default. Press <Tab>

Moves cursor to Host IP Address field.

Host IP Address 0 . 0 . 0 . 0

- 3** Key in the host pc IP address for the ACE node. Press <Tab>.
- Or, press <Tab> to skip this field and enter Host Name instead. Acknowledge any error message prompts.

System automatically determines the Host Name, when ACE node is online, and moves cursor to Host Name field.



Host Name

(Valid IP address entry results in system automatically determining the Host Name, when ACE node is online.)

- 4** If Host Name has been automatically determined, press <Tab>.
- Or, Key in name assigned to the host pc for the ACE node. There is a 255-character limit on this field. Press <Tab>

Moves cursor to ControlNet Connection field.



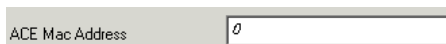
☐ ControlNet Connection

(Valid Host Name entry results in system automatically determining the Host IP Address, when ACE node is online.)

- 5** Leave the box unchecked, if ACE is not connected to the ControlNet network. Check the box, if ACE is connected to the ControlNet network. Press <Tab>.

If the box is unchecked, cursor moves to Time Zone field, since the preceding fields are unavailable. Go to Step 9.

If the box is checked, cursor moves to ACE Mac Address field.



ACE Mac Address

- 6** Key in the Media Access Control (MAC) address assigned to the PCIC card installed the ACE node for ControlNet connections. Press <Tab>.

Moves cursor to the Time Zone field, since the ACE Command field is unavailable in the Project mode and the ACE State field is read only.



Time Zone



TIP

The time zone represents the offset value from the Greenwich Mean Time (GMT) based on your geographical location. For example, the time zone value for a CPM located in the Eastern time zone of the United States that is currently not observing daylight savings time would be -05.0 or -5. Always use the offset value that is not adjusted for daylight savings time as the entry for the Time Zone field. For example, the adjusted offset value for the Eastern time zone of the United States is -04.0, but use the unadjusted value of -5 instead.

You may want to visit the <http://www.worldtimeserver.com/> website, if you have a question about the appropriate offset value for your given location.

- 7** Key in the appropriate time zone offset value for the location where the ACE is installed. Press <Tab>. Moves cursor to Daylight Savings Time check box.



- 8** Leave box unchecked, if Daylight Savings Time is not currently being observed at your location. Or, Check the box, if Daylight Savings time is currently being observed at your location. Press <Tab>. Moves cursor to Year Format field.



- 9** Accept default or click  down-arrow button and select desired format from the list. Press <Tab>. Moves cursor to Weekday Format field.



- 10** Accept default or click  down-arrow button and select desired format from the list. Click the Server History tab. Calls up the Server History configuration form.

SYSTEM:ACE Block, ACE183 - Parameters [Project]

Main | Statistics | Server History | Server Displays

Access Levels

Control Level Control Area

History Configuration

Number of History Parameters

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Create New or Edit Existing Server Scripts

☐ Show Parameter Names

OK Cancel Help



TIP

If you have a Distributed Server Architecture (DSA), you must enter the Control Area assignment for this Server. (Note that area code assignments are made through the Station application.) If you do not have a DSA, you can skip this field if areas is not enabled through the Station application.

- 11

Use the on-line help as a guide to complete the configuration entries on this tab. Click the Server Displays tab.
- Calls up the Server Displays configuration form.

Hardware Module Creation

Creating an ACE and CEE

SYSTEM:ACE Block, ACE183 - Parameters [Project]

Main | Statistics | Server History | Server Displays

Point Detail Display: Associated Display:

Group Detail Display:

Trends

Number of Trends:

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups:

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

☐ Show Parameter Names

OK Cancel Help

- 12** Use the on-line help as a guide to complete the configuration entries on this tab. Click the OK button.

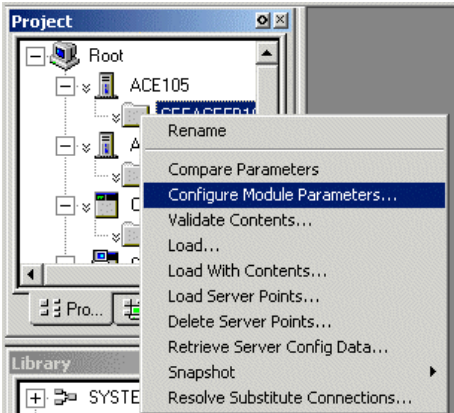
Closes the form and creates ACE/CEE block icons in Project tab.



- 13

Right-click CEEACE block icon.

Calls up shortcut menu.



- 14

Click Configure Module Parameters.

Calls up CEE Block configuration form.

Hardware Module Creation
Creating an ACE and CEE

SYSTEM:CEEACEFB Block, CEEACEFB185 - Parameters [Project]

Main | Statistics | CPU Loading | CPU Overruns | Server History | Server Displays

Name: CEEACEFB185

Base Execution Period: 500MS

Peer Defaults

Default of Subsc Period: DEFAULT

Default of Peer StrResp: 15

Command/State

CEE Command: IDLE

CEE State: IDLE

☐ In Alarm Flag

Number of Peer Envs: 0

Peer Environment Table

	Peer Envs of this EE	Peer Subscription Period	Peer Store Response Tim	Avg Peer Get Request	Avg Peer Str Request
1		2SEC	15	0	0

☐ Show Parameter Names

OK Cancel Help

- 15** Key in desired name of up to 16 characters or accept the default. Press <Tab>

Moves cursor to Base Execution Period field.

Base Execution Period: 500MS

- 16** Accept the default or click  down-arrow button and select desired period. Press <Tab>.

Moves cursor to Default of Subsc Period field.

Default of Subsc Period: DEFAULT

- 17** Accept the default or click  down-arrow button and select desired period. Press <Tab>.

Moves cursor to Default of Peer StrReponse field.

Default of Peer StrResp

- 18** Accept the default or key in desired value. Press <Tab>.

Moves cursor to Number of Peer Envs field.

Number of Peer Envs



TIP

The Number of Peer Envs and Peer Environment Table are interactive. The value entered for the Number of Peer Envs determines how many rows appear in the Peer Environment Table.

- 19** Key in number of peer environments for this ACE. Press <Tab>.
- Or, skip this field, if no peer environments will be used. Click Server History tab.

If peer environments will be used, cursor moves to the Peer Envs of this EE column in the Peer Environment Table.

Peer Environment Table		
	Peer Envs of this EE	Peer Sub
1		2SEC

If no peer environments exist, go to Step 23.

- 20** Key in valid name for existing peer environment. Press <Tab>.

Moves cursor to Peer Subscription Period column.

Peer Subscription Period

Hardware Module Creation

Creating an ACE and CEE

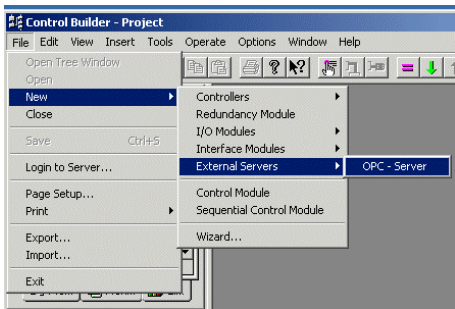
- 21** Accept default or click  down-arrow button to select another value specific to the given environment. Press <Tab>.
- Moves cursor to Peer Store Response Time column.
- 
- 22** Accept the default or key in desired value. Click Server History tab.
- Calls up the Server History configuration form.
- 23** Repeat Steps 11 and 12.
- Completes CEE configuration and closes the form.
- 24** This completes the ACE/CEE creation procedure.
-

Creating an External Server

Use the following procedure to create an OLE for Process Control (OPC) Server in the Project Tree to represent an external server.

The following procedure assumes that Control Builder is running and two tree windows are open. All illustrations used in the procedure are for example purposes only.

Step	Action	Result
1	Click File -> New -> External Servers -> OPC Server.	Calls up the OPC Server configuration form with Name field highlighted.

A screenshot of the 'Control Builder - Project' application window. The 'File' menu is open, showing options like 'Open Tree Window', 'Open', 'New', 'Close', 'Save' (with a 'Ctrl+S' shortcut), 'Login to Server...', 'Page Setup...', 'Print', 'Export...', 'Import...', and 'Exit'. The 'New' option is selected, which has opened a sub-menu. In this sub-menu, 'External Servers' is selected, which has opened another sub-menu where 'OPC - Server' is highlighted. Other options in the 'New' sub-menu include 'Controllers', 'Redundancy Module', 'I/O Modules', 'Interface Modules', 'Control Module', 'Sequential Control Module', and 'Wizard...'.

Hardware Module Creation

Creating an External Server

SYSTEM:OPC Block, OPC191 - Parameters [Project]

Main | Server History | Server Displays

Name: OPC191

Description: Server

Host IP Address: 0 . 0 . 0 . 0

Host Name:

OPC Server PROGID:

☐ Show Parameter Names

OK Cancel Help



TIP

Host name and Host IP Address are interactive entries. We recommend that you key in the Host IP Address first and let the system determine the Host Name automatically. This is especially true if you are configuring the OPC Server block with the server node offline. In this case, entering the Host IP address first generates a Warning message, but entering the Host Name first generates an error message.

When keying in an IP address, use the mouse or the left and right arrow keys to move the cursor to locations within the field. Do not press the <Tab> key until the complete address is keyed in.

- 2** Key in desired name of up to 16 characters or accept the default. Press <Tab>

Moves cursor to Description field.

Description

- 3** Accept default entry or key in desired descriptive data. There is a 132-character limit on this field. Press <Tab>.

Moves cursor to Host IP Address field.

Host IP Address

- 4** Key in the host pc IP address for the OPC server node. Press <Tab>.
- Or, press <Tab> to skip this field and enter Host Name instead. Acknowledge any error message prompts.

System automatically determines the Host Name, when OPC server node is online, and moves cursor to Host Name field.

Host Name

(Valid IP address entry results in system automatically determining the Host Name, when OPC server node is online.)

- 5** If Host Name has been automatically determined, press <Tab>.
- Or, Key in name assigned to the host pc for the OPC server node. There is a 255-character limit on this field. Press <Tab>

Moves cursor to OPC Server PROGID field.

OPC Server PROGID

(Valid Host Name entry results in system automatically determining the Host IP Address, when OPC server node is online.)



TIP

Base the choice of version specific or general type PROGID on how "automatic" the OPC Server component version upgrade is to be. With the general type of PROGID, the OPC Server component version upgrade will be more automatic, since it requires less user interaction.

- 6** Key in the Microsoft COM object Program ID for the intended OPC Server. Click the Server History tab.

Calls up the Server History configuration form.

Hardware Module Creation

Creating an External Server

SYSTEM:OPC Block, OPC191 - Parameters [Project]

Main | **Server History** | Server Displays

Access Levels

Control Level: Control Area:

History Configuration

Number of History Parameters:

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

☐ Show Parameter Names



TIP

If you have a Distributed Server Architecture (DSA), you must enter the Control Area assignment for this Server. (Note that area code assignments are made through the Station application.) If you do not have a DSA, you can skip this field if areas is not enabled through the Station application.

-
7	Use the on-line help as a guide to complete the configuration entries on this tab. Click the Server Displays tab.	Calls up the Server Displays configuration form.
-

SYSTEM:OPC Block, OPC191 - Parameters [Project]

Main | Server History | Server Displays

Point Detail Display: sysDtlOPCA.dsp Associated Display:

Group Detail Display: sysGrpOPCA.dsp

Trends

Number of Trends: 10

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups: 5

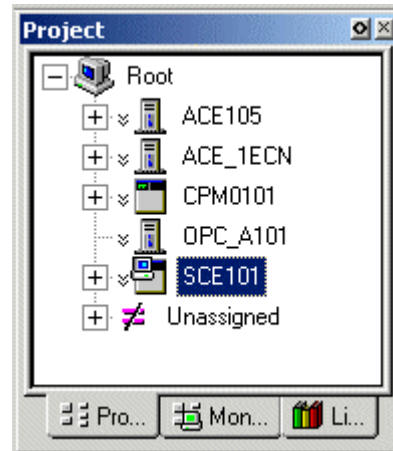
	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

☐ Show Parameter Names OK Cancel Help

- 8 Use the on-line help as a guide to complete the configuration entries on this tab. Click the OK button.
- Closes the form and creates OPC Server block icon in Project tab.

Hardware Module Creation

Creating an External Server



- 9 This completes the OPC Server creation procedure.
-

Creating an IOLIM and IOLINK

Use the following procedure to create an I/O Link Interface Module (IOLIM) and associated I/O Link blocks in the Project Tree that will represent an installed IOLIM. The IOLIM provides interface to Process Manager I/O through redundant I/O links to an Input/Output Processor (IOP) card file. The IOLIM also supports Controller redundancy. In this case, matching IOLIMs are installed in the Redundant Chassis Pair (RCP).



TIP

You can configure an IOLIM block in the Control Builder Project tab without the IOLIM hardware being installed. However, it is good idea to have the communications driver and hardware that is going to be used for the system installed, configured, and running. The IOLIM needs the name of the communications driver specified on its configuration form to complete its configuration data. Like the CPM, the IOLIM represents a hardware module and the block configuration specifies the communication path to the hardware.

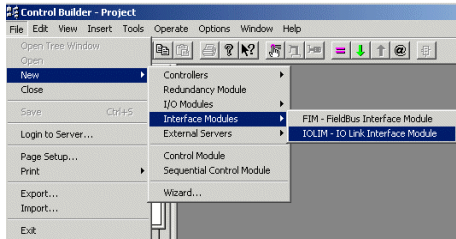


TIP

For Analog Output (AO) and Digital Output (DO) connections, CMs executing at 50 mS are not supported.

The following procedure assumes that Control Builder is running and two tree windows are open. All illustrations used in the procedure are for example purposes only.

Step	Action	Result
1	Click File -> New -> Interface Modules->IOLIM - IO Link Interface Module.	Calls up the IOLIM Block configuration form with Name field highlighted.



Hardware Module Creation

Creating an IOLIM and IOLINK

- 2 Key in desired name of up to 16 characters or accept the default. Press <Tab>

Moves cursor to Network Type field.

Network Type: **CONTROLNET** ▼

- 3 Accept default or click ▼ down-arrow button and select from list. Press <Tab>.

Moves cursor to Driver Name field.

Driver Name: ▼



TIP

All communications drivers must be installed and running before they will appear in the Driver Name selection list. The IOLIM requires a Supervisory network with ControlNet media for communications with the Server.

4

Click  down-arrow button and select installed ControlNet driver from the list. Press <Tab>.

Moves cursor to Supervisory MAC Address field.

Supervisory MAC Address: 

5

Click  down-arrow button and select Address of the CNI (ControlNet Interface) card in the chassis that is connected to the communications adapter card in the Server. Press <Tab>.

Moves cursor to Supervisory Slot Number field.

Supervisory Slot Number: 

6

Click  down-arrow button and select slot number where supervisory CNI card is installed in the chassis. CNI card takes up one slot in the chassis and slots are numbered from left starting at 0. Press <Tab>.

Moves cursor to Module Slot Number field.

Module Slot Number: 



ATTENTION

The Remote Chassis check box and related data fields are unavailable at this time, since communications with an IOLIM installed in a remote I/O chassis is **not** supported in this release.

7

Click  down-arrow button and select slot number where IOLIM is installed in the chassis from the list. IOLIM takes up 2 slots in the chassis and slots are numbered from left starting at 0. Only odd-numbered slot is selected. Press <Tab>.

Moves cursor to This Controller is Redundant check box.

☐ This controller is redundant

Hardware Module Creation

Creating an IOLIM and IOLINK

- 8** Leave the box unchecked, if non-redundant CPM configuration is intended. Check the box, if IOLIM is part of a Redundant Chassis Pair (RCP). Press <Tab>.

If the box is unchecked, click Server History tab. Go to Step 10.

If the box is checked, cursor moves to Secondary Name field.

Secondary Name:

- 9** A name consisting of that of primary IOLIM followed by "SEC" will be assigned to secondary IOLIM. Accept default name or key in desired name of up to 16 characters. Click Server History tab.

Calls up the Server History configuration form.

(The other data on the Main tab is unavailable in the Project mode.)

SYSTEM:IOLIM Block, IOLIM187 - Parameters [Project]

Main | Statistics | **Server History** | Server Displays

Access Levels

Control Level: Control Area:

History Configuration

Number of History Parameters:

	Parameter	Description	FAST	STD	EXT	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Create New or Edit Existing Server Scripts

☐ Show Parameter Names

OK Cancel Help



TIP

If you have a Distributed Server Architecture (DSA), you must enter the Control Area assignment for this Server. (Note that area code assignments are made through the Station application.) If you do not have a DSA, you can skip this field if areas is not enabled through the Station application.

- 10** Use the on-line help as a guide to complete the configuration entries on this tab. Click the Server Displays tab. Calls up the Server Displays configuration form.

SYSTEM:IOLIM Block, IOLIM187 - Parameters [Project]

Main | Statistics | Server History | **Server Displays**

Point Detail Display: sysDtlIOLIM.dsp Associated Display:

Group Detail Display: sysGrpIOLIM.dsp

Trends

Number of Trends:

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups:

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

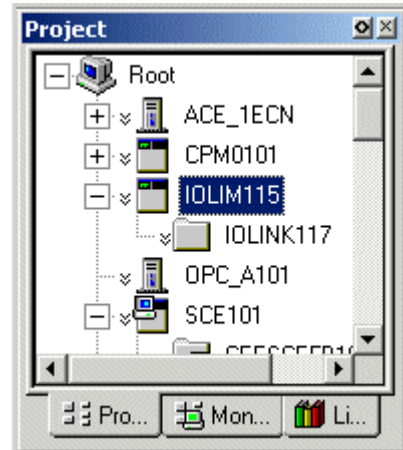
☐ Show Parameter Names

OK Cancel Help

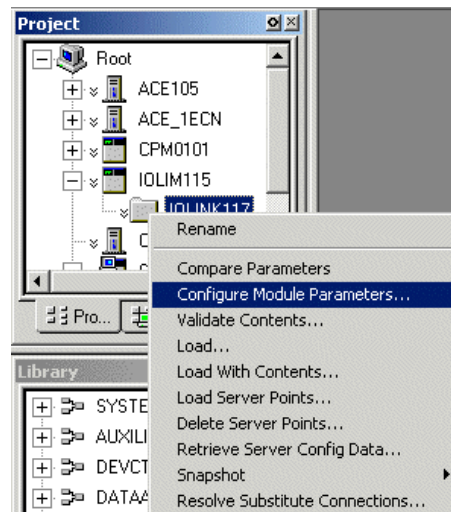
Hardware Module Creation

Creating an IOLIM and IOLINK

- 11** Use the on-line help as a guide to complete the configuration entries on this tab. Click the OK button. Closes the form and creates IOLIM/IOLINK block icons in Project tab.



- 12** Right-click IOLINK block icon. Calls up shortcut menu.



- 13** Click Configure Module Parameters. Calls up IOLINK Block configuration form with Name field highlighted.

SYSTEM:IOLINK Block, IOLINK189 - Parameters [Project]

I/O File 7		I/O File 8		Server History			Server Displays		
Main	Statistics	I/O Link Status	IOP Status Summary	I/O File 1	I/O File 2	I/O File 3	I/O File 4	I/O File 5	I/O File 6

Name: IOLINK189

Description:

I/O Link State: NOTLOADED

I/O Link Command: NONE

Soft Fail Errors:

- ☐ Duplicate IOL Address
- ☐ IOL Channel A Failure
- ☐ IOL Channel B Failure
- ☐ IOL Maximum Errors Exceeded
- ☐ Not Active Supervisor
- ☐ IOLIM Daughter Card Soft Failure
- ☐ Partner I/F Not Visible On IOL
- ☐ Partner I/F Mismatch On IOL
- ☐ IOL Process Data Cycle Overruns

☐ Show Parameter Names

OK Cancel Help

- 14

Key in desired name of up to 16 characters or accept the default. Press <Tab>

Moves cursor to Description field.
- 15

Key in desired descriptive text of up to 132 characters. Click the OK button.

Closes the form, since no other data on this form is available in the Project mode.
- 16

This completes the IOLIM/IOLINK creation procedure.

Creating Redundancy Modules

Use the following procedure to create primary and secondary Redundancy Modules (RMs).

The following procedure assumes that Control Builder is running and two tree windows are open. All illustrations used in the procedure are for example purposes only.

Step	Action

1	Click File -> New -> Redundancy Module.



2	By default, Redundancy Modules are created in pairs. Enter the following information to configure a Redundancy Module: • Name: Accept default or key in your own consisting of up to 16 characters. • Network Type: ControlNet or Ethernet • Driver Name: Select from a choice of currently installed and configured RSLinx drivers • Supervisory MAC Address: Address of the CNI (ControlNet Interface) card in the chassis that is connected to the communications adapter card in the server. • RM Slot Number: RM takes up 2 slots in the chassis and slots are numbered from left starting at 0. Only odd-numbered slot is selected.



ATTENTION

For Secondary Name, a name consisting of the name of the primary RM followed by "SEC" will be assigned to secondary RM.

Step

Action

SYSTEM:TC_PRR021 Block, RM93 - Parameters [Project]

Main | Summary | RM Profiles | Configuration | Synchronization | Chassis Profiles | Display | Security/History | Displays

Primary
Name: RM93
UNDEFINED
RM S/N: 0

Secondary Readiness
UNDEFINED

Secondary
Name:
Position
RM S/N:

Primary
Network Type: CONTROLNET
Driver Name:
Supervisory MAC Address:
RM Slot Number:

Secondary
Name: RM93SEC

☐ Show Parameter Names

OK Cancel Help

- 3** Click OK.
- 4** Right-click the primary RM block icon and select Configure Module Parameters from the shortcut menu.
- 5** Using on-line help as a guide, select available configuration parameters for the primary RM for all appropriate tabs (that is, Configuration, Synchronization, Server History, Server Displays, etc.).

Hardware Module Creation

Creating Redundancy Modules

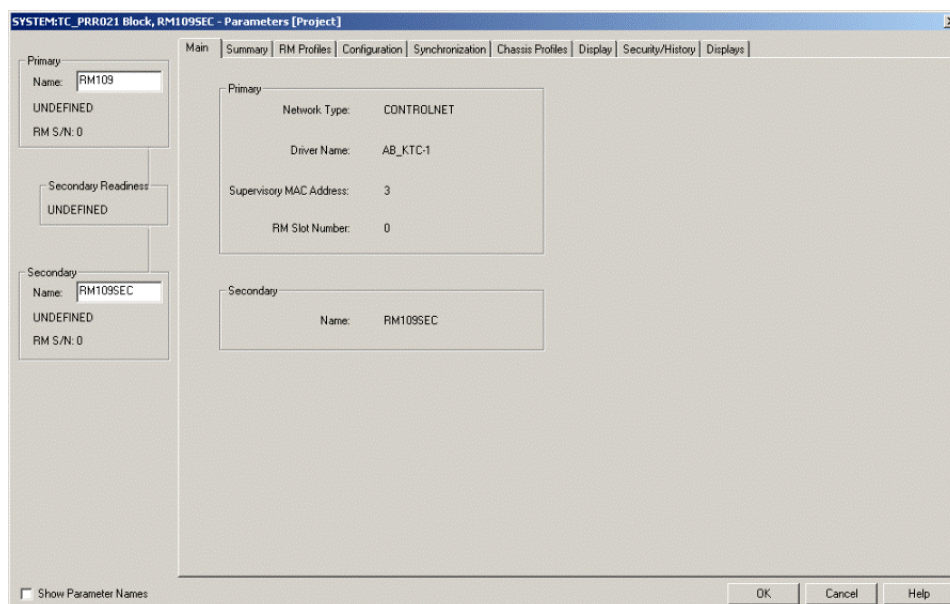
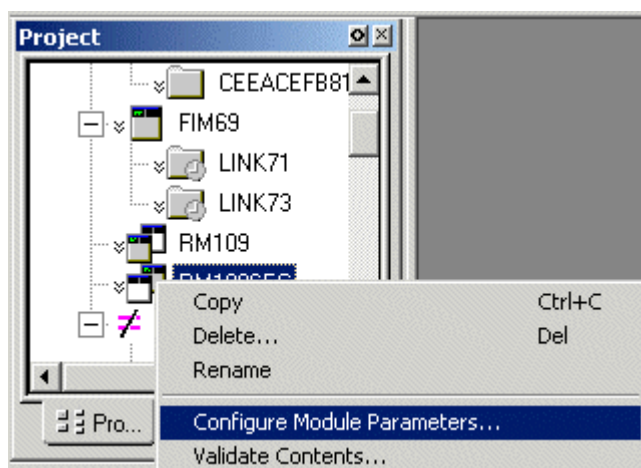
Step	Action																																																																								
	SYSTEM:TC_PRR021 Block, RM93 - Parameters [Project] Main Summary RM Profiles Configuration Synchronization Chassis Profiles Display Security/History Displays Primary Name: RM93 UNDEFINED RM S/N: 0 Secondary Readiness UNDEFINED Secondary Name: Position RM S/N: Auto-Synchronization Option: NEVER State: DISABLED Synchronize Secondary Disqualify Secondary Swap Control Swap to Standby Become Primary Chassis Synchronization States <table><thead><tr><th>Slot</th><th>% Complete</th><th>Module</th><th>Compatibility</th></tr></thead><tbody><tr><td>0</td><td>0</td><td>---</td><td>UNDEFINED</td></tr><tr><td>1</td><td>0</td><td></td><td></td></tr><tr><td>2</td><td>0</td><td></td><td></td></tr><tr><td>3</td><td>0</td><td></td><td></td></tr><tr><td>4</td><td>0</td><td></td><td></td></tr><tr><td>5</td><td>0</td><td></td><td></td></tr><tr><td>6</td><td>0</td><td></td><td></td></tr><tr><td>7</td><td>0</td><td></td><td></td></tr><tr><td>8</td><td>0</td><td></td><td></td></tr><tr><td>9</td><td>0</td><td></td><td></td></tr><tr><td>10</td><td>0</td><td></td><td></td></tr><tr><td>11</td><td>0</td><td></td><td></td></tr><tr><td>12</td><td>0</td><td></td><td></td></tr><tr><td>13</td><td>0</td><td></td><td></td></tr><tr><td>14</td><td>0</td><td></td><td></td></tr><tr><td>15</td><td>0</td><td></td><td></td></tr><tr><td>16</td><td>0</td><td></td><td></td></tr></tbody></table> Enter Standby Initiate Switchover Show Parameter Names OK Cancel Help	Slot	% Complete	Module	Compatibility	0	0	---	UNDEFINED	1	0			2	0			3	0			4	0			5	0			6	0			7	0			8	0			9	0			10	0			11	0			12	0			13	0			14	0			15	0			16	0		
Slot	% Complete	Module	Compatibility																																																																						
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6 Click OK.

Step

Action

- 7 Right-click the secondary RM block icon and select Configure Module Parameters from the shortcut menu. The Block parameters Configuration form appears on the screen.



Hardware Module Creation

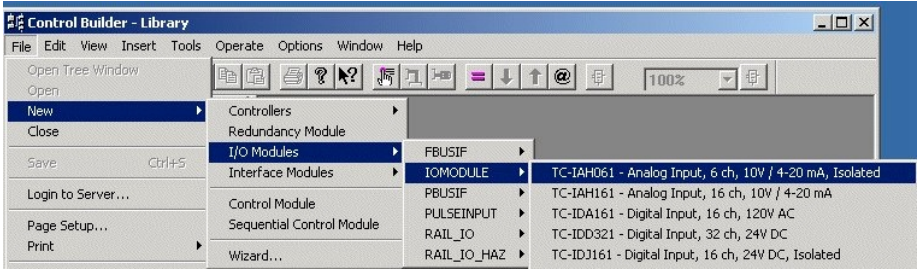
Creating Redundancy Modules

Step	Action
8	Using on-line help as a guide, select configuration parameters for the secondary RM for all appropriate tabs (Configuration, Synchronization, Server History, Server Displays, etc.).
9	Click OK.
10	This completes the RM creation procedure.

Creating an Instance of Input/Output Modules

The Controller supports a variety of Input/Output data interfaces including Chassis I/O – Series A, Rail I/O – Series A, Rail I/O – Series H, and Process Manager I/O as well as links to H1 fieldbus devices and other third party networks. The following procedure is based on creating a Chassis I/O module, but it can be readily adapted to any I/O type that is included in a Control Builder library. The procedure is divided into two sub-procedures to cover the menu and drag and drop methods, respectively

Menu Method

Step	Action
1	Click File -> New -> I/O Modules -> IOMODULE -> [desired I/O Module] to initiate creation of an IOM block by opening its configuration form.
	
2	On the Main Tab of the form, enter the appropriate I/O hardware location data in the applicable fields such as the IOM Slot Number, Remote IO Chassis MAC Address and CNI Slot Number for Chassis I/O. If necessary, access the on-line help for assistance during this step.



TIP

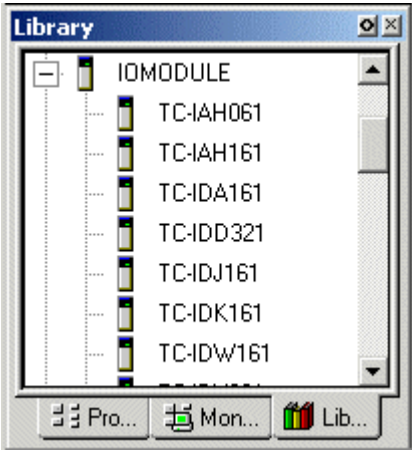
You must enter the address information for the I/O Module before Control Builder will create a block instance of the module in the Project tree.

- Click the OK button to create an instance of the I/O Module block in the Project tree.
- If multiple IOMs are required, repeat this procedure for each occurrence of the IOM, even if the type is the same as a previously created IOM.
- Complete the configuration of each module before loading it to the Controller. Use the appropriate configuration procedure in this document or the applicable I/O component Implementation Guide for reference along with the on-line help.

Hardware Module Creation

Creating an Instance of Input/Output Modules

Drag and Drop Method

Step	Action
1	With two tree windows open in Control Builder, click the Library tab on one tree window to access library contents.
2	Click the  sign for the IOMODULE icon to expand its tree.
	
3	Click the Project tab in the other tree window, to access the root project contents.
4	Drag and Drop the desired I/O Module from the IOMODULE contents in the Library tree to an open area in the Project tree.
	TIP Release the mouse button when the cursor with  sign appears in Project tree to drop the module.
5	Accept the default name assigned to the module in the Name New Function Block dialog or key in a desired name of your own. Click the Finish button.

Step	Action						
6	Name New Function Block(s)... ✕ <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 45%;">Source</th> <th style="width: 50%;">Destination</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>TC-IAH061117</td> <td>TC-IAH061117</td> </tr> </tbody> </table> Change the name in the column on the right to the new desired name or accept the default. Find/Replace... < Back Finish Cancel Help		Source	Destination	1	TC-IAH061117	TC-IAH061117
	Source	Destination					
1	TC-IAH061117	TC-IAH061117					

- 6 Confirm that an IOM block icon now appears in the Project tree. For this example, it is an icon with a default name of TC-IAH061117. See the figure following this table.
 - 7 If multiple IOMs are required, repeat this procedure for each occurrence of the IOM, even if the type is the same as a previously created IOM.
 - 8 Complete the configuration of each module before loading it to the Controller. Use the appropriate configuration procedure in this document or the applicable separate I/O component Implementation Guide for reference along with the on-line help.
-

Hardware Module Creation

Creating an Instance of Input/Output Modules



Figure 2 Adding I/O

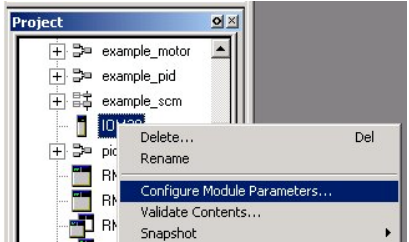


TIP

The number that appears after any object in Control Builder is only a reference created by the control library to ensure name uniqueness and has no other significance. In the previous example, an I/O module was created resulting in a device named TC-IAH061117. The 117 has no significance other than a reference for Control Builder.

Configuring Chassis Analog I/O Module

Use the following procedure to customize a Chassis Analog I/O Module (either AI Module such as model TC-IAH061 or an AO Module such as model TC-OAH061). You can customize an I/O Module by changing its name, description, slot location, MAC address, as well as other configuration parameters with regards to Module, Channel and Server configuration. While this procedure is specific to Chassis type I/O Modules, it can easily be adapted to other supported I/O types.

Step	Action	Result
1	Right-click the desired IOM block icon in the Project tree window.	Calls up the shortcut menu.
		
2	Click Configure Module Parameters.	Calls up the IOM's configuration form.
3	Go to the next appropriate section to configure parameters on one of these configuration form tabs. • Main • Module Configuration • Channel Configuration • Server History • Server Displays	Enter appropriate IOM data into the Engineering Repository Database (ERDB).

Hardware Module Creation

Configuring Chassis Analog I/O Module

Configuring Chassis Analog I/O Module Parameters – Main Tab

Step	Action
1	Under the Main tab (see figure below), enter a Module Name that is more meaningful to you than its default TC-IAH061xxx (xxx represents a preassigned number).
2	Enter an optional Module Description to explain the IO Module's function (such as, Test Strategy AI Module).
3	Enter appropriate values for IOM Slot Number, Remote IO Chassis MAC Address and CNI Slot Number. If necessary, press F1 to access on-line help for assistance during this step.
4	Proceed to the following procedures to configure parameters on the remaining tabs for the Analog I/O Module, or click OK to accept only the changes made so far and return to the Project tree.

Hardware Module Creation

Configuring Chassis Analog I/O Module

IOMODULE:TC-IAH061 Block, TC-IAH061193 - Parameters [Project]

Main | Module Configuration | Channel Configuration | Server History | Server Displays

Module Name:

Module Description:

I/O Module Information

Module Type:

Currently Assigned Channels:

Channel Number	Channel Name
0	
1	
2	
3	
4	
5	

IO Rack Addresses

IDM Slot Number

Remote IO Chassis MAC Address

ControlNet Module Slot Number (connected to IO Chassis)

☐ Show Parameter Names

OK Cancel Help

Configuring Chassis Analog I/O Module Parameters – Module Configuration Tab

Step	Action
1	Under the Module Configuration tab (see figure below), enter desired values for configuration parameters.
	ATTENTION Configuration parameters vary depending upon the type of Analog I/O Module being configured. If necessary, press F1 to access on-line help for assistance during this step. Once the module has been loaded and activated, additional parameters (such as Execution State) may be available in Monitoring Tree window.
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Analog I/O Module, or click OK to accept only the changes made so far and return to the Project tree.

Hardware Module Creation
Configuring Chassis Analog I/O Module

IOMODULE:TC-IAH061 Block, TC-IAH061193 - Parameters [Project]

Main | **Module Configuration** | Channel Configuration | Server History | Server Displays

Execution State: INACTIVE ☒ Alarming Enabled

ID Connection Status: NOTCONNECTED

Sample Rate (msec): 25

☐ Show Parameter Names

OK Cancel Help

Hardware Module Creation

Configuring Chassis Analog I/O Module

Configuring Chassis Analog I/O Module Parameters – Channel Configuration Tab

Step

Action

- 1 Under the Channel Configuration tab (see figure below), enter desired values for configuration parameters.



ATTENTION

Configuration parameters vary depending upon the type of Analog I/O Module being configured. If necessary, press F1 to access on-line help for assistance during this step.

- 2 Proceed to the following procedures to configure parameters on the remaining tabs for the Analog I/O Module, or click OK to accept only the changes made so far and return to the Project tree.

IOMODULE:TC-IAH061 Block, TC-IAH061193 - Parameters [Project]

Main | Module Configuration | Channel Configuration | Server History | Server Displays

Digital Filter: Valid values are 0 (disabled) or a value greater than (2 x Sample Rate).

	Input Range	Notch Filter	Calibration Bias (f)	Digital Filter (msec)	Low Engineering (f)
0	4MA_TO_20MA	60HZ	0	0	0
1	4MA_TO_20MA	60HZ	0	0	0
2	4MA_TO_20MA	60HZ	0	0	0
3	4MA_TO_20MA	60HZ	0	0	0
4	4MA_TO_20MA	60HZ	0	0	0
5	4MA_TO_20MA	60HZ	0	0	0

☐ Show Parameter Names

OK Cancel Help

Configuring Chassis Analog I/O Module Parameters – Server History Tab

Step	Action
1	Under the Server History tab (see figure below), enter the appropriate information for Control Level and Control Area along with values for appropriate parameters related to history collection and archiving. If necessary, press F1 to access on-line help for assistance during this step
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Analog I/O Module, or click OK to accept only the changes made so far and return to the Project tree.

The screenshot shows the 'Server History' tab of the 'IOMODULE:TC-IAH061 Block, TC-IAH061193 - Parameters [Project]' dialog box. The 'Access Levels' section has 'Control Level' set to 200 and 'Control Area' is empty. The 'History Configuration' section has 'Number of History Parameters' set to 10. Below this is a table with 10 rows and 7 columns: Parameter, Description, FAST, STD, EXTD, Gating Parameter, and Gate State. All checkboxes in the FAST, STD, and EXTD columns are currently unchecked. At the bottom, there is a 'Show Parameter Names' checkbox (unchecked) and 'OK', 'Cancel', and 'Help' buttons.

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Hardware Module Creation

Configuring Chassis Analog I/O Module

Configuring Chassis Analog I/O Module Parameters – Server Displays Tab

Step	Action
1	Under the Server Displays tab (see figure below), enter the appropriate information to specify related Point Detail Display, Group Detail Display, and Associated Display along with values for appropriate parameters to define Trends and Groups for display. If necessary, press F1 to access on-line help for assistance during this step
2	Click OK on the configuration form to accept all configuration selections made on each configuration tab and to return to the Project tree.

The screenshot shows the 'Server Displays' tab of the 'IOMODULE:TC-IAH061 Block, TC-IAH061193 - Parameters [Project]' dialog box. The 'Main' tab is selected. The 'Point Detail Display' field contains 'sysDtlA.dsp' and the 'Associated Display' field is empty. The 'Group Detail Display' field contains 'sysGrpA.dsp'. The 'Trends' section has a 'Number of Trends' field set to '10'. Below it is a table with 5 rows and 5 columns: Trend #, Pen, Trend Parameter, and Description. The first row is highlighted. The 'Groups' section has a 'Number of Groups' field set to '5'. Below it is a table with 5 rows and 5 columns: Group #, Pos #, Group Parameter, and Description. The first row is highlighted. At the bottom, there is a checkbox for 'Show Parameter Names' and three buttons: 'OK', 'Cancel', and 'Help'.

Point Detail Display: sysDtlA.dsp Associated Display:

Group Detail Display: sysGrpA.dsp

Trends

Number of Trends: 10

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

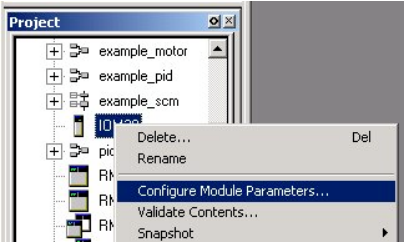
Number of Groups: 5

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

☐ Show Parameter Names OK Cancel Help

Configuring Chassis Digital I/O Module

Use the following procedure to customize a Digital I/O Module (either a DI Module such as TC-IDA161 or a DO Module such as TC-ODA161). You can customize an I/O Module by changing its name, description, slot location, MAC address, as well as other configuration parameters with regards to Module, Channel and Server configuration. While this procedure is specific to Chassis type I/O Modules, it can easily be adapted to other supported I/O types.

Step	Action	Result
1	Right-click the desired IOM block icon in the Project tree window.	Calls up the Context Menu.
		
2	Click Configure Module Parameters.	Calls up the IOM's configuration form.
3	Go to the next appropriate section to configure parameters on one of these configuration form tabs. • Main • Module Configuration • Channel Configuration • Server History • Server Displays	Enter appropriate IOM data into the Engineering Repository Database (ERDB).

Configuring Chassis Digital I/O Module Parameters – Main Tab

Step	Action
1	Under the Main tab (see figure below), enter a Module Name that is more meaningful to you than its default TC-IDA161xxx (xxx represents a preassigned number).
2	Enter an optional Module Description to explain the IO Module's function (such as, Test Strategy DI Module).
3	Enter appropriate values for IOM Slot Number, Remote IO Chassis MAC Address and CNI Slot Number. If necessary, press F1 to access on-line help for assistance during this step.
4	Proceed to the following procedures to configure parameters on the remaining tabs for the Digital I/O Module, or click OK to accept only the changes made so far and return to the Project tree.

Hardware Module Creation

Configuring Chassis Digital I/O Module

IOMODULE:TC-IDA161 Block, TC-IDA161195 - Parameters [Project]

Main | Module Configuration | Channel Configuration | Server History | Server Displays

Module Name:

Module Description:

I/O Module Information

Module Type:

Currently Assigned Channels:

Channel Number	Channel Name
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

IO Rack Addresses

IOM Slot Number

Remote IO Chassis MAC Address

ControlNet Module Slot Number (connected to IO Chassis)

☐ Show Parameter Names

OK Cancel Help

Configuring Chassis Digital I/O Module Parameters – Module Configuration Tab

Step	Action
1	Under the Module Configuration tab (see figure below), enter desired values for configuration parameters.
	ATTENTION Configuration parameters vary depending upon the type of Digital I/O Module being configured. If necessary, press F1 to access on-line help for assistance during this step. Once the module has been loaded and activated, additional parameters (such as Execution State) may be configured on the Monitoring Tree window.
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Digital I/O Module, or click OK to accept only the changes made so far and return to the Project tree.

Hardware Module Creation

Configuring Chassis Digital I/O Module

IOMODULE:TC-IDA161 Block, TC-IDA161195 - Parameters [Project]

Main | Module Configuration | Channel Configuration | Server History | Server Displays

Execution State: ☒ Alarming Enabled

ID Connection Status:

Filter Times

	OFF -> ON	ON -> OFF
Channels 0 - 7	1MSDELAY	9MSDELAY
Channels 8 - 15	1MSDELAY	9MSDELAY

☐ Show Parameter Names

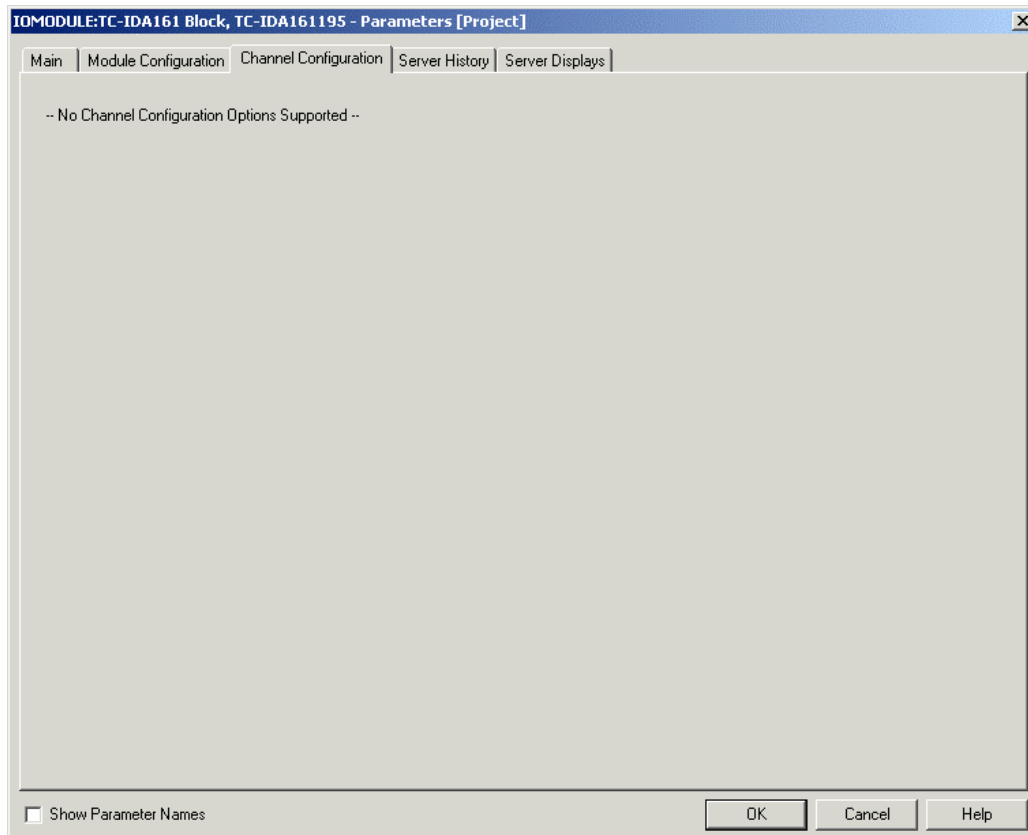
OK Cancel Help

Hardware Module Creation

Configuring Chassis Digital I/O Module

Configuring Chassis Digital I/O Module Parameters – Channel Configuration Tab

Step	Action
1	Under the Channel Configuration tab (see figure below), enter desired values for configuration parameters.
	ATTENTION Configuration parameters vary depending upon the type of Digital I/O Module being configured. If necessary, press F1 to access on-line help for assistance during this step.
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Digital I/O Module, or click OK to accept only the changes made so far and return to the Project tree.



Configuring Chassis Digital I/O Module Parameters – Server History Tab

Step	Action
1	Under the Server History tab (see figure below), enter the appropriate information for Control Level and Control Area along with values for appropriate parameters related to history collection and archiving. If necessary, press F1 to access on-line help for assistance during this step
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Digital I/O Module, or click OK to accept only the changes made so far and return to the Project tree.

The screenshot shows a software window titled "IOMODULE:TC-IDA161 Block, TC-IDA161195 - Parameters [Project]". It has five tabs: "Main", "Module Configuration", "Channel Configuration", "Server History" (which is selected), and "Server Displays".

Under the "Server History" tab, there are two main sections:

- Access Levels:** Contains two input fields. "Control Level" has the value "200" entered. "Control Area" is an empty field.
- History Configuration:** Contains a "Number of History Parameters" input field with the value "10" entered.

Below these sections is a table with 8 columns: "Parameter", "Description", "FAST", "STD", "EXTD", "Gating Parameter", and "Gate State". The table has 10 rows, numbered 1 through 10 in the first column. All cells in the table are currently empty.

At the bottom of the dialog box, there is a button labeled "Create New or Edit Existing Server Scripts".

At the very bottom, there is a checkbox labeled "Show Parameter Names" (which is unchecked), and three buttons: "OK", "Cancel", and "Help".

Hardware Module Creation

Configuring Chassis Digital I/O Module

Configuring Chassis Digital I/O Module Parameters – Server Displays Tab

Step	Action
1	Under the Server Displays tab (see figure below), enter the appropriate information to specify related Point Detail Display, Group Detail Display, and Associated Display along with values for appropriate parameters to define Trends and Groups for display. If necessary, press F1 to access on-line help for assistance during this step
2	Click OK on the configuration form to accept all configuration selections made on each configuration tab and to return to the Project tree.

The screenshot shows the 'Server Displays' tab of the 'IOMODULE:TC-IDA161 Block, TC-IDA161195 - Parameters [Project]' dialog box. The 'Main' tab is selected. The 'Point Detail Display' field contains 'sysDtlIDA.dsp'. The 'Group Detail Display' field contains 'sysGrpDXXA.dsp'. The 'Associated Display' field is empty. The 'Trends' section has a 'Number of Trends' field set to '10'. Below it is a table with 5 rows and 5 columns: Trend #, Pen, Trend Parameter, and Description. The first row is highlighted. The 'Groups' section has a 'Number of Groups' field set to '5'. Below it is a table with 5 rows and 5 columns: Group #, Pos #, Group Parameter, and Description. The first row is highlighted. At the bottom, there is a checkbox for 'Show Parameter Names' and three buttons: 'OK', 'Cancel', and 'Help'.

Point Detail Display: sysDtlIDA.dsp

Group Detail Display: sysGrpDXXA.dsp

Associated Display:

Trends

Number of Trends: 10

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups: 5

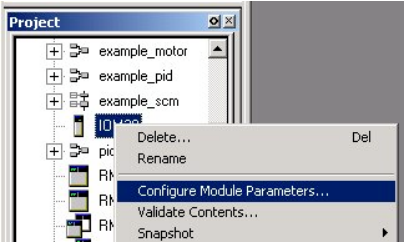
	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

☐ Show Parameter Names

OK Cancel Help

Configuring Chassis Diagnostic I/O Module

Use the following procedure to customize a Diagnostic I/O Module (either a digital input diagnostic module such as TC-IDX081 or a digital output diagnostic module such as TC-ODX081). You can customize an I/O Module by changing its name, description, slot location, MAC address, as well as other configuration parameters with regards to Module, Channel and Server configuration. While this procedure is specific to Chassis type I/O Modules, it can easily be adapted to other supported I/O types.

Step	Action	Result
1	Right-click the desired IOM block icon in the Project tree window.	Calls up the Context Menu.
		
2	Click Configure Module Parameters.	Calls up the IOM's configuration form.
3	Go to the next appropriate section to configure parameters on one of these configuration form tabs. • Main • Module Configuration • Channel Configuration • Diagnostic Configuration • Server History • Server Displays	Enter appropriate IOM data into the Engineering Repository Database (ERDB).

Configuring Chassis Diagnostic I/O Module Parameters – Main Tab

Step	Action
1	Under the Main tab (see figure below), enter a Module Name that is more meaningful to you than its default TC-IDX081xxx (xxx represents a preassigned number).
2	Enter an optional Module Description to explain the function of the Diagnostic I/O Module (such as Test Diagnostic Module).
3	Enter appropriate values for IOM Slot Number, Remote IO Chassis MAC Address and CNI Slot Number. If necessary, press F1 to access on-line help for assistance during this step.
4	Proceed to the following procedures to configure parameters on the remaining tabs for the Diagnostic I/O Module, or click OK to accept only the changes made so far and return to the Project tree.

Hardware Module Creation

Configuring Chassis Diagnostic I/O Module

IOMODULE:TC-IDX081 Block, TC-IDX081197 - Parameters [Project]

Main | Module Configuration | Channel Configuration | Diagnostic Configuration | Server History | Server Displays

Module Name:

Module Description:

I/O Module Information

Module Type:

Currently Assigned Channels:

Channel Number	Channel Name
0	
1	
2	
3	
4	
5	
6	
7	

IO Rack Addresses

IOM Slot Number

Remote IO Chassis MAC Address

ControlNet Module Slot Number (connected to IO Chassis)

☐ Show Parameter Names

OK Cancel Help

Hardware Module Creation

Configuring Chassis Diagnostic I/O Module

Configuring Chassis Diagnostic I/O Module Parameters – Module Configuration Tab

Step	Action
1	Under the Module Configuration tab (see figure below), enter desired values for configuration parameters.
	ATTENTION Configuration parameters vary depending upon the type of Diagnostic I/O Module being configured. If necessary, press F1 to access on-line help for assistance during this step. Once the module has been loaded and activated, additional parameters (such as Execution State) may be configured on the Monitoring Tree window.
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Diagnostic I/O Module, or click OK to accept only the changes made so far and return to the Project tree.

Hardware Module Creation
Configuring Chassis Diagnostic I/O Module

IDMODULE:TC-IDX081 Block, TC-IDX081197 - Parameters [Project]

Main | Module Configuration | Channel Configuration | Diagnostic Configuration | Server History | Server Displays

Execution State: INACTIVE ☒ Alarming Enabled

ID Connection Status: NOTCONNECTED

Filter Times

	OFF -> ON	ON -> OFF	
Channels 0 - 7	1MSDELAY	9MSDELAY	

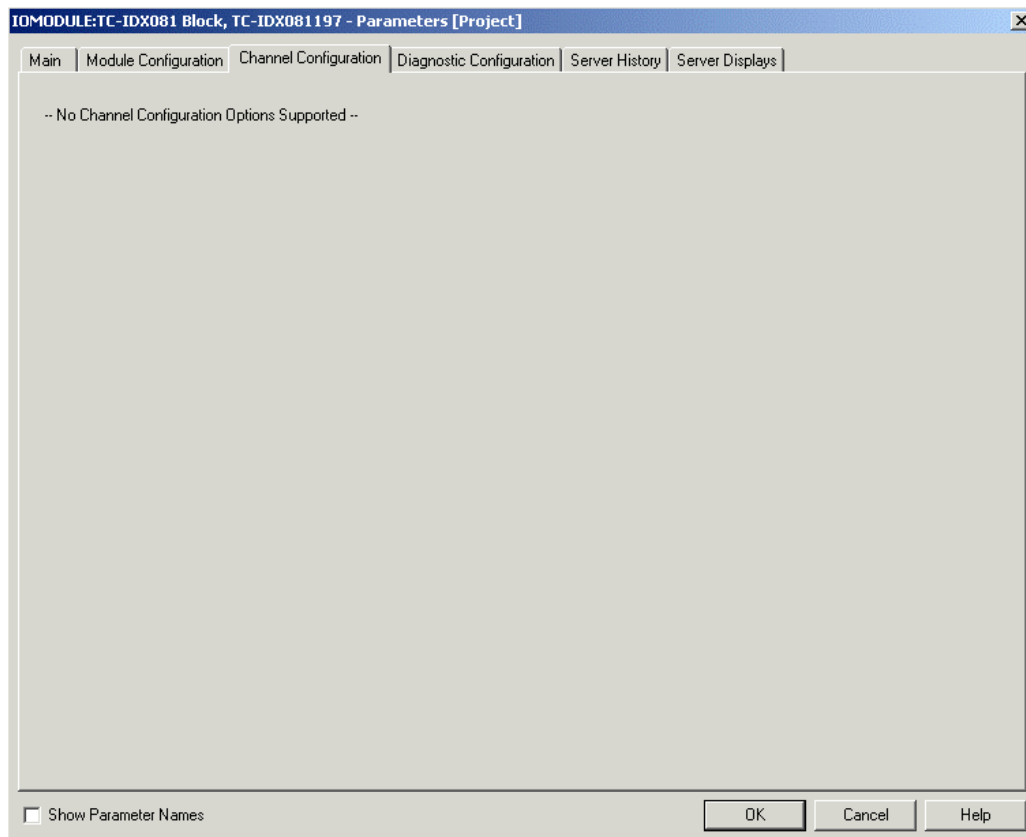
☐ Show Parameter Names OK Cancel Help

Hardware Module Creation

Configuring Chassis Diagnostic I/O Module

Configuring Chassis Diagnostic I/O Module Parameters – Channel Configuration Tab

Step	Action
1	Under the Channel Configuration tab (see figure below), enter desired values for configuration parameters.
	ATTENTION For many Diagnostic I/O Modules, there are no channel configuration options supported for the current release.
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Diagnostic I/O Module, or click OK to accept only the changes made so far and return to the Project tree.



Configuring Diagnostic I/O Module Parameters – Diagnostic Configuration Tab

Step	Action
1	Under the Diagnostic Configuration tab (see figure below), enter desired values for configuration parameters.
	ATTENTION Configuration parameters vary depending upon the type of Diagnostic I/O Module being configured. If necessary, press F1 to access on-line help for assistance during this step.
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Diagnostic I/O Module, or click OK to accept only the changes made so far and return to the Project tree.

Hardware Module Creation

Configuring Chassis Diagnostic I/O Module

IOMODULE:TC-IDX081 Block, TC-IDX081197 - Parameters [Project]

Main | Module Configuration | Channel Configuration | Diagnostic Configuration | Server History | Server Displays

Enable No-Wire

	Enable Wire Off
0	☐
1	☐
2	☐
3	☐
4	☐
5	☐
6	☐
7	☐

Enable No-Power

	Enable Loss of Power
0	☐
1	☐
2	☐
3	☐
4	☐
5	☐
6	☐
7	☐

☐ Show Parameter Names

OK Cancel Help

Configuring Chassis Diagnostic I/O Module Parameters – Server History Tab

Step	Action
1	Under the Server History tab (see figure below), enter the appropriate information for Control Level and Control Area along with values for appropriate parameters related to history collection and archiving. If necessary, press F1 to access on-line help for assistance during this step
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Diagnostic I/O Module, or click OK to accept only the changes made so far and return to the Project tree.

The screenshot shows the 'IOMODULE:TC-IDX081 Block, TC-IDX081197 - Parameters [Project]' dialog box with the 'Server History' tab selected. The 'Access Levels' section has 'Control Level' set to 200 and 'Control Area' is empty. The 'History Configuration' section has 'Number of History Parameters' set to 10. Below this is a table with 10 rows and 7 columns: Parameter, Description, FAST, STD, EXTD, Gating Parameter, and Gate State. All checkboxes in the FAST, STD, and EXTD columns are checked. At the bottom, there is a 'Create New or Edit Existing Server Scripts' button and a 'Show Parameter Names' checkbox which is unchecked. The bottom right has 'OK', 'Cancel', and 'Help' buttons.

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☒	☒	☒		
2			☒	☒	☒		
3			☒	☒	☒		
4			☒	☒	☒		
5			☒	☒	☒		
6			☒	☒	☒		
7			☒	☒	☒		
8			☒	☒	☒		
9			☒	☒	☒		
10			☒	☒	☒		

Hardware Module Creation

Configuring Chassis Diagnostic I/O Module

Configuring Chassis Diagnostic I/O Module Parameters – Server Displays Tab

Step	Action
1	Under the Server Displays tab (see figure below), enter the appropriate information to specify related Point Detail Display, Group Detail Display, and Associated Display along with values for appropriate parameters to define Trends and Groups for display. If necessary, press F1 to access on-line help for assistance during this step
2	Click OK on the configuration form to accept all configuration selections made on each configuration tab and to return to the Project tree.

The screenshot shows a configuration window titled "IOMODULE:TC-IDX081 Block, TC-IDX081197 - Parameters [Project]". The "Server Displays" tab is selected. The window contains the following fields and sections:

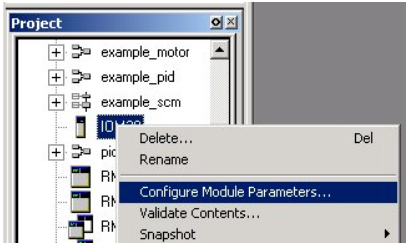
- Point Detail Display:** sysDtIDA.dsp
- Associated Display:** (empty field)
- Group Detail Display:** sysGrpDXXA.dsp
- Trends:**
 - Number of Trends: 10
 - Table with 5 rows and 4 columns: Trend #, Pen, Trend Parameter, Description.
- Groups:**
 - Number of Groups: 5
 - Table with 5 rows and 4 columns: Group #, Pos #, Group Parameter, Description.
- Show Parameter Names:** (unchecked checkbox)
- Buttons:** OK, Cancel, Help

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

Configuring the Serial Interface Module

Perform the following steps to customize a Serial Interface Module (such as, TC-MUX021). You can customize the Serial Interface Module by changing its name, description, slot location, MAC address, as well as other configuration parameters with regards to Module, Channel and Server configuration.

Step	Action	Result
1	Right-click the desired IOM block icon in the Project tree window.	Calls up the Context Menu.
		
2	Click Configure Module Parameters.	Calls up the IOM's configuration form.
3	Go to the next appropriate section to configure parameters on one of these configuration form tabs. • Main • Module Configuration • Channel Configuration • Server History • Server Displays	Enter appropriate IOM data into the Engineering Repository Database (ERDB).

Hardware Module Creation

Configuring the Serial Interface Module

Configuring Serial Interface Module Parameters – Main Tab

Step	Action
1	Under the Main tab (see figure below), enter a Module Name that is more meaningful to you than its default TC-MUX021xxx (xxx represents a pre-assigned number).
2	Enter an optional Module Description to explain the function of the Serial Interface Module (such as Serial Interface 01).
3	Enter appropriate values for IOM Slot Number, Remote IO Chassis MAC Address and CNI Slot Number. If necessary, press F1 to access on-line help for assistance during this step.
4	Proceed to the following procedures to configure parameters on the remaining tabs for the Serial Interface Module, or click OK to accept only the changes made so far and return to the Project tree.

Hardware Module Creation

Configuring the Serial Interface Module

IOMODULE:TC-MUX021 Block, TC-MUX021199 - Parameters [Project]

Main | Module Configuration | Channel Configuration | Server History | Server Displays

Module Name:

Module Description:

I/O Module Information

Module Type:

Currently Assigned Channels:

Channel Number	Channel Name
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

IO Rack Addresses

IOM Slot Number

Remote IO Chassis MAC Address

ControlNet Module Slot Number (connected to IO Chassis)

☐ Show Parameter Names

OK Cancel Help

Configuring Serial Interface Module Parameters – Module Configuration Tab

Step	Action
1	Under the Module Configuration tab (see figure below), enter desired values for configuration parameters.
	ATTENTION The only available choice is whether or not to select the Alarming Enabled checkbox. Once the module has been loaded and activated, additional parameters (such as Execution State) may be configured on the Monitoring Tree window. If necessary, press F1 to access on-line help for assistance during this step.
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Serial Interface Module, or click OK to accept only the changes made so far and return to the Project tree.

Hardware Module Creation

Configuring the Serial Interface Module

IOMODULE:TC-MUX021 Block, TC-MUX021199 - Parameters [Project]

Main | Module Configuration | Channel Configuration | Server History | Server Displays

Execution State: ☒ Alarming Enabled

IO Connection Status	
0	NOTCONNECTED
1	NOTCONNECTED
2	NOTCONNECTED
3	NOTCONNECTED
4	NOTCONNECTED
5	NOTCONNECTED
6	NOTCONNECTED
7	NOTCONNECTED

☐ Show Parameter Names

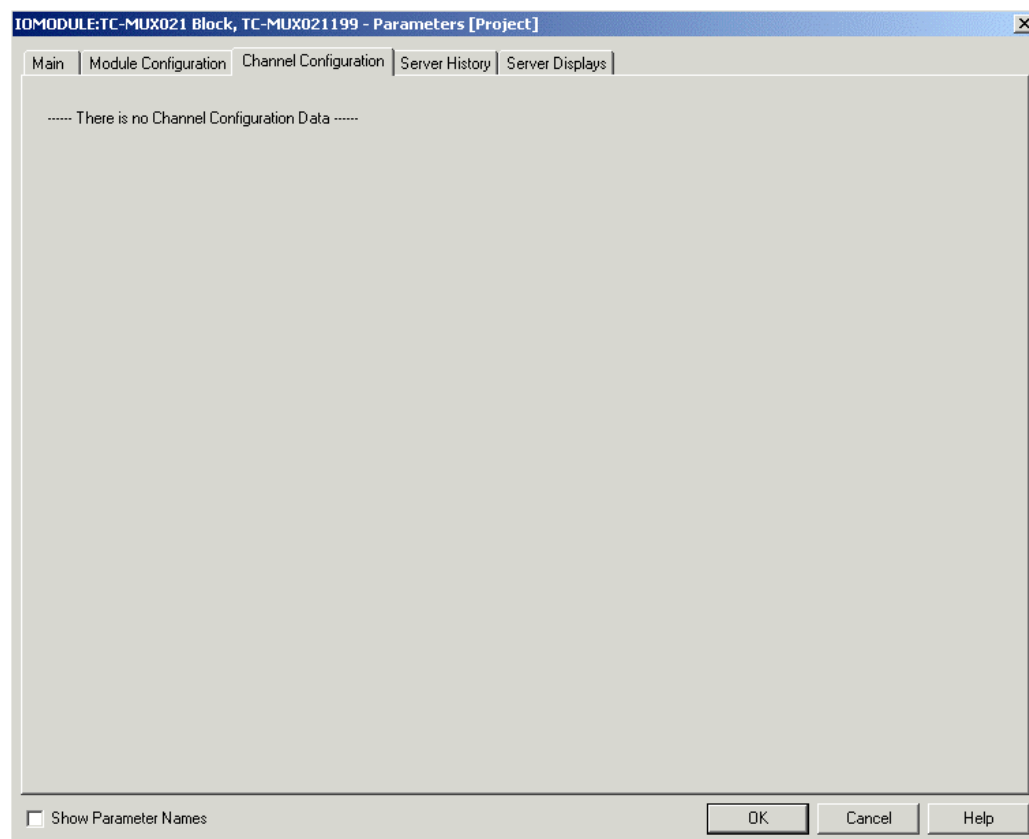
OK Cancel Help

Hardware Module Creation

Configuring the Serial Interface Module

Configuring Serial Interface Module Parameters – Channel Configuration Tab

Step	Action
1	Under the Channel Configuration tab (see figure below), enter desired values for configuration parameters.
	ATTENTION For the current release, there are no required channel configuration data supported. Therefore, no parameter entries are required.
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Serial Interface Module, or click OK to accept only the changes made so far and return to the Project tree.



Configuring Serial Interface Module Parameters – Server History Tab

Step	Action
1	Under the Server History tab (see figure below), enter the appropriate information for Control Level and Control Area along with values for appropriate parameters related to history collection and archiving. If necessary, press F1 to access on-line help for assistance during this step
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Serial Interface Module, or click OK to accept only the changes made so far and return to the Project tree.

IOMODULE:TC-MUX021 Block, TC-MUX021199 - Parameters [Project]

Main | Module Configuration | Channel Configuration | **Server History** | Server Displays

Access Levels

Control Level: Control Area:

History Configuration

Number of History Parameters:

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Create New or Edit Existing Server Scripts

☐ Show Parameter Names

OK Cancel Help

Hardware Module Creation

Configuring the Serial Interface Module

Configuring Serial Interface Module Parameters – Server Displays Tab

Step	Action
1	Under the Server Displays tab (see figure below), enter the appropriate information to specify related Point Detail Display, Group Detail Display, and Associated Display along with values for appropriate parameters to define Trends and Groups for display. If necessary, press F1 to access on-line help for assistance during this step
2	Click OK on the configuration form to accept all configuration selections made on each configuration tab and to return to the Project tree.

The screenshot shows the 'Server Displays' tab of the 'IOMODULE:TC-MUX021 Block, TC-MUX021199 - Parameters [Project]' dialog box. The 'Main' tab is selected. The 'Point Detail Display' field contains 'sysDtlSIA.dsp'. The 'Group Detail Display' field contains 'sysGrpSIA.dsp'. The 'Associated Display' field is empty. The 'Trends' section has a 'Number of Trends' field set to '10'. Below it is a table with 5 rows and 4 columns: Trend #, Pen, Trend Parameter, and Description. The first row has values 1, 0, NONE, and an empty description. The other four rows are empty. The 'Groups' section has a 'Number of Groups' field set to '5'. Below it is a table with 5 rows and 4 columns: Group #, Pos #, Group Parameter, and Description. The first row has values 1, 0, 1, and an empty description. The other four rows are empty. At the bottom left is a checkbox labeled 'Show Parameter Names'. At the bottom right are 'OK', 'Cancel', and 'Help' buttons.

Point Detail Display: sysDtlSIA.dsp

Group Detail Display: sysGrpSIA.dsp

Associated Display:

Trends

Number of Trends: 10

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups: 5

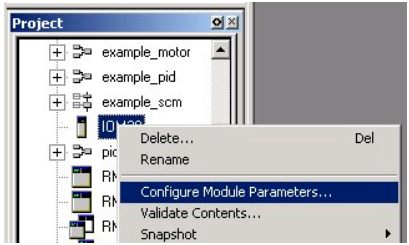
	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

☐ Show Parameter Names

OK Cancel Help

Configuring the Pulse Input Module

Perform the following steps to customize a Pulse Input Module (such as, TC-MDP081). You can customize the Pulse Input Module by changing its name, description, slot location, MAC address, as well as other configuration parameters with regards to Module, Channel and Server configuration.

Step	Action	Result
1	Right-click the desired IOM block icon in the Project tree window.	Calls up the Context Menu.
		
2	Click Configure Module Parameters.	Calls up the IOM's configuration form.
3	Go to the next appropriate section to configure parameters on one of these configuration form tabs. • Main • Module Configuration • Channel Configuration • Server History • Server Displays	Enter appropriate IOM data into the Engineering Repository Database (ERDB).

Configuring Pulse Input Module Parameters – Main Tab

Step	Action
1	Under the Main tab (see figure below), enter a Module Name that is more meaningful to you than its default TC-MDP081xxx (xxx represents a pre-assigned number).
2	Enter an optional Module Description to explain the function of the Pulse Input Module (such as Test Strategy PIM).
3	Enter appropriate values for IOM Slot Number, Remote IO Chassis MAC Address and CNI Slot Number. If necessary, press F1 to access on-line help for assistance during this step.
4	Proceed to the following procedures to configure parameters on the remaining tabs for the Pulse Input Module, or click OK to accept only the changes made so far and return to the Project tree.

Hardware Module Creation

Configuring the Pulse Input Module

PULSEINPUT:TC-MDP081 Block, TC-MDP081201 - Parameters [Project]

Main | Module Configuration | Channel Configuration | Status/Data | Server History | Server Displays

Module Name:

Module Description:

I/O Module Information

Module Type:

Currently Assigned Channels:

Channel Number	Channel Name
0	
1	
2	
3	
4	
5	
6	
7	

IO Rack Addresses

IOM Slot Number

Remote IO Chassis MAC Address

ControlNet Module Slot Number
(connected to IO Chassis)

☐ Show Parameter Names

OK Cancel Help

Configuring Pulse Input Module Parameters – Module Configuration Tab

Step	Action
1	Under the Module Configuration tab (see figure below), enter desired values for configuration parameters.
	ATTENTION The only available choice is whether or not to select the Alarming Enabled checkbox. Once the module has been loaded and activated, additional parameters (such as Execution State) may be configured on the Monitoring Tree window. If necessary, press F1 to access on-line help for assistance during this step.
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Pulse Input Module, or click OK to accept only the changes made so far and return to the Project tree.

Hardware Module Creation

Configuring the Pulse Input Module

PULSEINPUT:TC-MDP081 Block, TC-MDP081201 - Parameters [Project]

Main | Module Configuration | Channel Configuration | Status/Data | Server History | Server Displays

Execution State: INACTIVE

ID Connection Status: NOTCONNECTED

☒ Alarming Enabled

☐ Show Parameter Names

OK Cancel Help

Hardware Module Creation

Configuring the Pulse Input Module

Configuring Pulse Input Module Parameters – Channel Configuration Tab

Step	Action
1	Under the Channel Configuration tab (see figure below), enter desired values for configuration parameters. If necessary, press F1 to access on-line help for assistance during this step.
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Pulse Input Module, or click OK to accept only the changes made so far and return to the Project tree.

The screenshot shows a software window titled "PULSEINPUT:TC-MDP081 Block, TC-MDP081201 - Parameters [Project]". It has several tabs: "Main", "Module Configuration", "Channel Configuration" (which is selected), "Status/Data", "Server History", and "Server Displays".

Under the "Channel Configuration" tab, there are two main sections:

General Configuration

	Voltage Threshold	Edge Detection	Freq Integration Period	Time Base
0	LOW	RISINGEDGE	1000MS	SECONDS
1	LOW	RISINGEDGE	1000MS	SECONDS
2	LOW	RISINGEDGE	1000MS	SECONDS
3	LOW	RISINGEDGE	1000MS	SECONDS
4	LOW	RISINGEDGE	1000MS	SECONDS
5	LOW	RISINGEDGE	1000MS	SECONDS
6	LOW	RISINGEDGE	1000MS	SECONDS
7	LOW	RISINGEDGE	1000MS	SECONDS

EU Conversion, PL, FC

	C1 Scale Factor	C2 Scale Factor	Pulse Measurement	PL Scale Factor	Output Safe State
0	1	1	PULSEHIGH	1	
1	1	1	PULSEHIGH	1	
2	1	1	PULSEHIGH	1	
3	1	1	PULSEHIGH	1	
4	1	1	PULSEHIGH	1	
5	1	1	PULSEHIGH	1	
6	1	1			☐
7	1	1			☐

At the bottom left, there is a checkbox labeled "Show Parameter Names" which is currently unchecked. At the bottom right, there are three buttons: "OK", "Cancel", and "Help".

Configuring Pulse Input Module Parameters – Status/Data Tab

The Status/Data tab (see figure below) includes data fields that are only active in the Monitoring mode and they are unavailable for configuration in the Project mode.

The screenshot shows a software window titled "PULSEINPUT:TC-MDP081 Block, TC-MDP081201 - Parameters [Project]". It has a tabbed interface with the following tabs: Main, Module Configuration, Channel Configuration, Status/Data (selected), Server History, and Server Displays. The Status/Data tab contains two tables.

Pulse Counting/Frequency

	Process Value	Accumulated Value	Raw Accumulated Value	Reset Counter Flag
0	NaN	NaN	0	☐
1	NaN	NaN	0	☐
2	NaN	NaN	0	☐
3	NaN	NaN	0	☐
4	NaN	NaN	0	☐
5	NaN	NaN	0	☐
6	NaN	NaN	0	☐
7	NaN	NaN	0	☐

Pulse Length/Fast Cutoff

	Pulse Length	Target Value	TV Processing	Output State	Bad Output Status
0	NaN				
1	NaN				
2	NaN				
3	NaN				
4	NaN				
5	NaN				
6		NaN	☐	☐	☐
7		NaN	☐	☐	☐

At the bottom of the dialog, there is a checkbox labeled "Show Parameter Names" which is currently unchecked. To the right of this checkbox are three buttons: "OK", "Cancel", and "Help".

Hardware Module Creation

Configuring the Pulse Input Module

Configuring Pulse Input Module Parameters – Server History Tab

Step	Action
1	Under the Server History tab (see figure below), enter the appropriate information for Control Level and Control Area along with values for appropriate parameters related to history collection and archiving. If necessary, press F1 to access on-line help for assistance during this step
2	Proceed to the following procedures to configure parameters on the remaining tabs for the Pulse Input Module, or click OK to accept only the changes made so far and return to the Project tree.

The screenshot shows the 'PULSEINPUT:TC-MDP081 Block, TC-MDP081201 - Parameters [Project]' dialog box with the 'Server History' tab selected. The 'Access Levels' section has 'Control Level' set to 200 and 'Control Area' is empty. The 'History Configuration' section has 'Number of History Parameters' set to 10. Below this is a table with 10 rows and 7 columns: Parameter, Description, FAST, STD, EXTD, Gating Parameter, and Gate State. All checkboxes in the FAST, STD, and EXTD columns are unchecked. At the bottom, there is a 'Create New or Edit Existing Server Scripts' button, a 'Show Parameter Names' checkbox, and 'OK', 'Cancel', and 'Help' buttons.

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Configuring Pulse Input Module Parameters – Server Displays Tab

Step	Action
1	Under the Server Displays tab (see figure below), enter the appropriate information to specify related Point Detail Display, Group Detail Display, and Associated Display along with values for appropriate parameters to define Trends and Groups for display. If necessary, press F1 to access on-line help for assistance during this step
2	Click OK on the configuration form to accept all configuration selections made on each configuration tab and to return to the Project tree.

The screenshot shows the 'Server Displays' tab of the 'PULSEINPUT:TC-MDP081 Block, TC-MDP081201 - Parameters [Project]' dialog box. The tabs at the top are: Main, Module Configuration, Channel Configuration, Status/Data, Server History, and Server Displays (selected). The form contains the following fields and sections:

- Point Detail Display:** sysDtlPIA.dsp
- Associated Display:** (empty field)
- Group Detail Display:** sysGrpPIA.dsp
- Trends:**
 - Number of Trends: 10
 - Table with 5 rows and 5 columns: Trend #, Pen, Trend Parameter, Description.
- Groups:**
 - Number of Groups: 5
 - Table with 5 rows and 5 columns: Group #, Pos #, Group Parameter, Description.
- Show Parameter Names:** (unchecked checkbox)
- Buttons:** OK, Cancel, Help

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

Creating PM I/O High Level Analog Input IOP

Use the following procedure as a general guide for creating and configuring a function block for a High Level Analog Input (HLAI) type Input/Output Processor (IOP). The following procedure uses the menu method of creation but the [Drag and Drop Method](#) described above for Input/Output Modules can also be used. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	Click File->New->I/O Modules->PMIO->HLAI100 - High Level Analog Input 100ms Sample Rate, 16 ch.	Calls up the HLA100 Block configuration form with Name field highlighted.

PMIO:HLAI100 Block, HLA100203 - Parameters [Project]

Main | Status Data | Maintenance | Calibration | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Name:

IOP Module Type:

Description:

IOP Number:

Execution State:

Number of Channels:

I/O Link Scan Rate:

☐ Database Valid

☐ This IOP is redundant

IOP Partner A

File:

Card:

Status:

Operation:

Redundancy Status:

☐ FTA Present

IOP Partner B

File:

Card:

Status:

Operation:

Redundancy Status:

☐ FTA Present

☐ Show Parameter Names

2	Key in desired name of up to 16	Moves cursor to IOP Module Type field.

	characters or accept the default. Press <Tab>	IOP Module Type a Input 100ms Sample Rate, 16 ch
3	Be sure description in field matches the desired module type. Add optional details, if desired. There is a 132-character limit on this field. Press <Tab>.	Moves cursor to Description field. Description
4	Key in optional descriptive data of up to 132 characters. Press <Tab>.	Moves cursor to IOP Number field. IOP Number 1
5	Key in the logical address of the associated I/O Processor (IOP) on the given I/O Link. Press <Tab>	Moves cursor to I/O Link Scan Rate field. I/O Link Scan Rate 100_MS
6	Accept default or click down arrow and select desired rate from list. Press <Tab>	Moves cursor to This IOP is redundant check box. ☐ This IOP is redundant
7	Leave box unchecked if IOP is nonredundant. Press <Tab>. Check box if IOP is one of a redundant pair. Press <Tab>.	Moves cursor to IOP Partner A, File field. File 1
8	Accept default or key in the IOP card file number for the primary IOP. Press <Tab>.	Moves cursor to IOP Partner A, Card field. Card 1
9	Accept default or key in the card slot number for the primary IOP. - If IOP is nonredundant, click Server History tab. - If IOP is redundant, press <Tab>.	For nonredundant IOP, calls up Server History tab. Go to Step 12 For redundant IOP, moves cursor to IOP Partner B, File field. File 2
10	Accept default or key in the IOP card file number for the secondary IOP. Press	Moves cursor to IOP Partner B, Card field.

Hardware Module Creation

Creating PM I/O High Level Analog Input IOP

<Tab>.

Card

- 11** Accept default or key in the card slot number for the secondary IOP. Click Server History tab. Calls up the Server History configuration form.

PMIO:HLAI100 Block, HLA1100203 - Parameters [Project]

Main | Status Data | Maintenance | Calibration | Box Soft Failures | Channel Soft Failures | **Server History** | Server Displays

Access Levels

Control Level Control Area

History Configuration

Number of History Parameters

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Create New or Edit Existing Server Scripts

☐ Show Parameter Names

OK Cancel Help



TIP

If you have a Distributed Server Architecture (DSA), you must enter the Control Area assignment for this Server. (Note that area code assignments are made through the Station application.) If you do not have a DSA, you can skip this field if areas is not enabled through the Station application.

- 12** Use the on-line help as a guide to complete the configuration entries on this Calls up the Server Displays

tab. Click the Server Displays tab. configuration form.

PMIO:HLAI100 Block, HLA1100203 - Parameters [Project]

Main | Status Data | Maintenance | Calibration | Box Soft Failures | Channel Soft Failures | Server History | **Server Displays**

Point Detail Display: Associated Display:

Group Detail Display:

Trends

Number of Trends:

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups:

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

☐ Show Parameter Names

OK Cancel Help

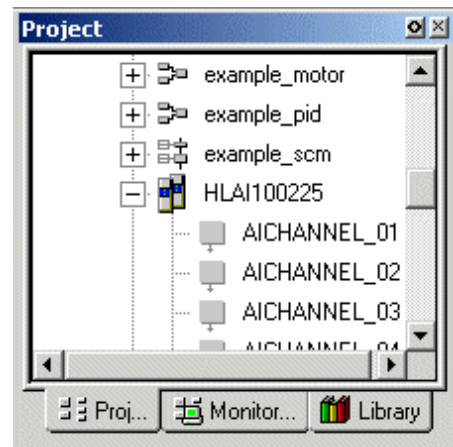
Hardware Module Creation

Creating PM I/O High Level Analog Input IOP

- 13** Use the on-line help as a guide to complete the configuration entries on this tab. Click the OK button.

Closes the form and creates HLAI100 block icon along with its Analog Input Channel blocks in Project tab.

(The icon shown is for a redundant HLAI100 IOP pair.)



- 14** This completes the creation of the HLAI100 IOP.

Other data on the configuration form is unavailable in Project mode. See the on-line help for information about the other parameters.

Creating PM I/O HART High Level Analog Input IOP

Use the following procedure as a general guide for creating and configuring a function block for a HART High Level Analog Input (HLAIHART) type Input/Output Processor (IOP). The following procedure uses the menu method of creation but the [Drag and Drop Method](#) described above for Input/Output Modules can also be used. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	Click File->New->I/O Modules ->PMIO->HLAIHART - High Level Analog Input, HART Capable, 16 ch.	Calls up the HLAIHART Block configuration form with Name field highlighted.

PMIO:HLAIHART Block, HLAIHART_451 - Parameters [Project]

Server History | Server Displays | Control Confirmation | Identification

Main | HART Status | Status Data | Maintenance | Calibration | Box Soft Failures | Channel Soft Failures

Name:

IOP Module Type:

Description:

IOP Number:

Execution State:

Number of Channels:

I/O Link Scan Rate:

☐ Database Valid

☐ This IOP is redundant

IOP Partner A:

File:

Card:

Status:

Operation:

Redundancy Status:

☐ FTA Present

IOP Partner B:

File:

Card:

Status:

Operation:

Redundancy Status:

☐ FTA Present

☐ Show Parameter Names

Hardware Module Creation

Creating PM I/O HART High Level Analog Input IOP

- 2** Key in desired name of up to 16 characters or accept the default. Press <Tab>

Moves cursor to IOP Module Type field.

IOP Module Type High Level Analog Input, HART C



TIP

When naming a HART IOP function block, it may be helpful to use the word “HART” (or HRT) in the name to readily identify it as a HART IOP.

- 3** Be sure description in field matches the desired module type. Add optional details, if desired. There is a 132-character limit on this field. Press <Tab>.

Moves cursor to Description field.

Description

- 4** Key in optional descriptive data of up to 132 characters. Press <Tab>.

Moves cursor to IOP Number field.

IOP Number 1

- 5** Key in the logical address of the associated I/O Processor (IOP) on the given I/O Link. Press <Tab>

Moves cursor to I/O Link Scan Rate field.

I/O Link Scan Rate 100_MS

- 6** Accept default or click  down arrow and select desired rate from list. Press <Tab>

Moves cursor to This IOP is redundant check box.

☐ This IOP is redundant

- 7** Leave box unchecked if IOP is nonredundant. Press <Tab>.

Moves cursor to IOP Partner A, File field.

Check box if IOP is one of a redundant pair. Press <Tab>.

File 1

- 8** Accept default or key in the IOP card file number for the primary IOP. Press <Tab>.

Moves cursor to IOP Partner A, Card field.

Card 1

- 9** Accept default or key in the card slot number for the primary IOP.
- If IOP is nonredundant, click Server History tab. Go to Step 12
 - If IOP is nonredundant, click Server History tab. For redundant IOP, moves cursor to IOP Partner B, File field.

Hardware Module Creation

Creating PM I/O HART High Level Analog Input IOP

- If IOP is redundant, press <Tab>.

File

- 10** Accept default or key in the IOP card file number for the secondary IOP. Press <Tab>.

Moves cursor to IOP Partner B, Card field.

Card

- 11** Accept default or key in the card slot number for the secondary IOP. Click Server History tab.

Calls up the Server History configuration form.

PMIO:HLAIHART Block, HLAIHART_451 - Parameters [Project]

Main	HART Status	Status Data	Maintenance	Calibration	Box Soft Failures	Channel Soft Failures
Server History	Server Displays	Control Confirmation	Identification			

Access Levels

Control Level Control Area

History Configuration

Number of History Parameters

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Create New or Edit Existing Server Scripts

☐ Show Parameter Names

OK Cancel Help

Hardware Module Creation

Creating PM I/O HART High Level Analog Input IOP



TIP

If you have a Distributed Server Architecture (DSA), you must enter the Control Area assignment for this Server. (Note that area code assignments are made through the Station application.) If you do not have a DSA, you can skip this field if area is not enabled through the Station application.

- 12** Use the on-line help as a guide to complete the configuration entries on this tab. Click the Server Displays tab. Calls up the Server Displays configuration form.

PMIO:HLAIHART Block, HLAIHART_451 - Parameters [Project]

Main | HART Status | Status Data | Maintenance | Calibration | Box Soft Failures | Channel Soft Failures

Server History | **Server Displays** | Control Confirmation | Identification

Point Detail Display: Associated Display:

Group Detail Display:

Trends

Number of Trends:

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups:

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

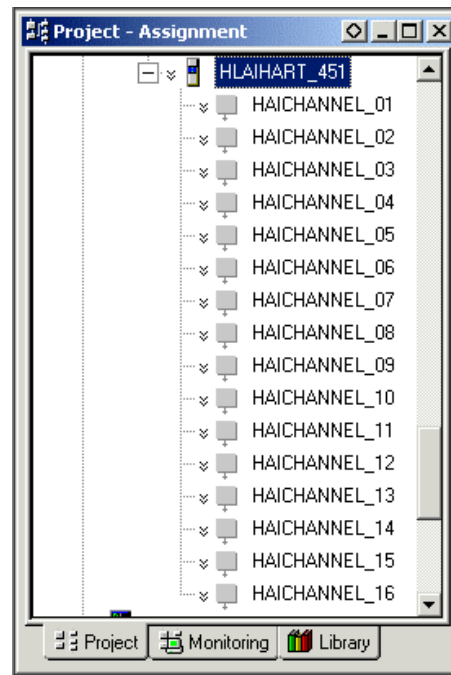
☐ Show Parameter Names

OK Cancel Help

- 13** Use the on-line help as a guide to complete the configuration entries on this tab. Click the OK button.

Closes the form and creates HLAIHART block icon along with its Analog Input Channel blocks in Project tab.

(The icon shown is for a non-redundant HLAIHART IOP.)



- 14** This completes the creation of the HLAIHART IOP.

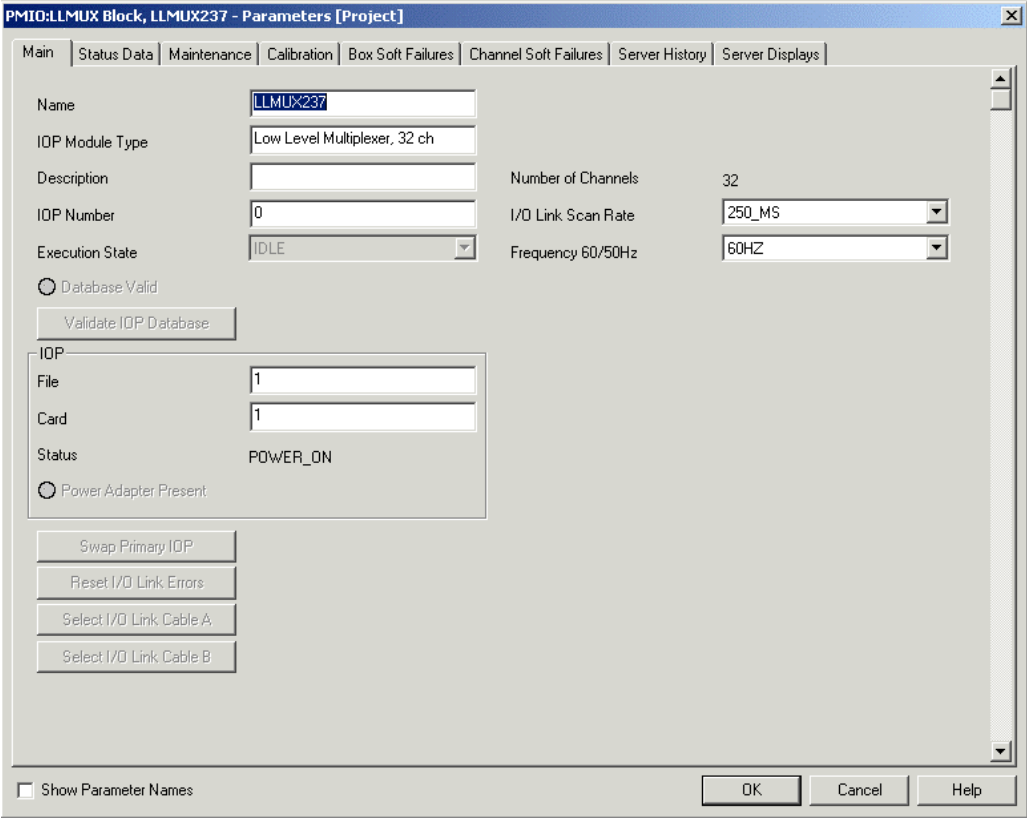
Other data on the configuration form is unavailable in Project mode. See the on-line help for information about the other parameters.

Note: To configure IO Channel blocks assigned to the HLAIHART IOP, go to PM I/O HART Device Configuration in the *HART Implementation Guide*.

Creating PM I/O Low Level Analog Multiplexer Input IOP

Use the following procedure as a general guide for creating and configuring a function block for a Low Level Analog Multiplexer Input (LLMUX) type Input/Output Processor (IOP). The following procedure uses the menu method of creation but the [Drag and Drop Method](#) described above for Input/Output Modules can also be used. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	Click File->New->I/O Modules->PMIO->LLAI - Low Level Multiplexer, 32 ch.	Calls up the LLMUX Block configuration form with Name field highlighted.



2	Key in desired name of up to 16 characters or accept the default. Press	Moves cursor to IOP Module Type field.

<Tab>

IOP Module Type a Input 100ms Sample Rate, 16 ch

- 3** Be sure description in field matches the desired module type. Add optional details, if desired. There is a 132-character limit on this field. Press <Tab>.

Moves cursor to Description field.

Description

- 4** Key in optional descriptive data of up to 132 characters. Press <Tab>.

Moves cursor to IOP Number field.

IOP Number

- 5** Key in the logical address of the associated I/O Processor (IOP) on the given I/O Link. Press <Tab>

Moves cursor to I/O Link Scan Rate field.

I/O Link Scan Rate 100_MS

- 6** Accept default or click  down arrow and select desired rate from list. Press <Tab>

Moves cursor to Frequency 60/50Hz field.

Frequency 60/50Hz 60HZ

- 7** Accept default or click  down arrow and select frequency that matches line power.

Moves cursor to File field.

File

- 8** Accept default or key in the IOP card file number for this IOP. Press <Tab>.

Moves cursor to Card field.

Card

- 9** Accept default or key in the card slot number for this IOP. Click Server History tab.

Calls up the Server History configuration form.

Hardware Module Creation

Creating PM I/O Low Level Analog Multiplexer Input IOP

PMIO:LLMUX Block, LLMUX237 - Parameters [Project]

Main | Status Data | Maintenance | Calibration | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Access Levels

Control Level: Control Area:

History Configuration

Number of History Parameters:

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Create New or Edit Existing Server Scripts

☐ Show Parameter Names

OK Cancel Help



TIP

If you have a Distributed Server Architecture (DSA), you must enter the Control Area assignment for this Server. (Note that area code assignments are made through the Station application.) If you do not have a DSA, you can skip this field if area is not enabled through the Station application.

10

Use the on-line help as a guide to complete the configuration entries on this tab. Click the Server Displays tab.

Calls up the Server Displays configuration form.

Hardware Module Creation

Creating PM I/O Low Level Analog Multiplexer Input IOP

PMIO:LLMUX Block, LLMUX237 - Parameters [Project]

Main | Status Data | Maintenance | Calibration | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Point Detail Display Associated Display

Group Detail Display

Trends

Number of Trends

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

☐ Show Parameter Names

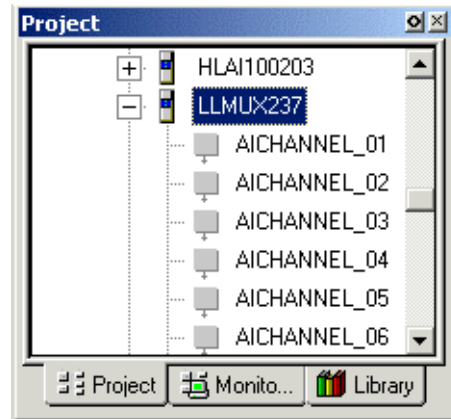
OK Cancel Help

Hardware Module Creation

Creating PM I/O Low Level Analog Multiplexer Input IOP

- 11** Use the on-line help as a guide to complete the configuration entries on this tab. Click the OK button.

Closes the form and creates LLMUX block icon along with its Analog Input Channel blocks in Project tab.



- 12** This completes the creation of the LLMUX IOP.

Other data on the configuration form is unavailable in Project mode. See the on-line help for information about the other parameters.

Creating PM I/O Analog Output IOP

Use the following procedure as a general guide for creating and configuring a function block for an Analog Output (AO) type Input/Output Processor (IOP). The following procedure uses the menu method of creation but the [Drag and Drop Method](#) described above for Input/Output Modules can also be used. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	Click File->New->I/O Modules->PMIO->AO16 - Analog Output, 16 ch.	Calls up the AO16 Block configuration form with Name field highlighted.

The screenshot displays the 'PMIO:AO16 Block, AO16303 - Parameters [Project]' window. The 'Main' tab is active, showing the following fields and values:

- Name:** AO16303 (highlighted)
- IOP Module Type:** Analog Output, 16 ch
- Description:** (empty)
- IOP Number:** 0
- Execution State:** IDLE
- Database Valid:** ☐ (unchecked)
- Validate IOP Database:** (button)
- Number of Channels:** 16
- I/O Link Scan Rate:** 250_MS
- Failure Option:** UNPOWER
- This IOP is redundant:** ☐ (unchecked)
- IOP Partner A:**
 - File:** 1
 - Card:** 1
 - Status:** POWER_ON
 - Operation:** PRIMARY
 - Redundancy Status:** ---
 - FTA Present:** ☐ (unchecked)
- IOP Partner B:**
 - File:** (empty)
 - Card:** (empty)
 - Status:** (empty)
 - Operation:** (empty)
 - Redundancy Status:** (empty)
 - FTA Present:** ☐ (unchecked)

Buttons at the bottom include: Swap Primary IOP, Reset I/O Link Errors, Select I/O Link Cable A, Select I/O Link Cable B, Show Parameter Names (checkbox), OK, Cancel, and Help.

Hardware Module Creation

Creating PM I/O Analog Output IOP

2	Key in desired name of up to 16 characters or accept the default. Press <Tab>	Moves cursor to IOP Module Type field.
		
3	Be sure description in field matches the desired module type. Add optional details, if desired. There is a 132-character limit on this field. Press <Tab>.	Moves cursor to Description field.
		
4	Key in optional descriptive data of up to 132 characters. Press <Tab>.	Moves cursor to IOP Number field.
		
5	Key in the logical address of the associated I/O Processor (IOP) on the given I/O Link. Press <Tab>	Moves cursor to I/O Link Scan Rate field.
		
6	Accept default or click  down arrow and select desired rate from list. Press <Tab>	Moves cursor to Failure Option field.
		
7	Accept default or click  down arrow and select desired action from list. Press <Tab>.	Moves cursor to This IOP is redundant check box.
		
8	Leave box unchecked if IOP is nonredundant. Press <Tab>. Check box if IOP is one of a redundant pair. Press <Tab>.	Moves cursor to IOP Partner A, File field.
		
9	Accept default or key in the IOP card file number for the primary IOP. Press <Tab>.	Moves cursor to IOP Partner A, Card field.
		
-

10	Accept default or key in the card slot number for the primary IOP. • If IOP is nonredundant, click Server History tab. • If IOP is redundant, press <Tab>.	For nonredundant IOP, calls up Server History tab. Go to Step 13 For redundant IOP, moves cursor to IOP Partner B, File field.	
11	Accept default or key in the IOP card file number for the secondary IOP. Press <Tab>.	Moves cursor to IOP Partner B, Card field.	
12	Accept default or key in the card slot number for the secondary IOP. Click Server History tab.	Calls up the Server History configuration form.	
-

Hardware Module Creation

Creating PM I/O Analog Output IOP

PM10:AO16 Block, AO16303 - Parameters [Project]

Main | Status Data | Maintenance | Calibration | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Access Levels

Control Level: 200 Control Area:

History Configuration

Number of History Parameters: 10

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Create New or Edit Existing Server Scripts

☐ Show Parameter Names

OK Cancel Help



TIP

If you have a Distributed Server Architecture (DSA), you must enter the Control Area assignment for this Server. (Note that area code assignments are made through the Station application.) If you do not have a DSA, you can skip this field if area is not enabled through the Station application.

13

Use the on-line help as a guide to complete the configuration entries on this tab. Click the Server Displays tab.

Calls up the Server Displays configuration form.

Hardware Module Creation
Creating PM I/O Analog Output IOP

PMIO:A016 Block, A016303 - Parameters [Project]

Main | Status Data | Maintenance | Calibration | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Point Detail Display: sysDtlFDevice.dsp Associated Display:

Group Detail Display:

Trends

Number of Trends:

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups:

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

☐ Show Parameter Names

OK Cancel Help

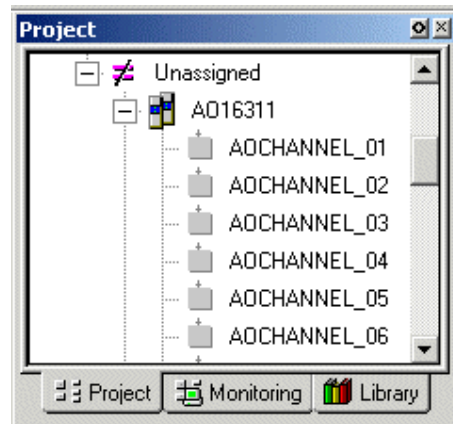
Hardware Module Creation

Creating PM I/O Analog Output IOP

- 14** Use the on-line help as a guide to complete the configuration entries on this tab. Click the OK button.

Closes the form and creates AO16 block icon along with its Analog Output Channel blocks in Project tab.

(The icon shown is for a redundant AO16 IOP pair.)



- 15** This completes the creation of the AO16 IOP.

Other data on the configuration form is unavailable in Project mode. See the on-line help for information about the other parameters.

Creating PM I/O HART Analog Output IOP

Use the following procedure as a general guide for creating and configuring a function block for a HART Analog Output (AO16HART) type Input/Output Processor (IOP). The following procedure uses the menu method of creation but the [Drag and Drop Method](#) described above for Input/Output Modules can also be used. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	Click File->New->I/O Modules-> PMIO-> AO16HART - Analog Output, HART Capable, 16 ch.	Calls up the AO16HART Block configuration form with Name field highlighted.

PMIO:AO16HART Block, AO16HART_468 - Parameters [Project]

Server History		Server Displays		Control Confirmation		Identification	
Main	HART Status	Status Data	Maintenance	Calibration	Box Soft Failures	Channel Soft Failures	
Name		AO16HART					
IOP Module Type		Analog Output, HART Capable, 16					
Description				Number of Channels		16	
IOP Number		0		I/O Link Scan Rate		250_MS	
Execution State		IDLE		Failure Option		UNPOWER	
☐ Database Valid Validate IOP Database		☐ This IOP is redundant					
IOP Partner A File: 1 Card: 1 Status: ... Operation: ... Redundancy Status: ... ☐ FTA Present				IOP Partner B File: Card: Status: Operation: Redundancy Status: ☐ FTA Present			
Reset I/O Link Errors Select I/O Link Cable A Select I/O Link Cable B Swap Primary IOP							
☐ Show Parameter Names							
						OK Cancel Help	

Hardware Module Creation

Creating PM I/O HART Analog Output IOP

- 2** Key in desired name of up to 16 characters or accept the default. Press <Tab>
- Moves cursor to IOP Module Type field.

IOP Module Type Analog Output, HART Capable, 16



TIP

When naming a HART IOP function block, it may be helpful to use the word “HART” (or HRT) in the name to readily identify it as a HART IOP.

- 3** Be sure description in field matches the desired module type. Add optional details, if desired. There is a 132-character limit on this field. Press <Tab>.
- Moves cursor to Description field.

Description

- 4** Key in optional descriptive data of up to 132 characters. Press <Tab>.
- Moves cursor to IOP Number field.

IOP Number 1

- 5** Key in the logical address of the associated I/O Processor (IOP) on the given I/O Link. Press <Tab>
- Moves cursor to I/O Link Scan Rate field.

I/O Link Scan Rate 100_MS

- 6** Accept default or click  down arrow and select desired rate from list. Press <Tab>
- Moves cursor to Failure Option field.

Failure Option UNPOWER

- 7** Accept default or click  down arrow and select desired action from list. Press <Tab>.
- Moves cursor to This IOP is redundant check box.

☐ This IOP is redundant

- 8** Leave box unchecked if IOP is nonredundant. Press <Tab>.
- Moves cursor to IOP Partner A, File field.

Check box if IOP is one of a redundant pair. Press <Tab>.

File 1

- 9** Accept default or key in the IOP card file number for the primary IOP. Press <Tab>.
- Moves cursor to IOP Partner A, Card field.

Card 1

10	Accept default or key in the card slot number for the primary IOP. • If IOP is nonredundant, click Server History tab. • If IOP is redundant, press <Tab>.	For nonredundant IOP, calls up Server History tab. Go to Step 13 For redundant IOP, moves cursor to IOP Partner B, File field.
		
11	Accept default or key in the IOP card file number for the secondary IOP. Press <Tab>.	Moves cursor to IOP Partner B, Card field.
		
12	Accept default or key in the card slot number for the secondary IOP. Click Server History tab.	Calls up the Server History configuration form.
-

Hardware Module Creation

Creating PM I/O HART Analog Output IOP

PMIO:AD16HART Block, AD16HART_468 - Parameters [Project]

Main	HART Status	Status Data	Maintenance	Calibration	Box Soft Failures	Channel Soft Failures
Server History	Server Displays		Control Confirmation		Identification	

Access Levels

Control Level: Control Area:

History Configuration

Number of History Parameters:

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Create New or Edit Existing Server Scripts

☐ Show Parameter Names

OK Cancel Help



TIP

If you have a Distributed Server Architecture (DSA), you must enter the Control Area assignment for this Server. (Note that area code assignments are made through the Station application.) If you do not have a DSA, you can skip this field if area is not enabled through the Station application.

- 13** Use the on-line help as a guide to complete the configuration entries on this tab. Click the Server Displays tab. Calls up the Server Displays configuration form.

Hardware Module Creation
Creating PM I/O HART Analog Output IOP

PMIO:AO16HART Block, AO16HART_468 - Parameters [Project]

Main | HART Status | Status Data | Maintenance | Calibration | Box Soft Failures | Channel Soft Failures

Server History | Server Displays | Control Confirmation | Identification

Point Detail Display: sysDtlPmiOP.dsp Associated Display:

Group Detail Display: sysGrpPmioHARTAO.dsp

Trends

Number of Trends: 10

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups: 5

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

☐ Show Parameter Names

OK Cancel Help

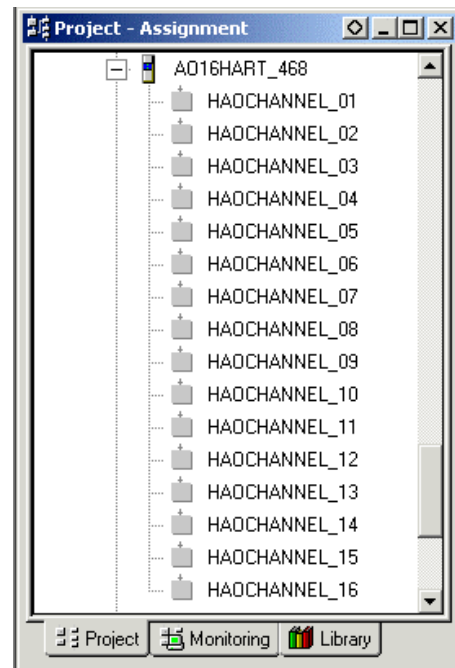
Hardware Module Creation

Creating PM I/O HART Analog Output IOP

- 14** Use the on-line help as a guide to complete the configuration entries on this tab. Click the OK button.

Closes the form and creates AO16HART block icon along with its Analog Output Channel blocks in Project tab.

(The icon shown is for a non-redundant AO16HART IOP.)



- 15** This completes the creation of the AO16HART IOP.

Other data on the configuration form is unavailable in Project mode. See the on-line help for information about the other parameters.

Note: To configure IO Channel blocks assigned to the AO16HART IOP, go to PM I/O HART Device Configuration in the *HART Implementation Guide*.

Creating PM I/O Digital Input IOP

Use the following procedure as a general guide for creating and configuring a function block for a Digital Input (DI) type Input/Output Processor (IOP). The following procedure uses the menu method of creation but the [Drag and Drop Method](#) described above for Input/Output Modules can also be used. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	Click File->New->I/O Modules->PMIO->DI24V - 24 Volt Digital Input, 32 ch.	Calls up the DI24V Block configuration form with Name field highlighted.

PMIO:DI24V Block, DI24V337 - Parameters [Project]

Main | Status Data | Maintenance | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Name:
 IOP Module Type:
 Description:
 IOP Number:
 Execution State:
 Number of Channels:
 I/O Link Scan Rate:
☐ Database Valid

☐ This IOP is redundant

IOP Partner A
 File:
 Card:
 Status:
 Operation:
 Redundancy Status:
☐ FTA Present

IOP Partner B
 File:
 Card:
 Status:
 Operation:
 Redundancy Status:
☐ FTA Present

☐ Show Parameter Names

Hardware Module Creation

Creating PM I/O Digital Input IOP

2	Key in desired name of up to 16 characters or accept the default. Press <Tab>	Moves cursor to IOP Module Type field.
		
3	Be sure description in field matches the desired module type. Add optional details, if desired. There is a 132-character limit on this field. Press <Tab>.	Moves cursor to Description field.
		
4	Key in optional descriptive data of up to 132 characters. Press <Tab>.	Moves cursor to IOP Number field.
		
5	Key in the logical address of the associated I/O Processor (IOP) on the given I/O Link. Press <Tab>	Moves cursor to I/O Link Scan Rate field.
		
6	Accept default or click  down arrow and select desired rate from list. Press <Tab>	Moves cursor to File field.
		
7	Accept default or key in the IOP card file number for this IOP. Press <Tab>.	Moves cursor to Card field.
		
8	Accept default or key in the card slot number for this IOP. Click Server History tab.	Calls up the Server History configuration form.
-

PMIO:DI24V Block, DI24V337 - Parameters [Project]

Main | Status Data | Maintenance | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Access Levels

Control Level: Control Area:

History Configuration

Number of History Parameters:

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Create New or Edit Existing Server Scripts

☐ Show Parameter Names

OK Cancel Help



TIP

If you have a Distributed Server Architecture (DSA), you must enter the Control Area assignment for this Server. (Note that area code assignments are made through the Station application.) If you do not have a DSA, you can skip this field if areas is not enabled through the Station application.

- 9** Use the on-line help as a guide to complete the configuration entries on this tab. Click the Server Displays tab. Calls up the Server Displays configuration form.

Hardware Module Creation

Creating PM I/O Digital Input IOP

PMIO:DI24V Block, DI24V337 - Parameters [Project]

Main | Status Data | Maintenance | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Point Detail Display: Associated Display:

Group Detail Display:

Trends

Number of Trends:

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

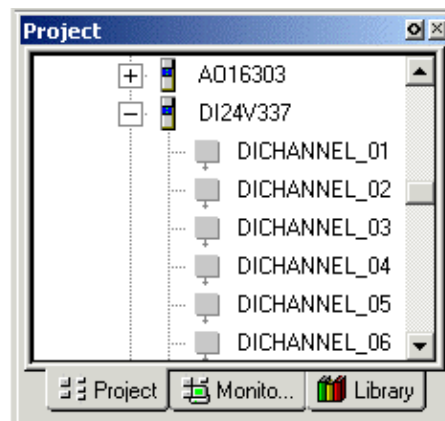
Number of Groups:

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

☐ Show Parameter Names

OK Cancel Help

10	Use the on-line help as a guide to complete the configuration entries on this tab. Click the OK button.	Closes the form and creates DI24V block icon along with its Digital Input Channel blocks in Project tab.



11	This completes the creation of the DI IOP.	Other data on the configuration form is unavailable in Project mode. See the on-line help for information about the other parameters.
-

Creating PM I/O Digital Output IOP

Use the following procedure as a general guide for creating and configuring a function block for a Digital Output (DO) type Input/Output Processor (IOP). The following procedure uses the menu method of creation but the [Drag and Drop Method](#) described above for Input/Output Modules can also be used. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	Click File->New->I/O Modules->PMIO->DO32 - Digital Output, 32 ch.	Calls up the DO32 Block configuration form with Name field highlighted.

PMIO:DO32 Block, DO32403 - Parameters [Project]

Main | Status Data | Maintenance | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Name:

IOP Module Type:

Description:

IOP Number:

Execution State:

Number of Channels:

I/O Link Scan Rate:

Failure Option:

☐ Database Valid

☐ This IOP is redundant

IOP Partner A

File:

Card:

Status:

Operation:

Redundancy Status:

☐ FTA Present

IOP Partner B

File:

Card:

Status:

Operation:

Redundancy Status:

☐ FTA Present

☐ Show Parameter Names

2 Key in desired name of up to 16 characters or accept the default. Press <Tab>	Moves cursor to IOP Module Type field. 
3 Be sure description in field matches the desired module type. Add optional details, if desired. There is a 132-character limit on this field. Press <Tab>.	Moves cursor to Description field. 
4 Key in optional descriptive data of up to 132 characters. Press <Tab>.	Moves cursor to IOP Number field. 
5 Key in the logical address of the associated I/O Processor (IOP) on the given I/O Link. Press <Tab>	Moves cursor to I/O Link Scan Rate field. 
6 Accept default or click  down arrow and select desired rate from list. Press <Tab>	Moves cursor to Failure Option field. 
7 Accept default or click  down arrow and select desired action from list. Press <Tab>.	Moves cursor to This IOP is redundant check box. 
8 Leave box unchecked if IOP is nonredundant. Press <Tab>. Check box if IOP is one of a redundant pair. Press <Tab>.	Moves cursor to IOP Partner A, File field. 
9 Accept default or key in the IOP card file number for the primary IOP. Press <Tab>.	Moves cursor to IOP Partner A, Card field. 
-

Hardware Module Creation

Creating PM I/O Digital Output IOP

10	Accept default or key in the card slot number for the primary IOP. • If IOP is nonredundant, click Server History tab. • If IOP is redundant, press <Tab>.	For nonredundant IOP, calls up Server History tab. Go to Step 13 For redundant IOP, moves cursor to IOP Partner B, File field.	
11	Accept default or key in the IOP card file number for the secondary IOP. Press <Tab>.	Moves cursor to IOP Partner B, Card field.	
12	Accept default or key in the card slot number for the secondary IOP. Click Server History tab.	Calls up the Server History configuration form.	
-

PMIO:D032 Block, D032403 - Parameters [Project]

Main | Status Data | Maintenance | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Access Levels

Control Level: 200 Control Area:

History Configuration

Number of History Parameters: 10

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Create New or Edit Existing Server Scripts

☐ Show Parameter Names

OK Cancel Help



TIP

If you have a Distributed Server Architecture (DSA), you must enter the Control Area assignment for this Server. (Note that area code assignments are made through the Station application.) If you do not have a DSA, you can skip this field if area is not enabled through the Station application.

- 13** Use the on-line help as a guide to complete the configuration entries on this tab. Click the Server Displays tab. Calls up the Server Displays configuration form.

Hardware Module Creation

Creating PM I/O Digital Output IOP

PMIO:D032 Block, D032403 - Parameters [Project]

Main | Status Data | Maintenance | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Point Detail Display: Associated Display:

Group Detail Display:

Trends

Number of Trends:

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups:

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

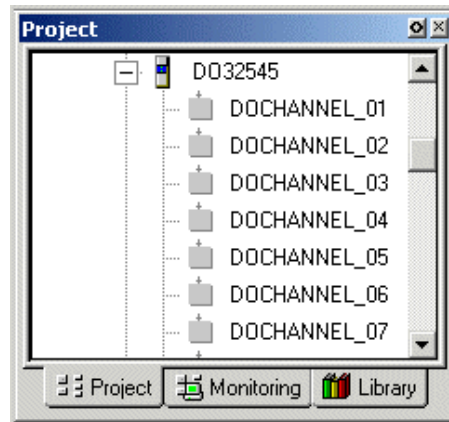
☐ Show Parameter Names

OK Cancel Help

- 14** Use the on-line help as a guide to complete the configuration entries on this tab. Click the OK button.

Closes the form and creates DO32 block icon along with its Digital Output Channel blocks in Project tab.

(The icon shown is for a nonredundant DO32 IOP.)



- 15** This completes the creation of the AO16 IOP.

Other data on the configuration form is unavailable in Project mode. See the on-line help for information about the other parameters.

Creating PM I/O STIMV IOP

Use the following procedure as a general guide for creating and configuring a function block for a Smart Transmitter Interface Multi-Variable (STIMV) type Input/Output Processor (IOP). The following procedure uses the menu method of creation but the [Drag and Drop Method](#) described above for Input/Output Modules can also be used. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	Click File->New->I/O Modules->PMIO->STIMV - Smart Transmitter Interface Multi-Variable, 16 ch.	Calls up the STIMV Block configuration form with Name field highlighted.

PMIO:STIMV Block, STIMV469 - Parameters [Project]

Main | Status Data | Maintenance | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Name: STIMV469

IOP Module Type: Smart Transmitter Interface Multi-V

Description:

IOP Number: 1

Execution State: IDLE

Number of Channels: 16

I/O Link Scan Rate: 250_MS

Frequency 60/50Hz: 60HZ

☐ Database Valid

Validate IOP Database

☐ This IOP is redundant

IOP Partner A

File: 1

Card: 1

Status: POWER_ON

Operation: PRIMARY

Redundancy Status: ...

☐ FTA Present

IOP Partner B

File:

Card:

Status:

Operation:

Redundancy Status:

☐ FTA Present

Swap Primary IOP

Reset I/O Link Errors

Select I/O Link Cable A

Select I/O Link Cable B

☐ Show Parameter Names

OK Cancel Help

2	Key in desired name of up to 16 characters or accept the default. Press	Moves cursor to IOP Module Type field.

<Tab>

IOP Module Type

- 3** Be sure description in field matches the desired module type. Add optional details, if desired. There is a 132-character limit on this field. Press <Tab>.

Moves cursor to Description field.

Description

- 4** Key in optional descriptive data of up to 132 characters. Press <Tab>.

Moves cursor to IOP Number field.

IOP Number

- 5** Key in the logical address of the associated I/O Processor (IOP) on the given I/O Link. Press <Tab>

Moves cursor to I/O Link Scan Rate field.

I/O Link Scan Rate

- 6** Accept default or click down arrow and select desired rate from list. Press <Tab>

Moves cursor to Frequency 60/50Hz field.

Frequency 60/50Hz

- 7** Accept default or click down arrow and select frequency that matches line power.

Moves cursor to This IOP is redundant check box.

☐ This IOP is redundant

- 8** Leave box unchecked if IOP is nonredundant. Press <Tab>.

Moves cursor to IOP Partner A, File field.

Check box if IOP is one of a redundant pair. Press <Tab>.

File

- 9** Accept default or key in the IOP card file number for the primary IOP. Press <Tab>.

Moves cursor to IOP Partner A, Card field.

Card

Hardware Module Creation

Creating PM I/O STIMV IOP

10	Accept default or key in the card slot number for the primary IOP. • If IOP is nonredundant, click Server History tab. • If IOP is redundant, press <Tab>.	For nonredundant IOP, calls up Server History tab. Go to Step 13 For redundant IOP, moves cursor to IOP Partner B, File field.	
11	Accept default or key in the IOP card file number for the secondary IOP. Press <Tab>.	Moves cursor to IOP Partner B, Card field.	
12	Accept default or key in the card slot number for the secondary IOP. Click Server History tab.	Calls up the Server History configuration form.	
-

PMIO:STIMV Block, STIMV469 - Parameters [Project]

Main | Status Data | Maintenance | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Access Levels

Control Level: 200 Control Area:

History Configuration

Number of History Parameters: 10

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

Create New or Edit Existing Server Scripts

☐ Show Parameter Names

OK Cancel Help



TIP

If you have a Distributed Server Architecture (DSA), you must enter the Control Area assignment for this Server. (Note that area code assignments are made through the Station application.) If you do not have a DSA, you can skip this field if area is not enabled through the Station application.

- 13**

Use the on-line help as a guide to complete the configuration entries on this tab. Click the Server Displays tab.
- Calls up the Server Displays configuration form.

Hardware Module Creation

Creating PM I/O STIMV IOP

PMIO:STIMV Block, STIMV469 - Parameters [Project]

Main | Status Data | Maintenance | Box Soft Failures | Channel Soft Failures | Server History | Server Displays

Point Detail Display: Associated Display:

Group Detail Display:

Trends

Number of Trends:

	Trend #	Pen	Trend Parameter	Description
1	0	NONE		
2	0	NONE		
3	0	NONE		
4	0	NONE		
5	0	NONE		

Groups

Number of Groups:

	Group #	Pos #	Group Parameter	Description
1	0	1		
2	0	1		
3	0	1		
4	0	1		
5	0	1		

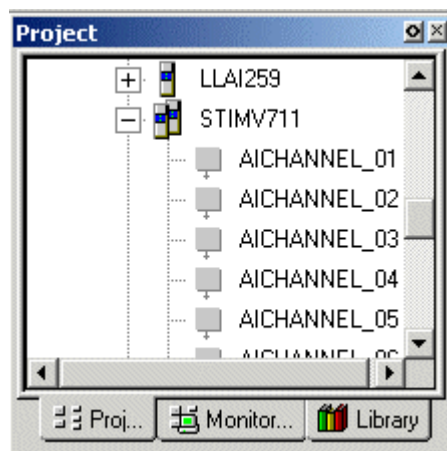
☐ Show Parameter Names

OK Cancel Help

- 14** Use the on-line help as a guide to complete the configuration entries on this tab. Click the OK button.

Closes the form and creates STIMV block icon along with its Analog Input Channel blocks in Project tab.

(The icon shown is for a redundant STIMV IOP.)



- 15** This completes the creation of the STIMV IOP.

Other data on the configuration form is unavailable in Project mode. See the on-line help for information about the other parameters.

Control Module Creation

Creating and Saving a Control Module

To create a Control Strategy, a Control Module must be created and function blocks inserted and connected. Figure 3 shows an example of Control Builder with a Control Module chart shown in the Control Drawing area.



WARNING

All edits done on project-related objects must be reloaded to the controller before those edits can be seen in the controller. See *Control Strategy Loading Overview* for information on how to load control strategy objects.

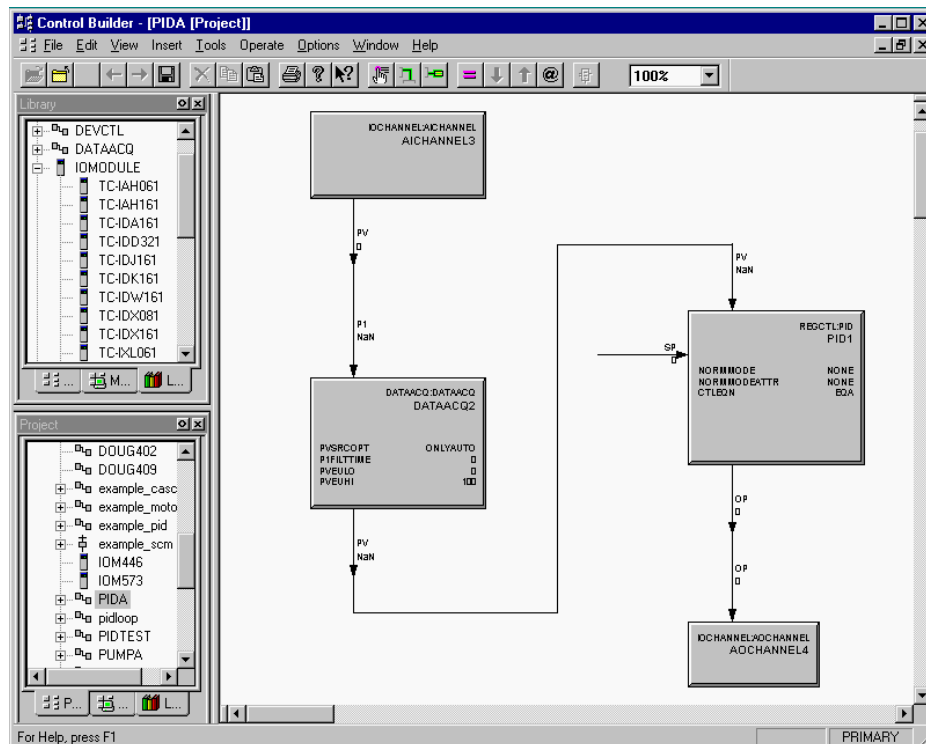


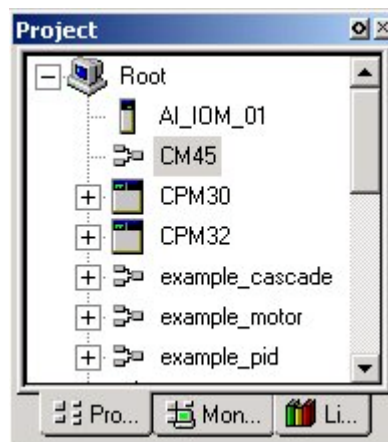
Figure 3 Control Builder CM Frame

Control Module Creation

Creating and Saving a Control Module

Use the following procedure to create and save a Control Module.

Step	Action
1	Click File -> New -> Control ModuleA blank Control Module is opened up in the Control Drawing area. - The new Control Module appears under the Root Project Tree. Control Module names are sequentially numbered (for example, CM30, CM31, etc.). - The new Control Module is automatically saved to your harddrive.



ATTENTION: Instead of using step 1 to create a Control Module, you can alternately use either step 1A, 1B or 1C which follow.

- 1A** (ALTERNATE 1A) Set up Control Builder with both the Library and Project views visible. See [Opening and navigating a tree window](#).
- Click on and expand the SYSTEM Library in the Library Tree.
 - Drag and drop a CONTROLMODULE block from the System Library onto the Project Root.
 - The new Control Module appears under the Root Project Tree. Control Module names are sequentially numbered (for example, CM30, CM31, etc.).
 - The new Control Module is automatically saved to your harddrive.

- 1B** (ALTERNATE 1B) Set up Control Builder with both the Library and Project views visible. See [Opening and navigating a tree window](#).
- Double-click on CONTROLMODULE in the Library tab
 - A blank Control Module is opened up in the Control Drawing area.
 - The new Control Module appears under the Root Project Tree. Control Module names are sequentially numbered (for example, CM30, CM31, etc.).
 - The new Control Module is automatically saved to your harddrive.
- 1C** (ALTERNATE 1C) Copy a Control Module. See [Copying Control Modules](#).
- 2** Select Tools -> Configure Module Parameters ... or double-click with the mouse cursor located anywhere inside the chart to open the Control Module Parameter Configuration form for input.

SYSTEM:CONTROLMODULE Block, CM46 - Parameters [Project]

Main | Server

Name: Execution Period:

Description: Execution Phase:

Engr Units: Unit Text:

Keyword: Version:

Enable Alarming Option: ☒ SCM Option:

Execution Order in CEE: SCM Name:

Fieldbus Specific

Execution Order in Link: FF Execution Period:

Stale Count:

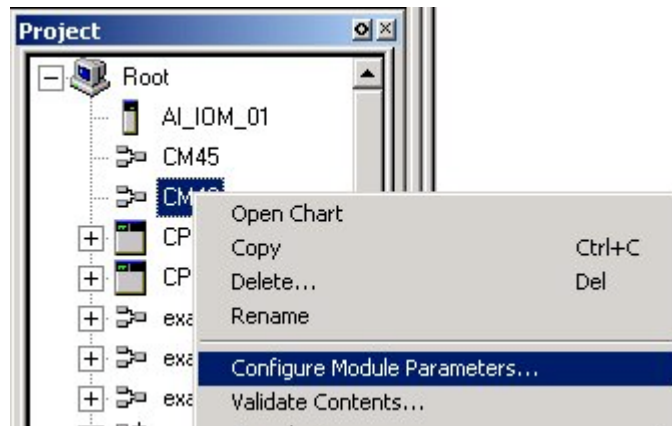
☐ Show Parameter Names

OK Cancel Help

Control Module Creation

Creating and Saving a Control Module

Note: If the Control Module's chart is NOT open in the Control Drawing area, right-click on the new Control Module in the Project Tree to display the selection options and click on Configure Module Parameters to open the Control Module Parameter Configuration form for input.



- 3 Enter a new Control Module name in the Name field along with a description in the Description field.
 - 4 Using the F1 key to access context-sensitive Help, fill in the remaining fields as required.
 - 5 Click OK.
 - 6 If necessary, double-click on the newly-named Control Module in the Project Tree to open it. The new name appears at the top of the Control Module drawing when the Control Drawing opens.
 - 7 Click File -> Save to save any additional changes you make to the Control Module before closing.
 - 8 Click File -> Close to close the chart.
-

Copying Control Modules

Perform the steps in the table below to copy an existing Control Module.

Step	Action	Result
1	From the Project Tree, select the desired Control Module block to be copied.	Selected Control Module block is highlighted on the Project Tree.
2	Click Edit -> Copy. Alternate method: Click <Ctrl>-C.	Selected Control Module block is saved to Control Builder clipboard and Name New Function Block(s)... dialog appears (see Figure 4).

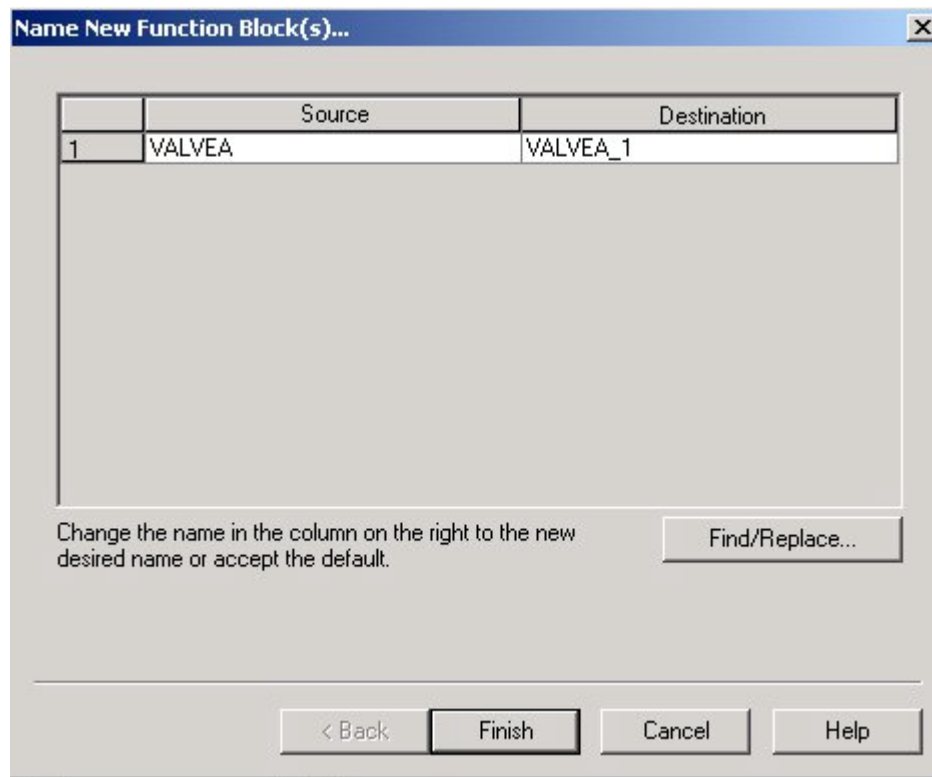


Figure 4 Name New Function Block(s) dialog

- 3** Change the Control Module block's name in the Destination column of the Name New Function Block(s) dialog to a desired name or accept the default name.

The copied Control Module block is assigned a new name.

Note:
You may opt to keep the default name which is simply the original name with a number appended to it.
- 4** Click Next to proceed to the next dialog page (if appropriate) and enter new names as prompted to resolve any existing connections and/or associations.

If the CM contains connections to outside blocks, an additional dialog page appears which is used to resolve any existing connections and/or associations (see Figure 5).

5 Click Finish

Copied Control Module block with newly-designated name is pasted onto the Project Tree.

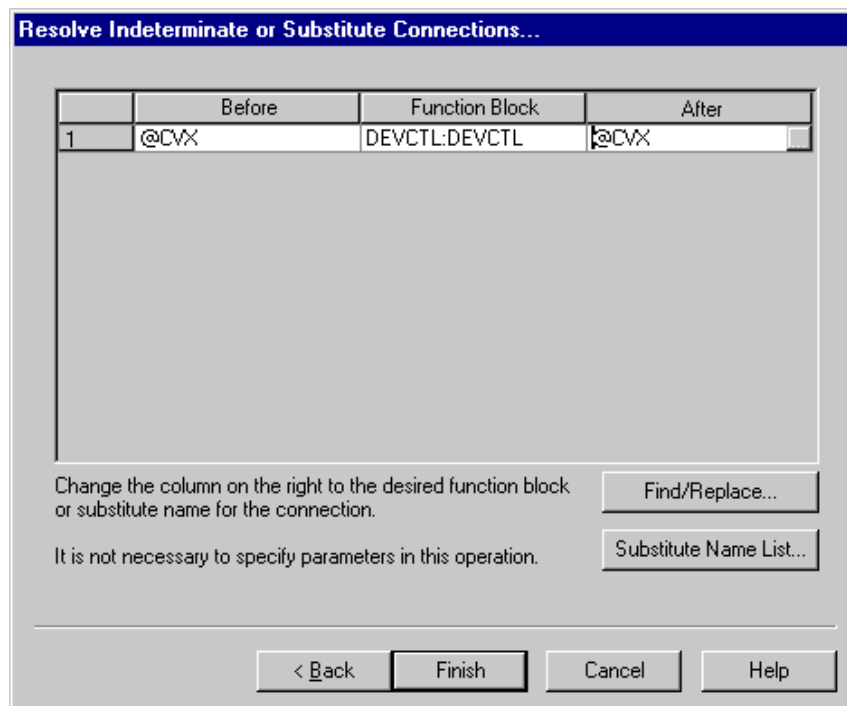


Figure 5 Resolve Indeterminate or Substitute Connections dialog

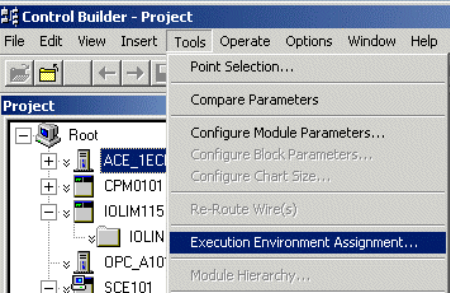
Assigning CMs and IOMs to CEE

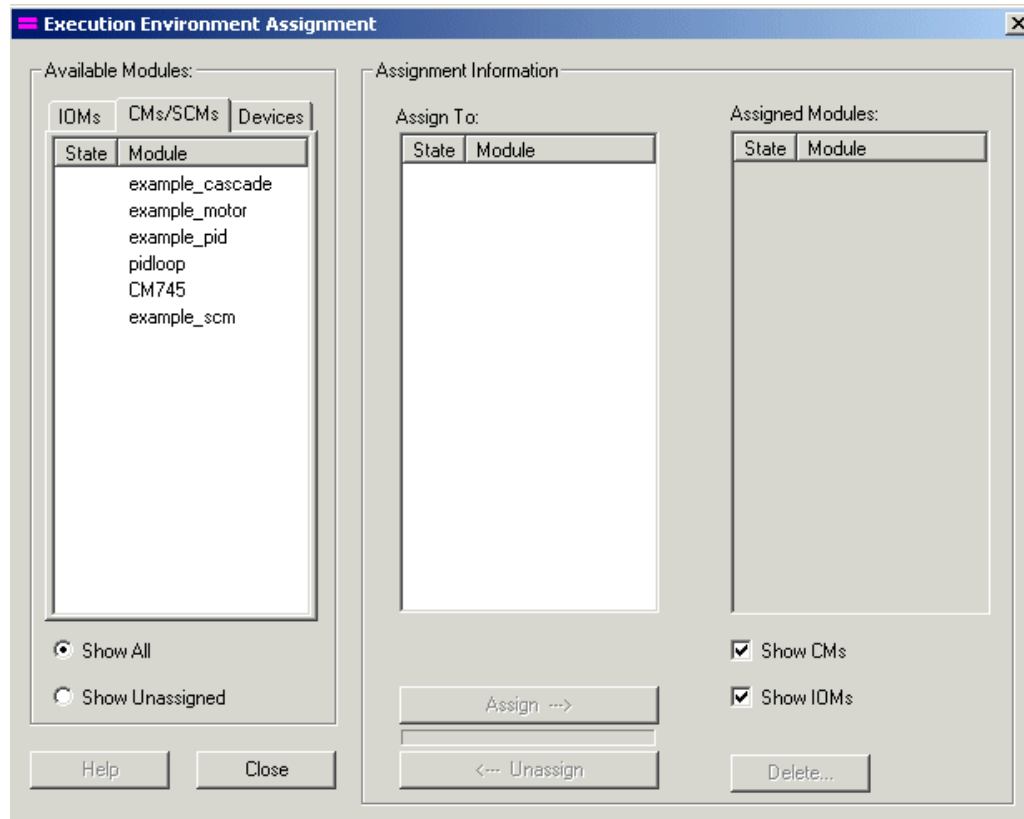
Use the following procedure as a general guide to assign configured Control Modules (CMs) and I/O Modules (IOMs) to configured Control Execution Environments (CEEs) for Control Processor Module (CPM), Application Control Environment (ACE), or Simulation Control Environment (SCE) blocks. The illustrations used in the following procedure are for example purposes only.



ATTENTION

- Before Control Builder allows you to associate an IOM to an IOCHANNEL block, it checks to make sure that the CM and IOM are assigned to the same CEE.
- All edit windows (such as CM charts) must be closed before proceeding with this procedure or a lock contention may occur. To resolve these types of lock contentions, close the open edit window (such as the CM chart) and attempt to perform the procedure again.

Step	Action	Result
1	Click Tools->Execution Environment Assignment. Or, click  assignment button in the toolbar. 	Calls up Execution Environment Assignment dialog box. (There is no set default state for the dialog, so it may come up with different active fields than shown below.)



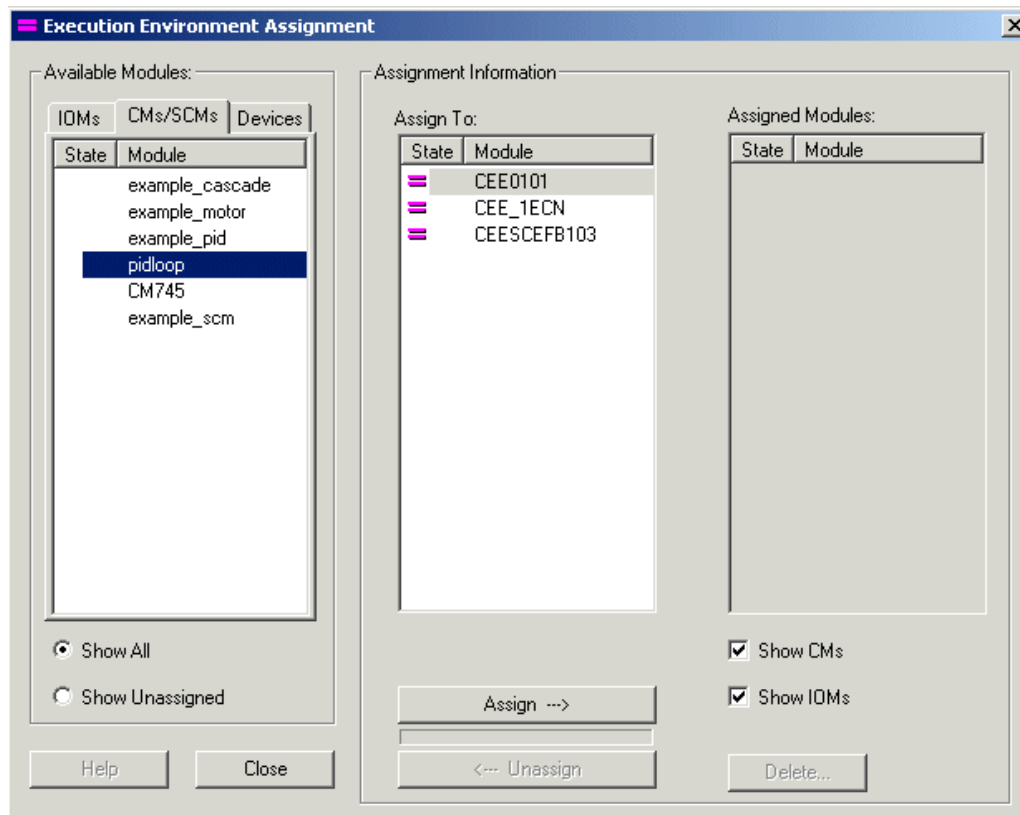
TIP

Can use common <Shift> plus click and <Control> plus click actions to select multiple items in Available Modules and Assigned Modules lists.

- 2 With CMs/SCMs tab selected, click listed CM to be assigned to a CEE. Highlights selection and configured CEEs appear in the Assign To list.

Control Module Creation

Assigning CMs and IOMs to CEE

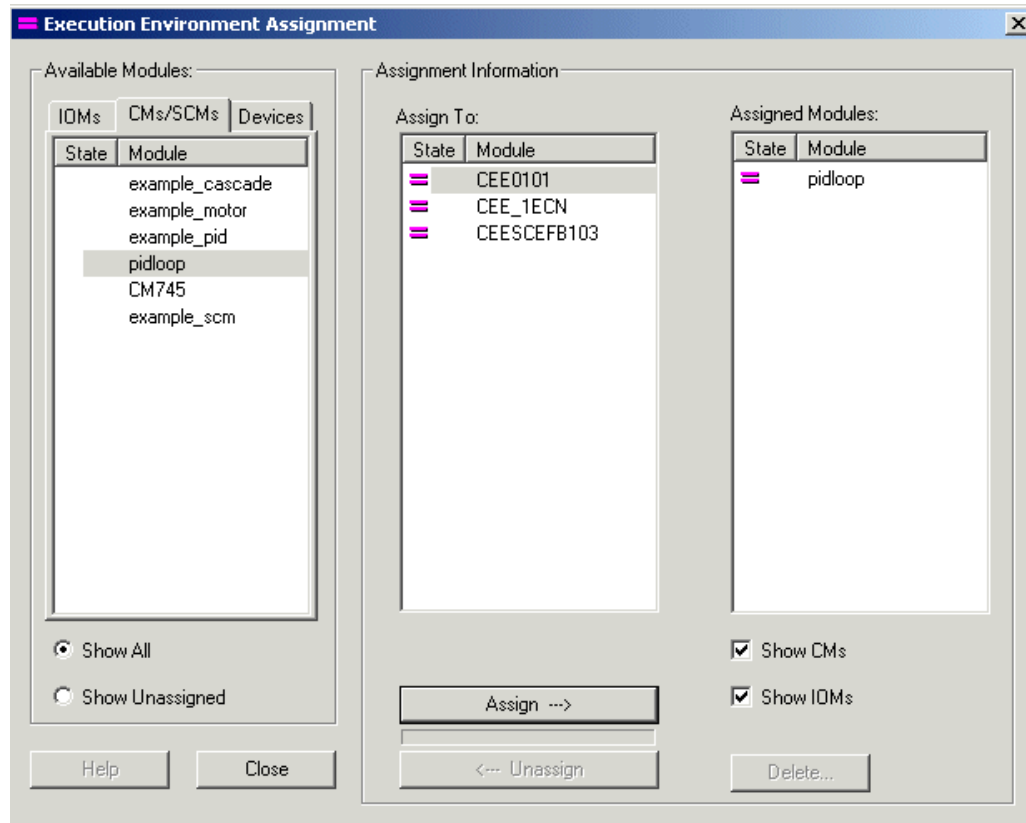


- 3** Accept default CEE selection or click desired CEE in list.

Be sure correct CEE is selected in list.

- 4** Click the  assign button.

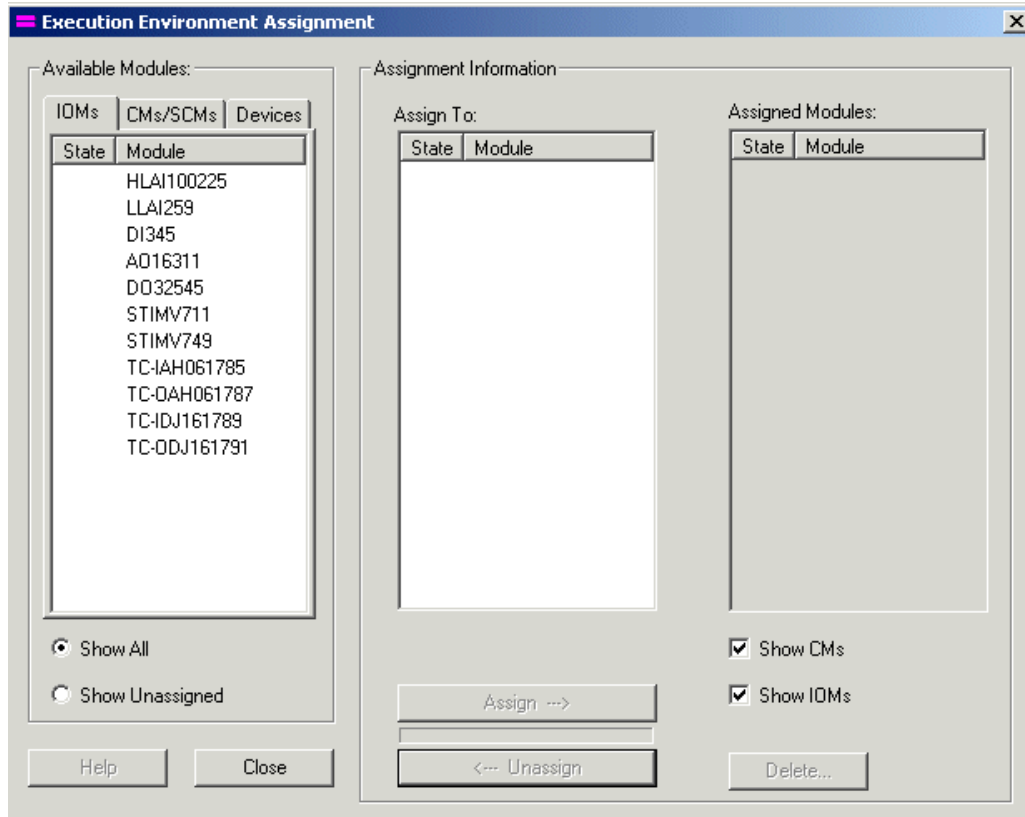
Selected CM is assigned to selected CEE and appears in the Assigned Modules list.



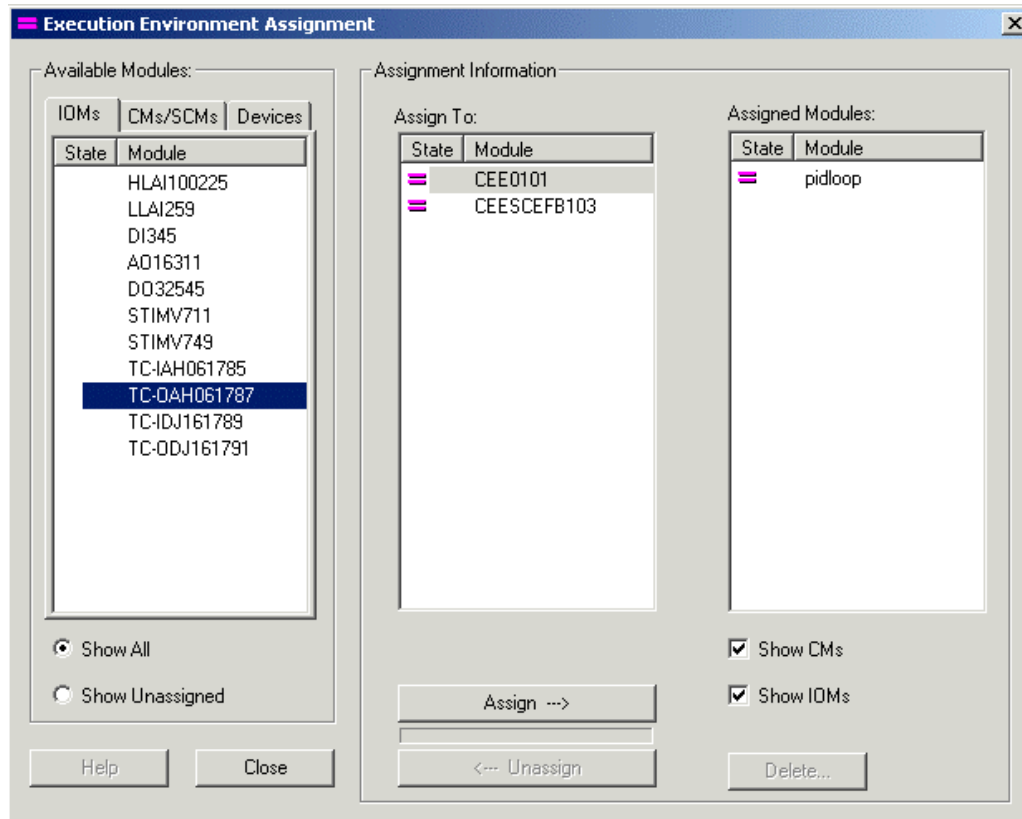
- 5** Click IOMs tab in Available Modules section. Configured IOMs/IOPs appear in list.

Control Module Creation

Assigning CMs and IOMs to CEE



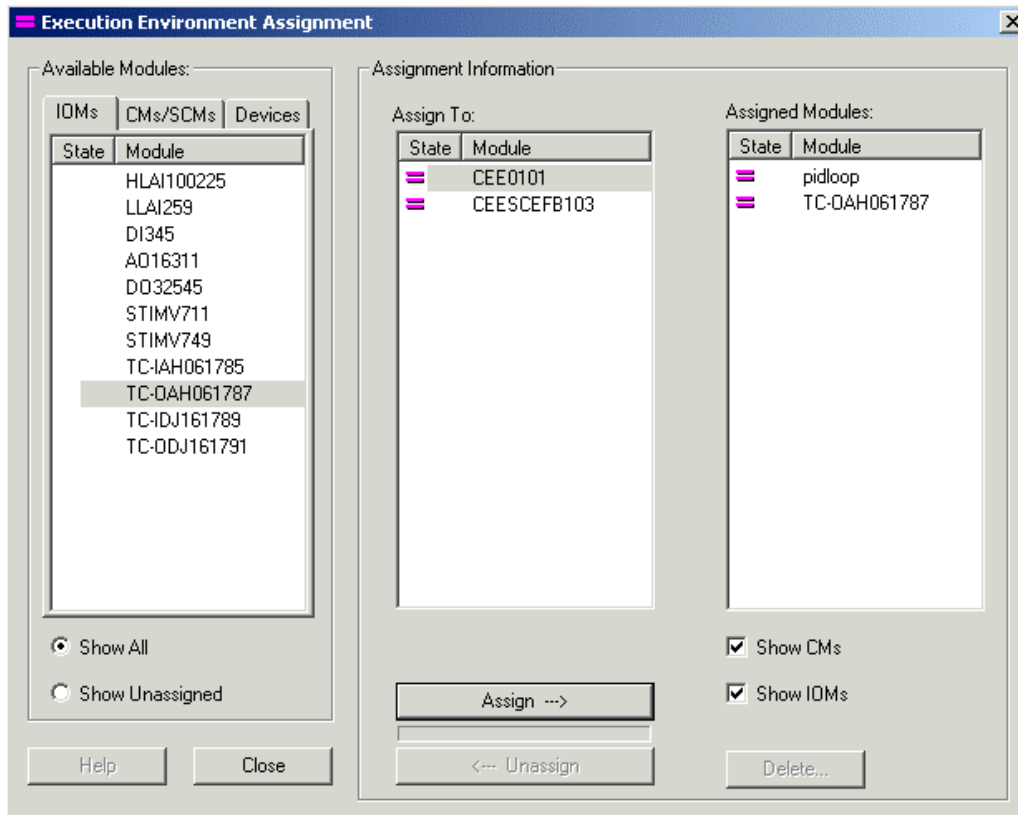
- 6** Click listed IOM to be assigned. Highlights selection and applicable CEEs appear in Assign To list.
-



- 7 Accept default CEE selection or click desired CEE in list. Be sure correct CEE is selected in list.
- 8 Click the  Selected IOM is assigned to selected CEE and appears in the Assigned Modules list.

Control Module Creation

Assigning CMs and IOMs to CEE

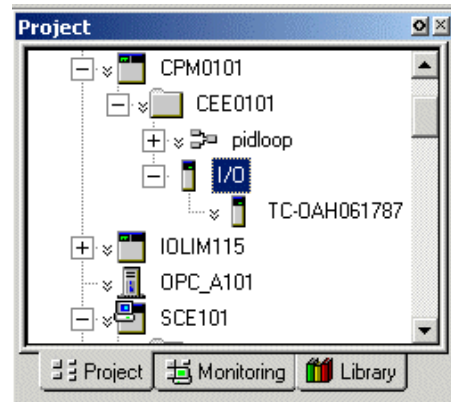


- 9** Repeat Steps 2 to 4 to assign other CMs/SCMs. Or, repeat Steps 5 to 8 to assign other IOMs. Complete CM, SCM, and IOM assignments.
-

10

Click  Close button.

Closes dialog box and assigned components now appear in CEE folder in Project tab.



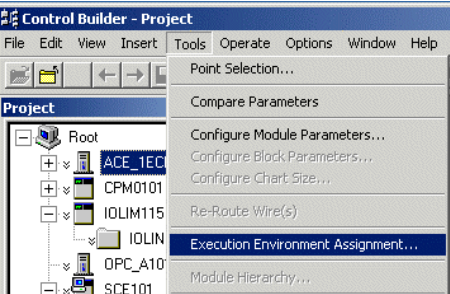
Assigning IOPs to IOLINK

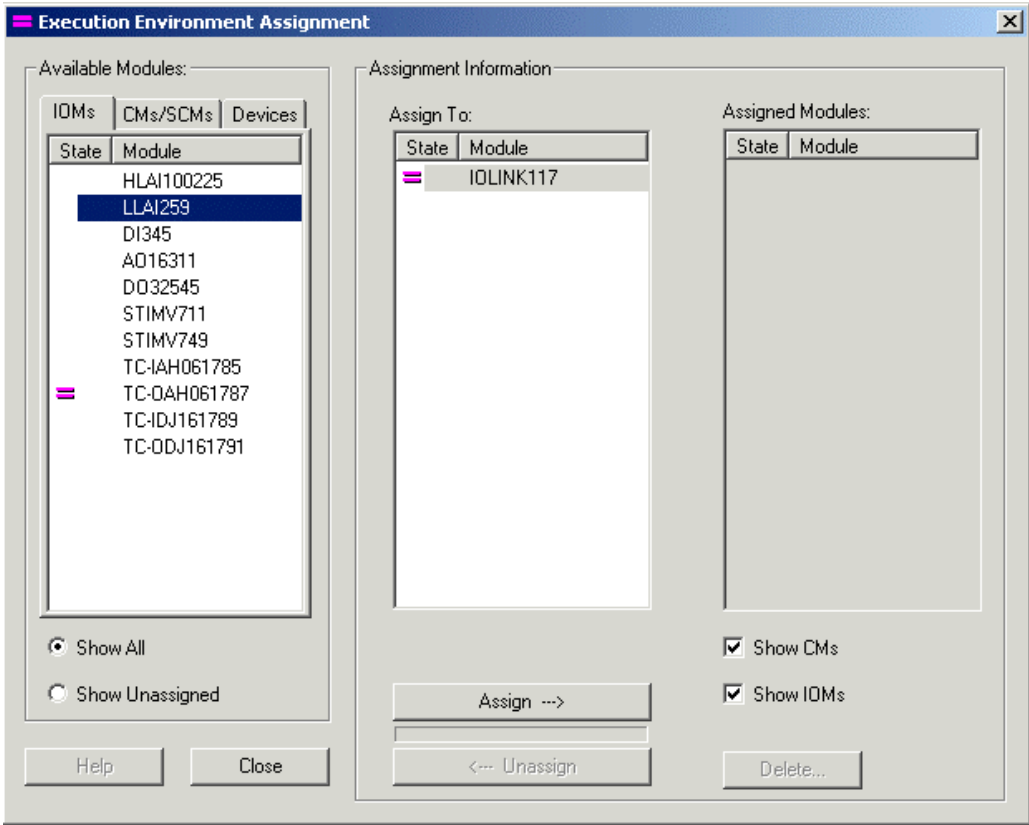
Use the following procedure as a general guide to assign configured Input/Output Processors (IOPs) to configured Input/Output Link (IOLINK) for given Input/Output Link Interface Module (IOLIM) blocks. The illustrations used in the following procedure are for example purposes only.



ATTENTION

- You must assign Input/Output Processors (IOP) to an I/O Link before you can assign Input/Output Channels (IOC) to a given IOP.
- Configure IOP first to avoid duplicate IOP number error message when attempting to assign an IOP to an IOLINK. System checks for unique IOP identification before assigning it to the IOLINK.

Step	Action	Result
1	Click Tools->Execution Environment Assignment. Or, click  assignment button in the toolbar. 	Calls up Execution Environment Assignment dialog box. (There is no set default state for the dialog, so it may come up with different active fields than shown below.)



TIP

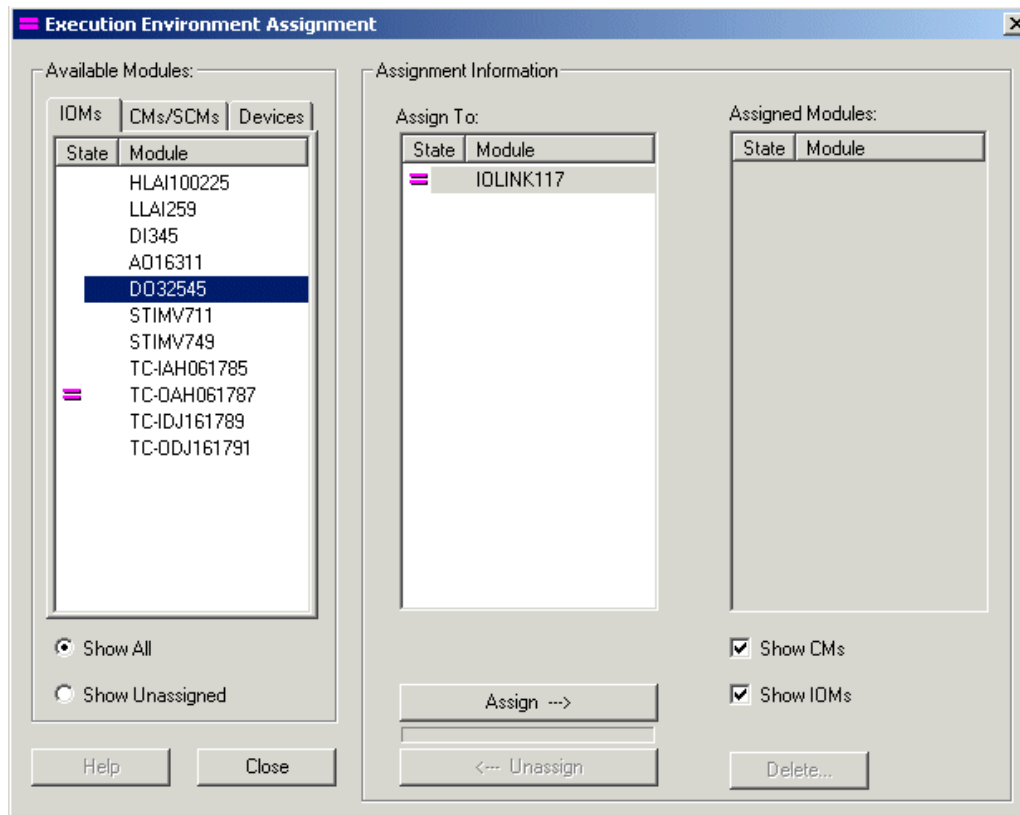
Can use common <Shift> plus click and <Control> plus click actions to select multiple items in Available Modules and Assigned Modules lists.

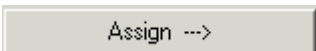
2

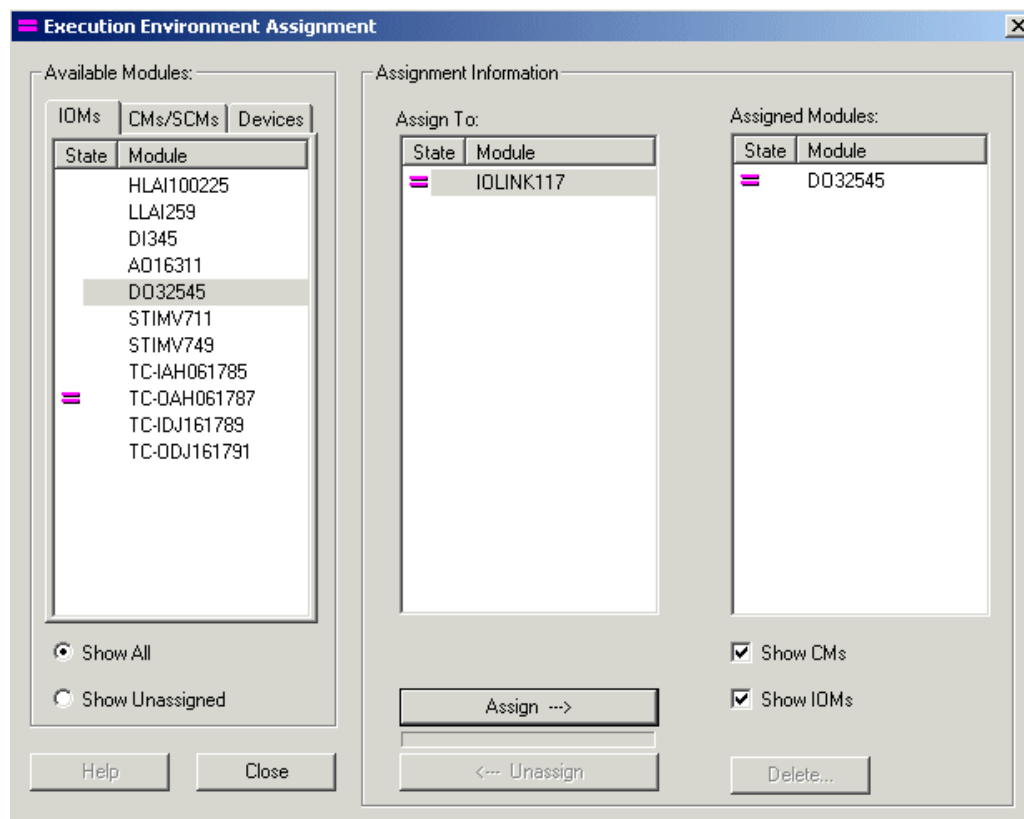
With IOMs tab selected, click desired IOP to be assigned to given IOLINK. Highlights selection and configured IOLINKs appear in the Assign To list.

Control Module Creation

Assigning IOPs to IOLINK



- 3 Accept default IOLINK selection or click desired IOLINK in list. Be sure correct IOLINK is selected in list.
 - 4 Click the  Selected IOP is assigned to selected IOLINK and appears in the Assigned Modules list.
-



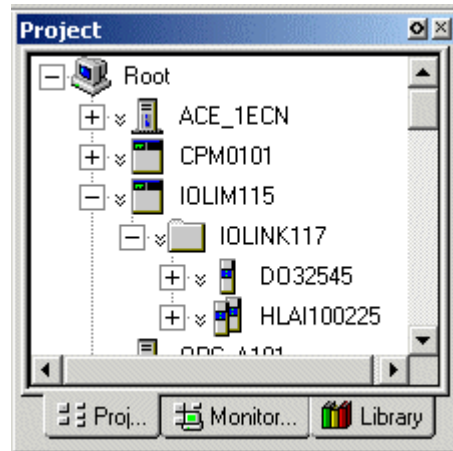
- 5** Repeat Steps 2 to 4 to assign other IOPs. Complete IOP assignments.

Control Module Creation

Assigning IOPs to IOLINK

- 6 Click  Close button.

Closes dialog box and assigned components now appear in IOLINK folder in Project tab.



Creating an Instance of a Basic Function Block

Perform the steps below to create an instance of a basic function block. Blocks appear as Block Symbols on the Control Drawing.

Step	Action	Result
1	Make sure a Control Module (CM) chart is open. - Double-click the CM in the Project Tree to open your CM chart so function blocks may be added. - See Creating and Saving a Control Module.	The Control Module (CM) chart is open so that function blocks may be added.
2	From the appropriate Library Tree group, drag and drop the desired block (or blocks) to the Control Module Control Drawing (such as an AICHANNEL block from the IOCHANNEL group).	Desired block is shown in reverse video on the tree. The new function block appears on the Control Module chart (see Figure 6).
 TIP - You can drag and drop PMIO Input/Output Channel (IOC) blocks directly from IOPs added to the Project tab to the Control Module. - You can not add PMIO IOC blocks to Control Modules already assigned to a Fieldbus Interface Module (FIM).		
3	Repeat Step 2 as many times as necessary to create the desired blocks for your control strategy.	

Control Module Creation

Creating an Instance of a Basic Function Block

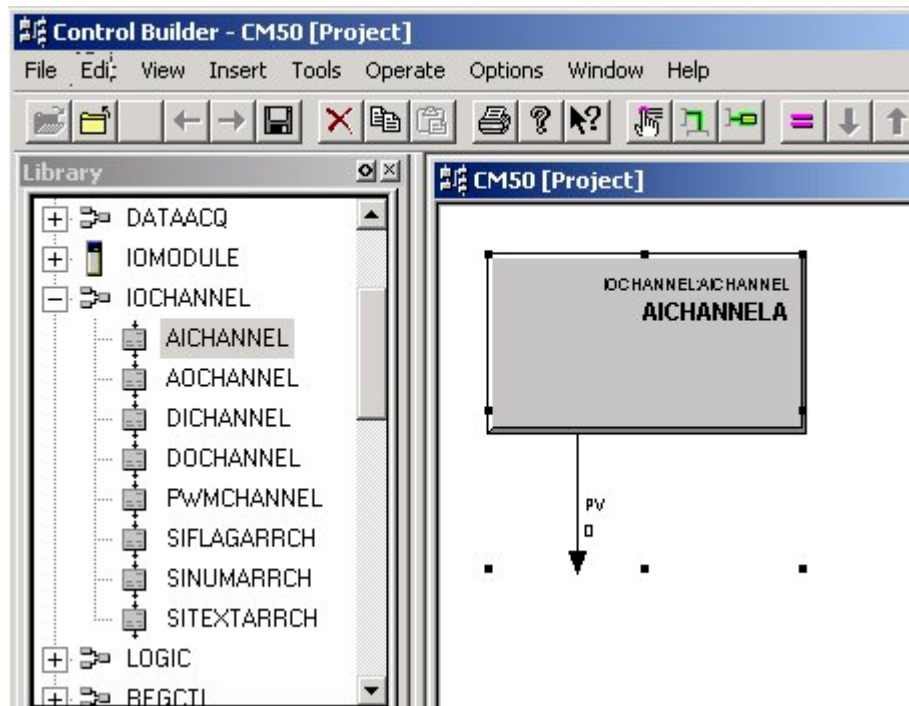


Figure 6 Control Module Chart with an AICHANNEL Block

Assigning PMIO IOC Block to IOP

Use the following procedure as a general guide to assign a Process Manager I/O, Input/Output Channel (IOC) block to an I/O Processor (IOP). This procedure assumes that an instance of an IOC block was created from the PMIO library in a Control Module (CM) as noted in the previous section. The illustrations used in the following procedure are for example purposes only.



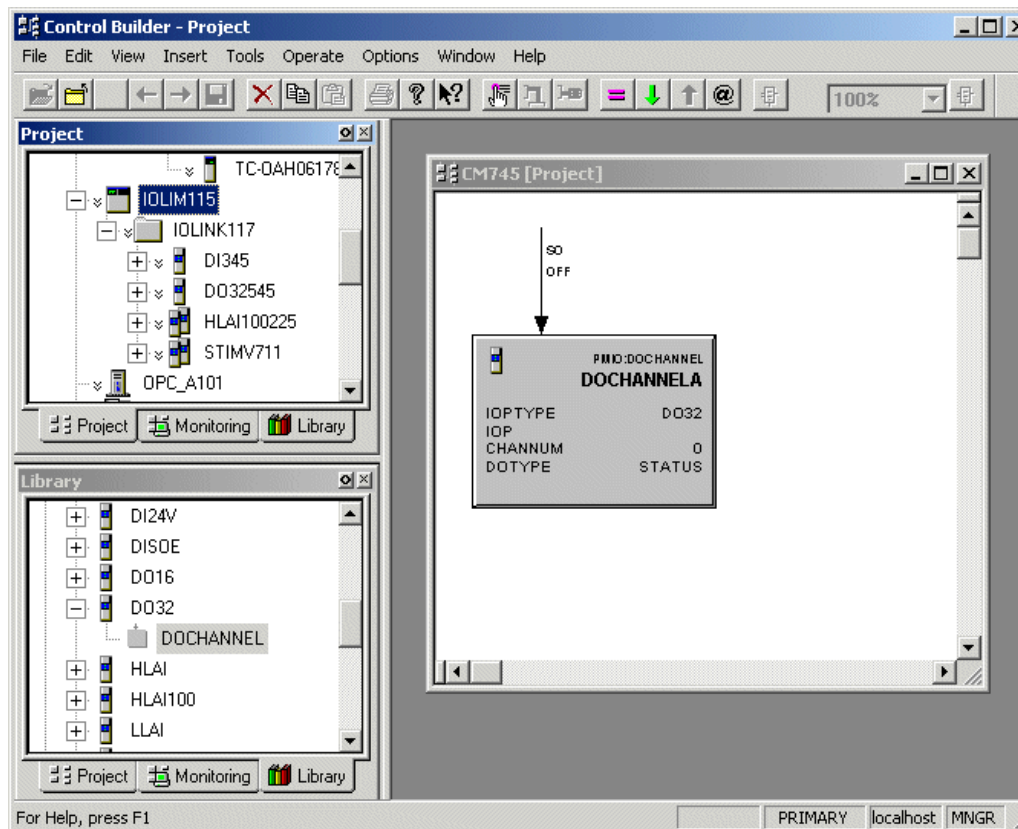
TIP

This procedure is only required when an IOC is added from an IOP in the PMIO directory in the Library tab or when an "unassigned" IOC needs to be re-assigned.

Control Module Creation

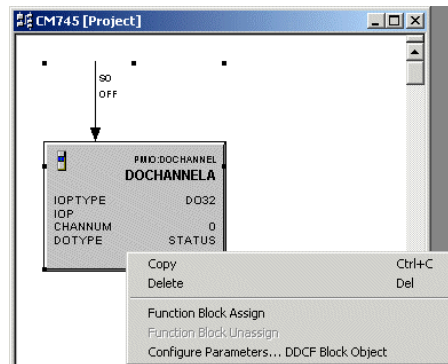
Assigning PMIO IOC Block to IOP

Step	Action	Result
1	Double click given CM icon in Project tree.	Opens CM in control chart area.



2 Right-click PMIO IOC block.

Opens shortcut menu.



3 Select Function Block Assign.

Opens Function Block Assignment Dialog that list compatible IOCs associated with IOPs assigned to an IOLINK.

Control Module Creation

Assigning PMIO IOC Block to IOP

Function Block Assignment Dialog

Block Information

Function Block Name: CM745.DOCHANNELA

Function Block Template: PMIO.DOCHANNEL

Compatible Function Block(s)

		Device Name	Function Block Name	Block Template Name
1	☐	DO32545	DOCHANNEL_01	PMIO:DO32.DOCHANNEL
2	☐	DO32545	DOCHANNEL_02	PMIO:DO32.DOCHANNEL
3	☐	DO32545	DOCHANNEL_03	PMIO:DO32.DOCHANNEL
4	☐	DO32545	DOCHANNEL_04	PMIO:DO32.DOCHANNEL
5	☐	DO32545	DOCHANNEL_05	PMIO:DO32.DOCHANNEL
6	☐	DO32545	DOCHANNEL_06	PMIO:DO32.DOCHANNEL
7	☐	DO32545	DOCHANNEL_07	PMIO:DO32.DOCHANNEL
8	☐	DO32545	DOCHANNEL_08	PMIO:DO32.DOCHANNEL
9	☐	DO32545	DOCHANNEL_09	PMIO:DO32.DOCHANNEL
10	☐	DO32545	DOCHANNEL_10	PMIO:DO32.DOCHANNEL
11	☐	DO32545	DOCHANNEL_11	PMIO:DO32.DOCHANNEL

Assign Cancel Help

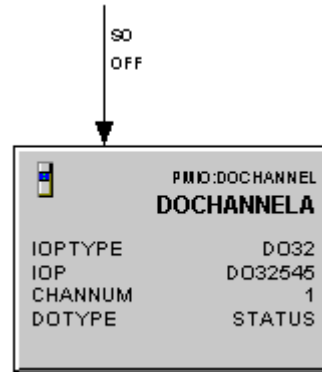
- 4 Click check box for desired channel in given IOP. Selects channel for assignment.



ATTENTION

You can **not** assign an IOC to an IOP channel that is currently loaded in the IOLINK and appears in the Monitoring tree.

- 5** Click the  Assign button. Close dialog box and assigns IOC to selected channel in named IOP.



- 6** Close the CM and click Yes. Closes CM and saves changes.
- 7** Repeat procedure as required to assign other PMIO library IOCs.
-

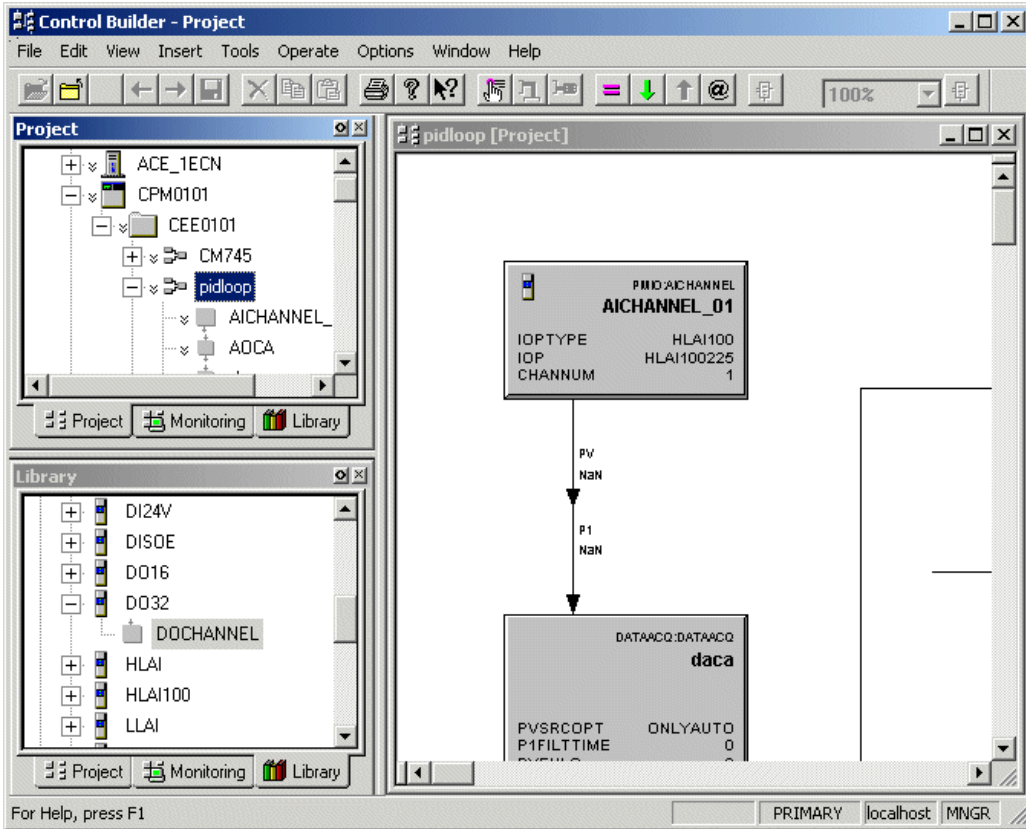
Control Module Creation

Unassigning PMIO IOC Block From IOP

Unassigning PMIO IOC Block From IOP

Use the following procedure as a general guide to unassign a Process Manager I/O, Input/Output Channel (IOC) block from an I/O Processor (IOP). The illustrations used in the procedure are for example purposes only.

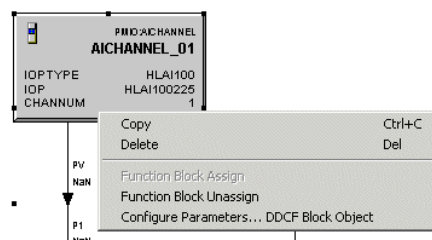
Step	Action	Result
1	Double click given CM icon in Project tree.	Opens CM in control chart area.



The screenshot displays the Control Builder - Project window. The Project tree on the left shows a hierarchy: ACE_1ECN > CPM0101 > CEE0101 > CM745 > pidloop. The pidloop icon is highlighted. Below the Project tree is the Library pane, which lists various I/O blocks including DI24V, DISOE, DO16, DO32, DOCHANNEL, HLAI, HLAI100, and LLAI. The main control chart area, titled 'pidloop [Project]', shows a block diagram. At the top is a block labeled 'PMIO:AICHANNEL AICHANNEL_01' with parameters: IOPTYPE HLA100, IOP HLA100225, and CHANNEL 1. An arrow labeled 'PV NaN' points from this block to a block labeled 'DATAACO:DATAACO data'. This second block has parameters: PVSRCOPT ONLYAUTO, P1FILTTIME 0, and P1FILT C. The bottom status bar indicates 'For Help, press F1' and shows 'PRIMARY localhost MNGR'.

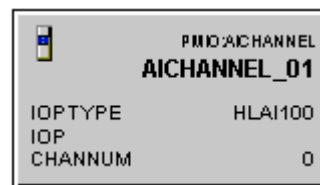
- 2** Right-click PMIO IOC block to be unassigned.

Opens shortcut menu.



- 3** Select Function Block Unassign.

Unassigns IOC block from IOP and associated channel number. This changes IOP field to blank and CHANNUM field to 0 on block face.



- 4** Close the CM and click Yes.

Closes CM and saves changes.



ATTENTION

You can **not** load a Control Module with an unassigned PMIO IOC block.

- 5** See the previous procedure to re-assign the IOC to another IOP.

Copying a Function Block

Perform the steps in the table below to copy an existing function block or function blocks.



ATTENTION

The following connection rules apply when copying function blocks:

Notes:

Inside the scope of operation means that the block is included in the list of selected blocks to be copied.

Outside the scope of operation means that the block is not included in the list of selected blocks to be copied.

1. Graphical connections to blocks that are inside the scope of operation are automatically resolved relative to the operation.
 2. Graphical connections to blocks that are outside the scope of the operation are not carried over to the new copied blocks.
 3. Parameter connections to blocks that are inside the scope of operation are automatically resolved relative to the operation.
 4. Parameter connections to blocks that are outside the scope of operation appear in the Connections page to be resolved by the user if desired at the time of copy.
 5. Substituted connections on selected blocks always appear in the Connections Page to be resolved by the user if desired at the time of copy.
-

Step	Action	Result
1	Select the desired function block or block(s) to be copied on the open control drawing.	Selected function block is highlighted on the control drawing.
2	Click Edit -> Copy. Alternate methods: • Click <Ctrl>-C. • Right-click, then select Copy from the drop-down menu. Tip: • Multiple blocks may be copied by shift-clicking and selecting or drawing a selection rectangle (or area) around the blocks.	Selected function block is saved to the Control Builder clipboard.
3	Click Edit -> Paste. Alternate method: • Click <Ctrl>-V.	The Name New Function Block(s) dialog appears (see Figure 7).

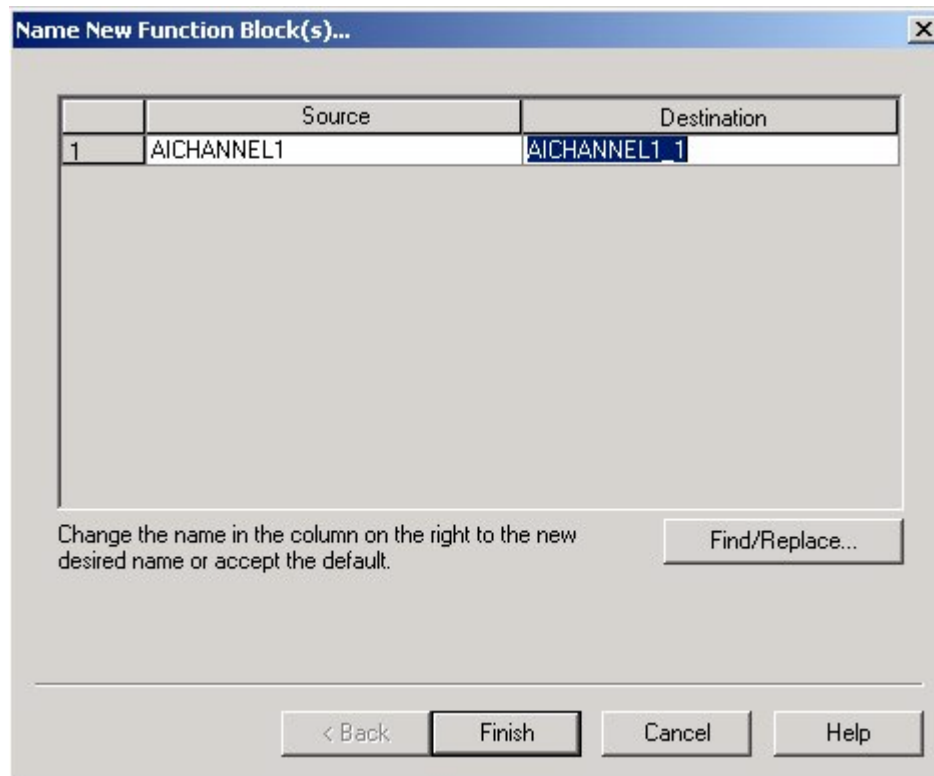


Figure 7 Name New Function Block(s) dialog

4	Change the function block's name in the Destination column of the Name New Function Block(s) dialog to a desired name or accept the default name.	The copied function block is assigned a new name. Note: You may opt to keep the default name which is simply the original name with a number appended to it.
5	Click Next to proceed to the next dialog page (if appropriate) and enter new names as prompted to resolve any existing connections and/or associations.	If the block contains connections to outside blocks, an additional dialog page appears which is used to resolve any existing connections and/or associations (see Figure 8).
6	Click Finish	The copied block appears on the control drawing.

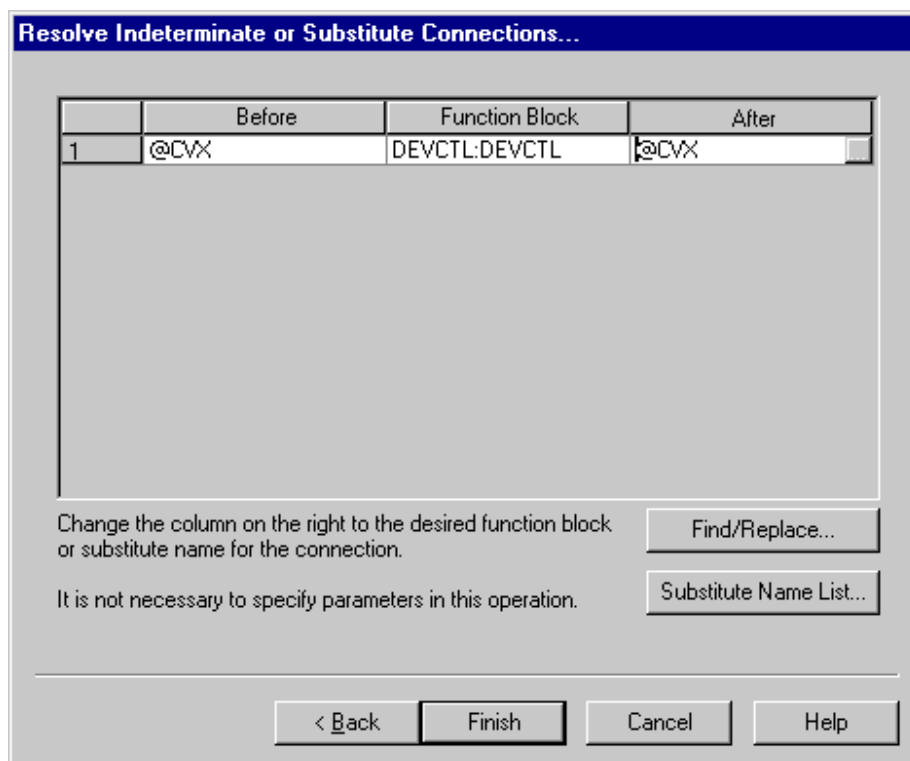


Figure 8 Resolve Indeterminate or Substitute Connections dialog

Moving Function Blocks within a Chart

Perform the steps below to move function blocks as desired within a chart.

Step	Action	Result
1	Select the desired function block or block(s) on the open control drawing. Note: Hold down the <Shift> key and click on any additional blocks, as desired, to select multiple blocks to be moved.	Selected function block is highlighted on the control drawing.
2	Hold the left mouse button down and drag (move) the selected block(s) to the desired location.	
3	Release the left mouse button.	Selected block(s) are moved to the desired location.

	ATTENTION A function block will not move if it's destination overlaps another block. Existing wiring between blocks will automatically resolve itself around the new block layout.

Deleting Function Blocks

Perform the steps below to delete function blocks as desired from a particular control strategy.

Step	Action	Result
1	Select the desired function block or block(s) on the open control drawing. Note: Hold down the <Shift> key and click on any additional blocks, as desired, to select multiple blocks to be moved.	Selected function block is highlighted on the control drawing.
2	Press the <Delete> key.	Selected block(s) are deleted from the Control Drawing.

Using the Parameters Configuration Form

The Parameter Configuration Form enables you to customize a function block by changing its name, execution order, and any associated parameters.

Considerations

- You have launched Control Builder and created a Control Module that includes an AND function block.
- The tabs that are included with a given block configuration form will vary depending upon block type and active licensed options.
- For parameter configuration help, press the **F1** key to call up help for the active field or click the **Help** button to call up help for the tab.
- The number of configurable parameters for a block varies depending upon whether the block is a data driven block or a custom block. A data driven block requires only a few configured parameters. The AND block is an example of a data driven block. A custom block requires many more configuration parameters, including those used specifically for configuring input, output and alarm parameters. The PID-PL block is an example of a custom block.

The following procedure outlines the typical steps for configuring an AND block for example purposes and can be easily adapted to apply to other blocks.

Step	Action
1	On Project tab or open Control Module, double-click the AND block icon or AND block, respectively. Or, right-click the icon or block and select Configure Parameters . . . from the list.

LOGIC:AND Block, ANDA - Parameters [Project]

Monitoring Parameters | Block Preferences | Template Defining

Main | Identification | Dependencies | Block Pins | Configuration Parameters

Name:

Execution Order in CM:

	Input Invert Option
1	☐
2	☐
3	☐
4	☐
5	☐
6	☐
7	☐
8	☐

☐ Show Parameter Names

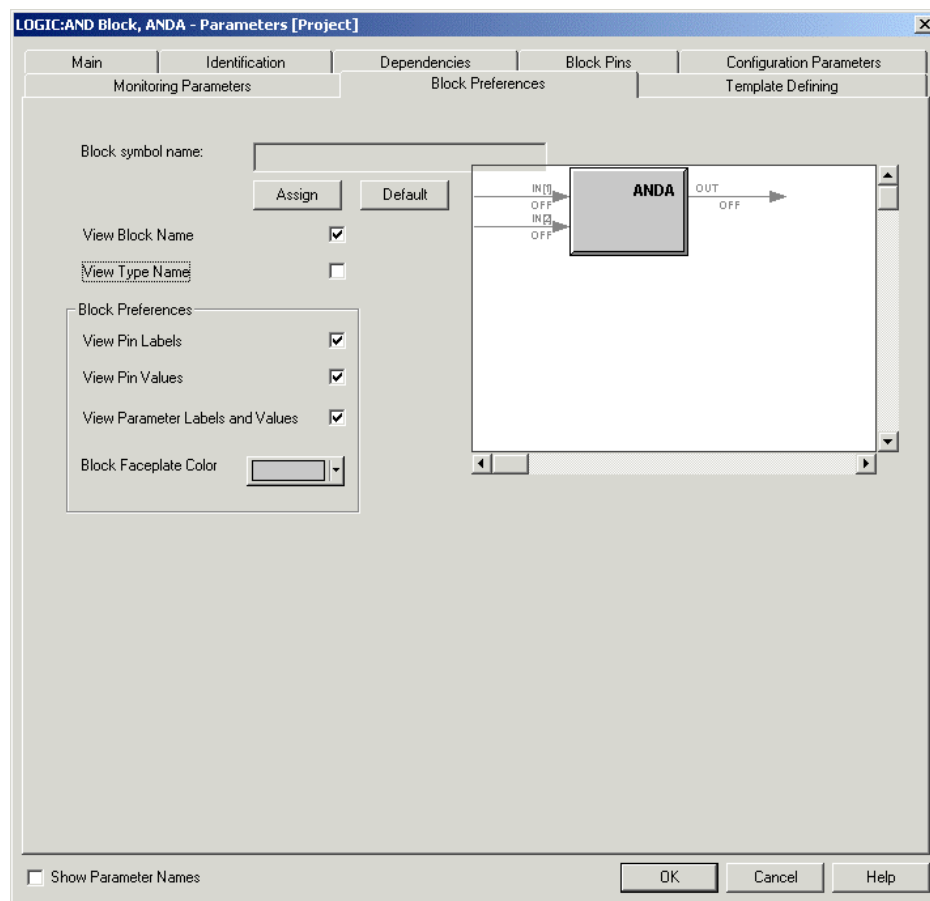
OK Cancel Help

- 2 On **Main** tab, key in desired block name In **Name** box. Press the **Tab** key.
- 3 In **Execution Order in CM** box, key desired value. Press the **Tab** key twice.
- 4 In row 1 of **Input Invert Option** list, click check box to turn option **On** or **Off**. A **check** means the function is **On**. The default is **blank** check box or function is **Off**. Repeat this Step as required.

Control Module Creation

Using the Parameters Configuration Form

- 5
 - Click the **Block Preferences** tab. In the view window, check a preview of how the block is displayed in the Control Module control drawing.
 - Use configuration functions on the tab to change the appearance of the block as desired. Click the **Help** button for more information about the functions. See [Error! Not a valid result for table.](#) for more information about user defined block symbols.



- 6
- Click the **Block Pins** tab. In the view window, check a preview of the pins currently configured for the block.
 - Use configuration functions on the tab to change the pin configuration for the block as desired. Click the **Help** button for more information about the functions.

LOGIC:AND Block, ANDA - Parameters [Project]

Monitoring Parameters | Block Preferences | Template Defining

Main | Identification | Dependencies | **Block Pins** | Configuration Parameters

Parameters

IN
IN[1]
IN[2]
OUT

Pin Position:
☐ Output ☒ Input
☒ Left/Right ☐ Top/Bottom

Array Indices:

Add ---->

Selected Parameters

	Parameter	Value	Label	Type	Location
1	IN[1]	YES	YES	INPUT	LEFT
2	IN[2]	YES	YES	INPUT	LEFT
3	OUT	YES	YES	OUTPUT	RIGHT

Delete

☐ Show Parameter Names

OK Cancel Help

Control Module Creation

Using the Parameters Configuration Form

- 7
 - Click the **Configuration Parameters** tab. In the view window, check a preview of the parameters currently configured to appear on the block in the **Project** tab.
 - Use configuration functions on the tab to change the parameter configuration for the block as desired. Click the **Help** button for more information about the functions.

LOGIC:AND Block, ANDA - Parameters [Project]

Monitoring Parameters | Block Preferences | Template Defining

Main | Identification | Dependencies | Block Pins | Configuration Parameters

Parameters

INPTINVSTS
ORDERINCM

Array Indices:

Add

Selected Parameters

	Parameter	Value	Label
1	INPTINVSTS[1]	YES	YES

Delete

☐ Show Parameter Names

OK Cancel Help

- 8
 - Click the **Monitoring Parameters** tab. In the view window, check a preview of the parameters currently configured to appear on the block in the **Monitoring** tab.
 - Use configuration functions on the tab to change the parameter configuration for the block as desired. Click the **Help** button for more information about the functions.

LOGIC:AND Block, ANDA - Parameters [Project]

Main | Identification | Dependencies | Block Pins | Configuration Parameters

Monitoring Parameters | Block Preferences | Template Defining

Parameters

IN
INPTINVS
ORDERINCM
OUT

Array Indices:

0
1

Add

Selected Parameters

	Parameter	Value	Label
1	OUT	YES	YES

Delete

☐ Show Parameter Names

OK Cancel Help

- 9 Click other tabs to check configuration details, as applicable.
- 10 Click the **OK** button to close the configuration form and save the changes.

Control Module Creation

Using the Parameters Configuration Form

- 11 This completes the procedure. Repeat the configuration procedure for each function block.

Configuring alarms

Configuration forms for Regulatory Control blocks (such as PID blocks), SCM blocks, Device Control blocks (such as DEVCTL blocks), and various auxiliary blocks (such as DATAACQ blocks) each have an Alarms tab which allows various alarms to be configured. Perform the steps in the table below to configure the Alarms tab for a typical block.

Step	Action
1	Double click on the desired function block. The Parameters Configuration Form for the specific function block is displayed. Alternate Method: Right-click on the function block to show the drop-down menu. Click Configure Module Parameters ... [Block Name] or [DDCF] Block Object to access the Parameter Configuration form.
2	Select the Alarms tab to access the Alarms form. Note that the Alarms tab for a PID block is used in this example. The Alarms tab for other blocks may include the same or different alarms.
3	Make the necessary changes to the Alarms form (see figure below) and click OK. While in each entry field, press the F1 key to view the Help Topic for the field.

REGCTL:PID Block, PIDA - Parameters [Project]

Configuration Parameters		Monitoring Parameters			Block Preferences																																															
Main	Algorithm	SetPoint	Output	Alarms	SCM	Block																																														
Alarms <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Type</th> <th style="width: 10%;">Enable Alarm</th> <th style="width: 15%;">Trip Point</th> <th style="width: 15%;">Priority</th> <th style="width: 35%;">Severity</th> </tr> </thead> <tbody> <tr> <td>OP High</td> <td></td> <td> NaN </td> <td>LOW</td> <td> 0 </td> </tr> <tr> <td>OP Low</td> <td></td> <td> NaN </td> <td>LOW</td> <td> 0 </td> </tr> <tr> <td>Deviation High</td> <td></td> <td> NaN </td> <td>LOW</td> <td> 0 </td> </tr> <tr> <td>Deviation Low</td> <td></td> <td> NaN </td> <td>LOW</td> <td> 0 </td> </tr> <tr> <td>Advisory Deviation</td> <td>☐</td> <td> NaN </td> <td>LOW</td> <td> 0 </td> </tr> <tr> <td>Safety Interlock</td> <td>☒</td> <td></td> <td>LOW</td> <td> 0 </td> </tr> <tr> <td>Bad Control</td> <td></td> <td></td> <td>LOW</td> <td> 0 </td> </tr> </tbody> </table> Deadband <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Deadband Value</td> <td style="width: 10%;"> 1 </td> <td style="width: 20%;">Deadband Time</td> <td style="width: 10%;"> 0 </td> <td style="width: 30%;">Deadband Units</td> <td style="width: 10%;"> ☒ PERCENT ☐ EU </td> </tr> </table>							Type	Enable Alarm	Trip Point	Priority	Severity	OP High		NaN	LOW	0	OP Low		NaN	LOW	0	Deviation High		NaN	LOW	0	Deviation Low		NaN	LOW	0	Advisory Deviation	☐	NaN	LOW	0	Safety Interlock	☒		LOW	0	Bad Control			LOW	0	Deadband Value	1	Deadband Time	0	Deadband Units	☒ PERCENT ☐ EU
Type	Enable Alarm	Trip Point	Priority	Severity																																																
OP High		NaN	LOW	0																																																
OP Low		NaN	LOW	0																																																
Deviation High		NaN	LOW	0																																																
Deviation Low		NaN	LOW	0																																																
Advisory Deviation	☐	NaN	LOW	0																																																
Safety Interlock	☒		LOW	0																																																
Bad Control			LOW	0																																																
Deadband Value	1	Deadband Time	0	Deadband Units	☒ PERCENT ☐ EU																																															

Control Module Creation

Using the Parameters Configuration Form

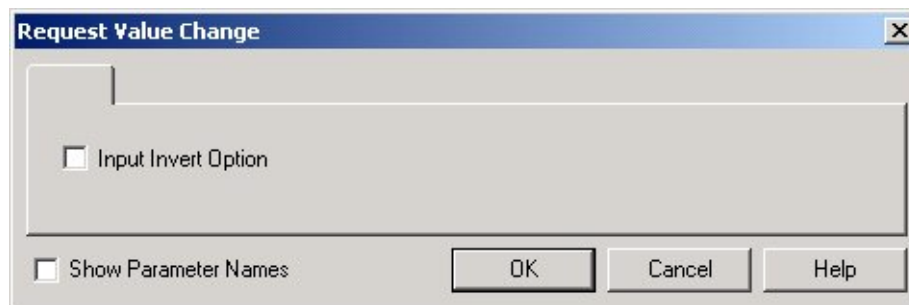
Requesting Value Changes for Configuration Parameters

Perform the following steps to access parameter values directly from function block symbols in a Control Drawing to request a value change.

Step	Action
1	Double-click on the desired parameter on the function block symbol in the Control Drawing to access the Request Value Change dialog box.



- 2 Enter the new parameter value in the Request Value Change dialog by overwriting the existing value.



- 3 Click OK to enter the new parameter value into the database.

Note:

These changes are not committed to the database until the chart is saved.

Setting System Preferences

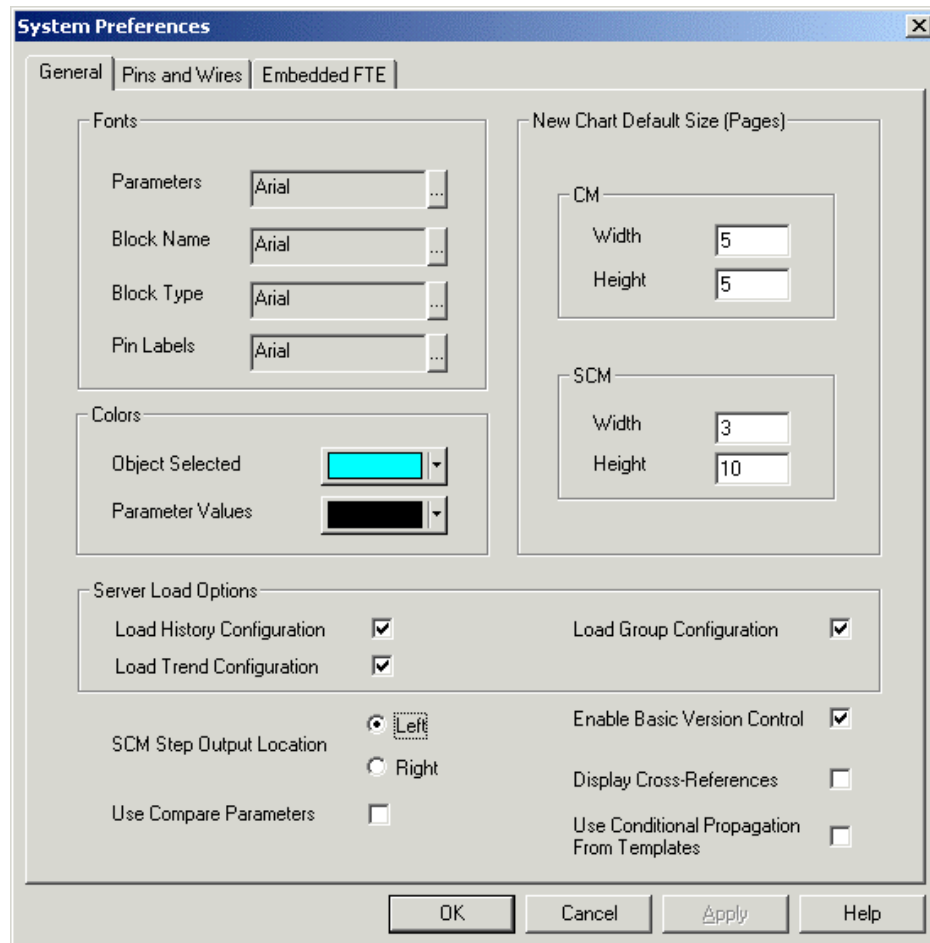
Use the following procedure to customize the look of your Control Drawing and enable or disable selected system functions by using the System Preferences dialog.



ATTENTION

- User preferences are stored in the registry and are intended for use by the current user.
 - System preferences are stored in the database and are intended for use by the entire system.
-

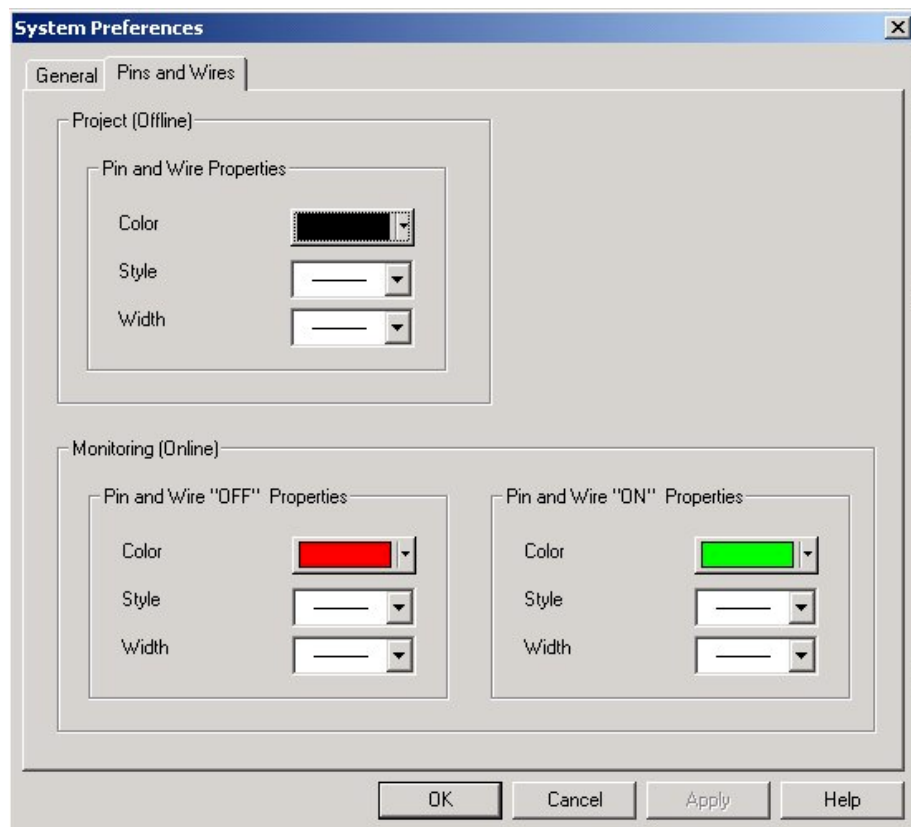
Step	Action
1	Click View -> System Preferences to call up the System Preferences dialog.



- 2 On the General Tab, click the Ellipsis button  to right of the Parameters entry field to call up the Font dialog box.
- 3 Select the desired font typeface, style, size and effects to be used for parameter data in Control Builder. Click OK to close the Font dialog.
- 4 Repeat Steps 2 and 3 to make desired Font selections for the Block Name, Block Type, and Pin Labels data in Control Builder.

- 5 Click the down arrow  to the right of the Object Selected entry field to open the color palette. Click the desired color or click Other to create a custom color.
- 6 Click the down arrow  to the right of the Parameter Values entry field to open the color palette. Click the desired color or click Other to create a custom color.
- 7 Double-click the value in the CM Width entry field and key in the desired value.
- 8 Repeat Step 7 for the CM Height , SCM Width, and SCM Height entry fields to change the values, if desired.
- 9 Click the check box for the Load History Configuration function. A **check** in the check box means the function is **enabled** and the configuration data on a block's Server History tab will be loaded to the Server when the block is loaded to the execution environment. A **blank** check box means the function is **disabled** and the configuration data on a block's Server History tab will not be loaded to the Server.
- 10 Click the check box for the Load Trend Configuration function. A **check** in the check box means the function is **enabled** and the Trend configuration data on a block's Server Display tab will be loaded to the Server when the block is loaded to the execution environment. A **blank** check box means the function is **disabled** and the Trend configuration data on a block's Server Display tab will not be loaded to the Server.
- 11 Click the check box for the Load Group Configuration function. A **check** in the check box means the function is **enabled** and the Group configuration data on a block's Server Display tab will be loaded to the Server when the block is loaded to the execution environment. A **blank** check box means the function is **disabled** and the Group configuration data on a block's Server Display tab will not be loaded to the Server.
- 12 For the SCM Step Output Location function, click the **Left** radio button to have the Step Output displayed on the left side of the SCM control chart drawing, or the **Right** radio button to have it displayed on the right side of the SCM Control chart drawing.
- 13 Click the check box for the Compare Parameters function. A **check** in the check box means the function is **enabled** and a **blank** check box means the function is **disabled**.
- 14 Click the check box for the Enable Basic Version Control function. A **check** in the check box means the function is **enabled** and a **blank** check box means the function is **disabled**.

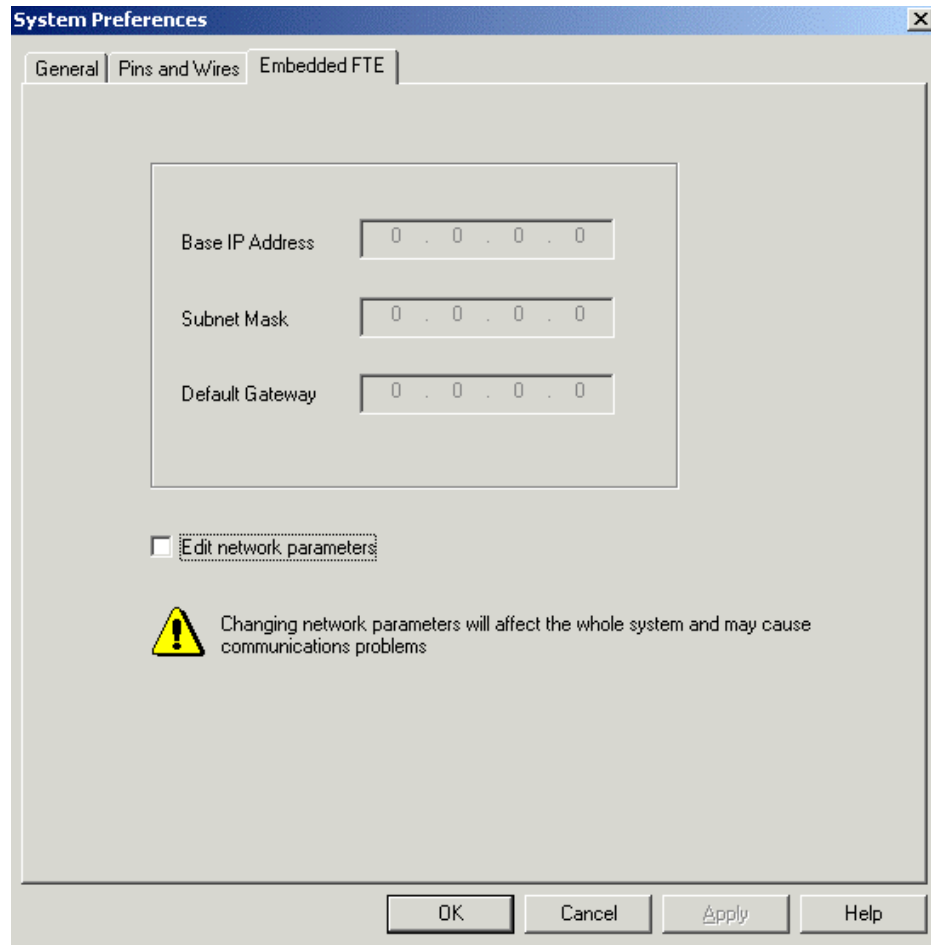
- 15 Click the check box for the Display Cross-References function. A **check** in the check box means the function is **enabled** and a **blank** check box means the function is **disabled**.
- 16 Click the check box for the Use Conditional Propagation From Templates function. A **check** in the check box means the function is **enabled** and a **blank** check box means the function is **disabled**. When this function is enabled, changes to default parameters are propagated to sub-templates and instances. Default parameters are those parameters associated with a template that are not declared to be template-defining.
- 17 Click the Pins and Wires tab to access it:



- 18 In Pin and Wire Properties category, click the down arrow  to the right of

the Color entry field to open the color palette. Click the desired color or click Other to create a custom color.

- 19** In Pin and Wire Properties category, click the down arrow  to the right of the Style entry field to open the line style menu. Click the desired line style.
- 20** In Pin and Wire Properties category, click the down arrow  to the right of the Width entry field to open the line width menu. Click the desired line width.
- 21** Repeat Step 17 to 19 in the Pin and Wire "OFF" Properties and Pin and Wire "ON" Properties categories to select the desired Color and line Style and Width.
- 22** Click the Embedded FTE tab to access it.
- 23** See the [Setting up addresses](#) section in the Fault Tolerant Ethernet Bridge Implementation Guide for configuration details.



- 24** Click the OK button to accept the changes and return to Control Builder.

Setting User Preferences

Perform the following steps to customize the look of your Control Drawing by using the User Preferences dialog.



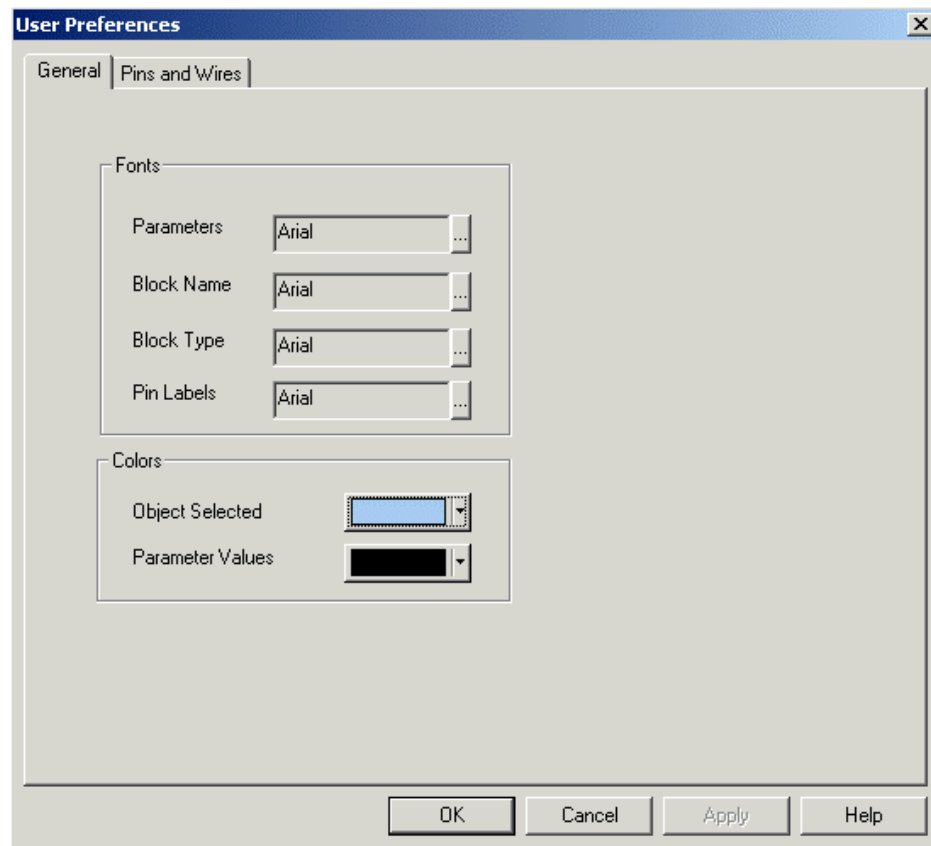
ATTENTION

- User preferences are stored in the registry and are intended for use by the current user.
- System preferences are stored in the database and are intended for use by the entire system.

Step	Action
1	Click View -> User Preferences to open the User Preferences dialog.

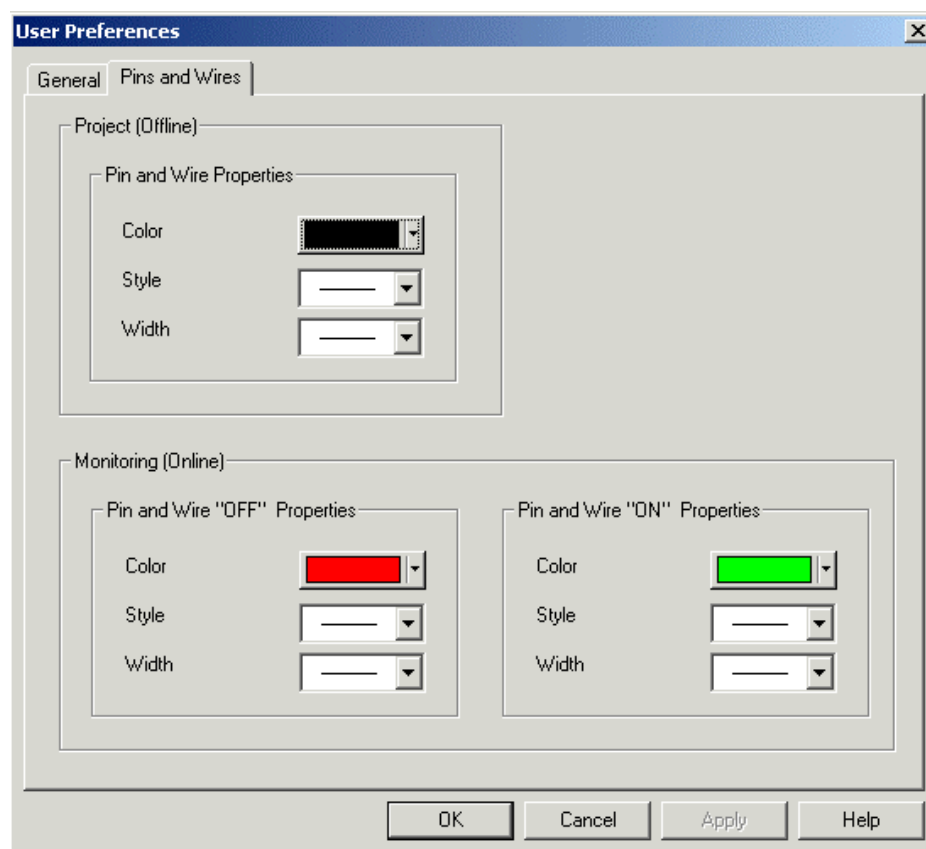
Step

Action



- 2** On the General Tab, click the Ellipsis button  to right of the Parameters entry field to call up the Font dialog box.
- 3** Select the desired font typeface, style, size and effects to be used for parameter data in Control Builder. Click OK to close the Font dialog.
- 4** Repeat Steps 2 and 3 to make desired Font selections for the Block Name, Block Type, and Pin Labels data in Control Builder.
- 5** Click the down arrow  to the right of the Object Selected entry field to open the color palette. Click the desired color or click Other to create a custom color.

Step	Action
6	Click the down arrow  to the right of the Parameter Values entry field to open the color palette. Click the desired color or click Other to create a custom color.
7	Click the Pins and Wires tab to access it:



- 8 In Pin and Wire Properties category, click the down arrow  to the right of the Color entry field to open the color palette. Click the desired color or click Other to create a custom color.

Control Module Creation

Setting User Preferences

Step	Action
9	In Pin and Wire Properties category, click the down arrow  to the right of the Style entry field to open the line style menu. Click the desired line style.
10	In Pin and Wire Properties category, click the down arrow  to the right of the Width entry field to open the line width menu. Click the desired line width.
11	Repeat Step 8 to 10 in the Pin and Wire "OFF" Properties and Pin and Wire "ON" Properties categories to select the desired Color and line Style and Width.
12	Click OK to accept the changes and return to Control Builder.

Connecting and Disconnecting Blocks

Connecting Blocks with Insert Wire

A control strategy is created by connecting function blocks to one another.

The following table describes how to connect function blocks using the Insert Wire option.

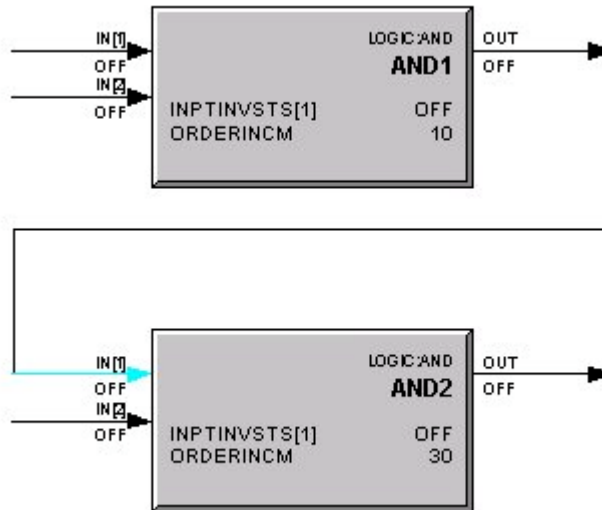
Step	Action
1	Click Insert -> Wire and select the desired pin. Alternate methods: - Click on the Wire toolbar button . - Double-click on the desired pin. The cursor changes to a cross-hair.
2	Continue clicking along the desired wire route. Each click completes the path to that point. However, you can click once on the destination block pin, and let Control Builder route the wire automatically for you.



Control Module Creation

Connecting and Disconnecting Blocks

Step	Action
3	Click on the final connection point. In the example below, five mouse clicks were made.



The pins are connected with a solid wire.



ATTENTION

Wires may automatically resolve to a more direct route when blocks are moved within the Control Module.



REFERENCE

- Press the ESC key to clear all wire entries if the final connection has not yet been made.
- To wire blocks together in a hurry, double-click on the desired parameter pin in the first block so that the cursor changes to a “+”, then click the desired parameter pin on the destination block so that a wire appears.

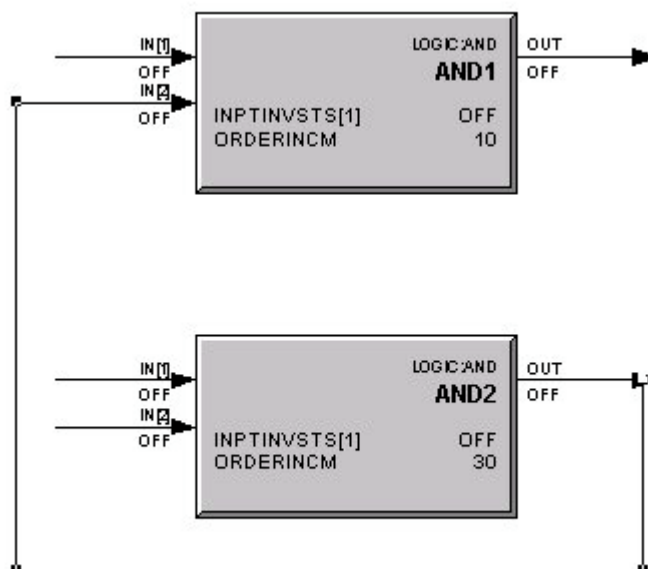
Disconnecting blocks

Step	Action	Result
1	Click on the wire to be deleted.	Connecting wire is selected.
2	Click Edit -> Delete, or press the Delete key.	The wire disappears, the connection is broken.

Repositioning connecting wires using drag and drop

Follow the steps in the table below to reposition an existing wire.

Step	Action	Result
1	Click on the wire to be repositioned.	

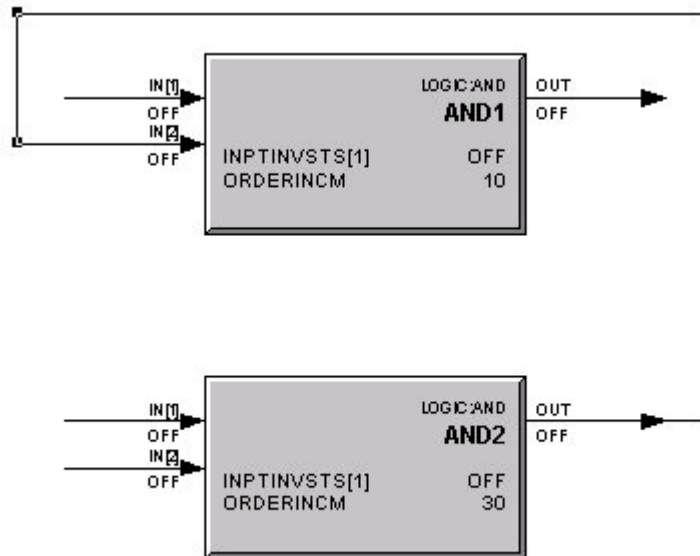


Connecting wire between AND1.OUT and AND2.IN[2] is selected.

Control Module Creation

Connecting and Disconnecting Blocks

- 2 Drag the desired vertices to the new position and release. The wire snaps to the new position.



The lower-left corner wire vertex has been positioned above the Block Symbols in the upper-right corner.



ATTENTION

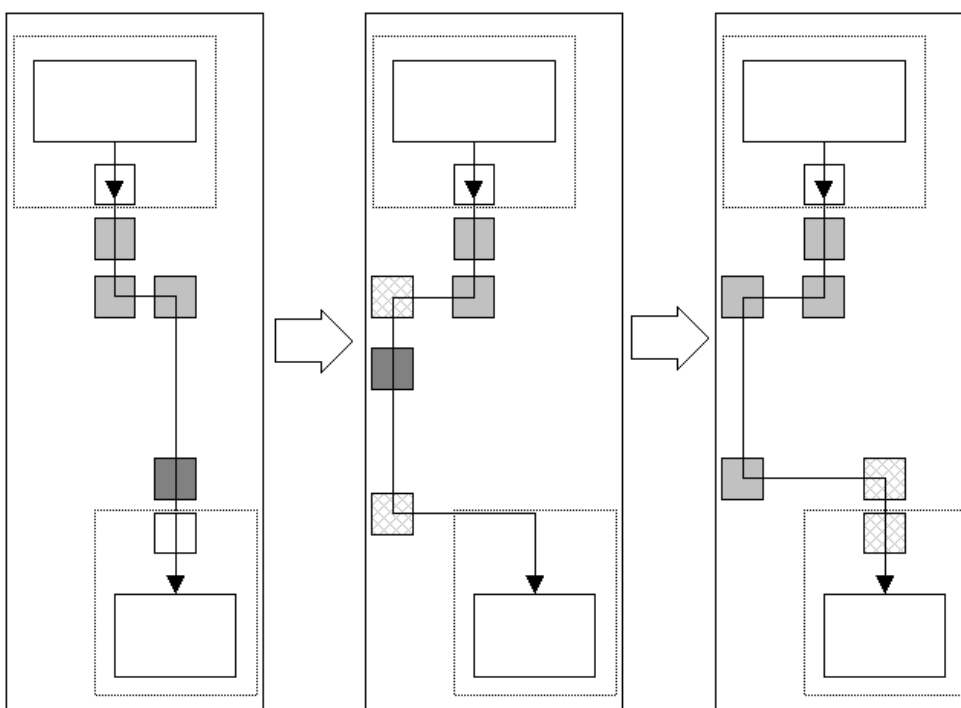
Wires may automatically resolve to a more direct route when blocks are moved within the Control Module.

Repositioning connecting wires using vertices

Step	Action
1	Click once on a vertex, the dark area at the corner of a wire. In the left illustration, this vertex is the dark square.
2	Drag the vertex to a new location. In the middle illustration, the vertex has been moved to the left, creating two new vertices.
3	Release the vertex. The original vertex will resolve itself, leaving the new vertices, as shown in the right illustration.

A maximum of 50 vertices may be present in a wire.

To remove vertices, drag the wire into a straight line and the middle vertices will resolve themselves.



Control Module Creation

Connecting and Disconnecting Blocks

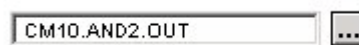
Connecting Blocks with Parameter Connector Option

To connect function blocks within different Control Modules, the Insert Parameter Connector option is used. This option may also be used to connect blocks within the same Control Module, if it is difficult to route a connecting wire.

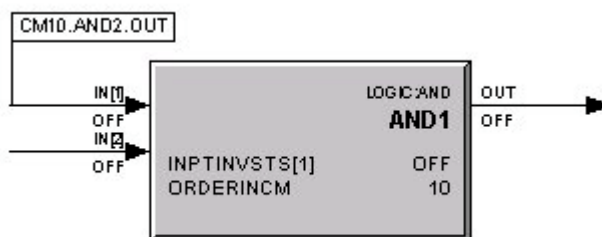
Step	Action	Result
1	Click the Parameter Connector toolbar button  . Alternate method: Click Insert -> Parameter Connector.	The pointer turns into a cross-hair.
2	Click on the desired input block pin.	
3	Double-click outside the block at the required Parameter Connector location.	Parameter Connector appears. Tip: Clicking in different places outside the block symbol results in the Parameter Connector being placed in different locations. Try single-clicking to establish a path to a desired location before double-clicking. Press the ESC key to cancel the operation and start over if desired.

- 4 Type in the full name of the desired block connection, including Control Module.Block Name(Tag).Parameter and press the <Enter> key.

Alternate method: Click on the button with the dot leader icon (three dots) to access the Point Selection dialog. Use this dialog to find the desired point name and parameter and then click on the button titled Select to insert the specified parameter into the parameter connection field. Then click the Close button on the top right-hand corner of the Point Selection dialog to close the dialog and return to the control drawing.



In this example, the OUT parameter of the block AND2 on Control Module 10 is entered.



This example illustrates a completed parameter connection.



ATTENTION

- The full Control Module.Block Name(Tag).Parameter name must be entered, even if the two blocks to be connected are in the same Control Module.
 - If an invalid parameter is entered, you will be prompted by a pop-up dialog.
 - Refer to [Creating a Substitute Name List](#) for information on creating a substitute name which can be used when connecting blocks using the parameter connector option.
-

Control Module Creation

Connecting and Disconnecting Blocks

Cross References Function

Cross-References are used to visually identify the source of a Parameter Connector in Control Builder. It will appear as a box alongside the Block with the Block name and full pin name.

Cross References are dynamically created as a by-product of:

- a Parameter Connector
- an Expression in an SCM Block or a CM's Auxiliary Block
- an Assigned Input or Output Block

Input Cross References will have a ">" or "#" symbol before the full pin name. Output Cross References, as illustrated in the "enabled" figure below, will have a ">" or "#" symbol after the full pin name. "#" is used for Expressions. "<" is used in all other cases.

Control Module Creation

Connecting and Disconnecting Blocks

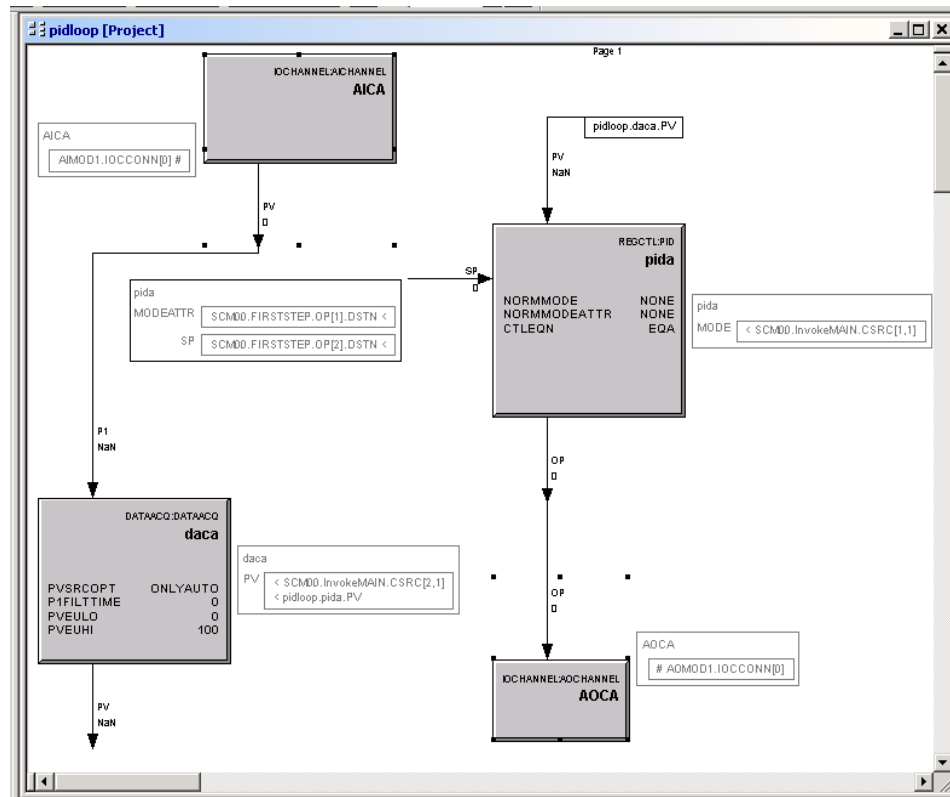


Figure 10 Parameter Connector with Cross-References enabled

Enabling Cross-References

Step	Action
1	Start Control Builder. Click View -> System Preferences to open the dialog.

The screenshot shows the 'System Preferences' dialog box with the 'General' tab selected. The 'Pins and Wires' sub-tab is also visible. The 'Fonts' section has four text boxes, all set to 'Arial'. The 'Colors' section has two color pickers: 'Object Selected' (cyan) and 'Parameter Values' (black). The 'New Chart Default Size (Pages)' section has two sub-sections: 'CM' with 'Width' and 'Height' both set to 8, and 'SCM' with 'Width' set to 8 and 'Height' set to 15. The 'Server Load Options' section has four checkboxes: 'Load History Configuration' (checked), 'Load Trend Configuration' (checked), 'Load Group Configuration' (checked), and 'Display Cross-References' (checked). The 'SCM Step Output Location' section has two radio buttons: 'Left' (selected) and 'Right'. The 'Use Compare Parameters' checkbox is unchecked. The 'Use Conditional Propagation From Templates' checkbox is unchecked. At the bottom are buttons for 'OK', 'Cancel', 'Apply', and 'Help'.

2	On the General tab, verify the Display Cross-References check box is checked or enabled. Click the check box, if it is blank or disabled.
3	Click OK to close the System Preferences dialog.

Printing Cross-References

Cross-References will appear in hardcopy charts printed from either Project or Monitor mode.

Using the Point Selection Tool

Perform the following steps to use the Point Selection tool to find a desired point name and parameter when referencing a particular parameter expression.

Step	Action	Result
1	Click Tools -> Point Selection to access the Point Selection dialog. Alternate methods: - Click the Point Selection toolbar button . - Click on the Ellipsis button  associated with a Parameter Connection or Peer-to-Peer Connection. - Select the Points button  on an Expression tab, such as those associated with AUXCALC, REGCALC, STEP and TRANSITION blocks.	Point Selection dialog appears on the screen (see Figure 9).

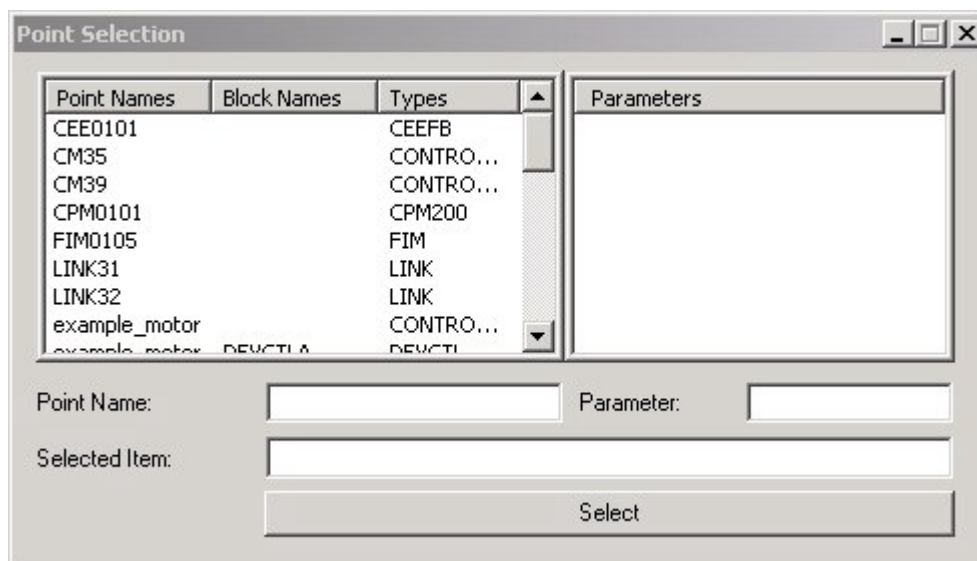


Figure 11 Point Selection dialog

- 2** Select the desired Point Name from the list of Point Names and associated Block Names/Types on the Point Selection dialog. Point Name is highlighted in the list and a list of related parameters appears in the right-hand listbox on the Point Selection dialog.
- Tip:
- Click the appropriate column heading (Point Name, Block Name, or Block Type) to sort the column's list in alphabetical order.
 - Click the column heading twice to arrange the column's list in reverse alphabetical order.
- Selected Point name appears in the Point Name field and Selected Item field on the lower portion of the Point Selection dialog.

Control Module Creation

Connecting and Disconnecting Blocks

3	Select the desired parameter from the list of parameters in the right-hand listbox on the Point Selection dialog.	Selected parameter is highlighted. Selected parameter appears in the Parameter field and as part of the Point Name in the Selected Item field on the lower portion of the Point Selection dialog.
4	Click the Select button.	Selected point (Point Name plus specified parameter name) appears as a tagname in the corresponding parameter expression. Note: An error expression appears if you attempt to enter a parameter that is not appropriate for the designated parameter expression.
5	Click the Close button on the top right-hand corner of the Point Selection dialog to close the dialog and return to the control drawing.	

Using Peer-to-Peer Communications

Peer-to-peer communications is a function in Control Builder whereby data can be shared among separate tagged blocks irrespective of CEE location. That is, if a connection can legitimately be formed between two blocks within the same CEE, then that connection can be formed between two of the same type of blocks which are in separate CEEs.

Perform the following procedure to establish peer-to-peer communications:

Step	Action	Result
1	Designate (determine) the definition (def) block in the subscribing CEE. - The definition block defines the parameter value which would be useful for the reference block to acquire or possibly modify. - Refer to the <i>Experion PKS Control Builder Components Theory, Peer-to-Peer Functionality, Basic Peer-to-Peer Design Concepts and Implications for Control Builder Configuration</i> for rules and tips for configuring the def block.	
2	Designate (determine) the reference (ref) block in the subscriber CEE. - The reference block receives parameter data from the definition block so long as the data type of the reference parameter matches the data type of the definition parameter. - Refer to the <i>Experion PKS Control Builder Components Theory, Peer-to-Peer Functionality Basic Peer-to-Peer Design Concepts and Implications for Control Builder Configuration</i> for rules and tips for configuring the ref block.	
3	Right-click on the subscribing CPM's icon symbol in the Project tab, then click Configure Module Parameters. Set the update rate for the subscribing CEE to a desired value. Click OK to close the configuration form. The update rate is the rate at which the publishing CEE publishes its data to its subscriber. The update rate is set for the whole of the CEE and hence all references are published at that rate. Refer to the <i>Experion PKS Control Builder Components Theory, Peer-to-Peer Functionality, Basic Peer-to-Peer Design Concepts and Implications for Control Builder Configuration</i> for the maximum number of parameter references allowed for each update rate.	
4	Click on Insert -> Parameter Connector. The chart containing the reference block must have the focus. The pointer turns into a cross-hair.	
5	Click on the desired input pin on the reference block.	

Control Module Creation

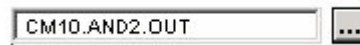
Connecting and Disconnecting Blocks

- 6 Double-click at the required Parameter Connector location in the same CM.

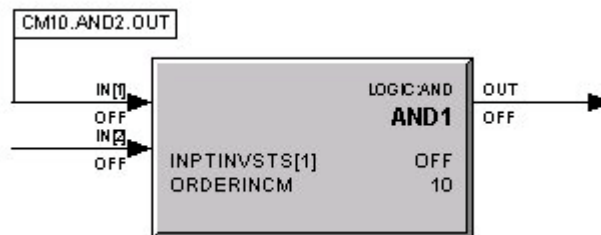
Tip: Clicking in different places outside the block symbol results in the Parameter Connector being placed in different locations. Try single-clicking to establish a path to a desired location before double-clicking. Press the ESC key to cancel the operation and start over if desired.

- 7 Type in the full name of the desired definition block parameter, including Control Module.Block Name(Tag).Parameter and press the <Enter> key.

Alternate method: Click on the button with the dot leader icon (three dots) to access the Point Selection dialog. Use this dialog to find the desired point name and parameter and then click on the button titled Select to insert the specified parameter into the parameter connection field. Then click the Close button on the top right-hand corner of the Point Selection dialog to close the dialog and return to the control drawing.



In this example, the OUT parameter of the block AND2 on Control Module 10 is entered.



This example illustrates a completed parameter connection.



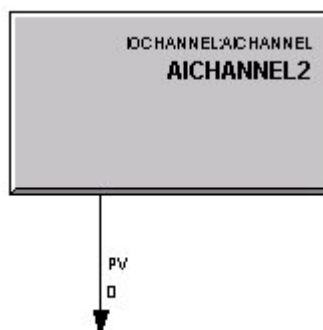
ATTENTION

- This example uses a “named” connector which is a parameter connector configured as an input to a reference block. A “named” connector could also be a named parameter within an expression (such as an SCM Step output).
- If an invalid parameter is entered, you will be prompted by a pop-up dialog.

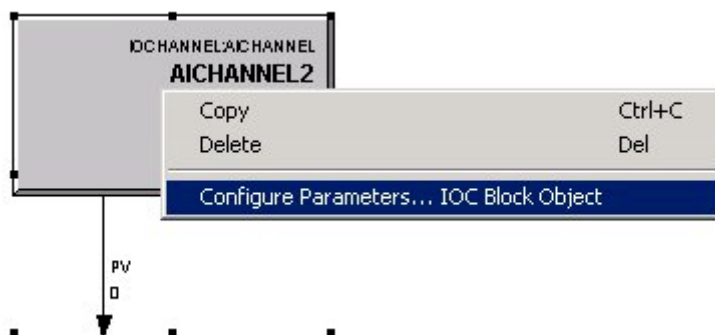
Associating I/O Channels to I/O Modules (IOMs)

Follow the steps in the table below to associate chassis I/O channels (IOC) to I/O Modules. Each I/O that you have identified must be associated with an appropriate analog I/O block or digital I/O block. This association gives the physical I/O a logical connection to the control strategy.

Step	Action
1	Right-click on the desired IO Channel block.



- 2 Click on Configure Module Parameters ... IOC Block Object.



or, double-click on the desired IO Channel block.

Control Module Creation

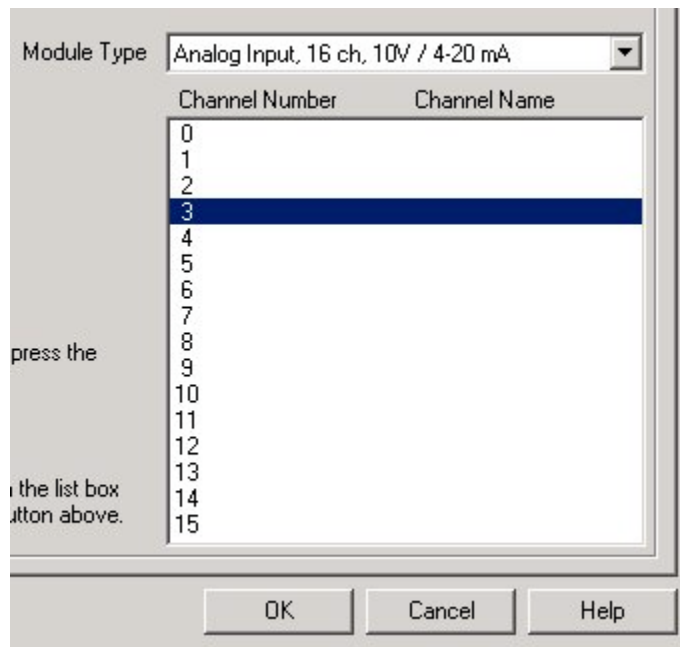
Associating I/O Channels to I/O Modules (IOMs)

Step	Action
3	On the Parameters Configuration form (Main tab), click on the Module Name drop-down box and select the I/O Module to which this I/O channel block is to be associated.

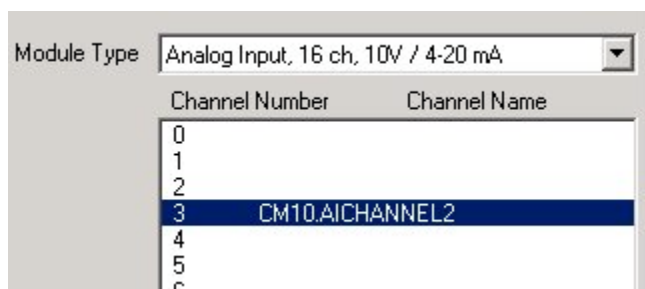
The screenshot shows a software interface for configuring an I/O channel block. The title bar reads 'IOCHANNEL:AICHANNEL Block, AICHANNEL2 - Parameters [Pro]'. There are four tabs: 'Main', 'Block Pins', 'Configuration Parameters', and 'Monitoring Parameters'. The 'Main' tab is active. The 'Channel Block Configuration' section contains a 'Channel Name' field with the value 'AICHANNEL2'. The 'Channel Block to IO Module Assignment' section contains a 'Module Name' dropdown menu with 'IOM573' selected, and a 'Module Type' field.

In the above example, AICHANNEL2 will be associated with IOM573.

Step	Action
4	Click on the channel number within this I/O module that is to contain this I/O channel block.



- 5** Click on the Assign Channel Block button.
- The I/O channel block has been assigned to channel number 3 in the I/O module.



Control Module Creation

Associating I/O Channels to I/O Modules (IOMs)



REFERENCE

To Unassign an I/O channel block, click on the I/O channel block on the Channel Parameter Configuration form in the Channel Block to IO Module Assignment portion of the window and click on the Unassign Channel Block button.

Inserting OLE Objects into Charts

Object linking and embedding (OLE) is a feature supported by Control Builder which enables you to transfer and share information between a third-party Windows-based application and a control chart. Typically, you might want to insert a Microsoft Word (or Wordpad/Notepad/Clipart) file to add an annotation to a chart. Various file formats are available depending on what third-party applications are installed on your computer. Refer to the following procedures and the separate third-party application documentation for complete instructions.

Linking an OLE Object into a Chart

Perform the following steps to link an OLE object into a chart.

Step	Action	Result
1	With the chart open on the screen, move the insertion point to the place where you want the object inserted.	
2	Click Insert -> OLE Object.	An Insert Object dialog box appears on the screen (see Figure 10).
3	Select either the Create New or Create from File radio button as appropriate: - Select Create New to create a new file. - Select Create from File to use an existing file and specify the proper pathname in the File entry field. If necessary, click on the Browse button to help locate the desired file.	
4	Check the Link checkbox to indicate this is a linked file.	

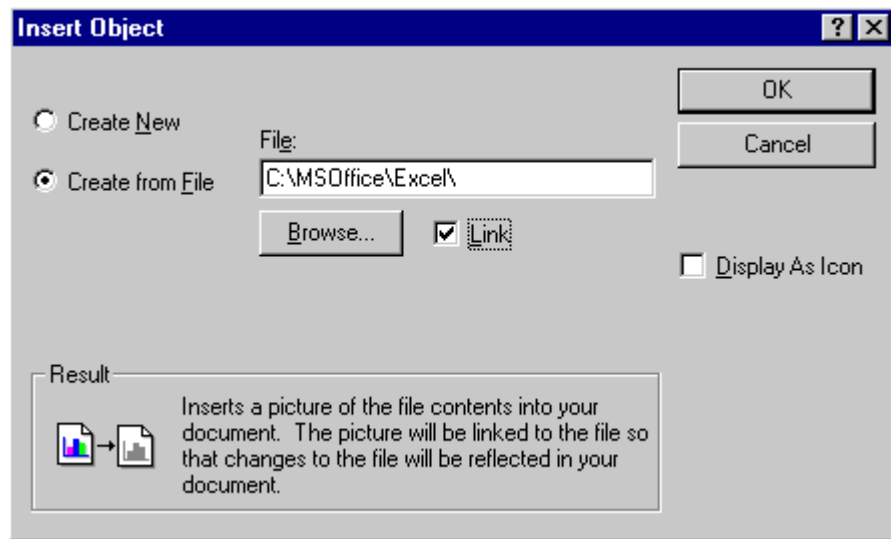


Figure 12 Insert Object dialog (for Linking an OLE Object into a Chart)

- 5** Click OK in the Insert Object dialog box. Linked file icon appears in the upper left-hand corner of the chart..
- 6** Select the file icon and drag it to a desired location in the chart.

Editing a Linked File in a Chart

Perform the following steps to edit a linked file in a chart.



ATTENTION

When you link an object, you are not making a copy of the information, you are creating a reference, or link, to the document that contains the information (source document). When you edit a linked object, you are actually editing the information in the source document. The destination document (that is, the chart) only contains a link to where the object exists in the source document.

Step	Action	Result
1	Double-click on the icon that represents the linked file.	The linked file opens in the corresponding application.
2	Make any desired changes to the file using the separate third-party application.	
3	Save the changes and close the third-party application.	The edited file is placed on the chart.

Embedding an OLE Object into a Chart

Perform the following steps to embed an OLE object into a chart.

Step	Action	Result
1	With the chart open on the screen, move the insertion point to the place where you want the object inserted.	
2	Click Insert -> OLE Object.	An Insert Object dialog box appears on the screen (see Figure 11).

- 3** Select either the Create New or Create from File radio button as appropriate:
- Select Create New to create a new file.
 - Select Create from File to use an existing file and specify the proper pathname in the File entry field. If necessary, click on the Browse button to help locate the desired file.
- All applications on your computer that support object linking and embedding are listed.

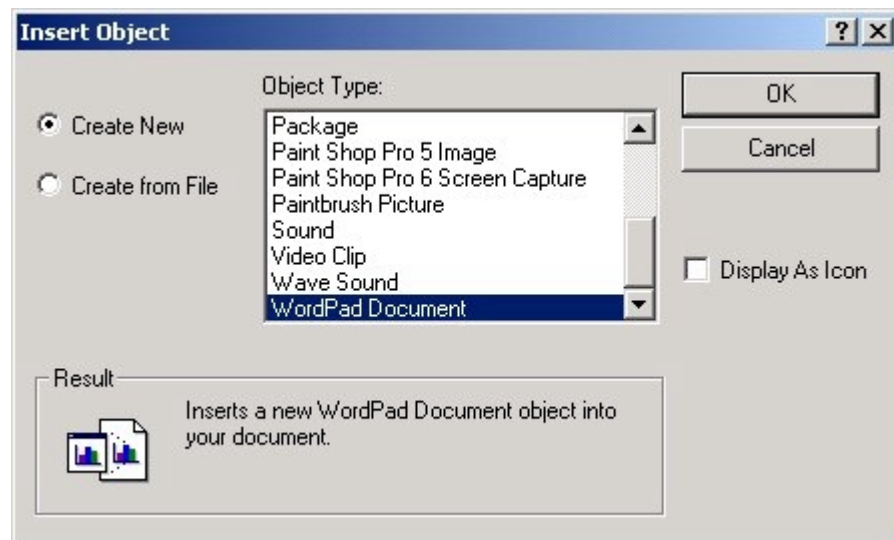


Figure 13 Insert Object dialog (for Embedding an OLE Object into a Chart)

- 4** Select the desired third-party application from the list of applications and click OK. The desired application opens.
- 5** Use the selected application to create the object to be embedded in the chart. Desired object is embedded in the chart.

Editing an Embedded File in a Chart

Perform the following steps to edit an embedded file in a chart.



ATTENTION

When you embed an object, you make a copy of the object in the source document and transfer this copy to the destination document (that is, the chart). You no longer have any connection to the document from which you transferred the information. When you edit an embedded object, the source document is not affected. For example, suppose you embed a drawing into a chart. If you change the embedded drawing from inside the chart, the drawing in the source document is not affected.

Step	Action	Result
1	Double-click on the object in the chart.	The appropriate application opens on the screen.
2	Make the desired edits using the corresponding third-party application.	Desired edits are made.
3	Save the edited object and close the third-party application to return to the Control Builder chart.	

Deleting an OLE Object from a Chart

Perform the following steps to delete an OLE object from a chart.

Step	Action	Result
1	Select the object.	Object is selected on the chart.
2	Either select Edit -> Delete or click the <Delete> key.	Object is deleted from the chart.

Using Server Scripting in Control Builder

Server Scripting overview

The Server Scripting feature allows scripts to be attached to various objects within the Experion PKS system, including points and parameters. These scripts are run whenever certain trigger events occur, such as a parameter change or a point entering or leaving an alarm state.

To create or write a script in Control Builder, use the instructions below to access the Script Editor. For more detailed instructions on Server Scripting functions and creating scripts, refer to the *Server Scripting Reference* in Knowledge Builder.

Using Script Editor

Open the CM properties screen and select the Server History tab.

SYSTEM:CONTROLMODULE Block, CM157 - Parameters [Project]

Main | **Server History** | Server Displays | Identification | Dependencies | Template Defining

Access Levels:

Control Level: Control Area:

History Configuration:

Number of History Parameters:

	Parameter	Description	FAST	STD	EXTD	Gating Parameter	Gate State
1			☐	☐	☐		
2			☐	☐	☐		
3			☐	☐	☐		
4			☐	☐	☐		
5			☐	☐	☐		
6			☐	☐	☐		
7			☐	☐	☐		
8			☐	☐	☐		
9			☐	☐	☐		
10			☐	☐	☐		

☐ Show Parameter Names

Figure 14 Server History tab

When the “Create New or Edit Existing Server Scripts” button is selected, Figure 15 will be displayed. The screen allow the editing of all scripts for a particular point, and all scripts for parameters of that point.

Control Module Creation

Using Server Scripting in Control Builder

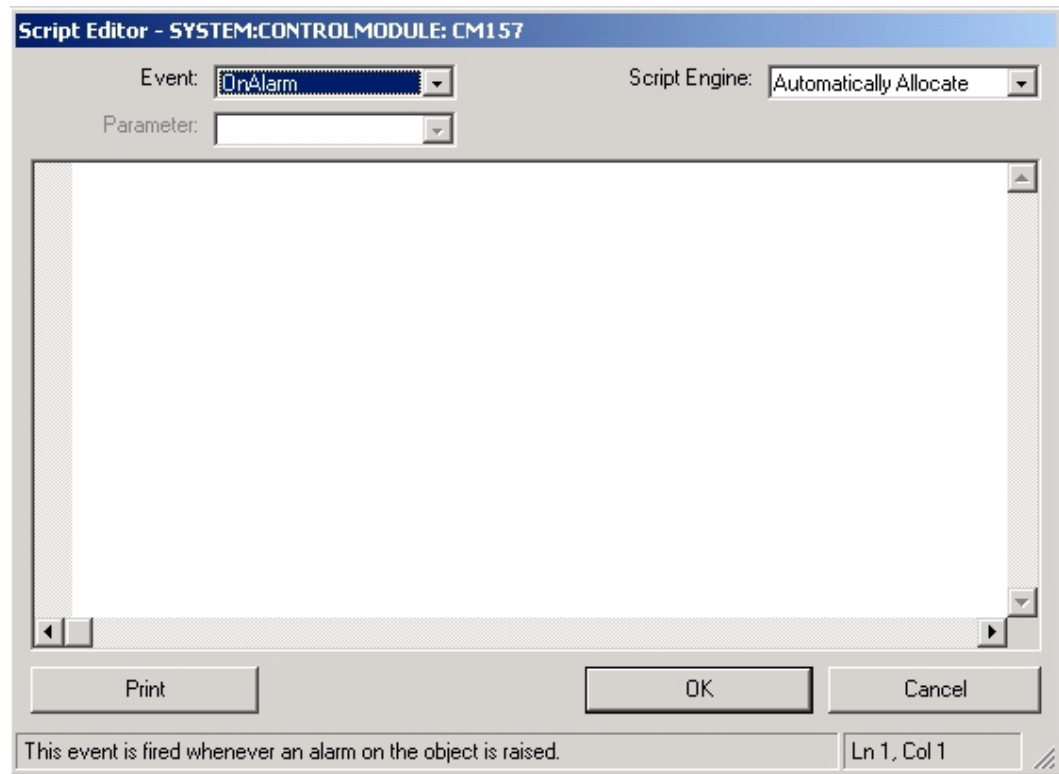


Figure 15 Script Editor for a point

If OnChange or OnOperChange are selected as the Event type, all the parameters of the container block and the basic blocks contained by the container block will be listed in the Parameter combo box, and any parameter can be tied to the script.

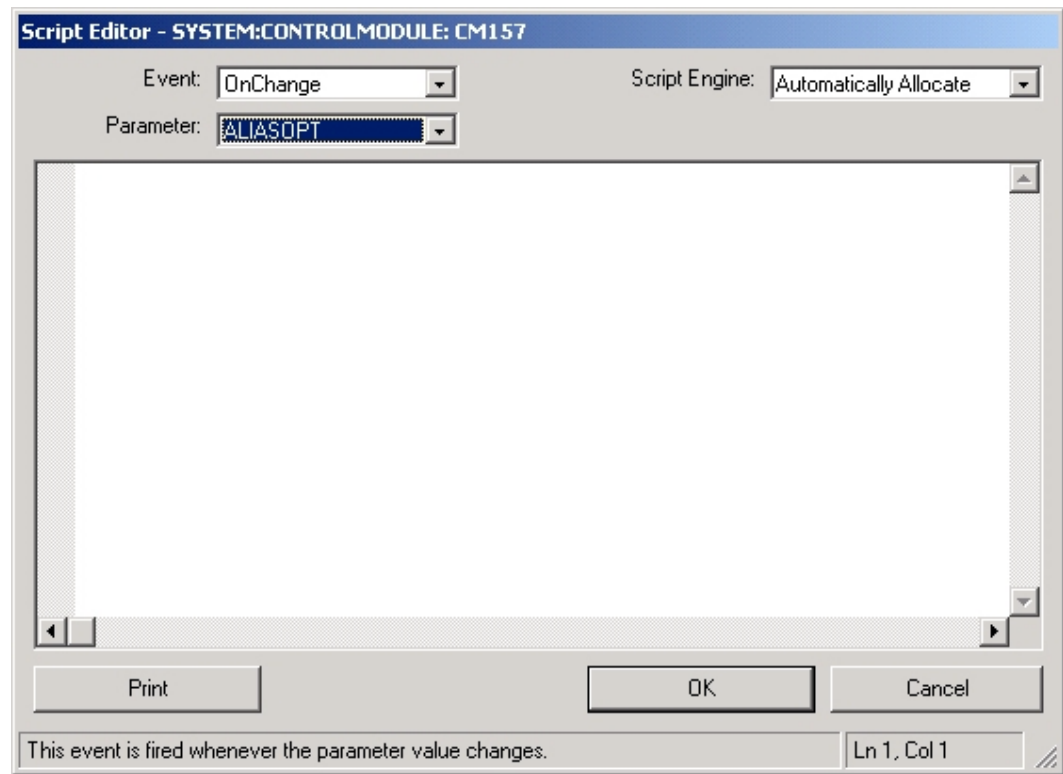


Figure 16 Script Editor for a point parameter

For detailed information on using Server Scripting, refer to the *Server Scripting Reference* in Knowledge Builder.

Printing from Control Builder

Printing Features

Printing and paging supports the graphical printout of CM and SCM charts and includes the following areas:

- A [Page Setup](#) dialog consisting of the following:
 - [Printing Options Dialog](#): Controls for setting page orientation, paper size, paper source, and page margins. Printing Options also includes chart fit options, page ordering options, and an SCM printing option.
 - [Header Setup](#) dialog: A button to invoke a Header Setup dialog containing controls for setting the header background bitmap, header text font, and header text sections.
 - [Footer Setup](#) dialog: A button to invoke a Footer Setup dialog containing controls for setting the footer background bitmap, footer text font, and footer text sections
- Support for printing the entire project tree or monitoring tree with one command
- Support for printing multiple selected unopened charts in the project tree or monitoring tree

Printing Preferences

Printing preferences are stored as GUI preferences in the database. The Control Builder GUI Preferences infrastructure is used to set and get the printing preferences.

Page Breaks

Page breaks are of the single selection variety, meaning that only one page break can be selected at a time and selecting one page break de-selects all other page breaks and all other items in the chart. Page breaks are stored as symbol attributes on the CM block for a CM chart and are stored as symbol attributes on each handler block in an SCM, including the main handler block. Both the edit and monitoring versions of SCM/SCM charts can have distinct pagination – each version has its own set of page breaks. Initially, the monitoring version can then be changed by the user, which does not affect the page breaks in the edit version. Page breaks are read in from the database when a chart is opened and are saved when the chart is saved.

Class CPageBreak defines the attributes and methods of a single page break. Class CPageBreakInfo defines the attributes and methods of an array of page breaks. Each document instance (of class CContainerDoc) contains a member variable of class CPageBreakInfo. Pagination information in CPageBreakInfo is stored as an unsorted array of horizontal and vertical page breaks for the entire document (i.e., for all charts in the document, not just for a handler of an SCM, for instance). When a control drawing is displayed, the page breaks are drawn using this unsorted array. However, when a control drawing is printed, the page breaks in this unsorted array are first sorted into two sorted arrays – an array of horizontal page breaks and an array of vertical page breaks for the current chart (e.g., for the current handler being printed in an SCM). From these two sorted arrays, it is then possible to determine, for a particular page, where the origin (upper left-hand corner) of the page is located and also what the x- and y- extents of the page are.

During printing, the printing function calculates what the minimum document size is for the current chart being printed (i.e., what the smallest bounding rectangle is that contains all items in the chart being printed). This information is used by the printing function to prevent printing empty pages in a chart, where the chart is basically empty except for some content in the upper left-hand corner of it.

Method CContainerView::OnPrint is responsible for printing a page of a chart. It prints the header and footer for the page and also the actual contents of the chart page.

Print Permissions

User Level	Permissions
LVL1 user and above	May change print settings. Setting changes will not be saved.
ENGR user and above	May change print settings. Setting changes may be saved.

Page Setup

The Page Setup dialog box is used to access the Header, Footer, and Options dialog boxes. It is also used to set up the standard printer features such as paper size and source, as well as margins and orientation.

The Page Setup dialog is accessed through File -> Page Setup.

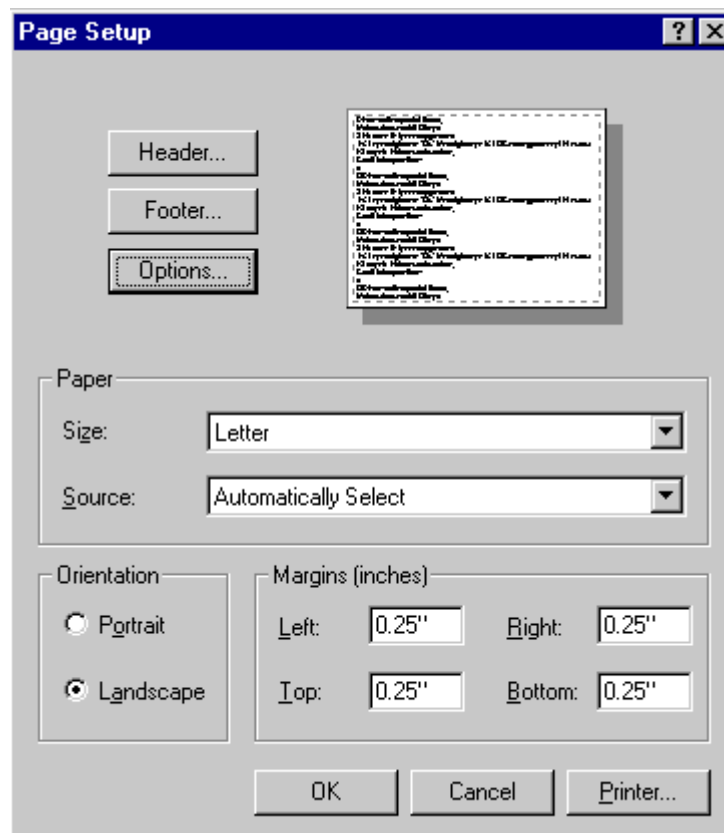


Figure 17 Page Setup dialog Box

Header Setup

The Header Setup dialog is accessed through File -> Page Setup, then selecting the Header... button.

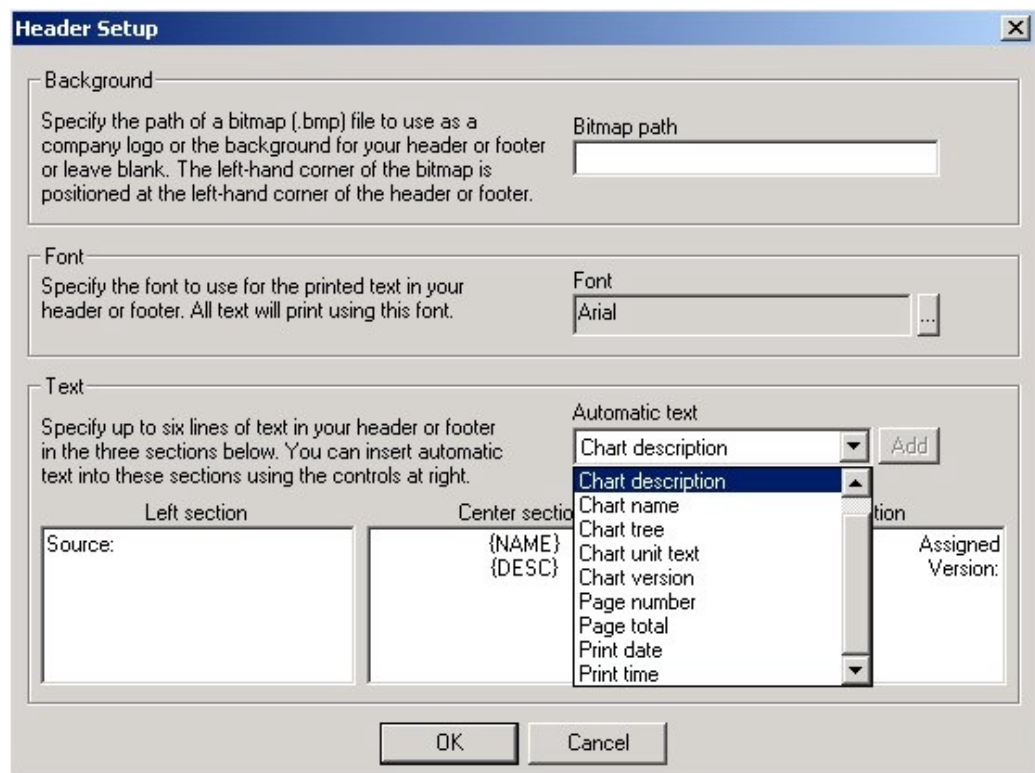


Figure 18 Header Setup dialog box

The Header Setup dialog box allows the user to format the printed documents header appearance.

Setup Feature	Use of..
Background	A background graphic may be inserted in the form of a bitmap (.bmp) file by entering the file pathway. The bitmap will always be positioned on the left of the header.
Font	Font styles may be changed, including font family, style, size and underline. Strikeout and style colors are not allowed. The Font dialog box can be accessed by selecting the button next to the font style name.
Text	All automatic text fields can be inserted into the Left, Center, and Right sections and are expanded at runtime. Up to six lines of text may be entered into each of the sections. Text may be entered directly into the section fields, or the text fields can be inserted using the Automatic text drop-down box. To enter a text field, the cursor must be placed into the section field before the drop-down selection is chosen. If more than six lines of text are entered, they are not saved or printed. Lines of text exceeding 255 characters are also not saved.

Footer Setup

The Footer Setup dialog is accessed through File -> Page Setup, then selecting the Footer... button.

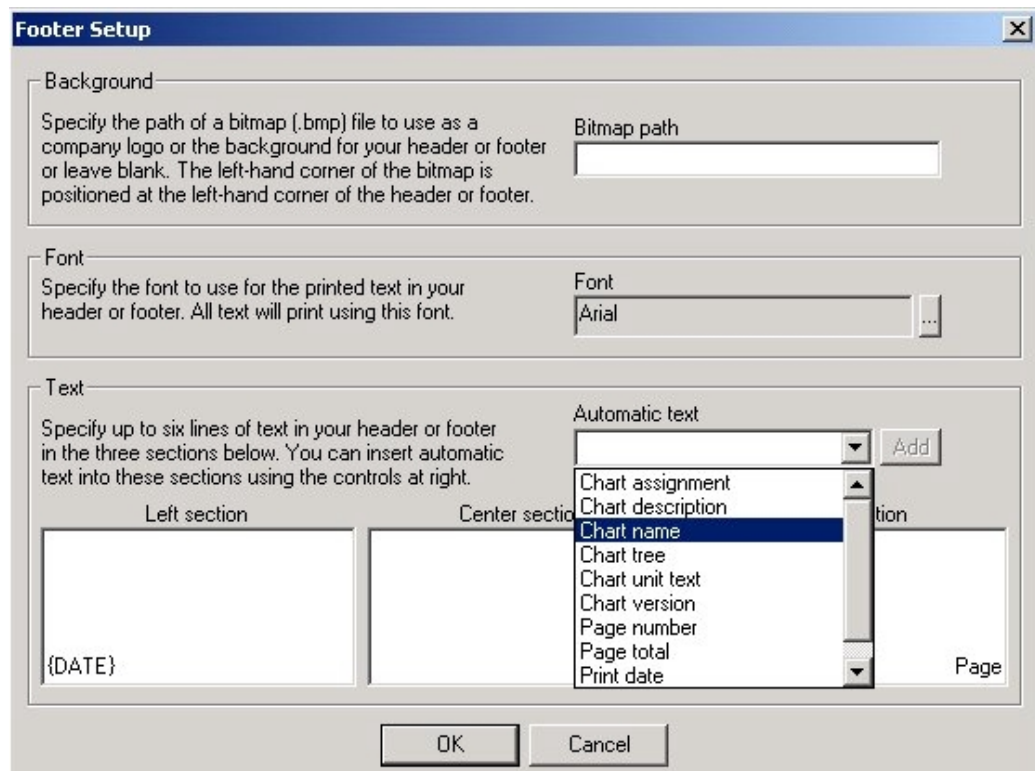


Figure 19 Footer Setup dialog box

The Footer Setup dialog box allows the user to format the printed documents header appearance. The Footer Setup functions and instructions are nearly identical to the Header Setup.

Setup Feature	Use of..
Background	A background graphic may be inserted in the form of a bitmap (.bmp) file by entering the file pathway. The bitmap will always be positioned on the left of the footer.
Font	Font styles may be changed, including font family, style, size and underline. Strikeout and style colors are not allowed. The Font dialog box can be accessed by selecting the button next to the font style name.
Text	All automatic text fields can be inserted into the Left, Center, and Right sections and are expanded at runtime. Up to six lines of text may be entered into each of the sections. Text may be entered directly into the section fields, or the text fields can be inserted using the Automatic text drop-down box. To enter a text field, the cursor must be placed into the section field before the drop-down selection is chosen. If more than six lines of text are entered, they are not saved or printed. Lines of text exceeding 255 characters are also not saved.

Printing Options Dialog

The Printing Options dialog is accessed through File -> Page Setup, then selecting the Options... button.

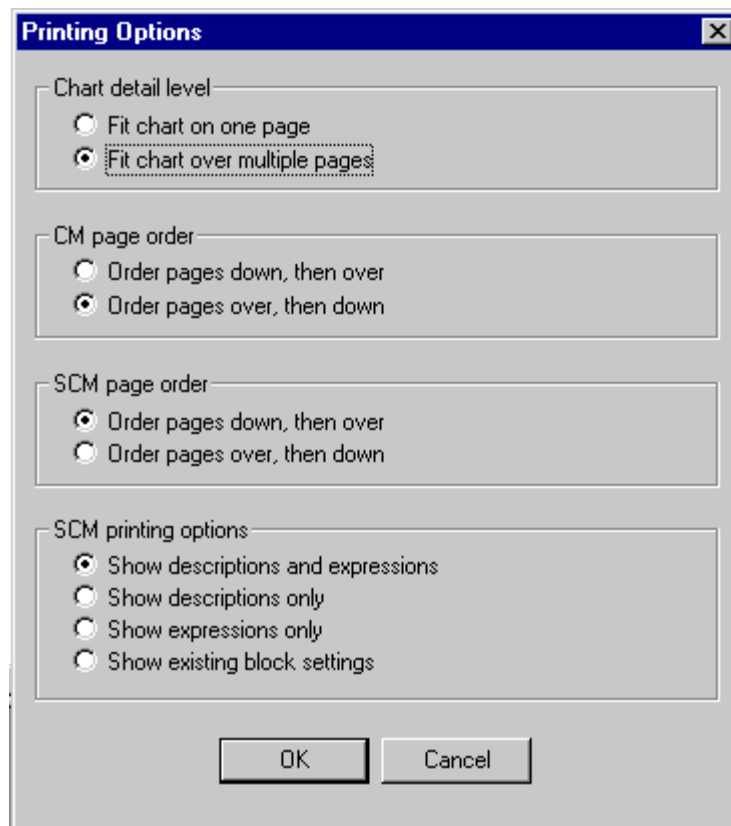


Figure 20 Printing Options dialog box

The Printing Options dialog box allows the following specifications:

Option	Effect
Chart detail level	Chart may be sized to fit on one, or multiple pages. • A chart having no page breaks will print on one page when the chart detail level is set to "Fit chart on one page". • A chart having page breaks will print on one page when the chart detail level is set to "Fit chart on one page". The chart will be sized to fit on the page. • A chart having no page breaks will print over multiple pages when the chart detail level is set to "Fit chart over multiple pages". In this case, default pagination will occur, similar to how pagination occurred before CB Printing Enhancements was introduced. A chart having page breaks will print over multiple pages when the chart detail level is set to "Fit chart over multiple pages".
CM page order	CM page order – Pages may be ordered by prioritizing over or down first. • Pages in a CM chart will be ordered and printed down then over when the CM page order option is set to "Order pages down, then over", respectively. Refer to Printing Charts for detailed information. • Pages in a CM chart will be ordered and printed over then down when the CM page order option is set to "Order pages over, then down", respectively. Refer to Printing Charts for detailed information.
SCM page order	Pages may be ordered by prioritizing over or down first. Refer to Printing Charts for detailed information. • Pages in an SCM chart will be ordered and printed down then over when the SCM page order option is set to "Order pages down, then over", respectively. • Pages in an SCM chart will be ordered and printed over then down when the SCM page order option is set to "Order pages over, then down", respectively.

SCM printing options	Select between showing descriptions and/or expressions or existing block settings. • All steps and transitions in an SCM chart will print with their descriptions and expressions (even when the user has hidden the details box) when the SCM printing option is set to "Show descriptions and expressions". • All steps and transitions in an SCM chart will print with their descriptions only (even when the user has hidden the details box) when the SCM printing option is set to "Show descriptions only". • All steps and transitions in an SCM chart will print with their expressions only (even when the user has hidden the details box) when the SCM printing option is set to "Show expressions only". • All steps and transitions in an SCM chart will print exactly as they are displayed when the SCM printing option is set to "Show existing block settings". Hidden details boxes will not print.

Printing Reports

Step	Action	Result
1	Select File -> Print -> Reports.	Report dialog appears on the screen.
2	Select the report type, and choose from the available IOMs, CMs and SCMs.	
3	Click the appropriate button for the desired operation (such as print, preview, export).	The desired operation executes.
4	Click the Close button to close the Reports dialog	

Printing Control Drawings

File -> Print -> Control Drawings brings up the basic printer dialog box. Any formatting must be done through File -> Page Setup prior to printing.

Printing Charts

Multiple selected up-opened charts can be printed from either the project tree or the monitoring tree using File -> Print -> Charts. Any formatting must be done through File -> Page Setup prior to printing.

Type of Chart to Print	Command
All project tree charts (whether the project tree is open or not)	File -> Print -> All Project Tree Charts.
All monitoring tree charts (whether the monitoring tree is open or not)	File -> Print -> All Monitoring Tree Charts

The CM control drawing pages are defined as follows.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

Figure 21 When CM page order option is "Order pages over, then down"

1	6	11	16	21
2	7	12	17	22
3	8	13	18	23
4	9	14	19	24
5	10	15	20	25

Figure 22 When CM page order option is "Order pages down, then over"

The SCM control drawing pages are set up in a similar manner, except that there are only 3 columns of pages and 10 rows by default.

Step	Action	Result
1	With the desired Control Drawing chart open on the screen, select File -> Print -> Chart. Alternate method: Select <Ctrl><P>.	Print dialog appears on the screen.
2	Make the desired selections (such as, name, print range, number of copies) on the Print dialog and click OK.	

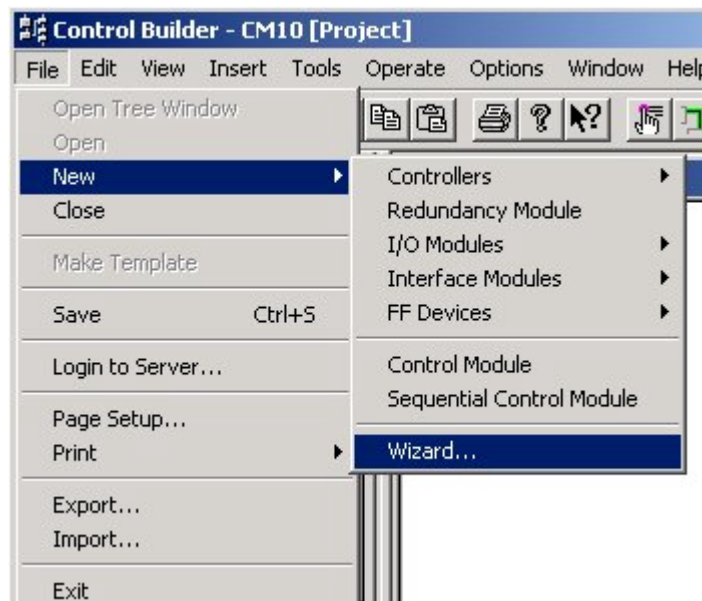
An entire chart must be printed. It is not possible to print only specific areas of a chart.

Using the Regulatory Loop Wizard

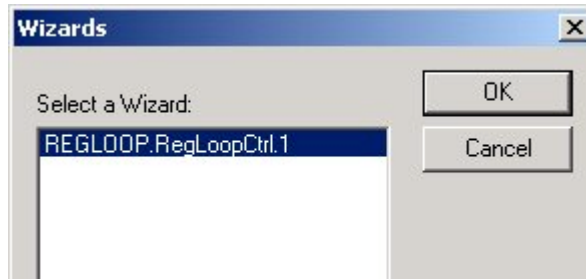
The Regulatory Loop Wizard allows you to quickly build a standard default Regulatory Loop Control Module using Control Builder. The Wizard includes a Suggest Tuning Constants option which provides estimated initial controller tuning values based on basic knowledge of the loop process requirements. This option may be bypassed, if preferred, so that known tuning values may be entered.

Perform the following steps to use the Regulatory Loop Wizard:

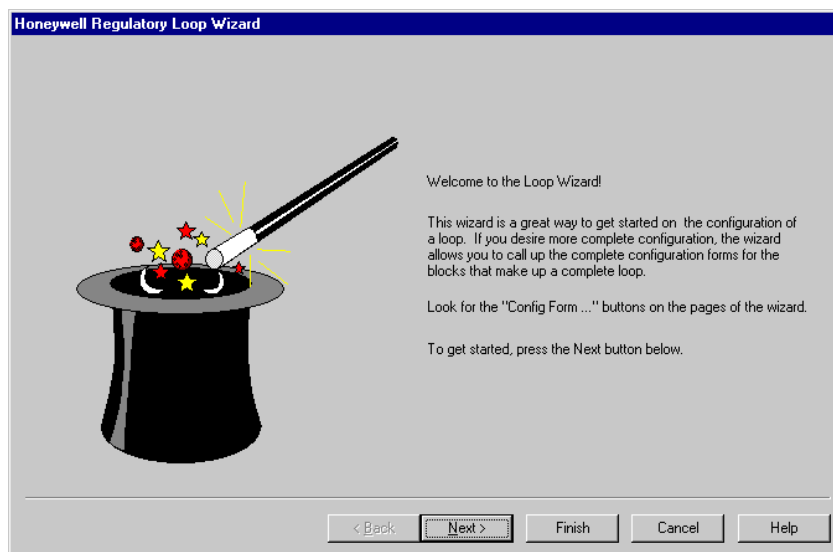
Step	Action
1	Click File -> New -> Wizard...



- 2 Select REGLOOP.RegLoopCtrl.1 from the Wizards selection dialog that appears on the screen and click OK.



- 3 The Regulatory Loop Wizard Welcome page appears on the screen. Read the introductory information and then click Next.



Control Module Creation

Using the Regulatory Loop Wizard

- 4 The Process Profile page appears on the screen. Enter the indicated process information along with the type of loop needed to control the process, then click Next.

The screenshot shows a software window divided into two main sections: "Process Profile" on the left and "Loop Type" on the right. In the "Process Profile" section, there are three input fields: "Process Gain" with the value "1.00", "Time Constant (mins)" with the value "0.03", and "Dead Time (mins)" with the value "0.00". In the "Loop Type" section, there are five radio button options: "Temperature", "Pressure", "Level", "Flow", and "Analytical". The "Flow" option is selected, indicated by a small circle next to it. Below these options is a checked checkbox labeled "Suggest Tuning Constants".

Note:

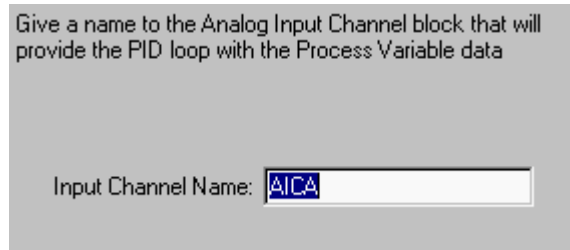
The Suggest Tuning Constants, when selected, provides ballpark estimates for initial controller tuning values based on the data parameters you have already entered in the Process Profile.

- 5 The Control Module Name page appears on the screen. Enter a name and description for the Control Module that will be used to contain the loop's function blocks and control configuration, then click Next.

Note: Select the Config. Form button in this and any subsequent pages if desired to access the Parameters Configuration form for the respective function block and thereby enter more detailed parameter configuration preferences.

The screenshot shows a software window with two input fields. The first field is labeled "Control Module Name:" and contains the text "CM41". The second field is labeled "Description:" and is currently empty.

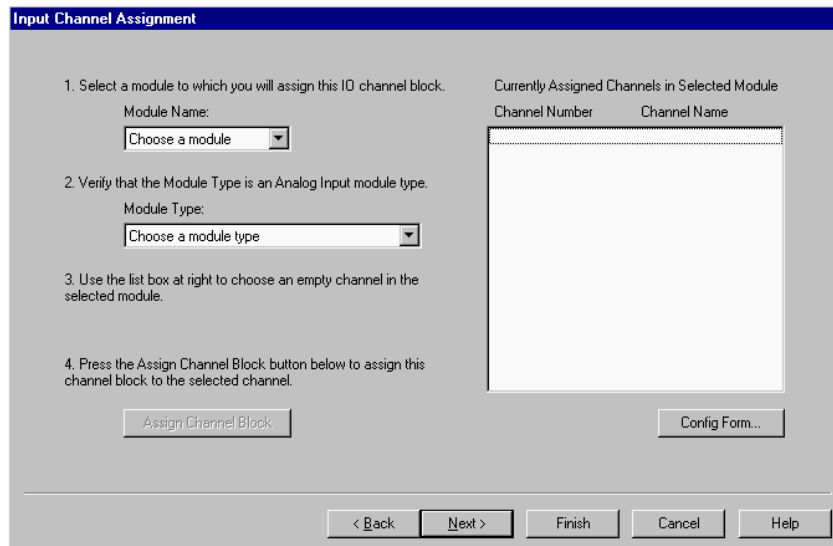
- 6** The Input Channel Name page appears on the screen. Enter a name for the Analog Input Channel block that will provide the regulatory loop with the process variable data, then click Next.



Give a name to the Analog Input Channel block that will provide the PID loop with the Process Variable data

Input Channel Name:

- 7** The Input Channel Assignment page appears on the screen. If necessary, enter the requested information to assign the appropriate Analog Input (AI) Module to the AICHANNEL block that is associated with this regulatory loop. Then click Next.



Input Channel Assignment

1. Select a module to which you will assign this IO channel block.

Module Name:

2. Verify that the Module Type is an Analog Input module type.

Module Type:

3. Use the list box at right to choose an empty channel in the selected module.

4. Press the Assign Channel Block button below to assign this channel block to the selected channel.

Currently Assigned Channels in Selected Module

Channel Number	Channel Name

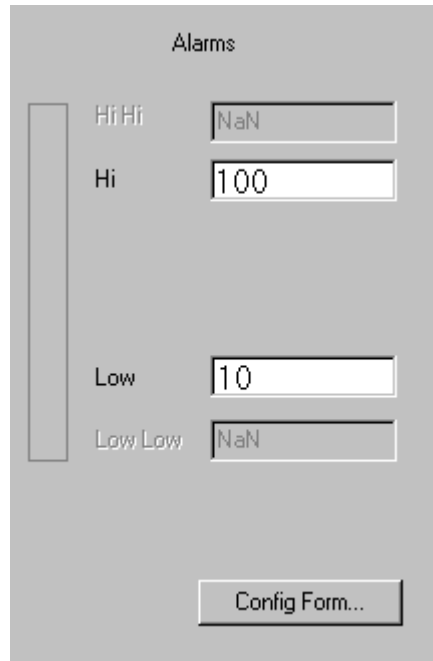
< Back Next > Finish Cancel Help

- 8** The Input Channel Configuration page appears on the screen. If you wish to configure on the Analog Input Module the input channel that was just created, press the Module Configuration button and enter the requested configuration parameters. Then return to the Input Channel Configuration page and click

Control Module Creation

Using the Regulatory Loop Wizard

- 9 The Alarming page appears on the screen. Enter desired alarm limit values for the available high and low alarms and then click Next.



The screenshot shows a window titled "Alarms" with a vertical scrollbar on the left. Inside the window, there are four input fields for alarm limits:

- HiHi: NaN
- Hi: 100
- Low: 10
- Low Low: NaN

At the bottom of the window is a button labeled "Config Form..."

- 10** The PID Block page appears on the screen. Enter the requested configuration parameters for the PID block and then click Next.

PID Block

Give a name to the PID Block that will be used in this Control Module. If desired, fill in a description about what this loop will control and the engineering units that the loop uses.

PID Block Name:

Description:

Engineering Units:

R201
01/04

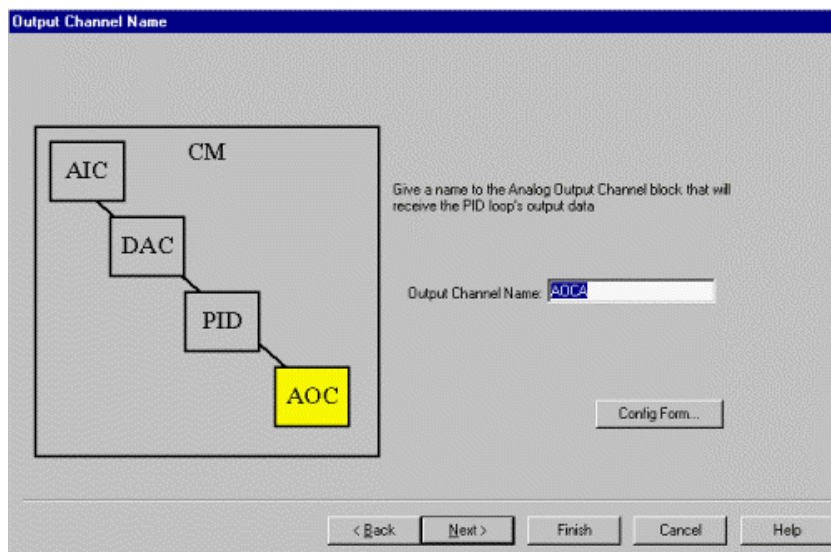
- 11** The Tuning Parameters page appears on the screen. Based on what was entered previously, the process and loop data is summarized on this page and estimated tuning constants are presented. Adjust the tuning constants as desired, then click Next.

The screenshot shows the 'Tuning Parameters' dialog box. It has a blue title bar and a grey background. At the top, there are two paragraphs of text. The left paragraph states: 'If you provided process and loop data at the beginning of the wizard, then the data is summarized below, and the tuning constants are estimated based on this information.' The right paragraph states: 'Of course, the values below are only estimates. You may adjust these values if desired. If no data was provided at the start of the wizard, then no estimates will appear below.'

Below the text are two main sections. The left section is titled 'Control Info' and contains four input fields: 'Process Gain' with a value of 1.00, 'Time Constant (mins)' with a value of 0.03, 'Dead Time (mins)' with a value of 0.00, and 'Loop Type' with a dropdown menu showing 'FLOW'. The right section is titled 'Tuning Constants' and contains three input fields: 'Controller Gain' with a value of 2.4, 'Integral Time (secs)' with a value of 0.03, and 'Derivative Time (mins)' with a value of 0.0075. Each field has a small label to its left (K, T1, T2 respectively).

At the bottom right of the dialog is a button labeled 'Config Form...'. At the very bottom are five buttons: '< Back', 'Next >', 'Finish', 'Cancel', and 'Help'.

- 12** The Output Channel Name page appears on the screen. Enter a name for the Analog Output Channel (AOCHANNEL) block that is to receive output data from the PID block in the Regulatory Loop. Then click Next.



Control Module Creation

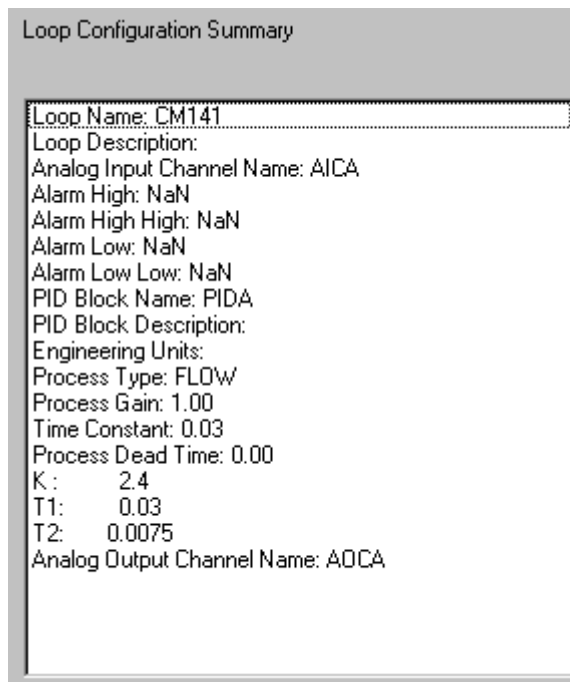
Using the Regulatory Loop Wizard

- 13** The Output Channel Assignment page appears on the screen. If necessary, enter the requested information to assign the appropriate Analog Output (AO) Module to the AOCHANNEL block that is associated with this Regulatory Loop. Then click Next.

The screenshot shows the 'Output Channel Assignment' dialog box. It has a blue title bar and a light gray background. On the left, there are four numbered instructions: 1. Select a module to which you will assign this IO channel block. 2. Verify that the Module Type is an Analog Output module type. 3. Use the list box at right to choose an empty channel in the selected module. 4. Press the Assign Channel Block button below to assign this channel block to the selected channel. Below these instructions are two dropdown menus: 'Module Name:' with a 'Choose a module' button and 'Module Type:' with a 'Choose a module type' button. To the right of these is a table titled 'Currently Assigned Channels in Selected Module' with columns 'Channel Number' and 'Channel Name'. The table is currently empty. Below the table is a 'Config Form...' button. At the bottom of the dialog are five buttons: '< Back', 'Next >', 'Finish', 'Cancel', and 'Help'.

- 14** The Output Channel Configuration page appears on the screen. If you wish to configure on the Analog Output Module the output channel that was just created, press the Module Configuration button and enter the requested configuration parameters. Then return to the Output Channel Configuration page and click .

- 15** The Loop Wizard Summary page appears on the screen. The data that has been entered in the Regulatory Loop Wizard is summarized in the Loop Configuration Summary box. Review the data to ensure that the desired configuration parameters have been entered. Any desired changes can be made by backing up to the page in the Wizard where the erroneous information was entered and making adjustments there. Then return to this page and click Next.



The screenshot shows a dialog box titled "Loop Configuration Summary". Inside the dialog, the following configuration parameters are listed:

- Loop Name: CM141
- Loop Description:
- Analog Input Channel Name: AICA
- Alarm High: NaN
- Alarm High High: NaN
- Alarm Low: NaN
- Alarm Low Low: NaN
- PID Block Name: PIDA
- PID Block Description:
- Engineering Units:
- Process Type: FLOW
- Process Gain: 1.00
- Time Constant: 0.03
- Process Dead Time: 0.00
- K: 2.4
- T1: 0.03
- T2: 0.0075
- Analog Output Channel Name: AOCA

- 16** The Finished! Page appears on the screen. Click on the  button at the bottom of the page and continue with the complete configuration of your control loop.
-

Exporting Function Block Configurations



REFERENCE - INTERNAL

For more information on Exporting Function Block Configurations refer to *Experion PKS Control Builder Components Theory, Control Builder Export and Import Functionality*.

ATTENTION



- Import and Export operate only on the primary database. Operation on the secondary database is not permitted.
 - User selection of Import as well as Export should not be permitted if Engineering Repository synchronization is in progress.
-

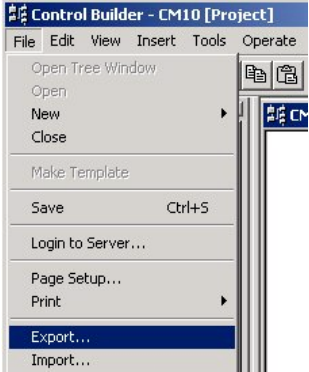
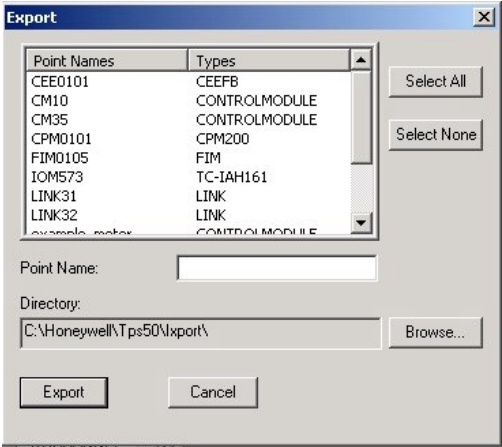
CAUTION

During the export function, a file is created by the system called Export.sl. This file contains the list of objects to be exported. If the file exists in the specified directory, a subsequent export function will overwrite it.

Opening the Export dialog box

Follow the step in the table below to open the export dialog box.

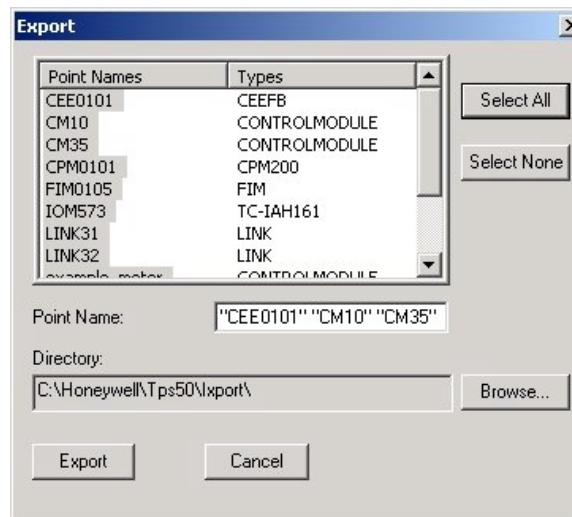
Step	Action	Result
1	From Control Builder, click File -> Export to open the Export dialog box.	The Export dialog box appears.

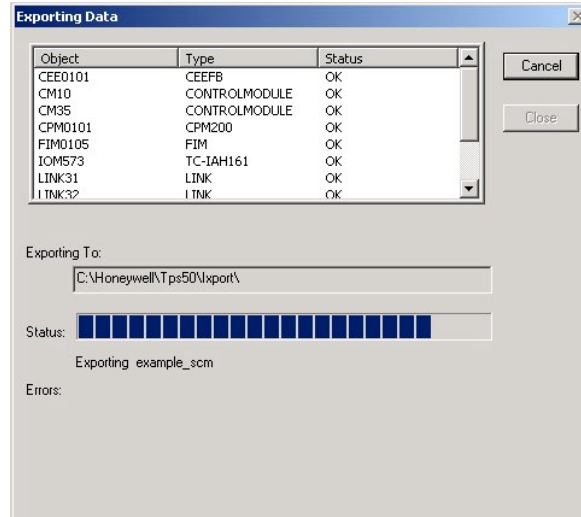
Exporting a selected project

Follow the steps in the table below to export a selected project.

Step	Action	Result
1	From the Export dialog box, click Select All to select all of the function blocks.	The selected function blocks are highlighted on the dialog box.



Step	Action	Result
2	Click Export to export the selected function blocks.	The Exporting Data dialog box appears.



When the Exporting Data dialog box disappears, the export is done.

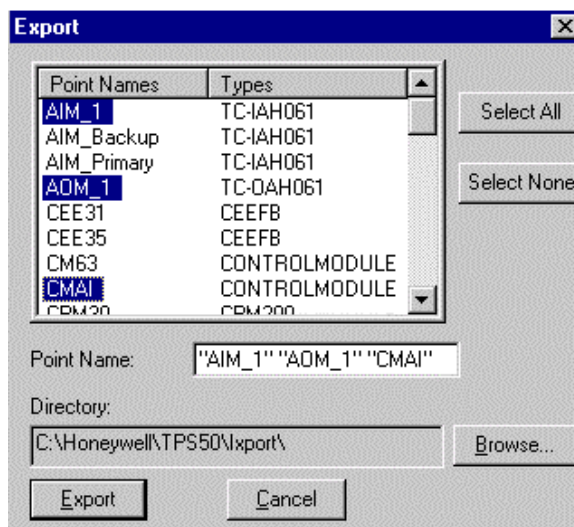
Control Module Creation

Exporting Function Block Configurations

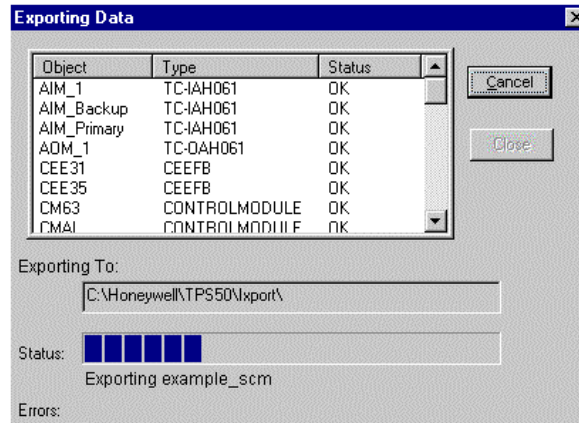
Exporting selected function block(s)

Follow the steps in the table below to export selected object(s).

Step	Action	Result
1	From the Export dialog box, press <Control> and click the function block(s) you want to export.	The selected function block(s) are highlighted on the dialog box.



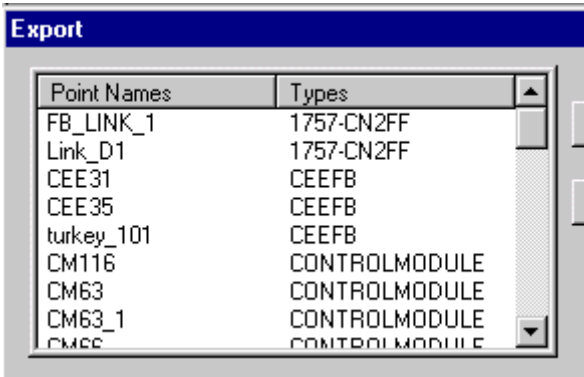
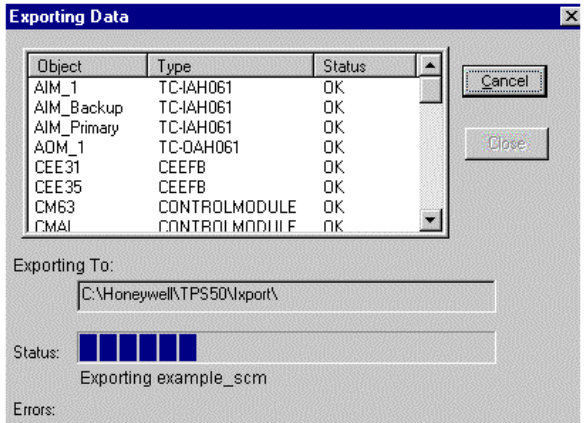
Step	Action	Result
2	Click Export to export the selected function blocks.	The Exporting Data dialog box appears.



When the Exporting Data dialog box disappears, the export is done.

Exporting a particular type of function blocks

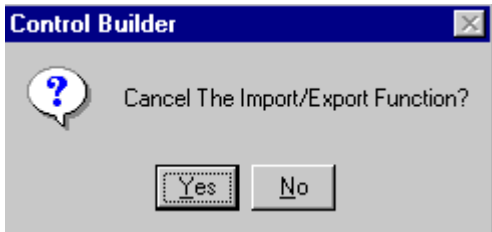
Follow the steps in the table below to export a particular type of object.

Step	Action	Result
1	From the Export dialog box, click the column header, Types to sort the function blocks by types	The function blocks will be sorted by type. 
2	Click Export to export the selected function blocks.	The Exporting Data dialog box appears. 

When the Exporting Data dialog box disappears, the export is done.

Canceling an export currently in progress

Follow the steps in the table below to cancel an export currently in progress.

Step	Action	Result
1	From the Exporting Data dialog box, click Cancel .	The following dialog box will appear.
		
2	Click Yes to cancel the export.	The export is canceled.

Commencing an Export while a Load is in progress



REFERENCE - INTERNAL

For more information on loading a control strategy, refer to [Control Strategy Loading](#).



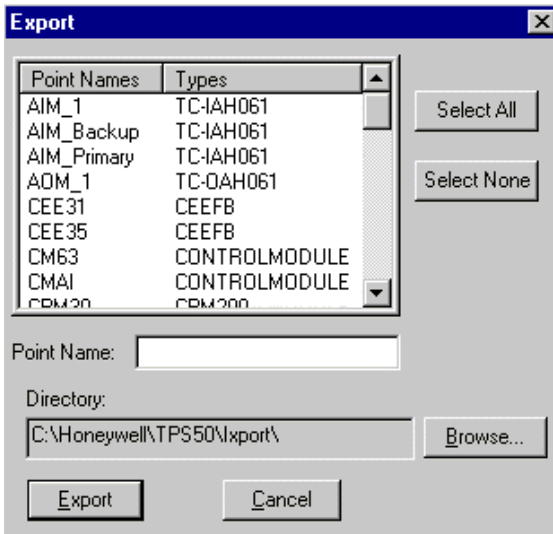
ATTENTION

- An Export may not be commenced during a load which has been triggered from the Controller Assignment dialog box.
- Load has a "stay on top" feature, so you may need to move windows around to interact with the Export dialog box.

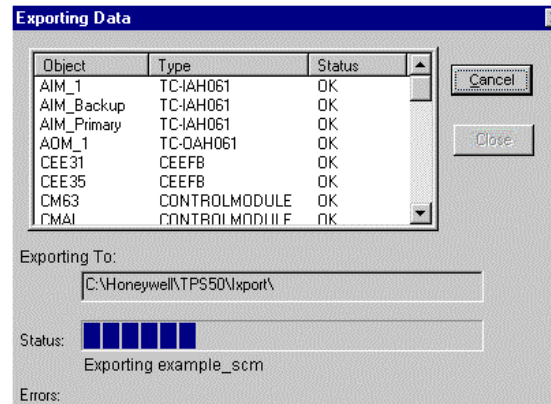
Control Module Creation

Exporting Function Block Configurations

Follow the steps in the table below to commence an Export while a LOAD is in progress.

Step	Action	Result
1	With a Load in progress, from Control Builder, click Export to open the Export dialog box.	The Export dialog box appears. 
2	Select the object(s) you wish to export.	
3	If desired, browse to the directory you want to export to.	

Step	Action	Result
4	Click Export .	The Exporting Data dialog box appears.



When the Exporting Data dialog box disappears, the export is done.

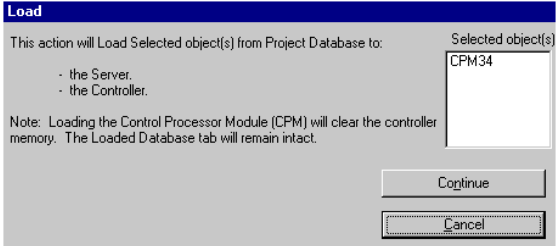
Commencing a Load while an Export is in progress



ATTENTION

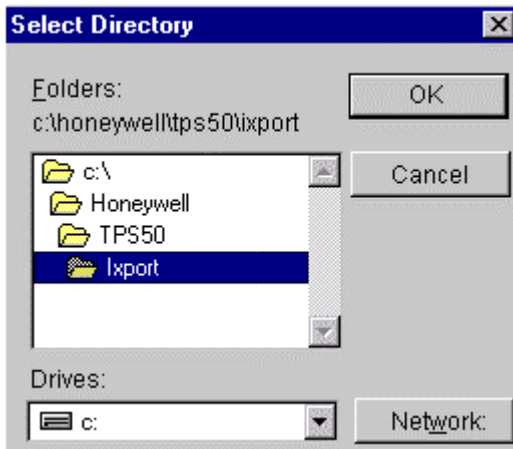
Load has a "stay on top" feature, so you may need to move windows around to interact with the Export dialog box.

Follow the steps in the table below to commence a Load while an Export is progress.

Step	Action	Result
1	With an export in progress, click the  icon to commence a load. Alternatively, commence the load from the Assignment dialog.	The Load dialog box will appear. 
2	Click Continue to commence the load.	When the Load dialog box disappears, the load is complete.

Exporting data to a user selected directory

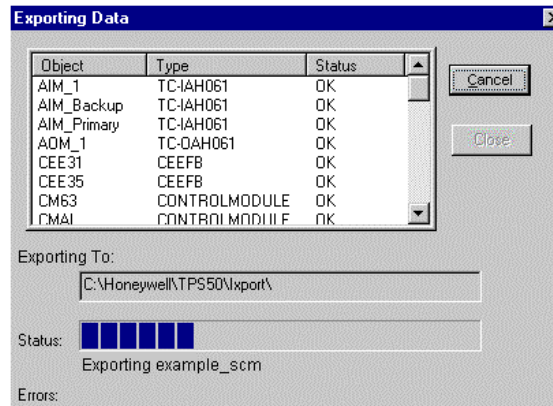
Follow the steps in the table below to export data a user selected directory.

Step	Action	Result
1	From the Export dialog box, click Browse .	The Select Directory dialog box appears:
		
2	Browse to the desired directory.	
3	Click OK .	

Control Module Creation

Exporting Function Block Configurations

Step	Action	Result
4	Click Export .	The Exporting Data dialog box appears.



When the Exporting Data dialog box disappears, the export is done.

Importing Function Block Configurations

CAUTION

- During the import function, a file is created by the system called Import.sl. This file contains the list of objects to be imported. If the file exists in the specified directory, a subsequent import function will overwrite it.
- During the import function, imported blocks write over each block, but new blocks are left as is.

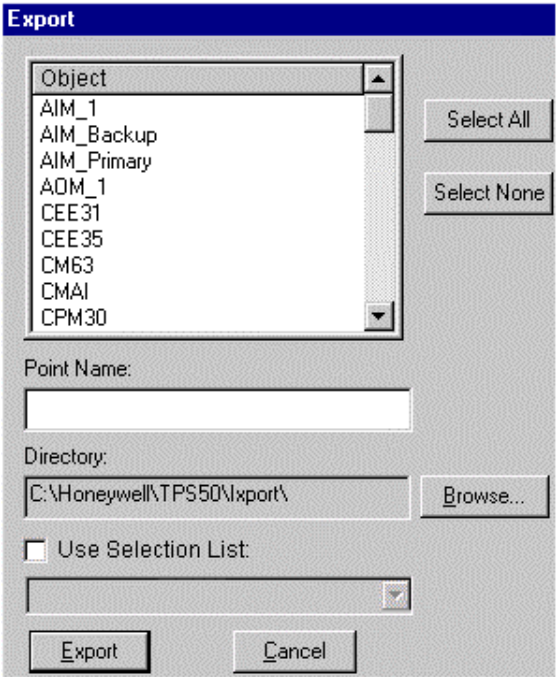
Some general import considerations

The following table summarizes some things you should consider before initiating the import function. This list is by no means comprehensive and should be supplemented with any first hand experience gained from previous imports. As a rule of thumb, it is better to import a large database in small logical segments, such as importing all IOMs first, rather than all at once.

If Database to be Imported Includes . . .	Then, Consider Doing This . . .
Example Control Modules and Sequential Control Modules provided with the "Clean" database	Delete the Example Control Modules and Sequential Control Modules from the "Clean" database that is to receive the import or do not import the example modules.
Fieldbus devices	Build templates for the devices using the Fieldbus Library Manager (FLM) and import the fieldbus devices first before importing any Control Modules (CMs). Otherwise, a fieldbus device import will fail if its corresponding device template is not present. Likewise, import of a CM containing a fieldbus function block will fail if its corresponding device has not yet been imported
Input/Output Modules (IOMs) and/or Input/Output Processors (IOPs)	Import IOMs and IOPs first before importing any Control Modules. Otherwise, import of a CM containing an IOM/IOP channel function block will fail if its corresponding IOM/IOP block has not yet been imported.

Opening the Import dialog box

Follow the steps in the table below to open the Import dialog box.

Step	Action	Result
1	From Control Builder, click File -> Import to open the Import dialog box.	The Import dialog box appears. 

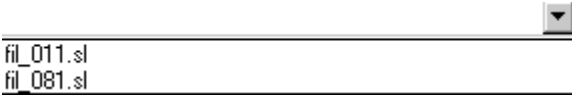
Importing function blocks from selection list



ATTENTION

Using the Notepad Accessory, you may edit the existing selection list, Export.sl, to create a new selection list of function blocks you wish to import.

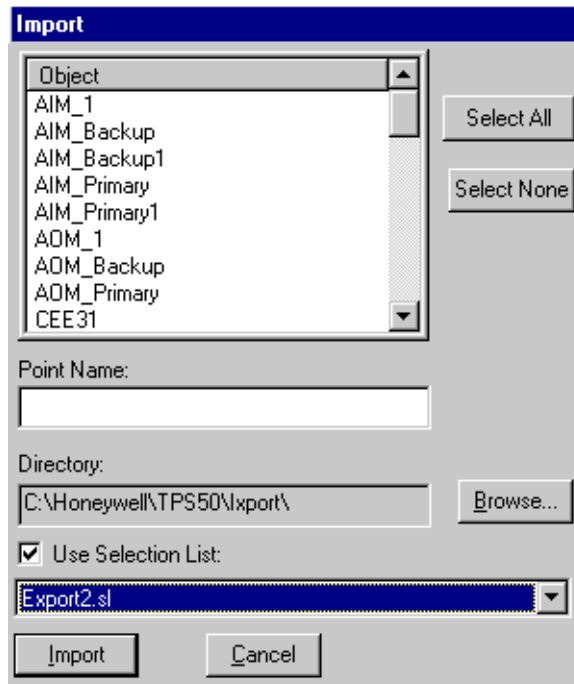
Follow the steps in the table below to import function blocks from a selection list.

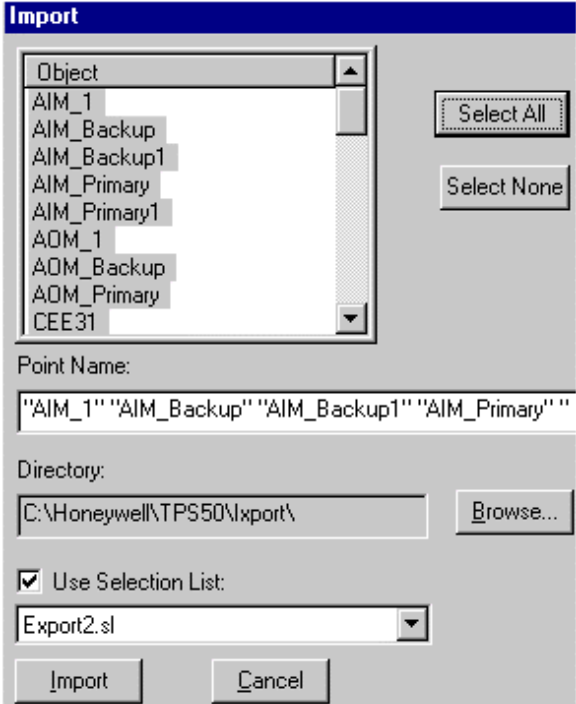
Step	Action	Result
1	From the Import dialog box, click Use Selection List check box. 	
2	Click  to view the names of selections lists in the directory.	The names of the selection lists will appear. 

Control Module Creation

Importing Function Block Configurations

Step	Action	Result
3	Select the selection list file from the combo box.	A list of the function blocks in the selection list appears in the dialog box.

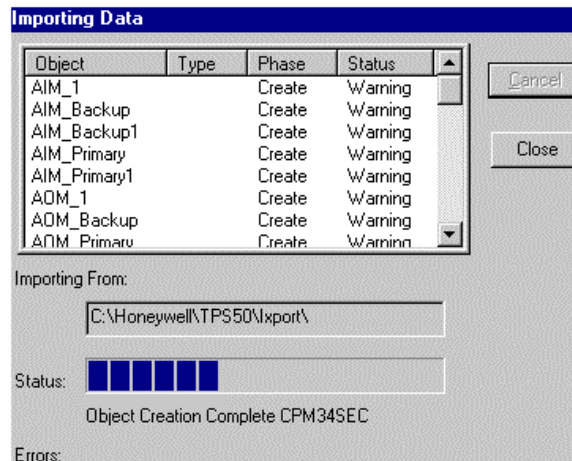


Step	Action	Result
4	Select the function blocks you wish to import. If you wish to import all of the function blocks in the selection list, click Select All. Note: You must have object(s) selected in order to do the import.	The following figure illustrates the result of clicking Select All. 

Control Module Creation

Importing Function Block Configurations

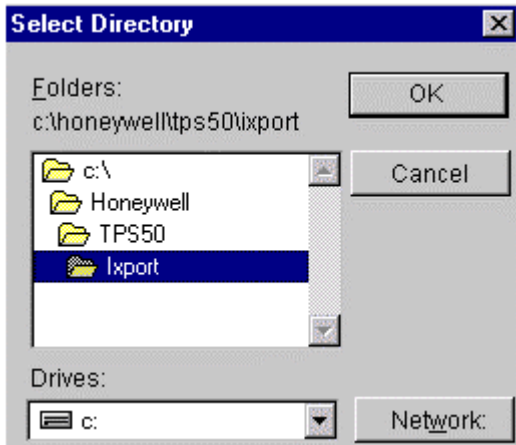
Step	Action	Result
5	Click Import .	The Importing Data dialog box appears.



When the Importing Data dialog box disappears, the import is done.

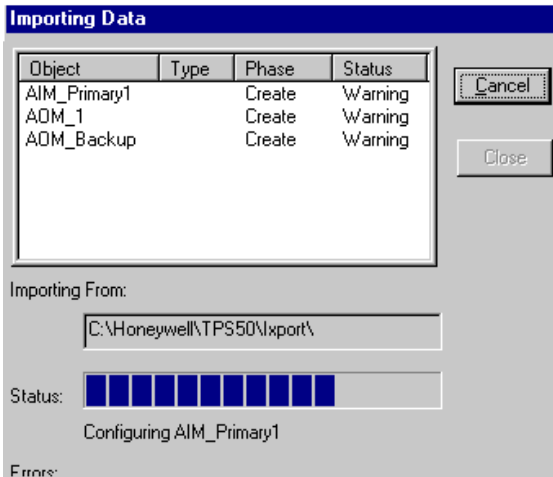
Importing function blocks from directory

Follow the steps in the table below to import function blocks from a directory.

Step	Action	Result
1	From the Import dialog box, click Browse .	The Select Directory dialog box appears:
		
2	Browse to the desired directory.	
3	Click OK to commence the import.	
4	Click Import to import the function blocks.	The Importing Data dialog box appears.

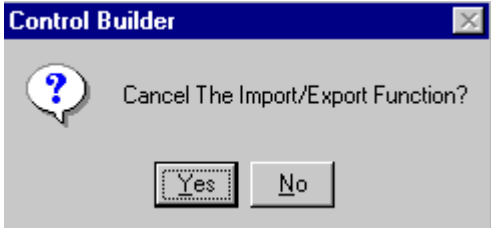
Control Module Creation

Importing Function Block Configurations

Step	Action	Result
		
		When the Importing Data dialog box disappears, the import is done.

Canceling an Import currently in progress

Follow the steps in the table below to cancel an Import currently in progress.

Step	Action	Result
1	From the Import dialog box, click Cancel .	The following dialog box will appear.  The 'Control Builder' dialog box contains a question mark icon and the text 'Cancel The Import/Export Function?'. It has 'Yes' and 'No' buttons.
2	Click Yes to cancel the import.	The import is canceled.

Commencing an Import while a Load is in progress



ATTENTION

- An import may not be commenced during a Load which has been triggered from the Controller Assignment dialog box.
- Load has a "stay on top" feature, so you may need to move windows around to interact with the Import dialog box.

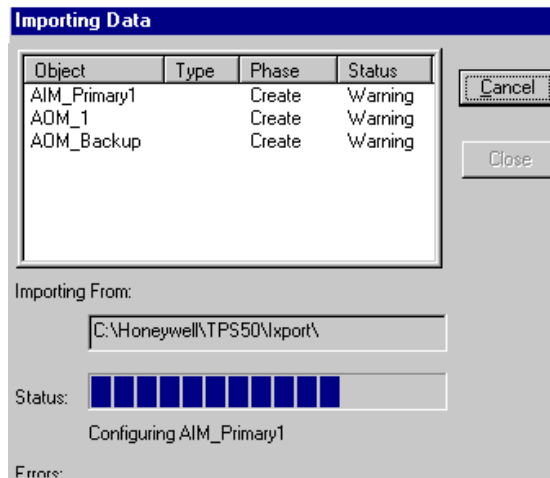
Follow the steps in the table below to cancel an import while a Load is in progress.

Step	Action	Result
1	With a Load in progress, from Control Builder, click Import to open the Export dialog box.	The Import dialog box appears.
2	Select the function block(s) you wish to import.	
3	If desired, browse to the directory you	

Control Module Creation

Importing Function Block Configurations

Step	Action	Result
	want to export to.	
4	Click Import .	The Importing Data dialog box appears.



When the Importing Data dialog box disappears, the import is done.

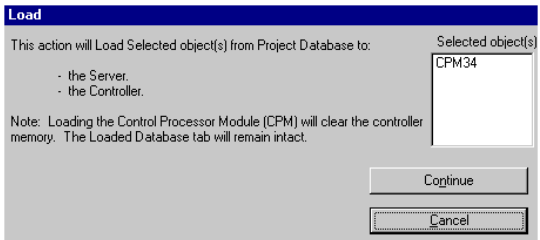
Commencing a LOAD while an Import is in progress



ATTENTION

Load has a "stay on top" feature, so you may need to move windows around to interact with the Export dialog box.

Follow the steps in the table below to commence a LOAD while an Import is in progress.

Step	Action	Result
1	With an import in progress, click the  icon to commence a load. Alternatively, commence the load from the Assignment dialog.	The Load dialog box will appear. 
2	Click Continue to commence the load.	When the Load dialog box disappears, the load is complete.

Using Module Hierarchy

Purpose

The purpose of Module Hierarchy is to provide a more hierarchical view of the Control Builder configuration and its contained children.

For information relating to Detail Displays, refer to the *HMIWeb Display Building Guide*.

Initializing Module Hierarchy

Step	Action
1	Start Control Builder.
2	Select Tools -> Module Hierarchy... to open the Module Hierarchy dialog box.

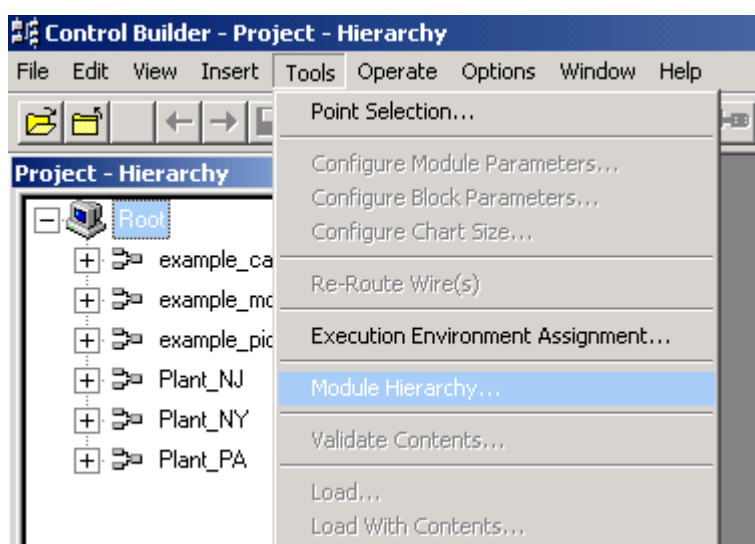


Figure 23 Initializing Module Hierarchy

Control Module Creation

Using Module Hierarchy

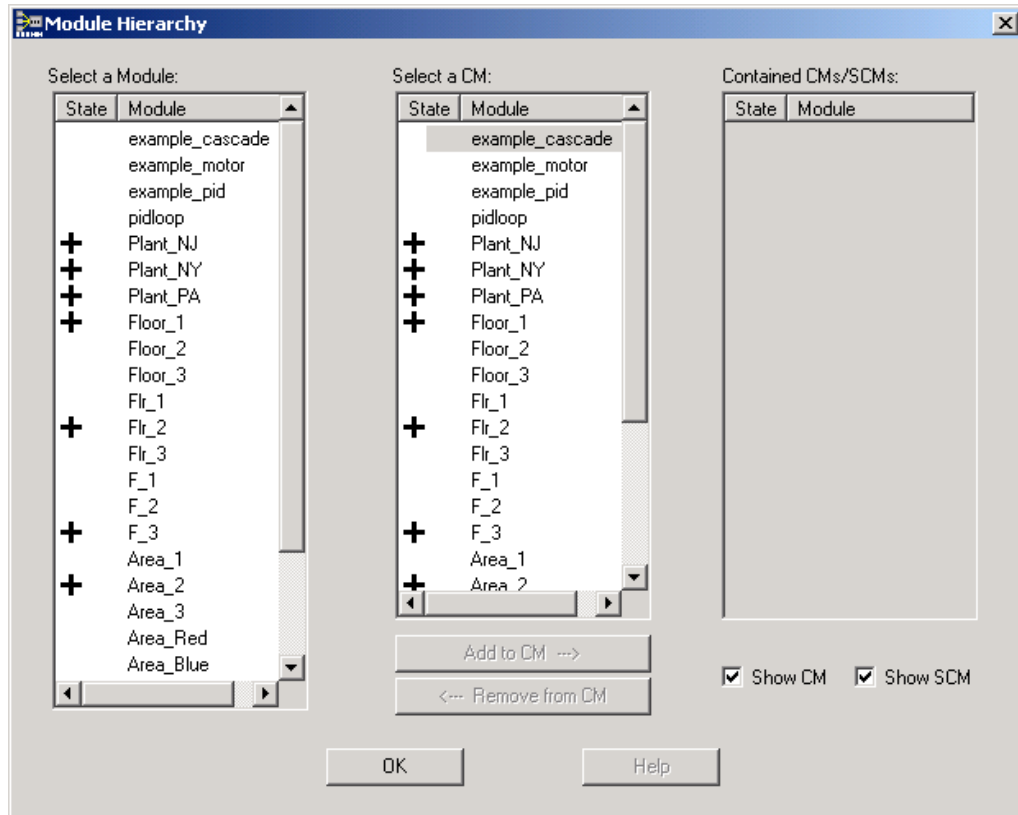


Figure 24 Module Hierarchy dialog box

CMs with Containment children will have a “+” marker in the State column. CMs without Containment children and all SCMs will not have the marker.

The right side list shows the Containment children (CMs and/or SCMs) of the selected CM. These may be removed from the CM by selecting the Remove from CM button.

Unchecking the ‘Show CM’ and ‘Show SCM’ toggles hides the CMs or SCMs from the lists.

Clicking ‘Module’ at the top of each list will resort the module list alphabetically, toggling between forward and reverse order. Clicking ‘State’ will sort the list by Children status



TIP

The lists of CMs and Modules are loaded when the dialog box is opened. If new CMs/SCMs are added from another Control Builder session while the dialog box is open, these items do not appear in "real time" in the dialog box.

Printing the Module Hierarchy chart

Step	Action
1	Access the Reports dialog box through File -> Page Setup...
2	Click either the Header or Footer buttons, depending on your preferences.

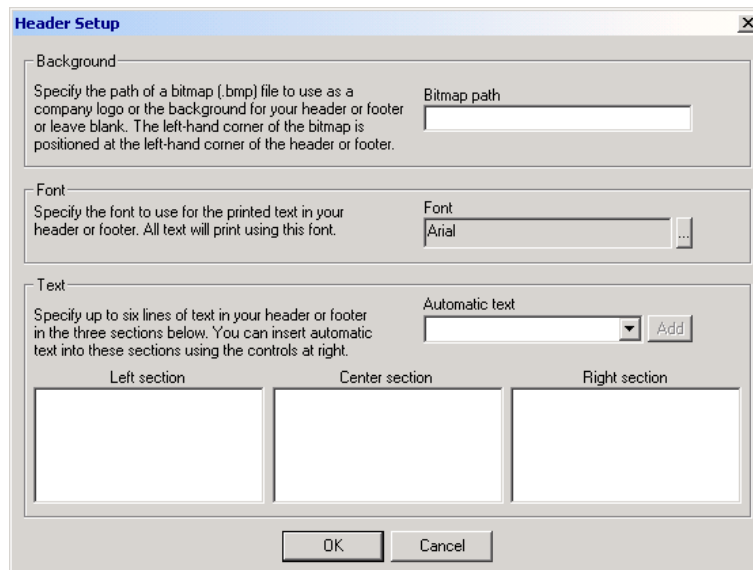


Figure 25 Header Setup dialog box

Control Module Creation

Using Module Hierarchy

- 3 “Parent container” will appear in the “Automatic text” drop down list box. Select the item and click into one of the section edit boxes.
 - 4 Click the “Add” button and {PARENT} is pasted into the selected edit box.
-



TIP

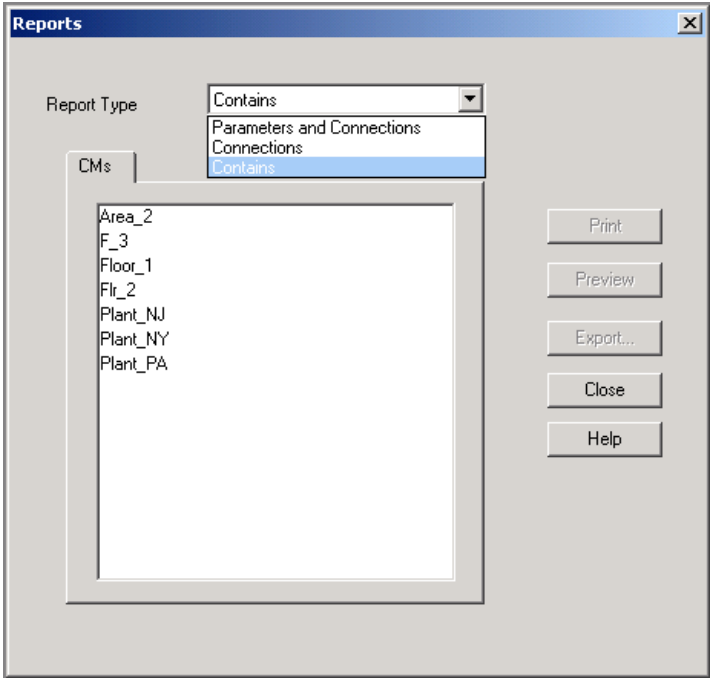
The identical steps are used in the Footer Setup dialog box.

Module Hierarchy reports

The report will contain the following information:

- A title on each page identifying it as a “Containment Report”.
- For each “Contained Child” the following data attributes will appear:
 - Description
 - Controller Assignment
 - Area
 - Parent. (Parent appears twice on the Report Page.)
- Table headings: Name, Description, Controller Assignment, Area, and Parent.
- The time and date when the report was created.
- Page numbers for multiple pages

Table 1 Accessing the Module Hierarchy report

Step	Action
1	Access the Reports dialog box through File -> Print -> Reports...
	
2	In the Report Type drop-down box, select Contains.
3	Select a CM from the CMs window that you wish to create a report for.
4	Choose to Print, Preview, or Export the report using the buttons on the right.

Working with Profit Loop PKS

Overview

What is Profit Loop PKS?

Profit Loop PKS is a robust, model-based, predictive controller and optimizer for single-input, single-output applications. In many cases, Profit Loop PKS can (and should) be used in place of the standard PID algorithm.

Implementing Profit Loop PKS

Within Control Builder, Profit Loop PKS is represented by the PID-PL block. As such, it is implemented using Control Builder, with basically the same procedures as with other control strategies. Basic procedures in [Control Module Creation](#) apply, in terms of adding a PID-PL function block to your control module.

Procedures specific to Profit Loop PKS are presented in this section.



REFERENCE - INTERNAL

For details on the PID-PL function block, refer to *Control Builder Components Theory, Regulatory Control* section, *PID-PL (Profit Loop PKS) Block*.

Converting a PID-based Control Loop to PID-PL

To convert an existing PID-based control module, with working PID constants, to a PID-PL-based control module, complete the following steps.



ATTENTION

Make sure you follow this procedure. For an accurate conversion, you *cannot* simply change the PID function block's equation type.

Conversion Phase

Considerations

- If you will be downloading the converted function block to the control module at the end of this procedure, make sure the controller is offline.
- If you will be downloading later, then the controller does not have to be offline for this conversion procedure.
- Be sure you have installed the Profit Loop Assistant software before attempting a conversion, if you want the PID tuning parameters converted.
- If you wish to convert the existing PID tuning parameters to PID-PL models, a prompt will ask you to define if selected PIDs are Integrator or Non-Integrator, when you initiate the PID conversion. If you select Integrator PIDs, you must also enter the Closed Loop Response Time. The information you enter applies to ALL of the PIDs selected for conversion. In this case, you should prepare groups of PIDs for conversion before initiating the conversion. You can do this by first differentiating between Integrator and Non-Integrator PIDs and then grouping the Integrator PIDs by the Closed Loop Response Time that applies to the PIDs. You can then convert the resulting groups of PIDs together

Complete the following steps to convert one or more PID function blocks to PID-PL blocks.

Step	Action
1	In Control Builder, make sure that the control module (CM) that contains the PID block to be converted is not open in the control chart for either the Project or Monitoring view.
2	Click in the Project tab that contains the control module(s) to be converted.
4	On the File menu, click Convert PID to PID-PL .

Step	Action
5	Complete the following steps in the Convert PID to PID-PL dialog box: a) In the Points list, select one or more points (control modules, or CMs) to be converted. TIP: To select more than one CM, use Shift+click to select a set of adjacent names, or Ctrl+click to select nonadjacent names. b) If desired, review your selections in the Point Name field. If the entries exceed this field's size, click in the field and use the right and left arrow buttons to scroll in the field. c) It is a good idea to select a different location for the conversion files, click Browse, navigate to the desired location, then click OK. For information on the files involved, see Conversion Files at the end of this procedure. d) If the PID function block has tuning parameters that you would like to use for a starting model for your PID-PL block, select Convert PID Tuning Parameters check box. This selection activates the Integrator Models options. If the underlying processes for the selected PIDs are integrating (not self-correcting), select the Integrator Model check box and enter the desired Closed Loop Response Time. e) If you want a name other than the original block name, clear the Retain PIDA Block name check box. For details about names, see Naming Considerations at the end of this procedure. f) Click the Convert button.
6	When the conversion is completed, the Converting Data dialog box closes unless errors were detected. If errors were detected, examine the errors listed in the Errors list box, then click the Close button. For additional details, go to <i>C:\Documents and Settings\All Users\Honeywell\Experion PKS</i> and examine the ErrLog_n.txt error log file. The Export, Transform, and Import phases of the Conversion process are performed against all of the selected PIDs. For example, if selected PIDs are in CM1, CM2 and CM3; then Export is performed on CM1, CM2 and CM3; Transform is performed on CM1, CM2 and CM3; and Export is performed on CM1, CM2, and CM3. The audit trail of these phases appears in the ErrLog_n.txt file. If the conversion does not complete successfully for any reason, a message appears in the log identifying which of the phases failed, with a reason for the failure. If either the Export or Transform phase fails, NONE of the selected PIDs will be converted. However, if the Import phase fails, some of the selected PIDs may be converted successfully. Completed conversions are listed in the log.

Working with Profit Loop PKS

Converting a PID-based Control Loop to PID-PL

Step	Action
7	If error codes were listed, check the <i>Control Builder Error Codes Reference</i> to identify the numerical code. For example, if error message [EXPKS_E_CBC_COMPLETEWITHERRORS (1L.101.12477)] is listed, check for code 12477 in the document. Take the appropriate steps to correct errors. Errors would be those occurring during the Control Builder Import process.
8	Go to the next procedure <i>Configuration Phase</i> to configure the converted block.

Configuration Phase

Complete the following steps to configure the new PID-PL block(s).

Step	Action
1	In the Project tab, double-click the converted CM icon to open its control drawing.
2	Double-click the new PID-PL block to access its configuration form. Modify all aspects of configuration as needed, beginning with the algorithm selection. Click the Algorithm tab and select PROFITLOOP for Control Equation Type.



ATTENTION

The equation for this block will not change to **PROFITLOOP** until you select it on the **Algorithm** tab of the PID-PL configuration form and you close the control drawing and save the changes.

3	If you want help defining the Profit Loop PKS model, use the Profit Loop PKS Assistant. To do so from the configuration form, click the Advanced tab, then the Start Assistant button. For details on using the Assistant, see Profit Loop PKS Assistant Overview.
-



ATTENTION

You may receive a message that the block cannot be locked. Read this message and take one of the actions suggested. If accessing the Assistant from the Control Builder **Project** tree and block configuration form, you may have to answer **No** to the message to close the assistant and return to Control Builder. Close the Control Module and save changes, then repeat Steps 1 and 3.

Once the block can be unlocked, the **Profit Loop PKS Assistant** will open.

Step	Action
4	After completing configuration, click OK to accept your changes and close the configuration form.

Download Phase

After conversion and configuration, you can load the new PID-PL block to the controller. Refer to [Control Strategy Loading](#) as needed.

Naming Considerations

If the name of the **PID** block to be converted begins with “PIDA” (using capital letters), then you can retain the block name (PIDA), or change it to include a Profit Loop PKS designation as part of the conversion process. If you do not retain the name, then the name will change to include “_PLA” as part of the name. For example:

- PIDA will become PID_PLA.
- PIDA_1 will become PID_PLA_1.

If the **PID** block to be converted does not begin with “PIDA,” then the original name will be used regardless of your conversion choice.

Conversion Files

The conversion process creates various files, including:

- Configuration data files (.xml):
 - *CMName.cnf.xml*: The final file used for input to the Import function. This file contains the PID-PL block configuration data.
 - *xxPID_CMName.cnf.xml*: The original file created by the Export function. This file is unchanged, except for the name, and contains the original PID block configuration data.
- Conversion file (.sl): Used internally by the conversion function.

Reverting to a PID Block

If you converted a **PID** block to a **PID-PL** block and wish to revert to the original **PID** block, complete the following steps. This procedure requires that you have not deleted the files created or moved during the block conversion.

Step	Action
1	In Control Builder, click File > Import .
2	In the Import dialog box, Browse to the directory used to store the original CM object. Be sure this directory does not contain the converted CM. The default location is <i>C:\Program Files\Honeywell\Experion PKS\Engineering Tools\Export\export_buildX</i> folder.
3	In the Object list, click the name of the CM that contained the PID block that was converted. For example, if CM name was pidloop, select pidloop in the list.
4	Click the Import button. The Importing Data dialog box appears to track the progress of the import. When the import is completed, error message 14185 will appear in the Errors list on the dialog to let you know that the PID-PL block was deleted. Click the Close button to acknowledge the message and complete the import.

Profit Loop PKS Assistant Overview

Defining A Model

The Profit Loop PKS Assistant is a companion intended to simplify your Profit Loop PKS configuration activities. The configuration of Profit Loop PKS regulatory control point (PID-PL) does not require a good understanding of the math and concepts involved in model predictive control because the Profit Loop PKS Assistant will aid you in the development of the model. If you are uncertain about completing the Model area in the **Advanced** tab of the PID-PL configuration form, the Profit Loop PKS Assistant provides several tools to help guide you through the model definition.

Since Profit Loop PKS is a model-based predictive controller, it must have a model. The Profit Loop PKS Assistant simplifies the model definition process by providing the following tools:

- **Model by Loop Type:** Default model parameter values can be specified by loop type and then modified for individual loops.
- **Model from PID Tuning:** The Profit Loop PKS model is calculated from existing PID tuning constants.
- **Model by Step Testing:** An automatic step generator and model identifier calculates the model from the step responses.
- **Model by Direct Entry:** When you have an existing LaPlace model from another source, you can enter the details directly.

Troubleshooting Loop Performance

The Profit Loop PKS Assistant provides diagnostic tools to assist with troubleshooting loop performance problems and performance improvement. These include:

- **Fine Tuning:** You can enter specific tuning parameters for a PID-PL loop, obtain current controller values, and download your settings to the controller.
- **Valve Doctor:** For flow and pressure loops, Profit Loop PKS Assistant analyzes valve stickiness probability. This analysis is automatically performed.
- **Loop analysis:** Provides an indication of loop health, based on oscillation detection, valve conditions, PV/OP standard deviations, and other factors.

Starting the Assistant

Three methods exist for accessing the Profit Loop PKS Assistant:

- Control Builder:
 - Starting from the Project Tab
 - Starting from the Monitoring Tab
- Experion PKS:
- Starting from an Experion PKS Station Point Detail Display

Starting from the Project Tab

Follow these steps to start the Profit Loop PKS Assistant from within a Control Module (CM) drawing, from the Control Builder Project tab.

Step	Action
1	If you have not already completed these steps, do so now: • Start Control Builder. • On the Project tab, double-click the needed CM icon in the Project tab to open your control drawing. • If a PID-PL function block has not been added to the CM drawing, add one by dragging it from the Regulatory Control group in the Library tab to the Control Module drawing.
2	Double-click the PID-PL block to open its Parameter Configuration Form.
3	Click the Advanced tab.
4	Click the Start Assistant button. A status box displays details as the Profit Loop PKS Assistant starts, followed by a Login Information dialog box.
5	Complete the Login Information dialog box by entering your Control Builder user name and password, and click OK .
6	The Profit Loop PKS Assistant opens as a separate tool. Note that the configuration form remains open unless you close it. The Profit Loop PKS Assistant runs separately.
7	This completes the procedure.

Starting from the Monitoring Tab

Follow these steps to start the Profit Loop PKS Assistant from within a Control Module (CM) drawing, from the Control Builder Monitoring tab. This procedure is applicable when the Control Module has been loaded to the C200 or ACE.

Step	Action
1	In the Monitoring tab, double-click the PID-PL block icon to open its Parameter Configuration Form.
2	Click the Advanced tab.
3	Click the Start Assistant button. A status box displays details as the Profit Loop PKS Assistant starts, followed by a Login Information dialog box.
4	Complete the Login Information dialog box by entering your Control Builder user name and password, and click OK .
5	The Profit Loop PKS Assistant opens as a separate tool. Note that the configuration form remains open unless you close it. The Profit Loop PKS Assistant runs separately.
6	This completes the procedure.

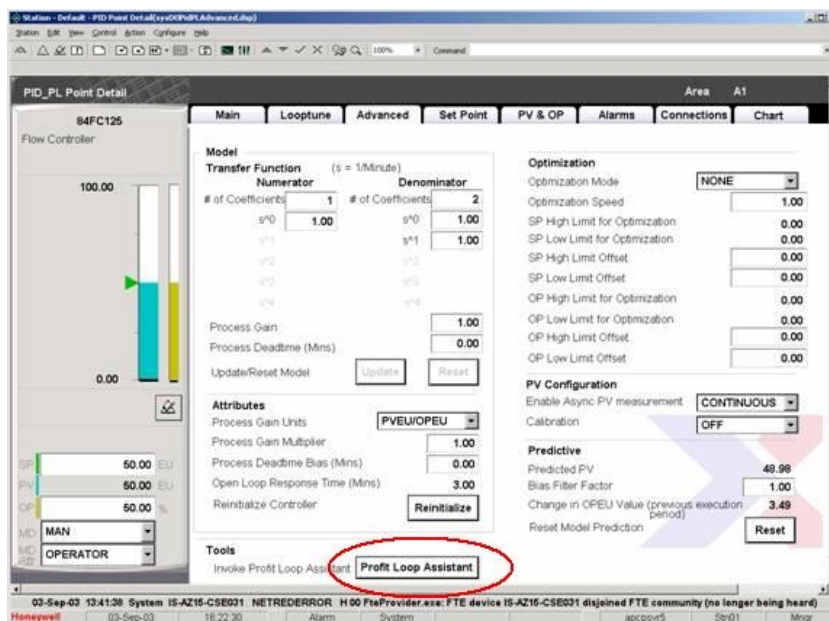
Working with Profit Loop PKS

Starting the Assistant

Starting from an Experion PKS Station Point Detail Display

Follow these steps to start the Profit Loop PKS Assistant from the Station Point Detail display for a PID-PL point.

Step	Action
1	If you have not already called up the required Point Detail display, do so.
2	Click the Advanced tab.
3	In the Tools section, click the Profit Loop Assistant button.



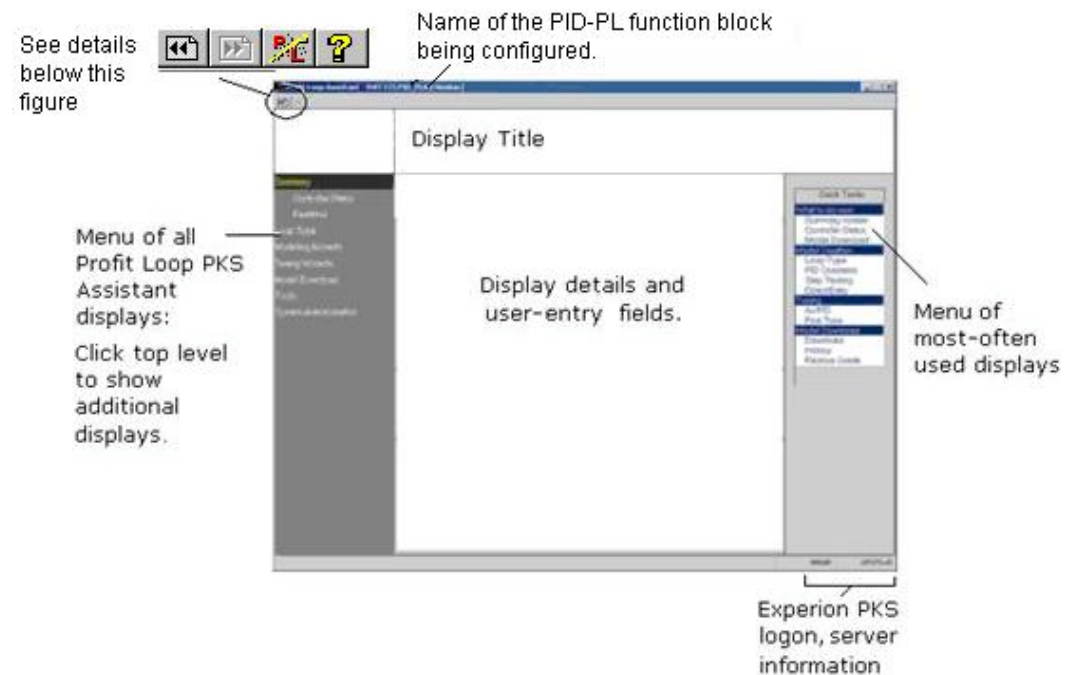
A status box displays details as the **Profit Loop PKS Assistant** starts, followed by a **Login Information** dialog box.

4	Complete the Login Information dialog box by entering your Control Builder user name and password and click OK . The Profit Loop PKS Assistant opens as a separate tool. Note that the Point Detail display remains open unless you close it. The Profit Loop PKS Assistant runs separately.
5	This completes the procedure.

Working with Profit Loop PKS Assistant Displays

General Layout of Displays

All Profit Loop PKS Assistant displays share common elements shown in the following figure.



Buttons in the upper left corner of every display include:

Button	Use
	Jump back to previous display, or forward to a display you recently visited.
	Display details about the Profit Loop PKS Assistant, such as file version and status information.
	Access the online Help, which contains details about every display.

Working with Graphs and Trends

You can enlarge a specific area of ("zoom in") nearly all of the trends or graphs presented in the Profit Loop PKS Assistant. For example, you can zoom in the Real-Time Trend display. To do so,

Step	Action
1	In a Profit Loop PKS Assistant display containing a trend or graph, identify the area of the graph you want enlarged.
2	Click and drag the cursor over the area to be enlarged. The selected area will become larger within the graph.
3	To return to the graph's original size, click the  button in the bottom left corner of the graph area

Obtaining Basic Information

Complete the following steps to obtain basic information about a PID-PL-based loop in an existing controller.

Step	Action
1	If the PID-PL function block of interest has not been selected in Control Builder or Experion PKS Station display, select it.
2	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
3	The Assistant opens to the Summary display. This display provides a synopsis of the selected PID-PL loop configuration. It also includes links to the displays where the settings can be modified and/or more details are available. See the Profit Loop PKS Assistant online Help for information about the contents of this (or any) display. Return to the Summary display from other displays by clicking Summary in the Profit Loop PKS Assistant "left menu" (the menu on the left side of the display).
4	To see other details: - For current controller settings and status, click Summary > Controller Status in the left menu. - For a trend view of the PV, SP, and OP, click Summary > Real-Time

Trend in the left menu.

- If you have defined character strings of tagnames for loop type identification, click **Loop Type** in the left menu to learn which loop type has been identified by the Assistant. See also [Define Character Strings for Automatic Loop Identification](#) in this document.
-

Defining a Model with Profit Loop PKS Assistant

The Profit Loop PKS Assistant includes four modeling wizards for creating the needed model.

To...	Use this Procedure...
Set up an approximate model based on loop type.	Define Model by Loop Type
“Extract” a model from a working PID’s tuning constants.	Define Model using PID Tuning
Use step-testing to identify an accurate model	Define Model by Step Testing
Enter a model identified from another source	Define Model by Direct Entry

Define Model by Direct Entry

When you have an existing LaPlace model from another source, you can enter the details directly. Complete the following steps to define a model using the Model by Direct Entry.

Step	Action
1	Obtain the coefficient details of the LaPlace model you want to use.
2	If the Profit Loop PKS Assistant is not open, open it as explained in Profit Loop PKS Assistant Overview .
3	If you want to compare the model you want to use with the one currently in your controller, go to step 4. If not, go to step 5.
4	To see the current controller model, click Summary in the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), then click Controller Status . Compare this model to the one you want to use.
5	To enter a model, click Modeling Wizards in the left menu.
6	In the list of wizards, click Model by Direct Entry .
7	In the Direct Entry display, enter the Laplace model coefficients. For help on specific entries on this display, refer to the Profit Loop PKS Assistant online Help .
8	If you are ready to load this model to the controller, click Model Download in

Step	Action
	the left menu.
9	In the Model Downloads display, select Direct Entry in the To Download list.
10	Click the Download Settings button.
11	To synchronize the Profit Loop PKS Assistant model definition with the Control Builder configuration, upload the newly loaded model from the controller to Control Builder.

Define Model using PID Tuning

This approach works especially well when you have converted from an existing **PID** function block with sound tuning constants. Even after conversion, the Assistant “remembers” the PID configuration (because a file containing the original PID data was saved). Thus, tuning constants from the original **PID** block can be used.

If your **PID-PL** function block was not created by conversion of a **PID** block, but you have tuning constant data you want to use, you can enter those values instead.

Complete the following steps to define a model using the Model from PID tuning.

Step	Action
1	If you will be entering tuning values instead of recalling data from a PID function block, obtain the needed data.
2	In Control Builder or the Experion PKS Station display, select the PID-PL function block of interest.
3	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
4	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click Modeling Wizards > Model from PID Tuning .
5	If you are retrieving existing PID values from an existing PID , skip to step 9. If you are entering tuning data, enter values for the following parameters: • K • T1 • T3
6	Select the PID’s current equation type (Eqn Number).
7	Select the PID’s current control action.

Working with Profit Loop PKS

Define Model by Loop Type

Step	Action
8	Enter a deadtime, in minutes.
9	If you are ready to load this model to the controller, click Model Download in the left menu.
10	In the Model Downloads display, To Download list, select Direct Entry .
11	Click the Download Settings button.
12	To synchronize the Profit Loop PKS Assistant model definition with the Control Builder configuration, upload the newly loaded model from the controller to Control Builder.

Define Model by Loop Type

If you know the dynamics of the loop, but do not want to perturb the process, the model can be selected from pre-defined loop dynamics. Complete the steps in the following phases to define a model by loop type:

- Phase 1: Preparation
- Phase 2: Establish Area-Group Relationships
- Phase 3: Define Loop Dynamics by Equipment Number
- Phase 4: Define Character Strings for Automatic Loop Identification
- Phase 5: Use Model by Loop Type

Preparation

The first phase in defining a model by loop type is preparation. This approach uses associations that you make between the areas in your plant (as defined in Experion PKS) and groups and equipment types you identify in the Profit Loop PKS Assistant, to define models with similar loop dynamics.

It may help to “think backwards,” by identifying the various controllers that have similar loop dynamics, then identifying ways that these can be grouped in terms of the areas in which they reside and the equipment with which they are associated.

Complete the following steps to prepare for model by loop type.

Step	Action

Step	Action
1	Decide on a group and equipment scheme based on the equipment in your plant's areas. This allows you to define models for equipment with similar loop dynamics across areas of your plant.
2	Document your scheme as needed for internal reference. You may find it helpful to use a Planning worksheet.
3	Continue with Establish Area-Group Relationships.

Planning worksheet

If desired, use the following type of worksheet to set up your model by loop type scheme. For up to five groups, identify the areas to be associated with each group. For up to five equipment types, check the loop types to be defined.

Group # (1 – 5): _____					
Areas Included:					Equipment Grouping or Other Details
Equipment	Loop Type(s)				
1		Flow		Analyzer	
		Level		Duty	
		Pressure		pH (External)	
		Temperature		Unknown	
2		Flow		Analyzer	
		Level		Duty	
		Pressure		pH (External)	
		Temperature		Unknown	
3		Flow		Analyzer	
		Level		Duty	
		Pressure		pH (External)	
		Temperature		Unknown	

Working with Profit Loop PKS

Define Model by Loop Type

Group # (1 – 5): _____					
Areas Included:					Equipment Grouping or Other Details
Equipment	Loop Type(s)				
4		Flow		Analyzer	
		Level		Duty	
		Pressure		pH (External)	
		Temperature		Unknown	
5		Flow		Analyzer	
		Level		Duty	
		Pressure		pH (External0	
		Temperature		Unknown	

Establish Area-Group Relationships

Phase 2 of the model-by-loop-type process is to associate Experion PKS areas with Profit Loop PKS groups, based on your Preparation. Complete the following steps to do so.

Step	Action
1	If the Profit Loop PKS Assistant is not open, open it as explained in Profit Loop PKS Assistant Overview .
2	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click System Administration > Model by Loop Type > Model Area Map .
3	In the Model Area Map display, all areas defined in Experion PKS are listed. Locate the first area you have identified for Model by Loop Type and click the group number with which the area is to be associated.
4	Repeat step 3 for all areas identified during Preparation. Refer to internal documentation as needed. The first twenty areas you map are considered Area Set 0.
If you need to map more than 20 areas, go to step 5. Otherwise, go to step 7.	

Step	Action
5	If you have more than 20 areas, in the Area Set field (at the top of the display), select Area Set 1. These sets are merely to allow Profit Loop PKS Assistant to manage and display all of your areas in the Model Area Map display. It is recommended that you document these sets in your internal documentation.
6	Continue mapping (steps 3 – 5) for the remainder of the areas, selecting a new Area Set when necessary.
7	Continue with Define Loop Dynamics by Equipment Number .

Define Loop Dynamics by Equipment Number

Phase 3 of the model-by-loop-type process is to establish particular loop dynamics for particular loop types, for equipment in the groups you have defined in Establish Area-Group Relationships. Complete the following steps to do so.

Step	Action
1	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
2	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click System Administration > Model by Loop Type > Model Definition .
3	In the Model Definitions display, Group Number list, select the first group to be defined.
4	In the Equipment Number list, select the first equipment to be defined, as determined during Preparation. Refer to internal documentation as needed.
5	For each loop to be defined, enter loop dynamic values: • Gain • Normal DeadTime • Short DeadTime • Time Constant • Long DeadTime

Working with Profit Loop PKS

Define Model by Loop Type

Step	Action
	Note the following: • It is recommended that you document these details in your internal documentation. • Leave the default values for loop types that are not relevant to the group-equipment you have selected. • If you have an existing text file exported from Profit Loop PKS at a previous time or on another server, you can import the data as explained in Exporting and Importing Model Definitions.
6	Repeat steps 4 and 5 for all equipment numbers within the group.
7	Repeat steps 3 – 6 for all groups.
8	Continue with Define Character Strings for Automatic Loop Identification .

Define Character Strings for Automatic Loop Identification

Phase 4 of the model-by-loop-type process is optional, but can improve the efficiency of your configuration activities. Completing this phase allows you to automate loop identification for selected points. This is possible because you affiliate character strings, based on the point naming conventions at your plant, with particular loop types (also called “setting up Control Module name filters”). The Assistant will then identify the loop type of a selected point based on its name.

Note that if you choose not to define these strings, or want a selection other than that made by the Assistant, you can select the loop type “manually.”

Complete the following steps to define character strings for automatic loop identification.

Step	Action
1	Gather information about the point naming conventions at your plant, as they pertain to loops. For example, temperature-related points (which would be in a temperature loop) might have names that include the letters “TC,” or analyzer-related points might include the letters “AN.”
2	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .

Step	Action
3	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click System Administration > General Settings > Loop Type Filters .
4	In the Setup CM Name Filters for Loop Type display, for a needed loop type, enter the character strings you identified in step 1 (up to five filters). Use wildcard characters as follows: • * (asterisk): Represents any number of characters. • ? (question mark): Represents a single character. For example, entering *TC* in the Temperature row causes Profit Loop PKS Assistant to identify points named “3TC100” and “5TC201” as temperature loop points.
5	Repeat steps 3 and 4 for all loop types relevant to your process control environment.
6	Click the Apply button to save the definitions.
7	Continue with Use Model by Loop Type .

Use Model by Loop Type

Once you have completed phases 1 – 4 of the model-by-loop-type process, Model by Loop Type must be chosen for a selected PID-PL function block, and the definition evaluated and modified if warranted by existing circumstances. Complete the following steps to use Model by Loop Type for your model definition.

Step	Action
1	In Control Builder or Experion PKS Station display, select the PID-PL function block of interest.
2	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
3	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click Loop Type .
4	In the Loop Type display, either verify the information or make the needed selections: • Loop Type • Integrator • Is Valve

Step	Action
	Refer to the Profit Loop PKS Assistant <i>online Help</i> for details about these selections.
5	Once the loop type details are entered or verified, in the left menu, select Modeling Wizards > Model by Loop Type .
6	Evaluate all of the data on this display, and modify it if needed, to match your process conditions. The model details here are based on the entries you made in phase 3 for the selected loop type.
7	If you make modifications, but want to start again from the default model, click Reset To Default . The values defined on the Model Definition display will be re-entered on this display.
8	When you are satisfied with the model definition, proceed to Download a Model .

Define Model by Step Testing

If you have no model data from other sources (such as PID tuning constants or an existing Laplace model), and it is possible to perturb the process, use step-testing to create a model. Complete the steps in the following phases to define a model by step testing:

- Phase 1: Preparation
- Phase 2: Run the Step Test
- Phase 3: Evaluate Model by Step-Testing Results

Preparation

The first phase of defining a model by step testing is preparation. Complete the following steps to set up the conditions of the step test. This involves three procedures:

- Defining general settings for all step tests. See General step-testing settings.
- Defining settings specific to the PID-PL function block whose model you want to define. See Specific step-testing settings.
- Making advanced settings if desired. See Advanced step-testing settings.

General step-testing settings

Complete these steps to begin the set-up for Model by Step Testing.

Step	Action
1	If the PID-PL function block of interest has not been selected in Control Builder or Experion PKS Station display, select it.
2	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
3	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click System Administration > Model by Step-Testing .
4	For each loop type, enter the maximum number of minutes the step-test should run. Note that if the model parameters calculated by the identifier are still varying significantly, or the model quality is insufficient when this time is reached, the test will end.
5	From the Maximum Rank to Download list, select a ranking from 1 through 5 to indicate the maximum quality of model you will allow to be downloaded to the controller: • 1: Excellent • 2: Good • 3: Fair • 4: Poor • 5: No model This rank is calculated by the model identification algorithm. If quality is not high enough (as determined by this selection), step testing will continue.
6	If the loop type settings have not yet been made (or to change loop type), in the left menu, click Loop Type and go to the next step. Otherwise, skip to step 8.
7	In the Loop Type display, make the following settings: • Loop Type: Verify or select the needed loop type. • Integrator: If the loop is an integrator, select Yes. If it is not an integrator, select No. This setting determines whether the OP (Open Loop) variable is stepped or the SP (Closed Loop) variable is stepped. • Is Valve: If the loop is directly connected to the valve, select Yes. If this is a primary loop in a cascade scheme, select No.
8	Continue with Specific step-testing settings .

Specific step-testing settings

Complete these steps to continue the set-up for Model by Step Testing.

Step	Action
1	In the Profit Loop PKS Assistant left menu, click Modeling Wizards > Model by Step-Testing > Test Setup .
2	In the Model by Step-Testing Test Setup display, review the loop information (Loop Info) to ensure it is correct. Note: • If the Loop Info is not correct, click the Loop Type link and make needed changes on the Loop Type display. • If you click the link, click the Back button, , to return to the Test Setup display.
3	In the Test Setup display, review the Controller State information. Messages in this part of the display will alert you to errors. Note: • For an integrator, the controller Mode must be Auto. • For a controller that is not an integrator, the Mode must be Manual. • In both cases, the Mode Attribute must be Program. • If the controller mode and/or attribute are incorrect, click either of the corresponding links to access the Controller Status display. On this display, make the needed changes. • If you make these changes, click the Back button, , to return to the Test Setup display.
4	In the Test Type area: • From the Test Type list, select either PRBS or Manual. • Estimated Response Time: Enter an estimation of the response time in minutes. • If Test Type is PRBS, enter an Upper Bound and Lower Bound for the step test.
5	Optionally, continue with Advanced step-testing settings . If you do not need to define any advanced settings, then go to Run the Step Test .

Advanced step-testing settings

If desired, you can make advanced settings for Model by Step Testing. Complete these steps to define advanced options, thereby deviating from the Profit Loop PKS Assistant default values.

Step	Action								
1	On the Model by Step-Testing Test Setup display, click the Advanced Settings button on the right side of the display (under the Quick Tasks list). Or, in the left menu, click Modeling Wizards > Model by Step-Testing > Advanced .								
2	On the Model by Step-Testing Advanced display, change any of the following items: <table> <tr> <td>Step Test Settings</td><td>Model Type Settings</td></tr> <tr> <td>• Execution Frequency</td><td>• Desired Rank</td></tr> <tr> <td>• Move Filter</td><td>• Dead Time Search Method</td></tr> <tr> <td>• Maximum Testing Time</td><td>• Model Order</td></tr> </table> Refer to the Profit Loop PKS Assistant <i>online Help</i> for details about these items.	Step Test Settings	Model Type Settings	• Execution Frequency	• Desired Rank	• Move Filter	• Dead Time Search Method	• Maximum Testing Time	• Model Order
Step Test Settings	Model Type Settings								
• Execution Frequency	• Desired Rank								
• Move Filter	• Dead Time Search Method								
• Maximum Testing Time	• Model Order								
3	If you to return to the Profit Loop PKS Assistant defaults, click the Restore Defaults button. Otherwise, go to Run the Step Test .								

Run the Step Test

Phase 2 of the model-by-step-testing process is to run the test, which will be conducted based on your step-test Preparation. Complete the following steps to run the test.

Step	Action
1	If the PID-PL function block of interest has not been selected in Control Builder or Experion PKS Station display, select it.
2	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
3	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click Modeling Wizards > Model by Step-Testing > Running .
4	At the top of the Running display, select the graph details:

Step	Action
	• Current PV, SP, OP or Future OP or SP. • Timeframe of the graph. Refer to the Profit Loop PKS Assistant <i>online Help</i> for details about these selections.
5	If desired, change Estimated Response Time, and, if applicable Upper and/or Lower Bound values. Otherwise, go to step 6. These values were originally set on the Model By Step-Testing Test Setup display, but may be changed here. (If you do this, the Test Setup display will be updated to match.) Refer to the Profit Loop PKS Assistant <i>online Help</i> for details about these entries.
6	When all settings are complete, click Start Test button.
7	Monitor the step-test from the Step-Test Running or Results display. Note the status messages on Running display. If needed, you can pause the test/resume the test, or stop the test.
8	There are several ways the test may end: • If the model quality is sufficient (as defined on the System Administration > Model by Step Testing display) and a number of identifications indicate the test is not changing much, the test will stop and the Assistant will automatically bring up the Model Download display. • If the model quality is insufficient or the test is changing significantly, and the maximum test time is reached, the test will stop. • You can stop the test at any time by clicking the Stop button. A positive reason to do this would be when a sufficient number of steps have been performed, the model quality is 3 or less, and the predictability value is 0.5 or greater.
9	When a model is identified during the test, you can view results as explained in Evaluate Model by Step-Testing Results .
10	Once an acceptable model is obtained, go to the Model Downloads display to download the model. See Download a Model in this section for details.

Evaluate Model by Step-Testing Results

Phase 3 of the model-by-step-testing process is to evaluate the test results. Complete the following steps to evaluate the step-test. This procedure assumes that the test has just completed running.

Step	Action
1	In the Model by Step-Testing Running display, click the Show Results button. Optionally, in the left menu, click Modeling Wizards > Model by Step-Testing > Results .
2	Evaluate all details in the Model by Step-Testing Results display. A rank (CalcRank) of 3 or less, and a Predictability value of 0.5 or greater, is generally considered a fairly good model. For other details on the display contents, see the Profit Loop PKS Assistant online Help .
3	If you are satisfied with the model, download it by clicking the Download Model button, to access the Model Download display. Complete the process as explained in Download a Model

Download a Model

Profit Loop PKS Assistant within Experion PKS

When you download a model from the Profit Loop PKS Assistant, you are downloading to the controller. As with other types of changes to the controller, you can upload the controller configuration to store the changes in Control Builder's Monitor-side Engineering Repository Database (ERDB), and then perform an update to store the changes in the Project-side ERDB.



REFERENCE - INTERNAL

For details on downloading and uploading, see [Control Strategy Loading](#) in this document.

Working with Profit Loop PKS

Revert to a Previous Model

Downloading Procedure

Complete the following steps to download a model definition from Profit Loop PKS to the controller.

Step	Action
1	Define a model using one of these methods: - Define Model by Direct Entry - Define Model by Loop Type - Define Model using PID Tuning - Define Model by Step Testing
2	When you are satisfied with the model, click Model Download in the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display). Ensure that you know which type of model it is (refer to step 1).
3	In the To Download list, select the type of model to be downloaded.
4	Review the model information.
5	If desired, - Compare the model selected in step 3 to the model currently in the controller. - Compare all model definitions in the Assistant to the model in the controller.
6	If the model to be downloaded is satisfactory, click the Download Settings button.
7	In response to the confirmation message, click Yes to download the new model, or Cancel if you do not want to download the model.

Revert to a Previous Model

Description

You can take different actions, depending on the situation, to revert to a previously downloaded or defined model:

- Retrieve one of the past ten models downloaded; see Retrieve Historical Model.
- Save and restore a particular set of model definitions; see Create Grades and Restore Grades

- Note that if you converted a PID block to a PID-PL block and do not like the results, you can retrieve the PID block configuration; see Reverting to a PID Block.

Retrieve Historical Model

Complete the following steps to retrieve one of the past ten models downloaded to a controller.

Step	Action
1	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
2	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click Model Download > History .
3	In the list of downloaded models, select the desired model.
4	Click the Load to Wizard button. The model will be imported into the Profit Loop PKS Assistant and the details will be added to the corresponding modeling wizard.
5	Confirm the model details presented at the bottom of the display. If needed, go to the corresponding Modeling Wizard display and make modifications.
6	When the model is acceptable, it can be downloaded to a controller as explained in Download a Model .

Create Grades

You can save any of the models currently configured in the Profit Loop PKS Assistant, or running in a controller, and associate them with grades of product (or particular products). This can be useful if you produce different grades (or types) of product, each requiring a different model. Each “grade” is a complete model definition. For details on this feature, refer to the Profit Loop PKS Assistant online Help.

Complete the following steps to create a set of grades.

Step	Action
1	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
2	Use the Modeling Wizards to define a model(s) that you want to save.
3	If you want to save the model definition from a particular controller, select the PID-PL function block of interest in Control Builder or Experion PKS Station

Working with Profit Loop PKS

Revert to a Previous Model

Step	Action
	display.
2	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click Model Download > Grades > Creating .
3	In the Grades list in the middle of the display (<i>not</i> the Grades Available table), select the number of the next available grade. For the first grade, select 1.
4	Enter a short name and a description (up to 100 characters) for the grade.
5	In the Current Models list, select the model type you want to associate with this grade. To choose the model from the controller, select Current Model .
6	Review the model summary at the bottom of the display. If needed, go to the appropriate Modeling Wizards display and refine the model. In this case, you will need to begin this procedure after you are finished.
7	Click Save Grade to save the definition and add it to the Grades Available table.
8	Repeat this procedure for all models to be saved.

Restore Grades

Complete the following steps to restore a model definition that has been saved as a grade.

Step	Action
1	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
2	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click Model Download > Grades > Restoring .
3	In the Grades Available list, select the grade you want to restore. Details of the selected grade display in the bottom of the display.
4	Review the grade details to ensure they match the model definition you are seeking.
5	Click the Model to Wizard button. The model will be imported into the Profit Loop PKS Assistant and the details will be added to the corresponding modeling wizard.

Modify Grade Name or Description

Complete the following steps to revise a grade name or description.

Step	Action
1	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
2	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click Model Download > Grades > Restoring .
3	In the Grades Available list, select the grade whose name and/or description are to be revised.
4	Click the Edit Name/Desc button.
5	In the Name and/or Description fields, make needed changes.
6	Click the Save Name/Desc button.

Exporting and Importing Model Definitions

If you have many controllers in different areas of your plant, and similar tuning constants can be used across these areas, it may simplify your work effort to export definitions and then import them on various servers.

Export Model Definitions

Complete the following steps to export model definitions.

Step	Action
1	In Profit Loop PKS Assistant , select System Administration > Model Definitions from the left menu.
2	If you have not yet defined a set of definitions for each loop type, do so as explained in Define Model by Loop Type , particularly Define Loop Dynamics by Equipment Number .
3	On the Model Definitions display, click Export .
4	In the resulting Export dialog box, select the group numbers to export, then click Choose File .
5	In the resulting dialog box, select the drive and folder location to which the file should be saved, enter the file name, then click Save File . The selected

Step	Action
	group definitions will be saved to the file specified, and the extension ".ini" will be appended to the file.

Import Model Definitions

If you have exported model definitions as explained in Exporting and Importing Model Definitions, complete the following steps to import them into Profit Loop PKS.

Step	Action
1	In Profit Loop PKS Assistant , select System Administration > Model Definitions from the left menu.
2	Identify the location of the model definitions file (a text file with an extension of ".ini") from another source. If needed, see Export Model Definitions .
3	In the left menu, select System Administration > Model Definitions .
4	On the Model Definitions display, click Import .
5	In the resulting Import dialog box, select the needed drive, folder, and file, then click Open File .
6	The group and equipment numbers defined in the file will display. Select the needed group and equipment numbers to be imported, then click Import . The definitions will be imported into this instance of Profit Loop PKS Assistant .

Copying Model Definitions

Complete the following steps to copy model definitions.

Step	Action
1	In Profit Loop PKS Assistant , select System Administration > Model Definitions from the left menu.
2	If you have not yet defined a set of definitions for each loop type, do so as explained in Define Model by Loop Type , particularly Define Loop Dynamics by Equipment Number .
3	Select a group and equipment number to be copied, click the Copy button.
4	In the resulting Copy dialog box, note that your selection is entered in the Source area.
5	Review the options in this dialog box.
6	To copy a group to multiple destinations, click the Copy Entire Group option.
	ATTENTION Selecting this option, causes the values for the equipment numbers in the group number selected to be copied to every equipment number for each group number selected as a Destination.
7	If the source equipment and group number values need to be copied to specific equipment numbers in specific groups: a) Select the Copy Entire Group option. b) Select the Destination Group numbers. c) Select the Copy Only Equip option. d) Select the Destination equipment numbers.
8	When the copy selections for source and destination have been made, click Copy .

Tune a PID-PL-based Controller

Description

The Profit Loop PKS Assistant includes two tuning wizards for adjusting the tunable parameters of the controller:

- Tune as PID
-

Fine Tune a Controller

In addition, you can read valve-related guidelines as explained in Obtain Valve Details.

Tune as PID

You can enter PID tuning constants, which will be automatically converted to PID-PL model coefficients. Use this method to determine the model for your controller by tuning it as a PID loop if you are more comfortable with PID tuning constants.

Complete the following steps to enter PID tuning constants.

Step	Action
1	If the PID-PL function block of interest has not been selected in Control Builder or Experion PKS Station display, select it.
2	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
3	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click Tuning Wizards > Tune as PID .
4	Adjust Gain, Integral Time, and Derivative Time values as needed. The Assistant automatically converts the data to the Laplace model needed by the controller. Make other settings on the display as needed. Refer to the Profit Loop PKS Assistant’s online Help for display details.
5	Evaluate the graph on the display to assess your entries.
6	If further adjustment is needed, see Fine Tune a Controller in this section.
7	When satisfied with your entries, click the Download Model button to download the new settings to the controller. In response to the resulting confirmation message, click Yes to download the model.

Fine Tune a Controller

You can enter specific tuning parameters for a PID-PL loop to assist in refining your model.

Complete the following steps to fine tune a controller

Step	Action
1	If the PID-PL function block of interest has not been selected in Control Builder or Experion PKS Station display, select it.
2	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
3	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click Tuning Wizards > Fine Tune .
4	Make settings as needed. Refer to the Profit Loop PKS Assistant’s online Help for display details.
5	If desired, you can retrieve the controller settings after you have made changes in this display. To do so, click the From Controller button.
6	When satisfied with your entries, click the Download Settings button to download the new settings to the controller.
7	In response to the confirmation message, click Yes to download the settings or No to cancel.

Obtain Valve Details

For suggestions on dealing with valves, access the Valve Problems display.

Step	Action
1	If the PID-PL function block of interest has not been selected in Control Builder or Experion PKS Station display, select it.
2	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
3	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click Tuning Wizards > Tune – Valve Problem .
4	Read the suggestions and take corrective action as needed.

Troubleshoot a PID-PL-based Controller

Description

If you have a controller configured with Profit Loop PKS, and it is performing poorly, you can use the Profit Loop PKS Assistant to troubleshoot the controller. Tools available include:

- Valve Doctor
- Loop Analysis

Use the Valve Doctor

The Valve Doctor uses online Experion PKS history if it is available, or collects its own data from the controller while the Profit Loop Assistant is open with the controller selected. These data are used to determine whether or not the valve is sticky.

Step	Action
1	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
2	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click Tools to open the Tools group .
3	If the controller is a flow or pressure loop with outputs to a valve, and is being operated in a closed loop, click Valve Doctor in the Tools group (this menu item will not be available unless the proper type of loop is identified). The Valve Doctor analysis begins when you start the Assistant. The analysis is active whenever the button on this display is labeled “ Stop Analysis .” If the analysis is stopped, click Restart Analysis to start again.
4	Check the More Data entry. If it is 1, more data is needed before the analysis will be valid. To perform analysis, the Valve Doctor needs 1 hour of fast-sampled (faster than 5 seconds) PV, OP, and SP closed-loop operational data. This data may or may not exist in the server history. If the entry is 1, check the More Data Left entry to determine how many more minutes of data are needed.
5	If more data is not needed, the More Data entry will be 0. See the Profit Loop PKS Assistant online Help for more information on the More Data entries.
6	When sufficient, good data is indicated, evaluate the Valve Doctor’s evaluation of valve stickiness:

Working with Profit Loop PKS

Troubleshoot a PID-PL-based Controller

Step	Action
	• Sticky Probability: High, medium, or low (or unknown) probability that valve stiction exists. • OP Sticky: Indicates how sticky a valve is. Entry is in the same units as the OP. For example, if the OP is a percentage between 0 and 100, then this number is normally between 0.3% and 2% for a typical sticky valve. • PV Sticky: PV stickiness caused by valve stiction, in the same units as the PV.
7	If the probability is High, and the OP and/or PV stickiness readings indicate a problem, check the valve and take corrective action as needed. For general guidelines on dealing with valves, see Obtain Valve Details in this document.

Use Loop Analysis

Loop Analysis provides an indication of loop health. The analysis consists of calculations for the following:

- Oscillation detection
- Valve-sizing problem detection
- PV resolution detection

Loop Analysis uses the best available existing data for the different calculations. The analysis is automatically performed when the Profit Loop PKS Assistant is started and the loop is determined to send its output to a valve.

Complete the following steps to analyze a loop.

Step	Action
1	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
2	In the Profit Loop PKS Assistant "left menu" (the menu on the left side of the display), click Tools > Loop Analysis .
3	Evaluate the display contents, referring to the Profit Loop PKS Assistant online Help for details about the entries. Note that for this release, the Valve Travel Calculation and PV OP Variance Calculation are not used
4	If problems are identified by the Loop Analysis, make corrections as needed.

Controlling Access to Profit Loop PKS

Description

Security, based on Experion PKS role, can be configured to control access to Profit Loop PKS displays. Access can be allowed or denied for roles other than the administrative role, on per-display basis.

Complete the following steps to set access.

Step	Action
1	If the Profit Loop PKS Assistant is not open, open it as explained in Starting the Assistant .
2	In the Profit Loop PKS Assistant “left menu” (the menu on the left side of the display), click System Administration > General Settings > Security .
3	For each of the Assistant’s displays, enter the required security level (Experion PKS role), and whether or not access is allowed. Or, if desired, select a display, then make your settings in the Security for Selected Tool area of the display.
4	When finished, click the Apply button.

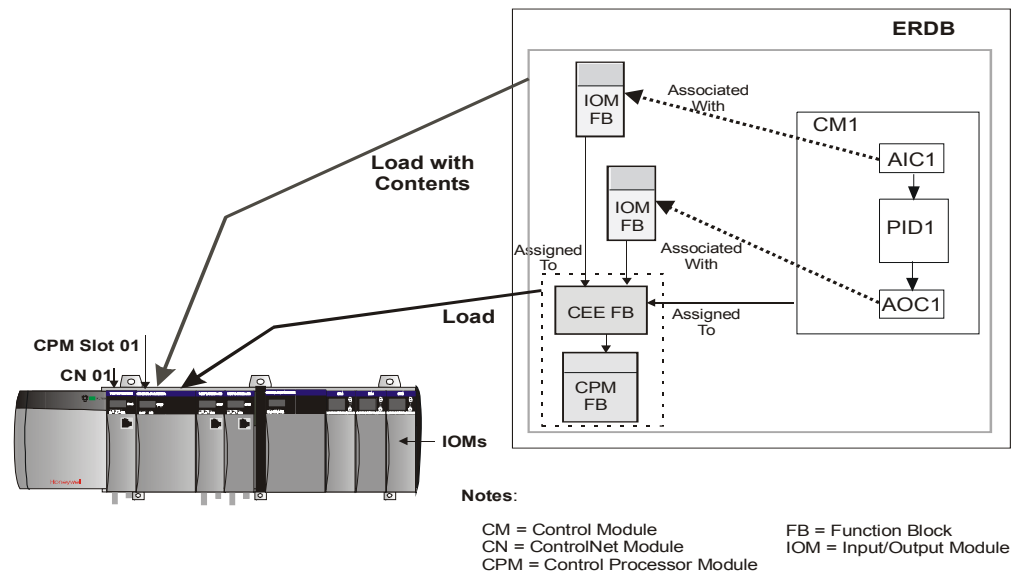
Control Strategy Loading

Overview

About load operations

The system provides the ability to build control strategies offline, without being connected to the actual field components. The process of transferring the Control Strategy to the "live" working components in the field is called the load operation.

The load operation functionally copies configuration data from the control strategy that is stored in the Engineering Repository Database (ERDB) to the assigned field component in the system architecture. It indirectly assures that the planned system matches the actual one. The communication addresses and physical location assignments specified for components through Control Builder configuration must match the actual addresses and locations of components in the system. The following illustration shows a simplified graphical representation of what happens during a load operation.



Loaded versus Project database versions

The master control strategy stored in the Engineering Repository Database (ERDB) is configured and edited through the Project tree. Once the contents of the control strategy are loaded from Project to the applicable components a loaded version of the Project or master database is created. The loaded version of the database is only viewable through the Monitoring tree and only supports minimal editing of the Control Strategy configuration data.

The following commands are included in the Control Builder Tools menu to synchronize data in the loaded database with the data in the Project/master database.

- Update to Project
- Update with Contents (to Project)

See the on-line help for information about these commands.

Load initiation and Load Dialog box

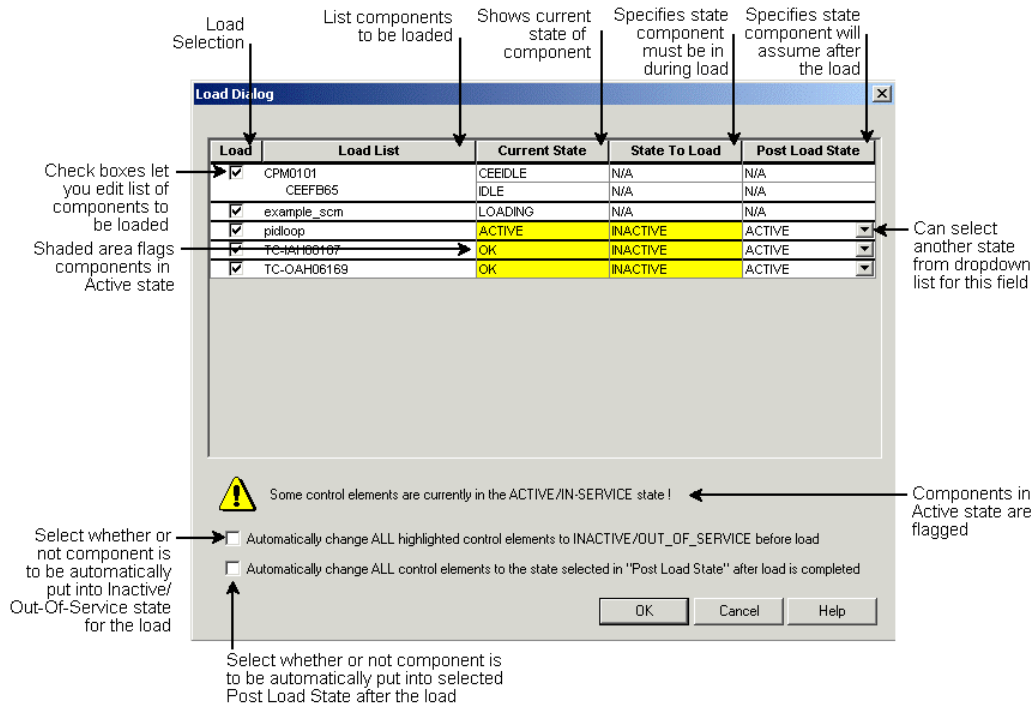
You can initiate a load function for selected components from either the Project tree or Monitoring tree using one of the following commands in the Control Builder Tools menu.

- Load
- Load with Contents

Either command invokes the Load Dialog box. The following figure shows a sample Load Dialog box invoked for a load with contents operation for a CPM. It provides a brief description of the dialog box features for quick reference. The appearance of the dialog box will vary depending on the current load circumstances such as whether this is an initial load or a re-load operation.

CAUTION

The load operation is still an offline function. The Load Dialog box provides the ability to automatically inactivate a component during a load and then return the component to its active state. Do **not** use this automatic inactivate/activate function, if your process **cannot** tolerate the load disruption and consequent delay in activation. In this case, you must manually toggle the component state through the Monitoring tab in Control Builder.



Load action with compare parameters function

The capability of the load action is expanded when the Use Compare Parameters function is enabled through the System Preferences dialog. Please refer to the following [Using Compare Parameters](#) section for more information.

Load options for Server History and Server Displays configuration

You can enable or disable the loading of history, trend, or group configuration data for a block to Server through the System Preferences dialog. Please refer to the Setting System Preferences section for more information.

Control Strategy Loading

Overview

Initial load order guidelines

Make the initial load of control strategy components from the Project tab in the following order to minimize possible load interaction generated error messages. Use the Load rather than the Load with Contents command.

Order	Component
1	Control environment components such as: CPM/CEE ACE/CEE SCE/CEE
2	Input/Output interface components such as: FIM/LINK IOLIM/IOLINK SIMIOLIM/SIMIOLINK
3	Redundancy related components such as: CPM (secondary) IOLIM (secondary) RM (primary and secondary)
4	Fieldbus devices
5	Input/Output Processors (IOPs)
6	Input/Output Modules (IOMs)
7	Control Modules (CMs) and/or Sequential Control Modules (SCMs)

Component deletion considerations

Control Strategy edits must be performed from the Project Tree only.

- Deleting blocks from the Project Tree eliminates them from the Project version of the database only. Only blocks that are not loaded can be deleted. Delete loaded blocks from the Monitoring Tree first before deleting them from the Project Tree.
- Deleting blocks from the Monitoring Tree eliminates them from the controller, Server and loaded version of the database. The blocks remain in the Project version of the database.



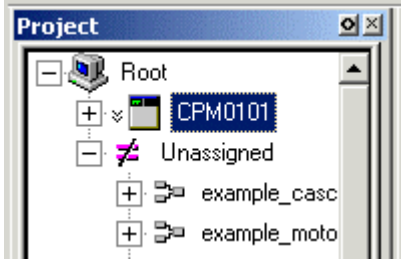
ATTENTION

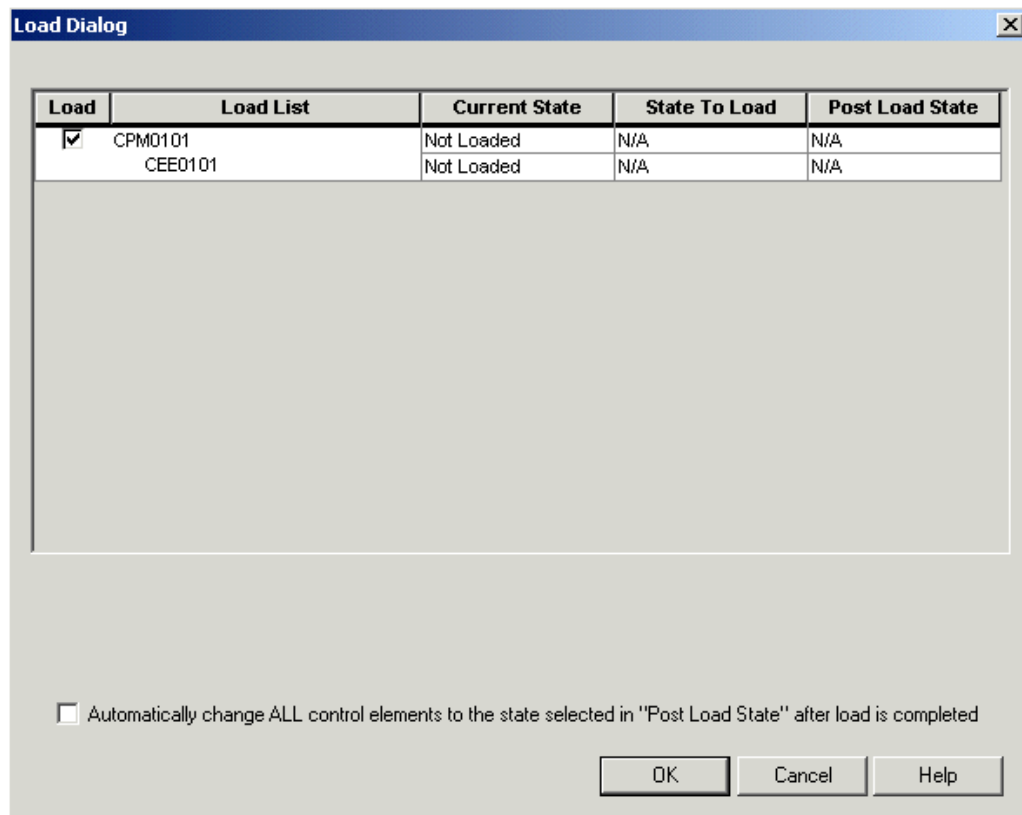
Changes to parameters in the controller can be made from the Monitoring Tree. See [Changing Parameters while Monitoring](#) in the *On-line Monitoring using Control Builder* section.

Loading Control Strategy Components

Loading CPM/CEE

Use the following general procedure to load a Control Processor Module and its associated Control Execution Environment (CEE). The load procedure is similar for all control environment related components. This procedure assumes that the Control Processor Module is installed and capable of communicating with the Server. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	Click desired CPM block icon in Project tab.	Selects and highlights the component. 
2	Click Tools->Load. Or, click the  load button in the toolbar.	Calls up Load Dialog box



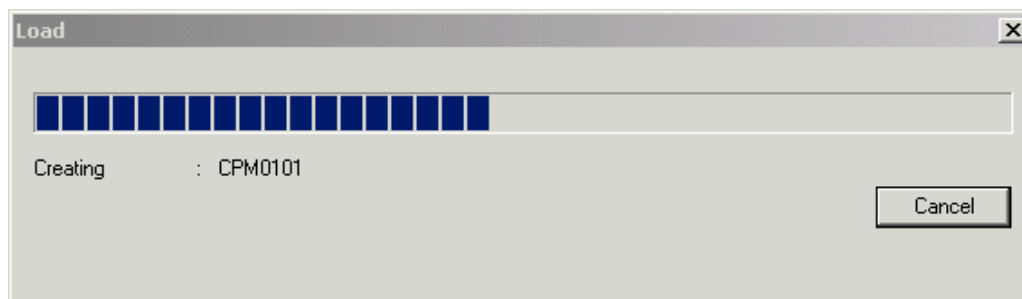
The Load Dialog window features a table with five columns: Load, Load List, Current State, State To Load, and Post Load State. The first row is selected, showing 'CPM0101' and 'CEE0101' in the Load List, both with a 'Not Loaded' current state and 'N/A' for both target and post-load states. Below the table is an unchecked checkbox labeled 'Automatically change ALL control elements to the state selected in "Post Load State" after load is completed'. At the bottom right are 'OK', 'Cancel', and 'Help' buttons.

Load	Load List	Current State	State To Load	Post Load State
☒	CPM0101	Not Loaded	N/A	N/A
	CEE0101	Not Loaded	N/A	N/A

☐ Automatically change ALL control elements to the state selected in "Post Load State" after load is completed

OK Cancel Help

- 3** With load check box checked, click the OK button. Initiates the load to the CPM and calls up the load progress dialog.



The Load progress dialog shows a progress bar with 15 blue segments. Below it, the text 'Creating : CPM0101' is displayed. A 'Cancel' button is located at the bottom right.

Creating : CPM0101

Cancel

Control Strategy Loading

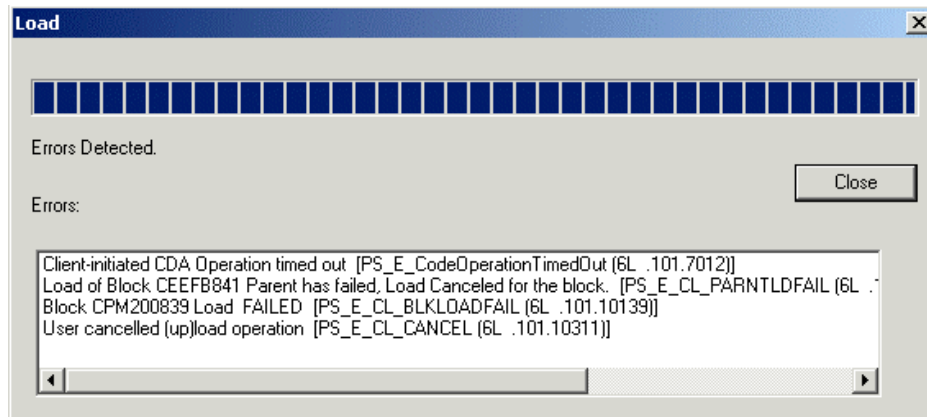
Loading Control Strategy Components



TIP

You can also check load progress through the four-LED display on the front panel of the Control Processor Module. The display changes from NODB to NOEE to IDLE upon a successful Load.

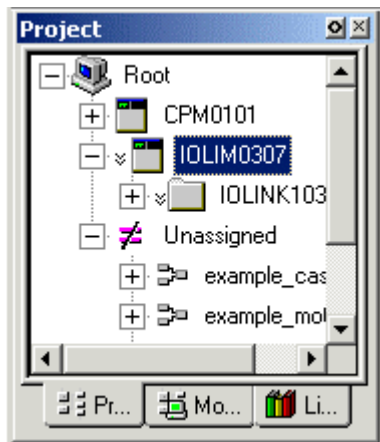
If errors are detected, they will be displayed in the Load progress dialog and you will be asked if you want to continue the load or cancel, depending on the nature of the error. We suggest that you cancel the load and identify and fix the errors. The following illustration shows how error messages are typically displayed. Each message includes an error code in parentheses. Note the last number in the string. In some cases, more information about the code number may be included in the Control Builder Notifications Reference document in Knowledge Builder.



-
4	Once the load completes and the dialog box closes, click the Monitoring tab.	CPM/CEE icons now appear in Monitoring tab. The default state for a loaded CPM/CEE is inactive/idle or color code blue.
5	See the Activating the CEE section in this document to set the CPM to its Run state.	CPM/CEE icons turn green when active.
6	Repeat this procedure for other control components as required.	
-

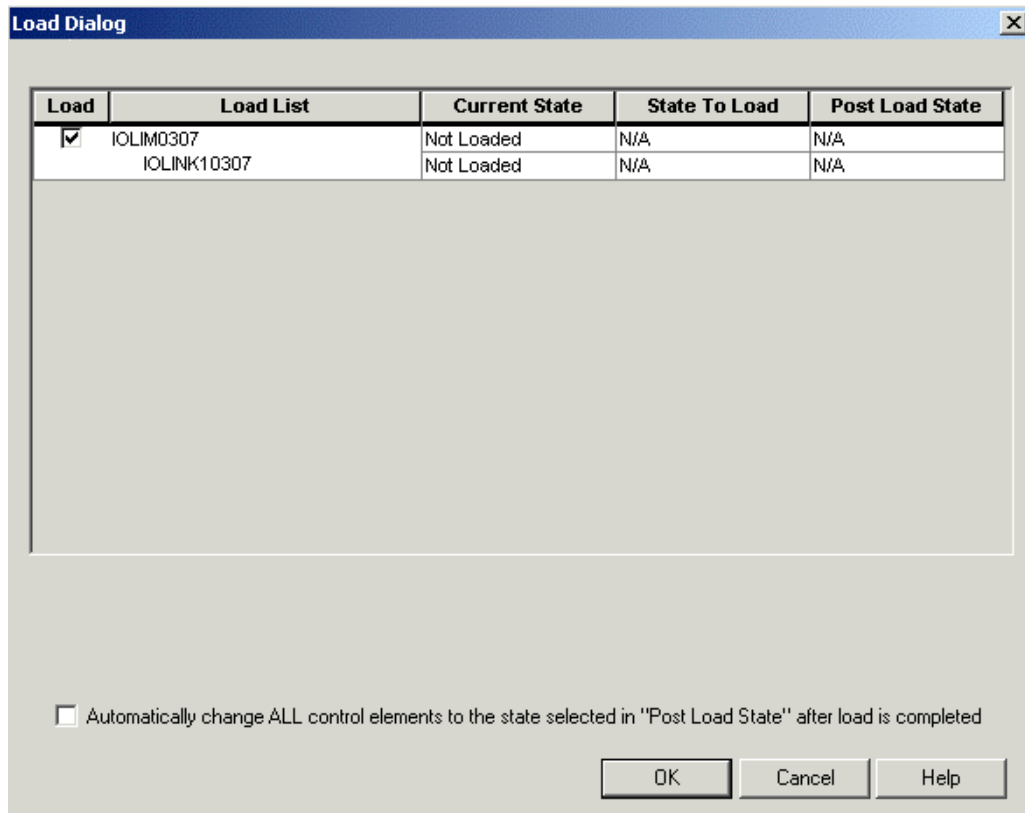
Loading IOLIM/IOLINK

Use the following general procedure to load an I/O Link Interface Module (IOLIM) and its associated I/O Link (IOLINK). The load procedure is similar for all I/O interface related components. This procedure assumes that the IOLIM is installed and capable of communicating with the Server. The illustrations used in this procedure are for example purposes only.

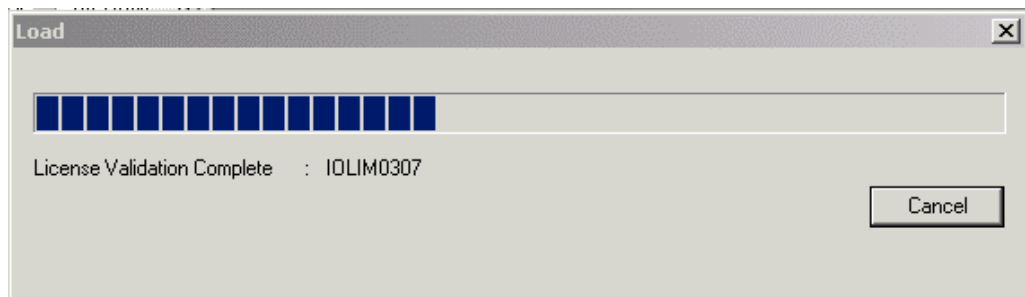
Step	Action	Result
1	Click desired IOLIM block icon in Project tab.	Selects and highlights the component.
		
2	Click Tools->Load. Or, click the  load button in the toolbar.	Calls up Load Dialog box

Control Strategy Loading

Loading Control Strategy Components



- 3** With load check box checked, click the OK button. Initiates the load to the IOLIM and calls up the load progress dialog.





TIP

You can also check load progress through the four-LED display on the front panel of the I/O Link Interface Module. The display changes from NODB to NOEE to OK upon a successful Load.

If errors are detected, they will be displayed in the Load progress dialog and you will be asked if you want to continue the load or cancel, depending on the nature of the error. We suggest that you cancel the load and identify and fix the errors. Each message includes an error code in parentheses. Note the last number in the string. In some cases, more information about the code number may be included in the *Control Builder Notifications Reference* document in Knowledge Builder.

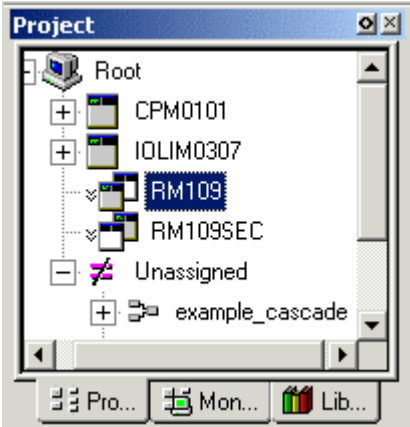
-
4	Once the load completes and the dialog box closes, click the Monitoring tab.	IOLIM/IOLINK icons now appear in Monitoring tab. The default state for a loaded IOLIM/IOLINK is active or color code green.
5	Repeat this procedure for other I/O interface components as required.	
-

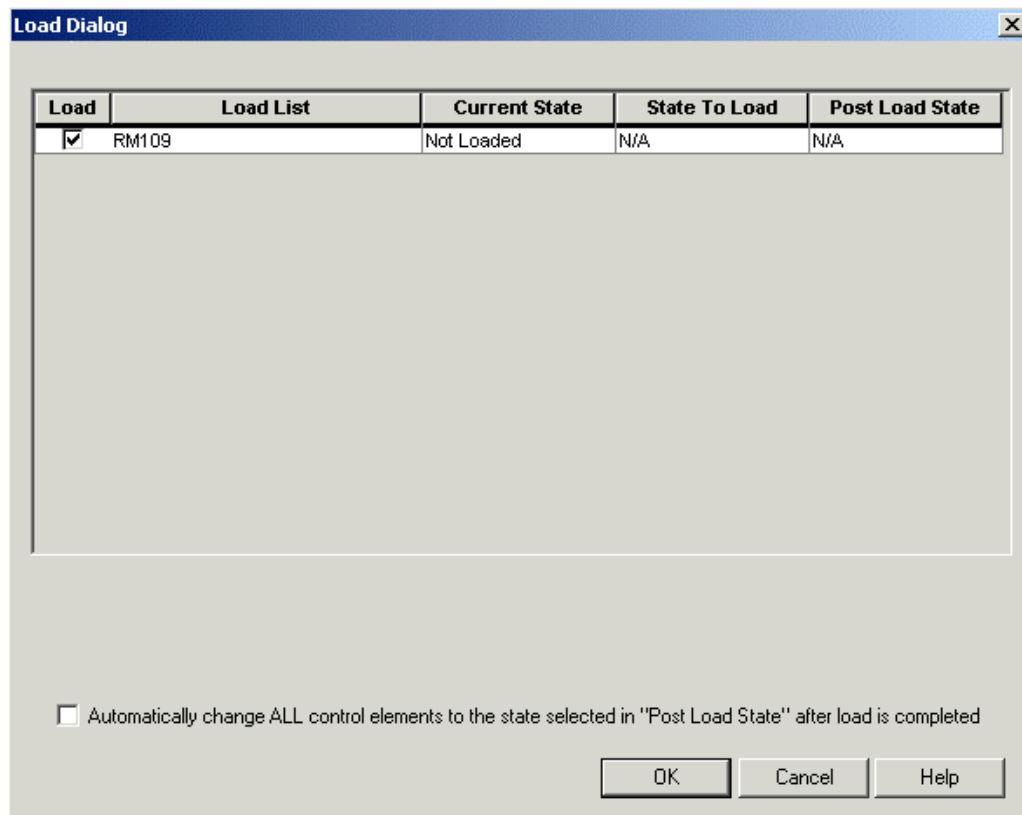
Control Strategy Loading

Loading Control Strategy Components

Loading RM

Use the following general procedure to load a Redundancy Module (RM) and its associated secondary Redundancy Module. The load procedure is similar for all primary and secondary redundant components. This procedure assumes that the RM and matching pair are installed and capable of communicating with the Server. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	Click desired primary RM block icon in Project tab.	Selects and highlights the component. 
2	Click Tools->Load. Or, click the  load button in the toolbar.	Calls up Load Dialog box

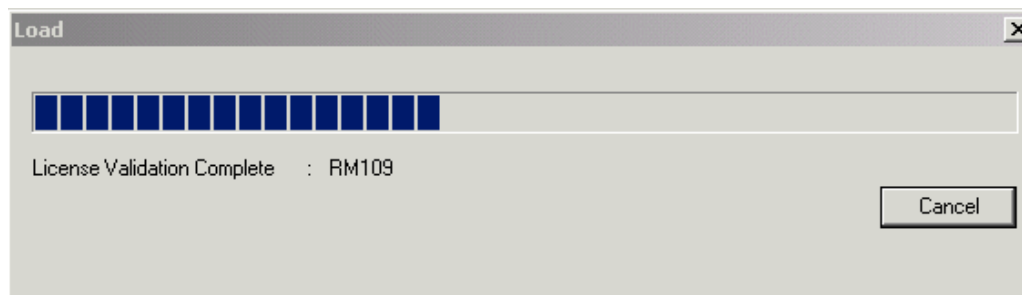


The "Load Dialog" window contains a table with the following data:

Load	Load List	Current State	State To Load	Post Load State
☒	RM109	Not Loaded	N/A	N/A

Below the table is a checkbox labeled "Automatically change ALL control elements to the state selected in 'Post Load State' after load is completed". At the bottom right are three buttons: "OK", "Cancel", and "Help".

- 3** With load check box checked, click the OK button. Initiates the load to the primary RM and calls up the load progress dialog.



The "Load" progress dialog shows a progress bar with 12 segments, all of which are filled with blue. Below the progress bar, the text "License Validation Complete : RM109" is displayed. A "Cancel" button is located at the bottom right.

Control Strategy Loading

Loading Control Strategy Components



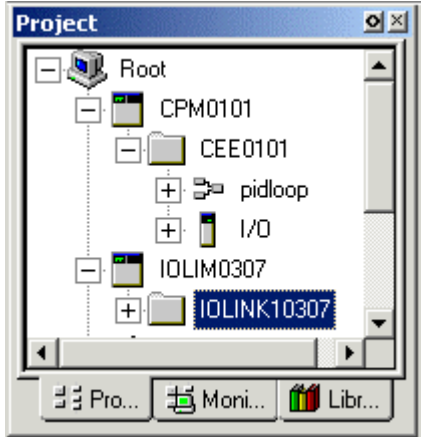
TIP

If errors are detected, they will be displayed in the Load progress dialog and you will be asked if you want to continue the load or cancel, depending on the nature of the error. We suggest that you cancel the load and identify and fix the errors. Each message includes an error code in parentheses. Note the last number in the string. In some cases, more information about the code number may be included in the *Control Builder Notifications Reference* document in Knowledge Builder.

4	Once the load completes and the dialog box closes, click the Monitoring tab.	Primary RM icon now appears in Monitoring tab. The default state for a loaded RM is inactive or color code blue.
5	Repeat Steps 1 to 4 for the secondary RM. Select the secondary RM icon in place of the primary one.	Both primary and secondary RM icons appear in the Monitoring tab.
-

Loading IOP

Use the following general procedure to load an Input/Output Processor (IOP). The load procedure is similar for all I/O signal-handling components. This procedure assumes that the IOLINK and IOP are installed and capable of communicating with the Server. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	Click desired IOLINK block icon in Project tab.	Selects and highlights the component. 
2	Click Tools->Load with Contents	Calls up Load Dialog box

Control Strategy Loading

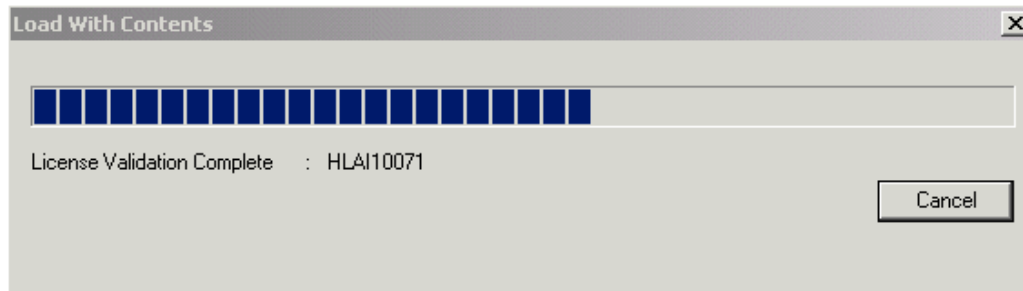
Loading Control Strategy Components

The Load Dialog window contains a table with the following data:

Load	Load List	Current State	State To Load	Post Load State
☒	IOLINK10307	ONLINE	N/A	N/A
☒	HLA110071	Not Loaded	IDLE	RUN

Below the table is a checkbox labeled "Automatically change ALL control elements to the state selected in 'Post Load State' after load is completed". At the bottom right are three buttons: "OK", "Cancel", and "Help".

-
- 3** Be sure load check boxes are checked for components to be loaded. Click component to remove/insert check mark. Click the OK button. Initiates the sequential load to the selected components and calls up the load progress dialog.
-



TIP

If errors are detected, they will be displayed in the Load progress dialog and you will be asked if you want to continue the load or cancel, depending on the nature of the error. We suggest that you cancel the load and identify and fix the errors - unless you know the error is due to missing hardware that is scheduled to be installed later. Each message includes an error code in parentheses. Note the last number in the string. In some cases, more information about the code number may be included in the *Control Builder Notifications Reference* document in Knowledge Builder.

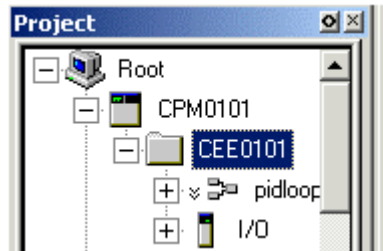
-
4	Once the load completes and the dialog box closes, click the Monitoring tab.	IOP icon now appears in Monitoring tab. The default state for a loaded IOP is active or color code green.
5	Repeat this procedure to install other IOPs.	
-

Control Strategy Loading

Loading Control Strategy Components

Loading IOM

Use the following general procedure to load an Input/Output Module (IOM). The load procedure is similar for all I/O signal-handling components. This procedure assumes that I/O Modules are installed and capable of communicating with the Server. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	Click desired CEE block icon in Project tab.	Selects and highlights the component. 
2	Click Tools->Load with Contents	Calls up Load Dialog box

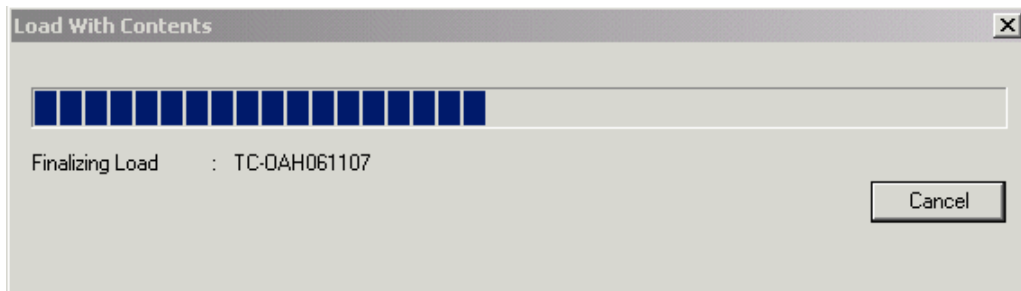
Load	Load List	Current State	State To Load	Post Load State
☒	CEE0101	IDLE	N/A	N/A
☒	pidloop	Not Loaded	INACTIVE	ACTIVE ▼
☒	TC-IAH061105	Not Loaded	INACTIVE	ACTIVE ▼
☒	TC-OAH061107	Not Loaded	INACTIVE	ACTIVE ▼

☐ Automatically change ALL control elements to the state selected in "Post Load State" after load is completed

- 3**
- Be sure load check boxes are checked for components to be loaded. Click a component to remove/insert a check mark.
 - Be sure no Control Module blocks are Checked. Click the OK button.
- Initiates the sequential load to the selected components and calls up the load progress dialog.

Control Strategy Loading

Loading Control Strategy Components



TIP

If errors are detected, they will be displayed in the Load progress dialog and you will be asked if you want to continue the load or cancel, depending on the nature of the error. We suggest that you cancel the load and identify and fix the errors. Each message includes an error code in parentheses. Note the last number in the string. In some cases, more information about the code number may be included in the *Control Builder Notifications Reference* document in Knowledge Builder.

-
4	Once the load completes and the dialog box closes, click the Monitoring tab.	IOM icon now appears in Monitoring tab. The default state for a loaded IOM is inactive or color code blue.
5	See the Activating the CEE section in this document to set the IOM to its Run state.	IOM icon turns green when active.
6	Repeat this procedure to install other IOMs.	
-

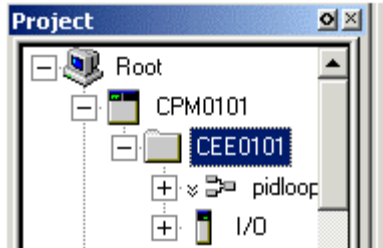
Loading CM

Use the following general procedure to load a Control Module or Sequential Control Module. The load procedure is similar for all container type components. This procedure assumes that the CPM is installed and capable of communicating with the Server. The illustrations used in this procedure are for example purposes only.



ATTENTION

Before attempting to load any CM or SCM components, be sure its control chart is **not** open in Control Builder.

Step	Action	Result
1	Click desired CEE block icon in Project tab.	Selects and highlights the component. 
2	Click Tools->Load with Contents	Calls up Load Dialog box

Control Strategy Loading

Loading Control Strategy Components

Load Dialog

Load	Load List	Current State	State To Load	Post Load State
☒	CEE0101	IDLE	N/A	N/A
☒	pidloop	Not Loaded	INACTIVE	ACTIVE
☒	TC-IAH061105	OK	INACTIVE	ACTIVE
☒	TC-OAH061107	OK	INACTIVE	ACTIVE

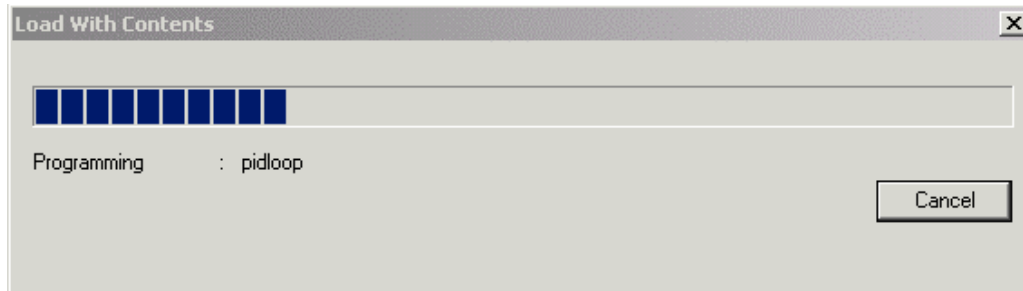
 Some control elements are currently in the ACTIVE/IN-SERVICE state !

☐ Automatically change ALL highlighted control elements to INACTIVE/OUT_OF_SERVICE before load

☐ Automatically change ALL control elements to the state selected in "Post Load State" after load is completed

OK Cancel Help

- 3
- Be sure only load check boxes for CMs or SCMs are checked for components to be loaded. Click a component to remove/insert a check mark.
 - Be sure to click appropriate automatic change selections, if loads are made to active installed components. Click the OK button.
- Initiates the sequential load to the selected components and calls up the load progress dialog.
-



TIP

If errors are detected, they will be displayed in the Load progress dialog and you will be asked if you want to continue the load or cancel, depending on the nature of the error. We suggest that you cancel the load and identify and fix the errors. Each message includes an error code in parentheses. Note the last number in the string. In some cases, more information about the code number may be included in the *Control Builder Notifications Reference* document in Knowledge Builder.

4	Once the load completes and the dialog box closes, click the Monitoring tab.	CM icon now appears in Monitoring tab. The default state for a loaded CM is inactive or color code blue.
5	See the Activating the CEE section in this document to activate the CM.	CM icon turns green when active.
6	Repeat this procedure to install other CMs or SCMs.	

Re-Loading components

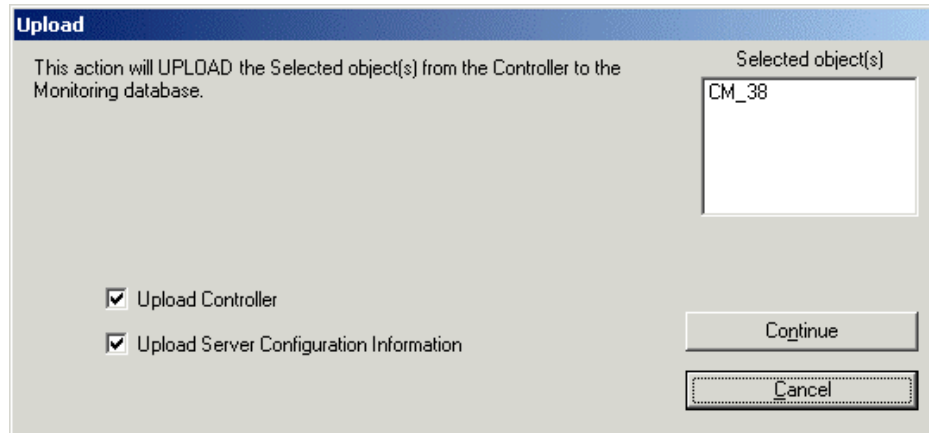
You can use the applicable previous load procedure to re-load data to components from the Project or Monitor tab. It is good idea to invoke the following commands through the TOOLS menu after a re-load operation.

- Update to Project
- Upload

Using Upload Command

Use the following procedure as a guide to initiate an **Upload** command.

Step	Action
1	In Monitoring tree, click icon for tagged object such as Control Module (CM) or Sequential Control Module (SCM)
2	In Tools menu, click Upload . Or, right-click the icon and select Upload from the shortcut menu.



- 3 In **Upload** dialog,
 - be sure the **Upload Controller** check box is checked (default selection), if you want to upload data for the selected object from the Controller to the Monitoring Engineering Repository Database (ERDB). Clear the check box to disable the upload of data from the Controller.
 - be sure the **Upload Server Configuration Information** check box is checked (default selection), if you want to upload data for the selected object from the Experion PKS Server to the ERDB. Clear the check box to disable the upload of data from the Server.
- 4 In **Upload** dialog, click the **Continue** button to initiate the upload.



ATTENTION

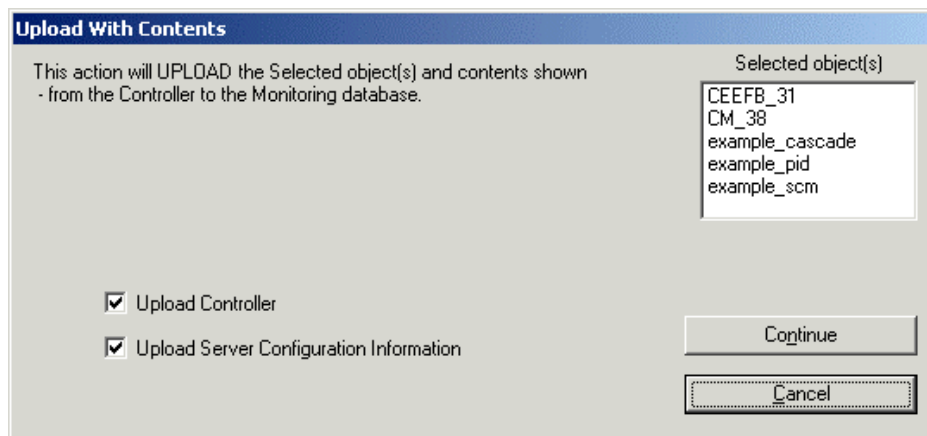
- When **Upload Server Configuration information** check box is checked, configuration data uploaded from the Experion PKS Server database overwrites any existing configuration data in the Monitoring ERDB. This

Step	Action
	includes information configured through the Server History and Server Display configuration forms for the tagged object in the Project tree. To transfer configuration data uploaded to the Monitoring ERDB to the Project ERDB, click Tools->Update to Project with object icon selected in Monitoring tree.
5	Repeat these Steps to upload data for other tagged objects.

Using Upload With Contents Command

Use the following procedure as a guide to initiate an **Upload With Contents** command.

Step	Action
1	In Monitoring tree, click icon for Control Execution Environment function block, such as CEEFBxx.
2	In Tools menu, click Upload With Contents . Or, right-click the icon and select Upload With Contents from the shortcut menu.



- 3** In **Upload With Contents** dialog,
- be sure the **Upload Controller** check box is checked (default selection), if you want to upload data for the selected object(s) from the Controller to the Monitoring Engineering Repository Database (ERDB). Clear the

Step	Action
	check box to disable the upload of data from the Controller.
	be sure the Upload Server Configuration Information check box is checked (default selection), if you want to upload data for the selected object(s) from the Experion PKS Server to the ERDB. Clear the check box to disable the upload of data from the Server.
4	In Upload With Contents dialog, click the Continue button to initiate the upload.
	ATTENTION
	- When Upload Server Configuration information check box is checked, configuration data uploaded from the Experion PKS Server database overwrites any existing configuration data in the Monitoring ERDB. This includes information configured through the Server History and Server Display configuration forms for the tagged object(s) in the Project tree. - To transfer configuration data uploaded to the Monitoring ERDB to the Project ERDB, click Tools->Update to Project with object icon selected in Monitoring tree.
5	Repeat these Steps to upload data for other Control Execution Environment blocks.

Using Compare Parameters

Purpose of Compare Parameters

Compare Parameters extends the load functionality of Control Builder to allow the user to decide which parameters will and will not be downloaded based on the following criteria:

- The parameter must be controller (CEE) resident, or system repository (SR) resident.
- The parameter being downloaded (from the database) must be different from the value in the controller prior to the download

After the user selects one or more objects to download they will be presented with a dialog box that allows them to:

- Look at a list of parameters that meet the above criteria and decide which parameters they wish to download

- Print out a report showing the list of differences (user may continue with load after the report is printed)
- Get help regarding the new functionality

Without having to perform a load function, the user may:

- Select and view the differences for several objects (same criteria as above)
- Print a report showing these differences

Enabling Compare Parameters

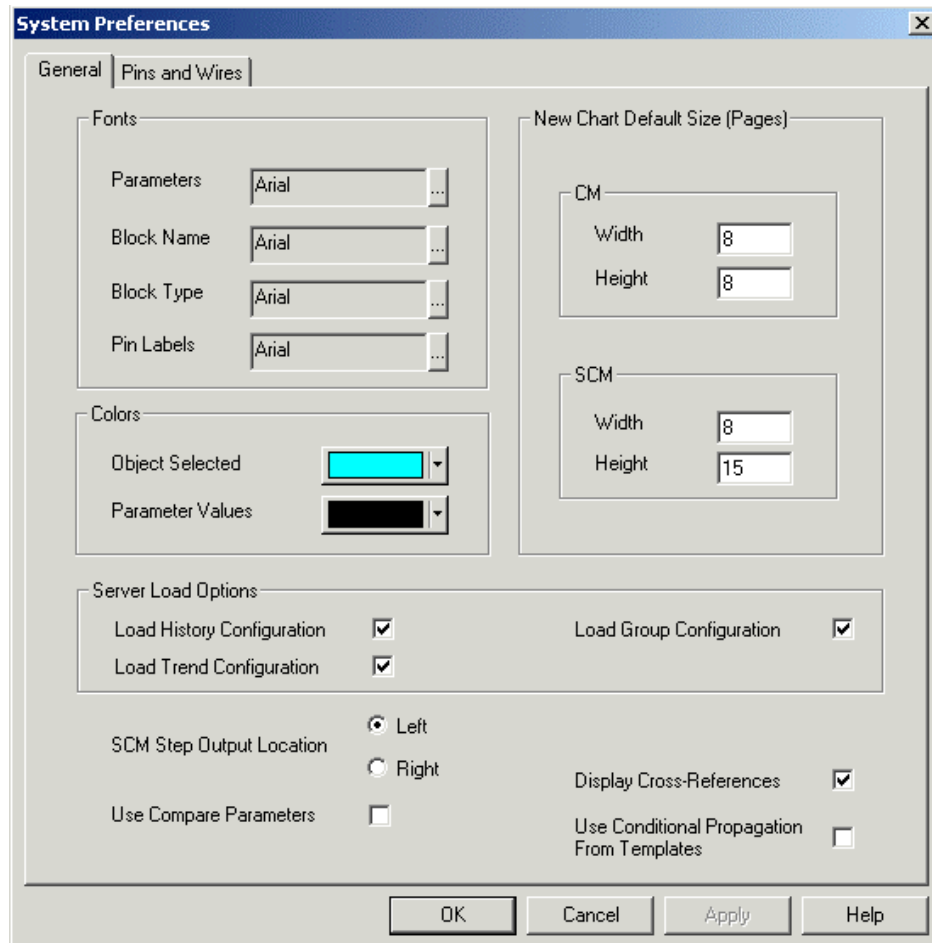
Compare Parameters functionality is available immediately after an Experion PKS system is installed (which includes engineering tools) and requires no special licensing.

Control Builder must be running for access. A “Use Compare Parameters” check box available in the System Preferences dialog allows Compare Parameters to be turned Enabled or Disabled. By default, Compare Parameters will be disabled upon installation.

Step	Action
1	Start Control Builder. Click View -> System Preferences to open the dialog.

Step

Action



- 2 On the General tab, verify the Use Compare Parameters check box is **checked** or enabled. Click the check box, if it is **blank** or disabled.
- 3 Click OK to close the System Preferences dialog.

Compare Parameters Security

For the use of Compare Parameters within a load, the access level will be the same for Compare Parameters as it is to perform a load

For the use of Compare Parameters outside of a load (standalone) the access level will be Operator.

Using Compare Parameters

Table 2 Using Compare Parameters during a Load

Step	Action
1	With Compare Parameters enabled, select modules from the tree in Control Builder: - From the Project or Monitor trees - From assignment view or hierarchical view
2	Issue a load command by: - Right-clicking on the selected modules in the tree - Selecting the load icon from the toolbar - Selecting load from the main menu
3	The LoadUI dialog box appears. Select which modules will be loaded and what the post load states will be. Close the dialog box by selecting the OK button.
4	The Compare Parameters Dialog box will open. Select which parameters will be downloaded to the controller and which will not. Click the OK button. Refer to “ <i>Compare Parameters Dialog box</i> ” for additional information.
5	The load will process. When complete, review entries in the Experion PKS event log.



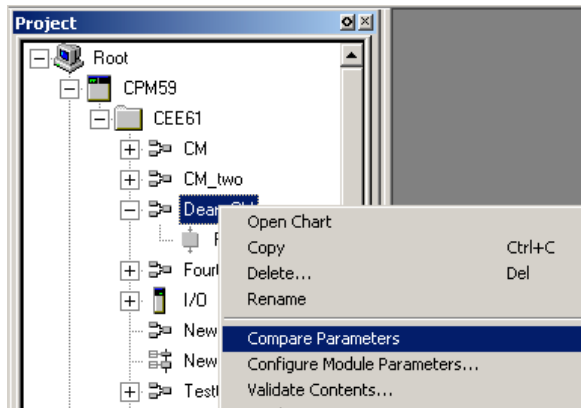
TIP

When the user does not load a parameter to the controller this parameter is not uploaded to the project or monitoring database.

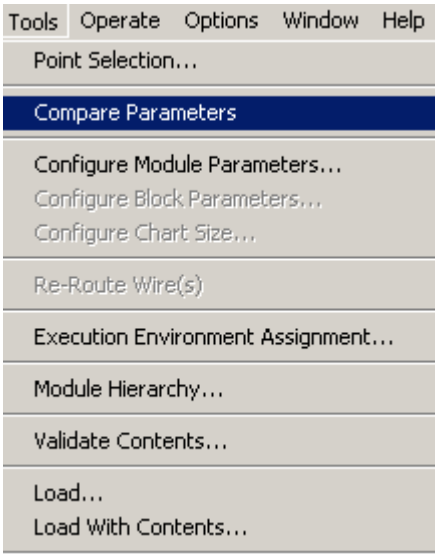
Table 3 Using Compare Parameters without performing a Load

Standalone functionality for Compare Parameters is the ability to generate a list of differences (Controller vs. database) for objects that is identical to those seen during the load operation, without performing a load.

Step	Action
1	With Compare Parameters enabled, select modules from the tree in Control Builder: • From the Project or Monitor trees • From assignment view or hierarchical view
2	Right-click on the module and select 'Compare Parameters'...



Or select 'Compare Parameters' from the Tools menu.

Step	Action
	

- 3** Once the objects are selected and the Compare Parameters is initiated, the Compare Parameters dialog box will appear.

Refer to “*Compare Parameters Dialog box*” for additional information.

Print or close the dialog box when finished.

Control Strategy Loading

Using Compare Parameters

Using the Compare Parameters Dialog box

The Compare Parameters Dialog box will vary slightly depending on the situation. When using Compare Parameters when not performing a Load, the Clear and Cancel buttons, and 'Download Param?' column are not available.

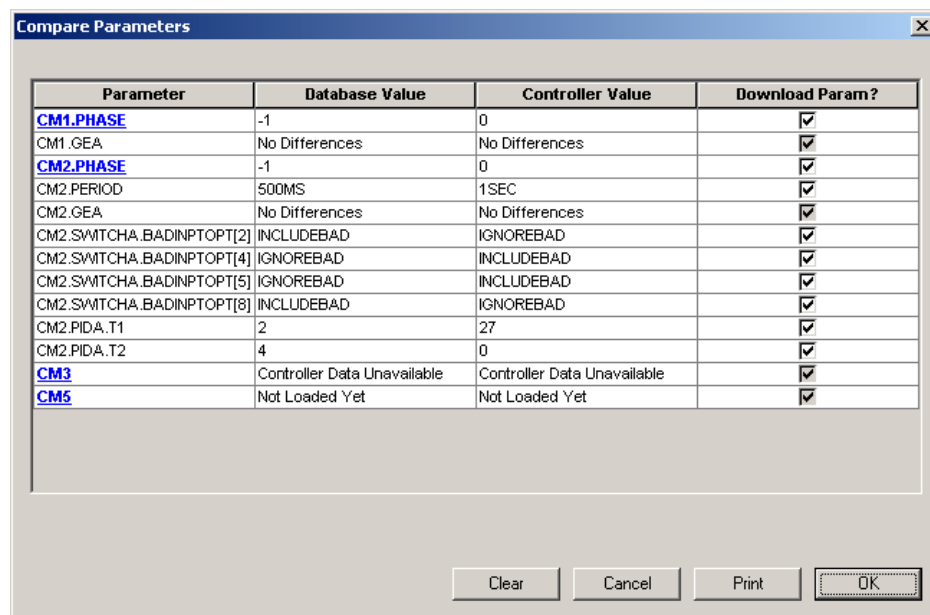


Figure 26 Compare Parameters Dialog box during Load operations

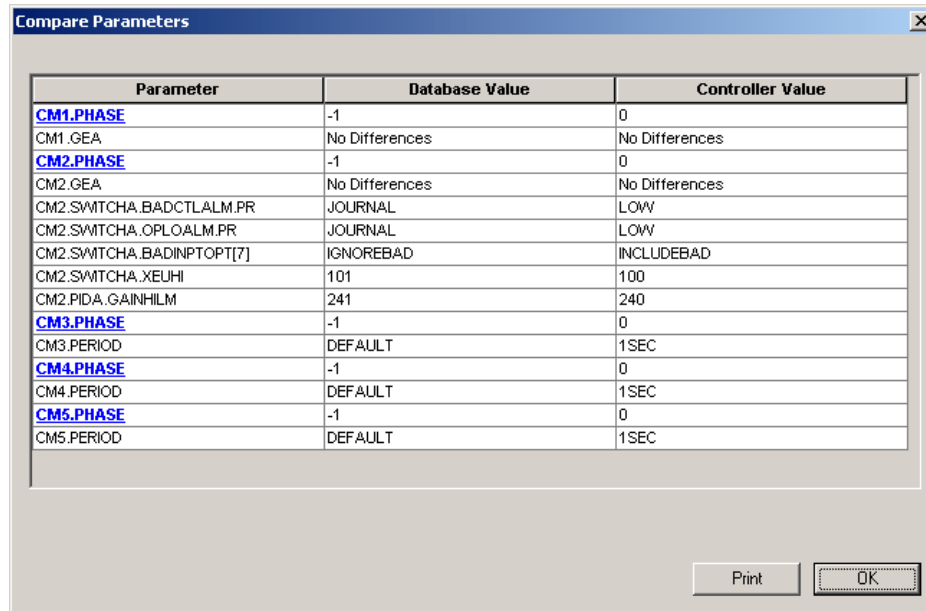


Figure 27 Compare Parameters Dialog box when a Load is not being performed.

Table 4 Dialog box functions

Column Name	Function
Parameter	Shows parameters from modules (tagged blocks) where the database value is different than the controller value. The parameter name will be shown in full form containing both the module name as well as the parameter and intermediate parameter names.
Database Value	The value of the parameter from the database.

Control Strategy Loading
Using Compare Parameters

Column Name	Function
Controller Value	The value of the parameter from the controller prior to completion of loading with the following exceptions: • If an object being loaded has no differences between the database and the controller value then the words 'No differences found' will appear in both the Database and Controller Value columns. • If an object being loaded is a newly created object, which has never been loaded before, the words 'Not Loaded Yet' will appear in both the Database and Controller Value columns. • If an object has been loaded before, but there is another object within it that has been newly created and never loaded before, the words 'Not Loaded Yet' will appear in both the Database and Controller Value columns for the basic block. • If an object cannot be accessed, the words 'Controller Data Unavailable' will appear.
Download Param?	A checkbox where the user can select to download (checked) or not download (unchecked) the database value to the controller. If the checkboxes are grayed out, the user must download the parameters. This column is not available when Compare Parameters is used without a performing a Load.
Print button	Prints the currently viewed values into a report. A report generator by this method does not require object selection because object names and data are already known.
Clear button	Deselects all check boxes for all entries in the table. Not available when Compare Parameters is used without performing a Load.
Cancel button	End (aborts) the load process. Prompts if modules should or should not be set to their post load state. Not available when Compare Parameters is used without performing a Load.

Column Name	Function
OK button	Signals that all selections on the form have been made and that the load should continue.

Event Log Entries during a Controller Load

When a controller load is performed and not all parameters are selected for download, entries are made in the Experion PKS event log. The entries indicate which parameters the user decided not to download to the controller.

Date	Time	Point ID	Event	Level	Description
07-Feb-02	09:57:25	CM2.SWITCHA.BADC	LOAD	Compr	Parameter Not Loaded
07-Feb-02	09:57:25	CM2.SWITCHA.XEUIH	LOAD	Compr	Parameter Not Loaded
07-Feb-02	09:57:25	CM2.SWITCHA.BADI	LOAD	Compr	Parameter Not Loaded
07-Feb-02	09:57:25	CM2.SWITCHA.OPLO	LOAD	Compr	Parameter Not Loaded
07-Feb-02	09:57:25	CM2.PIDA.GAINHIL	LOAD	Compr	Parameter Not Loaded

Figure 28 Event Log entries

Table 5 Event Log columns

Column Name	Functionality
Date	Date when the parameter was bypassed from loading.
Time	Time when the parameter was bypassed from loading.
Point ID	Full name of the parameter.
Event	Will always be 'LOAD.'
Level	Will always be 'Compr' followed by a '(M)' or '(P)' to indicate if the load was from the Monitor or Project view.
Description	Will always be 'Parameter Not Loaded.'

Using Compare Parameters Reports

Compare Parameters reporting is available as a selection in Control Builder report generation.

Table 6 Creating the Compare Parameters report

Step	Action
1	Call up the Report Selection box.
2	Select Compare Parameter as the Report Type.

3	Select which object to report on from the tabs available.
4	Click Print to create the report.

Compare Parameters Report		
Name		
Parameter Name	Database Value	Controller Value
CM1.GEA		
CM1.PHASE	0	-1
CM2.GEA		
CM2.PHASE	0	-1
CM2.PIDA.GAINHILM	240	241
CM2.SWITCHA.BADCTLALM.PR	LOW	JOURNAL
CM2.SWITCHA.BADINPTOPT[7]	INCLUDEBAD	IGNOREBAD
CM2.SWITCHA.OPLOALM.PR	LOW	JOURNAL
CM2.SWITCHA.XEUHI	100	101
CM3.PERIOD	1SEC	DEFAULT
CM3.PHASE	0	-1
CM4.PERIOD	1SEC	DEFAULT
CM4.PHASE	0	-1
CM5.PERIOD	1SEC	DEFAULT
CM5.PHASE	0	-1

Figure 29 Compare Parameters report

Table 7 Compare Parameters report columns

Column Name	Functionality
Parameter Name	Shows parameters from modules (tagged blocks) where the database value is different than the controller value. The parameter name will be shown in full form containing the module, parameter, and intermediate parameter names.
Parameter Database Value	The value of the parameter in the database (Monitor or Project view).
Controller Value	The value of the parameter in the controller (snapshot).

Copying Control Strategies using Templates

Background

Templates may be created in Control Builder. Once created, templates may be used to create multiple copies of desired control strategies.

A template is a user-configured control strategy (that is, a logically specified set of function blocks arranged on a Control Builder control drawing to simulate your process application) that does not have I/O assignments, parameter connections or SCM expressions explicitly declared outside the scope of the copy operation.

- Inside the scope of operation means that the specific control object (such as a function block, I/O assignment, parameter connection or SCM expression) is included in the list of selected control objects to be copied.
- Outside the scope of operation means that the specific control object is not included in the list of selected control objects to be copied.

Notes:

- The user-configured template uses parameters with substitute names in its expressions.
- After copying a desired control strategy using a template, you must replace (resolve) each substitute name with an appropriate block name for that particular control strategy as described in the subsequent procedure titled Using a Template.
- Substitute names must be resolved prior to loading the control strategy to the controller.

Creating a Substitute Name List

Follow the steps in the table below to create a substitute name list to be used in a user-configured template.



ATTENTION

- Substitute names must be created prior to being used in a control strategy.
 - Substitute names must have the following format: @xxxxx....
 - Every substitute name must begin with the “@” character.
 - Substitute names may be up to 64 characters in length, including the “@” sign and at most one (1) period.
 - A substitute name represents the first two parts of a parameter tagname or a basic block: **[CM.BLOCK].PARAMETER** where **[CM.BLOCK]** represents the substitute name.
-

Step	Action	Result
1	Select Tools -> Substitute Name List to call up the Substitute Name List dialog. Alternate method: Select the  toolbar button.	The Substitute Name List dialog appears (see Figure 18).
2	Create a substitute name for each function block to be referenced by the generic control strategy. • Click Insert Row to add a new row for each substitute name to be added.	The Substitute Name List dialog becomes populated with the substitute names required for the template to be created.

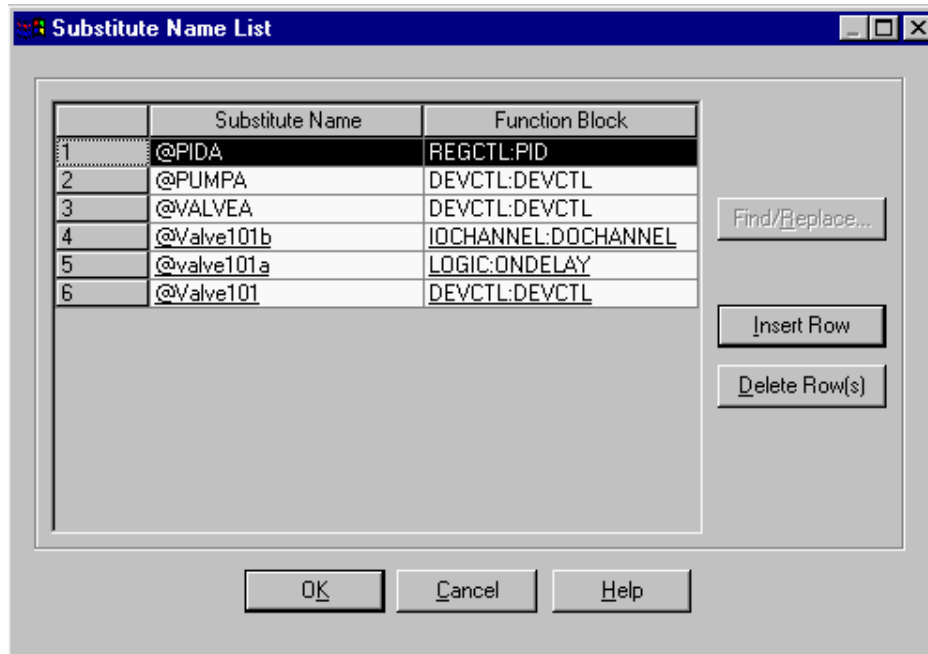


Figure 30 Substitute Name List dialog

Control Strategy Loading

Copying Control Strategies using Templates

Creating a Template

Follow the steps in the table below to create a template to be used to create a desired number of copied control strategies.

Step	Action	Result
1	Create a generic control strategy using parameter connectors or SCM expressions with substitute names.	The template is created and resides on the Project tree. For example, a control strategy template named "SCMX" might be created and located on the Project Tree. An "@" character is attached to the "SCMX" name on the Project Tree to indicate that some of its expression components use substitute names which will be resolved during a copy procedure using the Operation Name List Wizard.



Using a Template

Follow the steps in the table below to use a previously-created template to create a desired number of copied control strategies.

Step	Action	Result
1	Select the template to be copied on the Project tree. For example, a control strategy template named "SCMX" might be located on the Project tree. This template was created previously and has a "@" character appearing next to it on the Project Tree.	The template is highlighted on the Project tree.

Step	Action	Result
2	Select Edit -> Copy. Alternate methods: - Click <Ctrl>-C - Select the Copy toolbar button 	The template is copied to the Control Builder clipboard. The Name New Function Block(s) dialog appears (see Figure 19). Note: This is the first page of the Operation Name List Wizard.

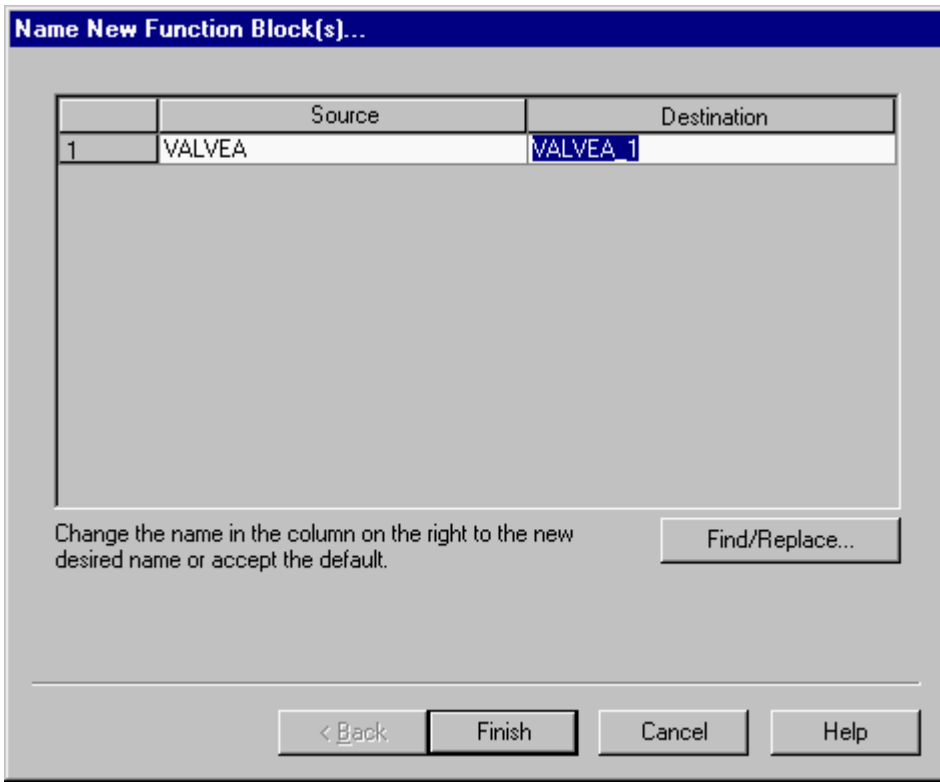


Figure 31 Name New Function Block(s) dialog



ATTENTION

The following connection rules apply when copying function blocks:

Notes:

Inside the scope of operation means that the block is included in the list of selected blocks to be copied.

Outside the scope of operation means that the block is not included in the list of selected blocks to be copied.

1. Graphical connections to blocks that are inside the scope of operation are automatically resolved relative to the operation.
2. Graphical connections to blocks that are outside the scope of the operation are not carried over to the new copied blocks.
3. Parameter connections to blocks that are inside the scope of operation are automatically resolved relative to the operation.
4. Parameter connections to blocks that are outside the scope of operation appear in the Connections page to be resolved by the user if desired at the time of copy. An exception would be parameter connections which have hidden "back init" which are discarded. IO assignments are also discarded and shown in a special window.
5. Substituted connections on selected blocks always appear in the Connections Page to be resolved by the user if desired at the time of copy. The same applies to references.

-
3	Change the control strategy's name in the Destination column of the Name New Function Block(s) dialog (see Figure 19) to a desired name or accept the default name.	The copied control strategy is assigned a new name.
4	Click Next or Finish as appropriate.	If appropriate, additional pages of the Operation Name List Wizard appear, depending on the particular control strategy being copied, to include: • Resolve Indeterminate or Substitute Connections dialog (see Figure 20). • Resolve Deleted I/O Associations (see Figure 21).

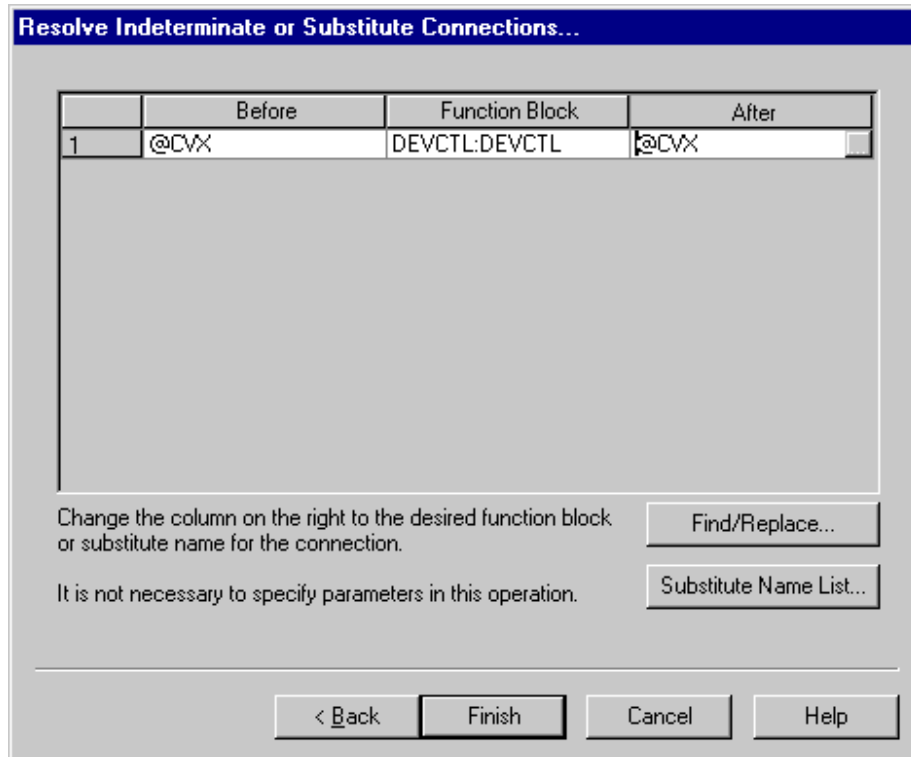


Figure 32 Resolve Indeterminate or Substitute Connections dialog

Control Strategy Loading

Copying Control Strategies using Templates

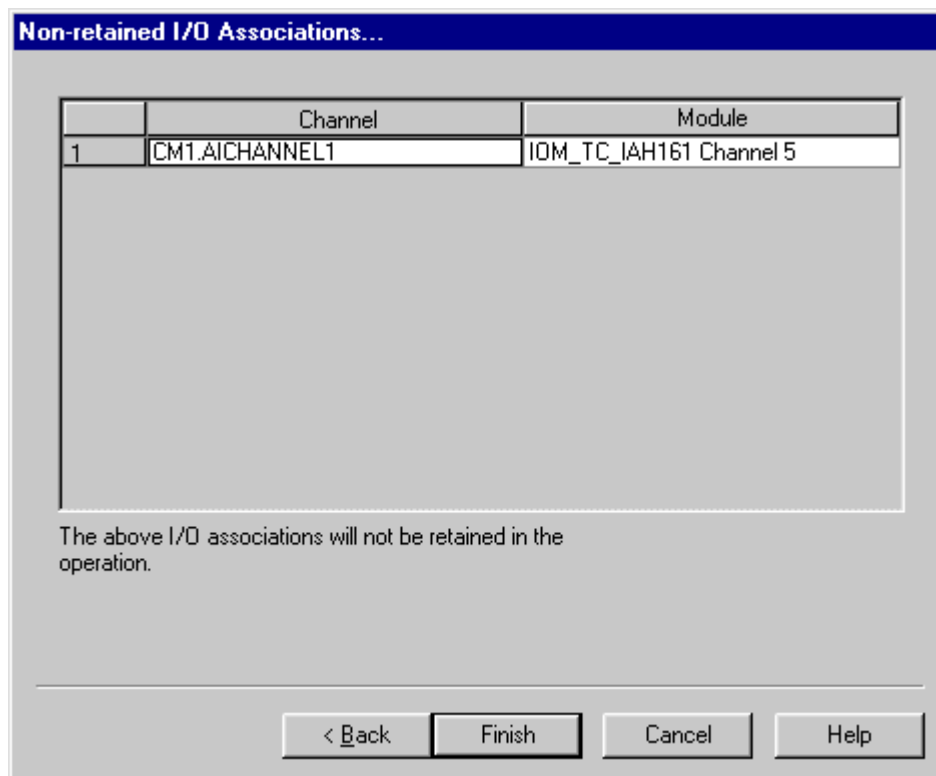


Figure 33 Non-retained I/O Associations dialog

- 5** Follow the directions on each additional page of the Operation Name List Wizard. Click Finish on the final page of the wizard to complete each copy operation.

The copied control strategy is pasted to the Project Tree.
- 6** Repeat steps 1-5 to make additional copies of control strategies as required.

Additional control strategies are created.

Using the Change Parent Template Wizard

Change Parent Template functional description

The goal of the Change Parent Template operation is to provide the capability to change the derivation hierarchy of a control module, embedded block, or user template that had been derived from a user template.

The selected new parent must have been included in the original derivation hierarchy of the target object. For example, if strategy “X” is derived from user template “Kid”, and “Kid” is derived from user template “Dad”, and “Dad” is derived from user template “Grandpa”, and “Grandpa” is derived from the System “Control Module” template, then, the valid new parent choices for kid “X” would be either “Grandpa” or the System “Control Module”.

The Change Parent Template wizard is invoked to change the parent template of:

- a user template,
- a stand-alone template embedded in a user template, and which has not been inherited from the parent of the user template,
- a control module derived from a user template, and
- an embedded block contained in a strategy that was derived from a user defined stand-alone template.

Change Parent Template requirements

The ENGR level of access and the User Templates Licensed Option are required to use the Change Parent Template Wizard.

Invoking the Change Parent Template Wizard



WARNING

Do not change the content or structure of the ERDB with respect to user-defined templates while the Change Parent Template Wizard is in operation.

The system does not prevent the ERDB from being modified, or blocks from being locked that are needed by an open Change Parent Template Wizard”.

If the problem is one of database structure change while the wizard is in progress, it is possible for the wizard to present information, including selection possibilities for objects that have since been removed from the ERDB. If the wizard property page does not have valid selections, immediately exit the wizard, and DO NOT select objects that are no longer contained in the ERDB.

There are two methods provided to invoke the Change Parent Template Wizard

1. Select the block for which a Change Parent Template operation is desired; or
2. Select the parent of the block for which a Change Parent Template operation is desired.

Using method (1) is recommended if there may be other instances or sub-templates of the block’s parent that should also be changed.

For a Control Module Instance or for an Embedded Block in a Control Module Instance that has been derived from a Stand Alone Template:

Step	Action
1	Select the Control Module on the Project tree view.
2	Tools -> Change Parent Template or right-click and select Change Parent Template.
3	The New Parent Selection page is opened.

Notes:

- The menu item will be disabled if more than one item is selected on the project tree.
- The menu item will be disabled if the selected control module is directly derived from a System Template.

- The menu item will be disabled if the user does not have sufficient access rights to perform the Change Template Parent operation.

For a User Template, Embedded Stand Alone Template, or Sub-Template; or for an Embedded Block in a User Template that has been derived from a Stand Alone Template:

Step	Action
1	Select the target user template on the Library tree.
2	Tools -> Change Parent Template or right-click and select Change Parent Template.
3	The Select Scope of Operation page will open If the target: • is derived from a user template, and • has sub-templates and/or strategies derived from it

Change Parent Template: Select Scope of Operation

Change the parent of the selected template only, or change the parent of the selected template's instances and/or sub-templates

Selected Template : USER:UT01_Gen02Kid01

Current Parent : USER:UT01_Gen01

Change Parent Target Objects

☒ Selected Template

☐ Instances and Sub-Templates of Selected Template

< Back Next > Cancel

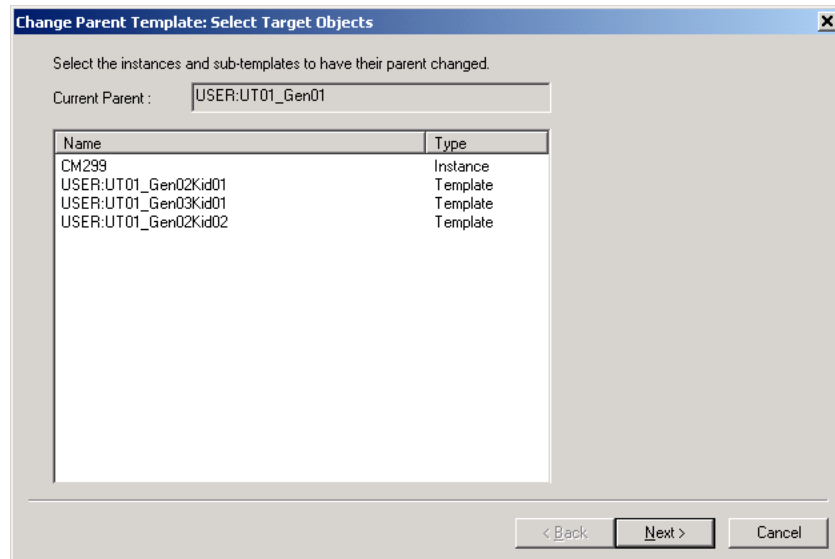
This page presents two radio buttons for the customer to specify if it is their desire to:

- change the derivation parent of the selected template itself, or
- change the derivation parent of sub-templates and/or instances of the

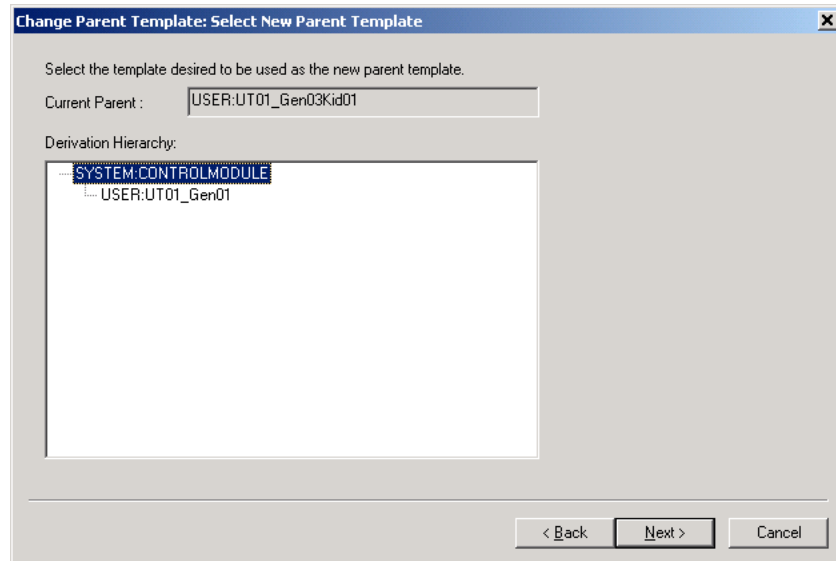
Control Strategy Loading

Copying Control Strategies using Templates

Step	Action
	selected template.
	After selecting the desired radio button, select the Next button to continue with the wizard, or the Cancel button to leave the wizard.
	Notes:
	- The menu item will be disabled if more than one template is selected is selected on the tree. - The menu item will be disabled if the template selected is not a user template. - The menu item will be disabled if the user does not have sufficient access rights to perform the Change Template Parent operation.
4	The Select Target Objects page is invoked if sub-templates and/or instances need to be selected to be the change parent operation targets. Multiple selections are permitted.



Step	Action
	Wizard.
5	The New Parent Selection Page allows the new parent to be selected. The current parent is indicated.



After selecting the desired new parent, select the Next button to continue with the wizard, or the Cancel button to exit the wizard.

If the selected new parent template is locked by another user, an error message will be given, and the wizard will not be able to progress to the next page. If that occurs, contact the other user to unlock the new parent template before continuing with the wizard. If desired, the Cancel button may be used to cancel out of this wizard.

6	The Operation Status Page indicates all choices made, and initiates the Change Parent Template operation.
-

Control Strategy Loading

Copying Control Strategies using Templates

Step

Action

Select Finish to initiate the change parent operation.
WARNING : This operation is NOT reversible.

New Parent Template

Status Summary:

Selected Control	Type	Status	Prevented Lock	Prevented By
C3	Template	Locked OK		

< Back Finish Cancel

- The Selected Control column indicates the target of the operation.
- The Type Column indicates if the control is a template, or strategy.
- The Status column indicates the status of the operation. The following values may appear in the Status column:
 - Locked OK – ready for the Change Parent Template operation
 - Open Failed – could not open the corresponding control, will FAIL the Change Parent Template operation
 - Lock Failed – could not lock the corresponding control, will FAIL The Change Parent Template operation.
 - OK To Commit – Change Parent Template operation completed, but not yet committed to the database
 - OK – Change Parent Template operation completed, and committed to the database
 - Fail – Change Parent Template operation or commit to database has failed.

If the selected control could not be locked to perform the Change Parent Template operation, the Prevented Lock column indicates the object that prevented the lock from occurring. The Prevented By column indicates the

Step	Action
	user who has locked the object that is preventing the wizard from being given the lock. After reviewing the selected targets and status, select the Finish button to commence the Change Parent Template operation. (Once the Finish button is selected, you will not be allowed to cancel out of or close the wizard until the operation completes.) Alternatively, select the Cancel button to exit the wizard, or use the Back button page back through the wizard to review previous selections. When the operation is complete, the Status column is updated accordingly. Select "Done" to exit the wizard.

SnapShot Save and Restore

The SnapShot function provides a fast way to restore a controller when the controller fails and needs to be replaced/reloaded.

Follow the steps in the table below to have the ability to restore a database to the controller once a CPM with Contents has been loaded to a controller:

Step	Action	Result
1	With the CPM selected in the Monitoring tab, click Tools -> Snapshot -> Save Controller Snapshot	
2	Click Continue	Saves controller database with contents to a Snapshot file (*.snapshot) in the Engineering Repository (ER) directory.
3	If the controller database is deleted for some reason, select the CPM in the Monitoring tab, then click Tools -> Snapshot -> Restore Controller from Snapshot	
4	Click Continue	Restores the database to the controller. A typical database that may take several hours to load, should only take less than 5 minutes to restore.

Follow the steps in the table below to update the loaded side of the engineering database after changes in tuning constants have been made in the controller.

Step	Action	Result
1	Click Tools -> Snapshot -> Save Controller Snapshot	
2	Click Continue	Saves the controller database to the Snapshot file.
3	Click Tools -> Snapshot -> Refresh Selected Object(s) Monitoring Tab from Snapshot	
4	Click Continue	Saves re-entered tuning constants in the loaded side of the engineering database.

Loading Only Server Configuration

Follow the steps in the table below to load Server data only.



ATTENTION

Two reasons why you would want to do this is:

- If you do not have any controllers yet and you want to be able to see your tag names in selection lists in Display Builder so that you can easily build displays when the hardware is not present
 - You want to reload changed server data (such as display names) without having to reload to a controller which necessitates inactivating part of your strategy
-

Control Strategy Loading

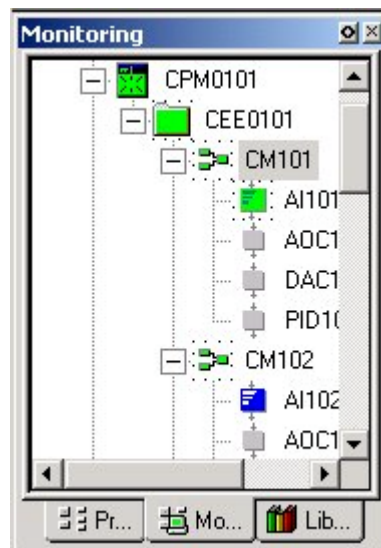
Loading Only Server Configuration

Step	Action

1	Click on the Monitoring tab; then click on the desired items in the tree to be loaded to the server. • Use either the <Shift> key or the <Ctrl> key to select multiple items in the tree to be loaded to the server. – Hold down the <Shift> key to select multiple items as an uninterrupted block in the entire list of available items. – Hold down the <Ctrl> key to select multiple items in various locations throughout the entire list of available items.

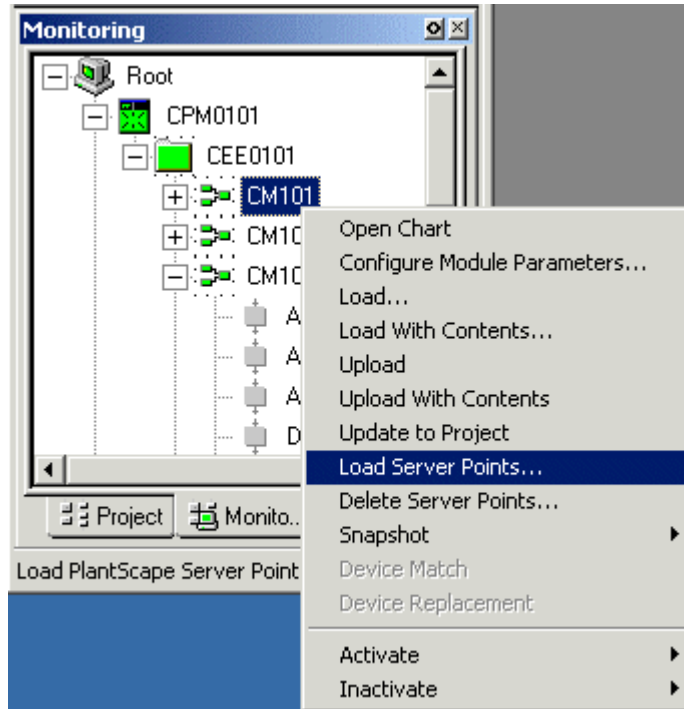
Note:

There is no “with Contents” for loading server points – only the selected points are loaded, not their contents as well.

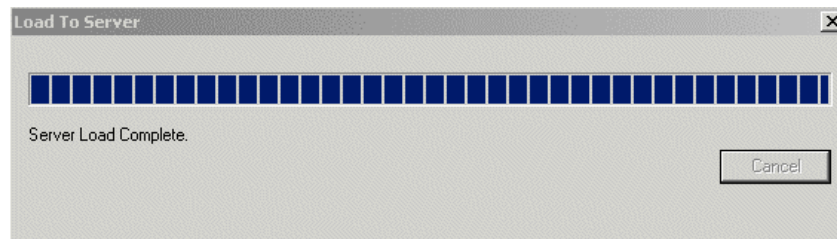


Step	Action

2	Click on Tools->Load Server Points.



3	Click Continue on the Load To Server dialog.
4	Control Builder will validate and rebuild the Server points based on the selected points in the Monitoring Tree.



Control Strategy Loading
Loading Only Server Configuration

On-Line Monitoring Using Control Builder

Initial Activation Order Guidelines

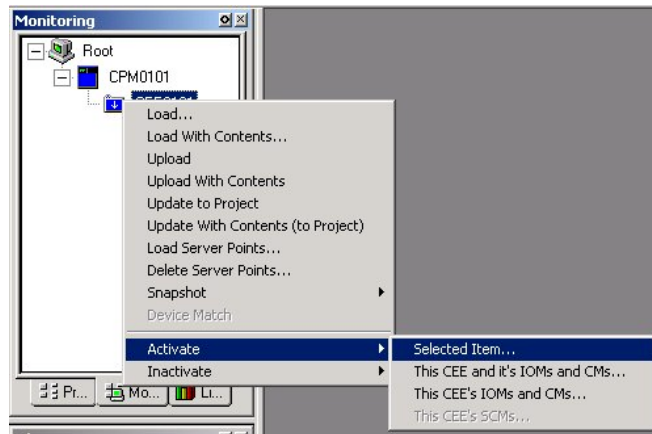
Make the initial activation of control strategy components from the Monitoring tab in the following suggested order to minimize possible bad data generated alarms.

Order	Component
1	Control environment components such as: CPM/CEE ACE/CEE SCE
2	Input/Output Processors (IOPs)
3	PMIO I/O Channels
4	Fieldbus contained function blocks
5	Fieldbus device resident blocks
6	Input/Output Modules (IOMs)
7	Control Modules (CMs) and/or Sequential Control Modules (SCMs)

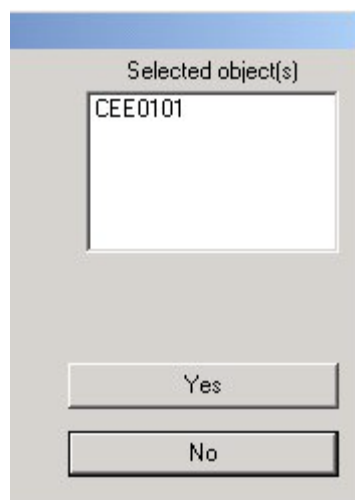
Activating the CEE

Follow the steps in the table below to activate the CEE.

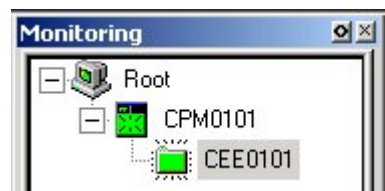
Step	Action	Result
1	From the Monitoring Tree, right-click the CEE..	
2	Click Activate and then the desired selection as follows to activate multiple items: - Selected Item ... - This CEE and its IOMs and CMs - This CEE's IOMs and CMs ... - This CEE's SCMs ...	



Step	Action	Result
3	Click YES from the pop-up window to set the selected item active.	The CEE turns green on the Monitoring Tree.



- Remember that the CEE must be active for anything assigned to the CEE to work. Even if a CM is active, it won't do anything unless the CEE is also active.



Alternate methods:

- Click the Toggle State toolbar button  to set the selected item active.
- Select Operate -> Activate and then the desired selection as follows to activate multiple items:
 - Selected Item ...
 - This CEE and its IOMs and CMs
 - This CEE's IOMs and CMs ...
 - This CEE's SCMs ...

On-Line Monitoring Using Control Builder

Activating the CEE

Refer to the table below for Monitoring Tree objects status information.

CPM	 1 2 3 4 5 6 7 8	
	States	Corresponding Enum Values
	1. Project Tree	
	2. Loaded, not monitoring	
	3. Communication Failure	
	4. Not Used	
	5. Active	PCMSTATE = CEERUN, CEEMIX, BACKUP
	6. Failed	PCMSTATE = FAILED, OFFNET, TESTING, BOOTING
	7. Not Loaded	PCMSTATE = ALIVE, LOADING, PIREADY, NOTLOADED
	8. Loaded	PCMSTATE = NOCEE, CEEIDLE
Primary CPM	 1 2 3 4 5 6 7 8 9 10	
Secondary CPM	 1 2 3 4 5 6 7 8 9 10	
	States	Corresponding Enum Values
	1. Project Tree	
	2. Loaded, not monitoring	
	3. Communication Failure	
	4. Not Used	

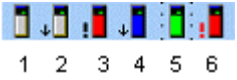
	5. Active (in Synch)	PCMSTATE = CEERUN, CEEMIX, BACKUP and RDNSYNCSTATE = kCpmSyncMaintenance
	6. Failed	PCMSTATE = FAILED, OFFNET, TESTING, BOOTING
	7. Not Loaded	PCMSTATE = ALIVE, LOADING, PIREADY, NOTLOADED
	8. Loaded	PCMSTATE = NOCEE, CEEIDLE
	9. Not Synched	PCMSTATE = CEERUN, CEEMIX, BACKUP and RDNSYNCSTATE = kCpmNotInSync, kCpmPartnerVisible, kCpmSyncInProgress
	10. Standby	PCMSTATE = CEERUN, CEEMIX, BACKUP and RDNSYNCSTATE = kCpmSyncStandby
Primary RM		
Secondary RM		
	States	Corresponding Enum Values
	11. Project Tree	
	12. Loaded, not monitoring	

On-Line Monitoring Using Control Builder
Activating the CEE

	13. Communication Failure	
	14. Not Used	
	15. Active (in Synch)	GENSTATE= kMGenStateOK and RDNSYNCSTATE = kRMReadiStateSynchronized
	16. Failed	GENSTATE= kRMGenStateUndefined, kRMGenStateStartup, kRMGenStateReload, kRMGenStateFault
	17. Not Used	
	18. Not Used	
	19. Not Synched	GENSTATE= kMGenStateOK and RDNSYNCSTATE = KRMReadiStateUndefined, kRMReadiStateNopartner, kRMReadiStateDisqualified, kRMReadiStateSynchronizing
	20. Standby	GENSTATE= kGenStateOK and READINESS= kRMReadiStateStandby
CEE		
	States	Corresponding Enum Values
	21. Project Tree	
	22. Loaded, not monitoring	

	23. Communication Failure	
	24. InActive	CEESTATE = IDLE
	25. Active	CEESTATE = RUN
	26. Configuration Error	CEESTATE = FAIL, NOT_LOADED
CM		
	States	Corresponding Enum Values
	27. Project Tree	
	28. Loaded, not monitoring	
	29. Communication Failure	
	30. Inactive	EXECSTATE = Inactive
	31. Active	EXECSTATE = Active
SCM		
	States	Corresponding Enum Values
	32. Project Tree	
	33. Loaded, not monitoring	
	34. Communication Failure	
	35. Inactive	STATE = kStsNulling, kStsNull, kStsNone, kStsEditing

On-Line Monitoring Using Control Builder
Activating the CEE

	36. Active	STATE = KStsEdited, kStsRunning, kStsComplete, kStsChecking, kStsIdle, kStsInterrupting, kStsInterrupted, kStsRestarting, kStsRestarted, kStsHolding, kStsHeld, kStsStopping, kStsStopped, kStsAborting, kStsAborted, kStsCommErr
	37. Not Used	
	38. Configuration Error	ConfigSts != 0
Basic Blocks		
	States	Corresponding Enum Values
	39. Project Tree	
	40. Communication Failure	
	41. Configuration Error	ConfigSts != 0
IOM		
	States	Corresponding Enum Values
	42. Project Tree	
	43. Loaded, not monitoring	
	44. Communication Failure	
	45. Inactive	IOMSTATE = klomInactive, klomStart
	46. Active	IOMSTATE = klomRunning, klomStub
	47. Failed	IOMSTATE = klomFail, klomStandBy, klom6

FIM	 1 2 3 4 5 6 7 8	
	States	Corresponding Enum Values
	48. Project Tree	
	49. Loaded, not monitoring	
	50. Communication Failure	
	51. Not Used	
	52. Active	FIMSTATE = CEERUN, CEEMIX, BACKUP
	53. Failed	FIMSTATE = FAILED, OFFNET, TESTING, BOOTING
	54. Not Loaded	FIMSTATE = ALIVE, LOADING, PIREADY, NOTLOADED
	55. Loaded	FIMSTATE = NOCEE, CEEIDLE
LINK	 1 2 3 4 5 6 7 8	
	States	Corresponding Enum Values
	56. Project Tree	
	57. Loaded, not monitoring	
	58. Communication Failure	
	59. Inactive	STATE = kDown
	60. Active	STATE = kOnline

On-Line Monitoring Using Control Builder
Activating the CEE

	61. Failed	STATE = KFmwLoadErr, kCommInitErr, kDbInitErr
	62. Active With UCD	STATE = KOnline And Number of UCDs > 0
	63. Going Active	STATE = KFmwLoad, kDbInit, kCommInit
Uncomm- issioned Device		
DEVICE		
	States	Corresponding Enum Values
	64. Project Tree	
	65. Loaded, not monitoring	
	66. Communication Failure	
	67. Not Used	
	68. Active	DEVSTATE = kDevOnline
	69. Failed	DEVSTATE = kDevOffline
Resource Block		
Transducer Block		
FF Function Block		

	States	Corresponding Enum Values
	70. Project Tree	
	71. Loaded, not monitoring	
	72. Communication Failure	
	73. Inactive	MODE.ACTUAL = kFFModeOOS
	74. Active	MODE.ACTUAL = KFFModeNORMAL, kFFModeIMAN, kFFModeLO, kFFModeMAN, kFFModeAUTO, kFFModeCAS, kFFModeRCAS, kFFModeROUT

Setting the CEE Inactive

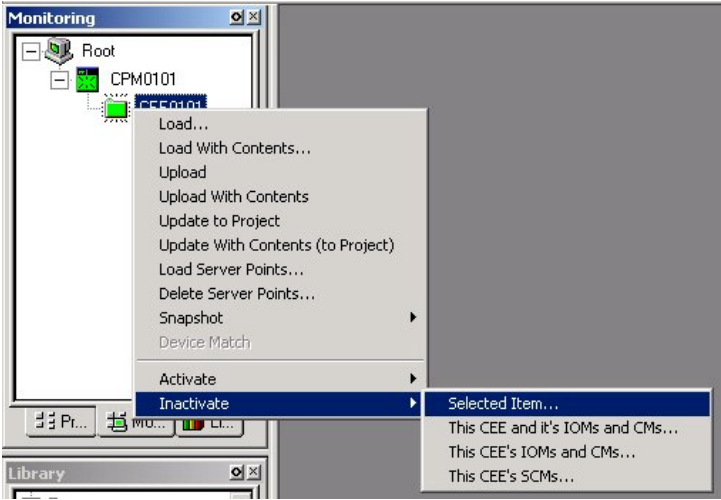
Follow the steps in the table below to set the CEE inactive.

Step	Action	Result
1	From the Monitoring Tree, right-click the CEE.	
2	Click Inactivate and then the desired selection as follows to activate multiple items: • Selected Item ... • This CEE and its IOMs and CMs • This CEE's IOMs and CMs ... • This CEE's SCMs ...	

Alternate methods:

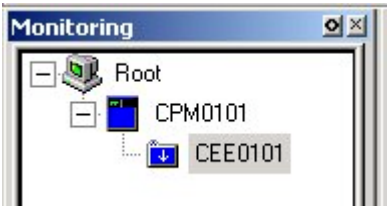
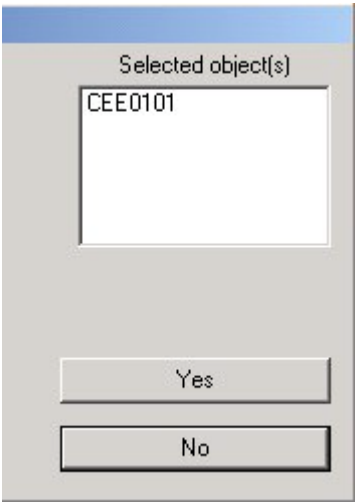
- Click the Toggle State  toolbar button to set the selected item inactive.
- Select Operate -> Inactivate and then the desired selection as follows to make multiple items inactive:
 - Selected Item ...
 - This CEE and its IOMs and CMs
 - This CEE's IOMs and CMs ...
 - This CEE's SCMs ...

Step	Action	Result



- 3

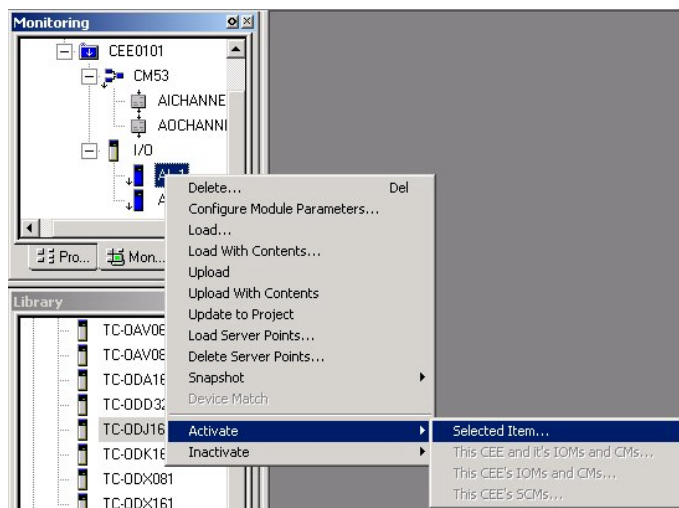
Click YES from the pop-up window to set the selected item inactive.
- The CEE turns from green to blue on the Monitoring Tree.



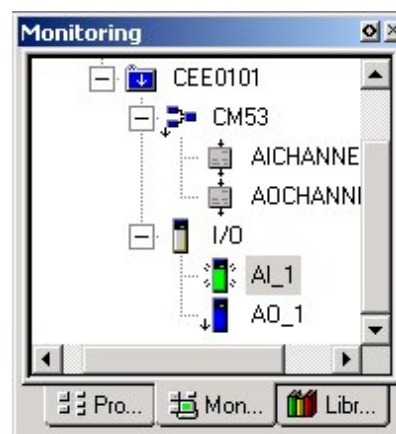
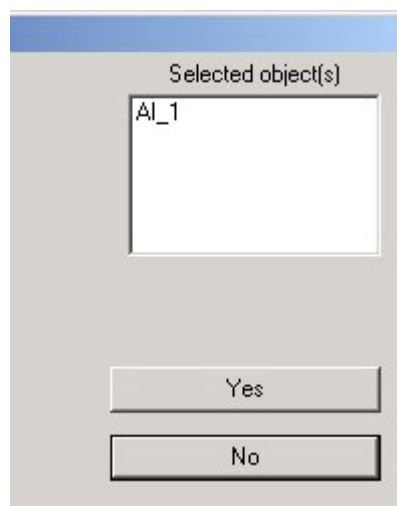
Setting I/O Active

Follow the steps in the table below to set I/O to an active state.

Step	Action	Result
1	From the Monitoring Tree, right-click the desired I/O block.	
2	Click Activate.	



Step	Action	Result
3	Click Yes from the pop-up window to set the selected item active.	The I/O block turns green on the Monitoring Tree.



Note: IOMs can also be activated through the server database (that is, an IOM status point).

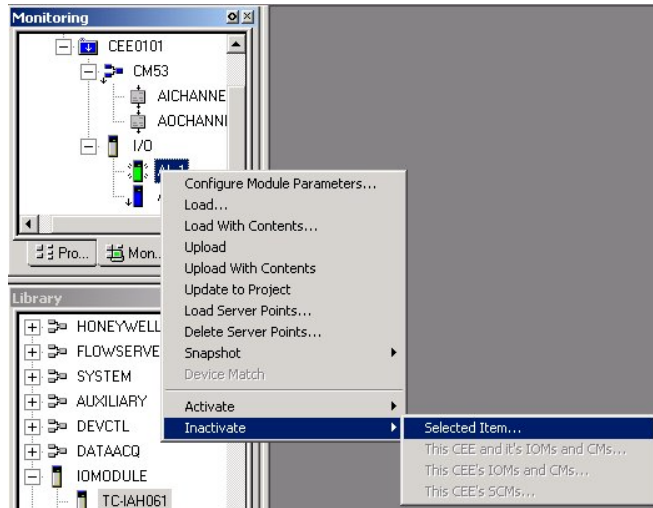
Setting I/O Inactive

Follow the steps in the table below to set the I/O inactive.

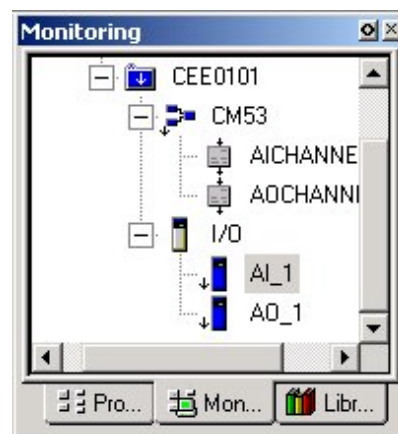
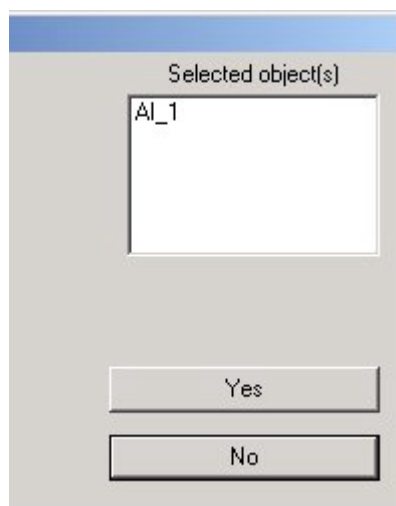
Step	Action	Result
1	From the Monitoring Tree, right-click the desired I/O block.	
2	Click Inactivate.	

Alternate method:

Click the Toggle State  toolbar button to set the selected item inactive.



Step	Action	Result
3	Click Yes from the pop-up window to set the selected item inactive.	The I/O block turns from green to blue on the Monitoring Tree.

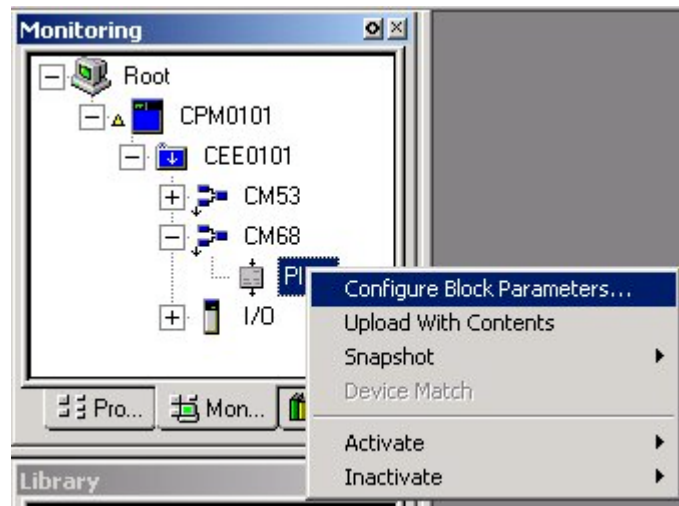


Note: IOMs can also be activated through the server database (that is, an IOM status point).

Changing Parameters while Monitoring

Follow the steps in the table below to change parameters while monitoring a strategy. Note that the following is one specific example of changing parameters while monitoring using a PID block.

Step	Action
1	Click on the Monitoring Tree.
2	Right-click on the desired block

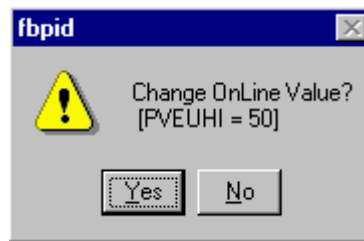


In this example, the block PIDA was selected.

Note:

CEE must be idle or FB must be inactive in order for some parameter changes to be allowed. For example, you can change the Enable Alarming Option on-line when both the CEE and function block are active.

Step	Action
3	Click on Configure Block Parameters, then enter the parameter changes. When the OK button is clicked, or the cursor is placed in any other field a confirm change dialog box appears. Confirm the change dialog as YES, if you want to write the new value to the controller, otherwise select No. Tip: Press the SHIFT-TAB keys to change the focus between the Yes and No buttons. Note: Any parameters changed while monitoring are only written to the controller; they are not written to the ERDB.



On-Line Monitoring Using Control Builder

Changing Parameters while Monitoring

Step	Action
4	In this example, the parameter PVEU Range Hi was changed to 50. The changed parameter will now appear underlined.

REGCTL:PID Block, PIDA - Parameters [Monitoring]

Configuration Parameters Monitor

Main Algorithm SetPoint

Name: PIDA

Description:

Engineering Units:

Process Variable

PVEU Range Hi : 50

PVEU Range Low : 0

Operator Actions Versus IOP Outputs

The following table summarizes the affects that given operator actions can have on IOP outputs and/or related functions.

If Operator. . .	Then, this occurs. . .	And, indications are. . .
Changes execution state (IOMSTATE) of an output IOP to IDLE	- For all channels, field output terminals hold the value applied at the time of idling. - Initialization Request (INITREQ) is asserted on all associated Output Channel Blocks. - No fault alarms should occur in Server (communication with the module is not disrupted). - The Detail Display shows IDLE state.	- IOP icon turns blue in Monitor tab - Detail Display shows IDLE state - No change in the IOP status LED display.
Inactivates the Point Execution State (PTEXECST) of an Output Channel	- For all channels, field output terminals hold the value applied at the time of idling. The exception is DO channels executing ONPULSE/OFFPULSE commands. Inactivating the PTEXECST will not affect the output terminals, the pulse will complete at the specified time. - Initialization Request (INITREQ) is asserted on the IOC block. - No fault alarms should occur in Server (communication with the module is not disrupted).	- IOP icon turns blue in Monitor tab - No change in the IOP status LED display.

On-Line Monitoring Using Control Builder
Operator Actions Versus IOP Outputs

If Operator. . .	Then, this occurs. . .	And, indications are. . .
Inactivates a Control Module containing an output channel	- For Output Channel block, execution is NOT affected. - No fault alarms should occur in Server (communication with the module is not disrupted).	- Control Module icon turns blue in Monitor tab. - I/O Channel icon remains green in Monitor tab. - The Detail Display shows INACTIVE state for the CM. - No change in the IOP status LED display.
Inactivates CEE containing PMIO output block	- No affect on output channel block execution. - No fault alarms should occur in Server (communication with the module is not disrupted).	- CEE icon turns blue in Monitor tab. - I/O Channel icon remains green in Monitor tab. - The Detail Display shows IDLE state for the CEE. - No change in the IOP status LED display.
Deletes IOP from Monitor tab	- IOP is currently in its IDLE state. - The IOP has no associated IOC blocks loaded (contained in CMs and appearing in the Monitor tab).	IOP icon does not appear in Monitor tab.
Deletes an IOP from Project tab	- IOP is not loaded or has been deleted from Monitor tab. - IOP has no associated I/O Channel blocks contained in Control Modules.	IOP icon does not appear in Project or Monitor tab.

On-Line Monitoring Using Control Builder
Operator Actions Versus IOP Outputs

If Operator. . .	Then, this occurs. . .	And, indications are. . .
Deletes a Control Module containing PMIO Output Channel blocks from Monitor tab	- I/O Channel block's Point Execution State must be INACTIVE or IOP must be in its IDLE state. - Sets all outputs to UNPOWERED.	CM icon does not appear in Monitor tab.
Deletes PMIO output Channel block from CM in Project tab and re-loads CM to controller	- Output block's Point Execution State must be set to INACTIVE. - Output is set to UNPOWERED	Output Channel icon does not appear in CM.

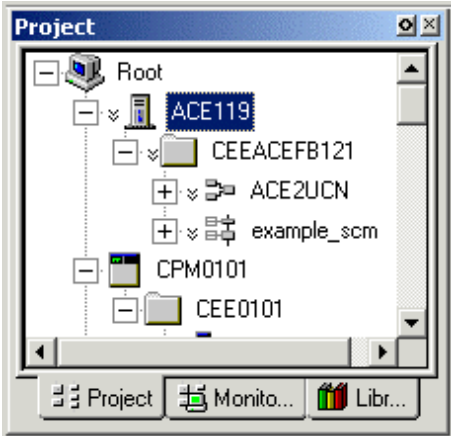
Interacting with ACE

Deleting ACE/CEEACE block

Use the following procedure as a general guide for deleting a loaded ACE/CEEACE block from the Control Strategy. This procedure assumes that Control Builder is running with tree views open. The illustrations used in this procedure are for example purposes only.

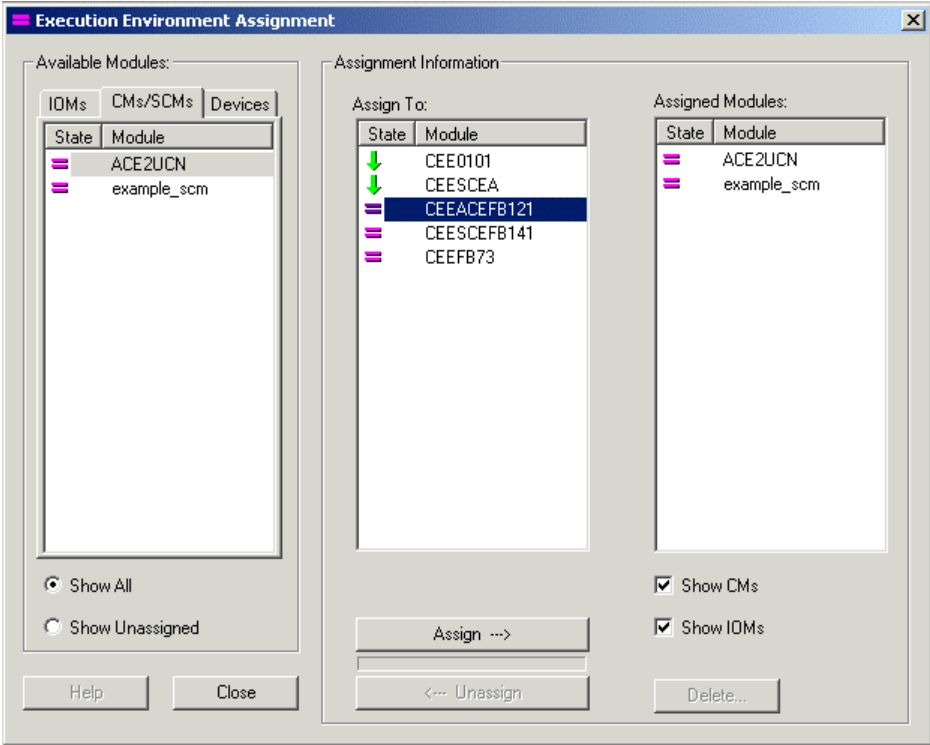
Step	Action	Result
1	In Monitor Mode, open root directory for ACE/CEEACE.	Exposes contents of the CEEACE.
2	Right-click the CEEACE block and select Inactivate->Selected CEE(s), IOMs, CMs, Applicable Function Blocks from the shortcut menu.	Inactivates all components including the CEEACE. Block icons turn blue.
 TIP If ACE/CEEACE and its assigned components have been loaded, you must first put the CEEACE in its Idle mode and delete all of its components in the Monitor mode before you can delete them from the Project mode.		
3	Select components contained in CEEACE and click  delete button in the tool bar.	Calls up Delete Selected Objects dialog.
4	Click the Deleted Selected Object(s) button.	Initiates the delete function and progress dialog tracks status until complete.
5	Click the ACE block and click the delete button in the tool bar.	Calls up Delete Selected Objects dialog.
6	Click the Delete Selected object(s) button.	Initiates the delete function and progress dialog tracks status until complete.

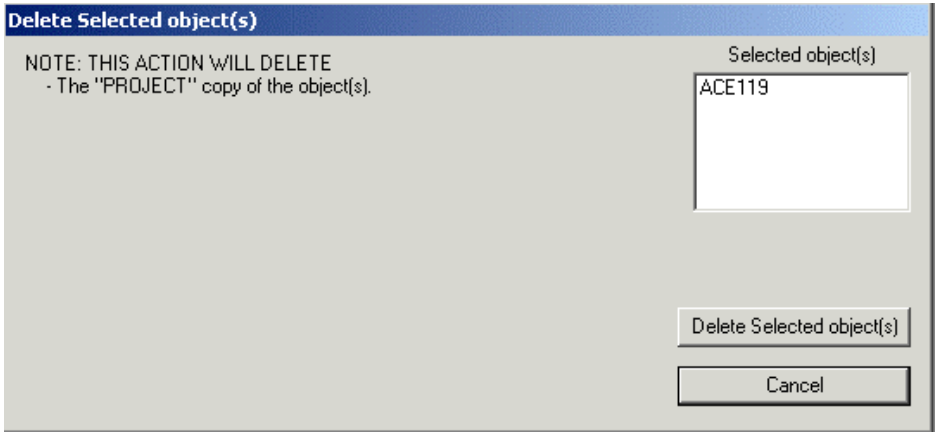
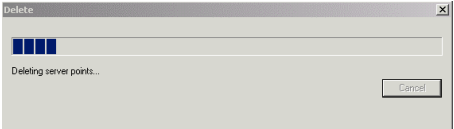


Step	Action	Result
7	Click the Project tab.	Calls up the Project view.
		
8	With ACE selected, click  assign button in the tool bar.	Opens the Execution Environment Assignment dialog box.

On-Line Monitoring Using Control Builder

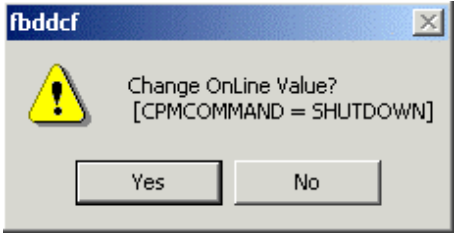
Interacting with ACE

Step	Action	Result
		
9	Click module assigned to ACE in Available Modules list, select CEEACE in Assign To list, select all the modules listed in the Assigned Modules list and click the Unassign button.	Unassigns modules from CEEACE.
10	Click the Close button.	Closes dialog box and returns to Project view.
11	With ACE selected, click  delete button in tool bar.	Calls up Delete Selected Objects dialog.

Step	Action	Result
		
12	Click the Delete Selected object(s) button.	Initiates the delete function and progress dialog tracks status until complete.
		
13	This completes the deleting ACE/CEEACE procedure.	Stops the ace.exe on the ACE node, but the Control Data Access for supervisory platform (CDA-sp) continues to run.

Issuing a Shutdown Command and using snapshot to restore ACE

Use the following procedure as a general guide for issuing a Shutdown command to a loaded ACE/CEEACE block through the Monitor mode in Control Builder. This procedure assumes that Control Builder is running with tree views open. The illustrations used in this procedure are for example purposes only.

Step	Action	Result
1	In Monitor mode, right-click the CEEACE block and select Inactivate->Selected CEE(s), IOMs, CMs, Applicable Function Blocks from the shortcut menu.	Calls up Change State dialog.
2	Click the Yes button to continue.	Inactivates all components including the CEESCE. Block icons turn blue.
3	Right-click the ACE icon and select Configure Module Parameters.	Calls up the ACE Block configuration form.
4	On Main tab, click down arrow button in ACE Command field and select shutdown.	Calls up warning prompt for confirmation of online change.
		
5	Click the Yes button.	Initiates shutdown of ACE, ACE turns yellow and other icons turn red. (The ace.exe stops, but the Control Data Access for supervisory platform (CDA-sp) continues to run. Use Administrative Tools in Windows Control Panel to stop the CDA-sp service on the ACE node.)
6	Right click ACE icon and select Snapshot->Restore Controller from Snapshot from shortcut menu.	Opens Restore Controller Snapshot dialog.

On-Line Monitoring Using Control Builder
Interacting with ACE

Step	Action	Result
7	Click the Continue button.	Restores ACE data using the snapshot files and icons turn blue. (This Step assumes that the CDA-sp service is running.)
8	Right-click CEESCE icon and select Activate->Selected CEE(s), and its IOMs, CMs and Applicable Function Blocks from the shortcut menu.	Calls up Change State dialog.
9	Click the Yes button to continue.	Activates components and icons turn green.
10	This completes the Shutdown Command and snapshot recovery procedure.	

Recovering from power failure

Use the following procedure as a general guide for recovering ACE/CEEACE operation after a power failure. This procedure assumes that Control Builder is running with tree views open. The illustrations used in this procedure are for example purposes only.



TIP

You can use this same general procedure to recover from an ACE application failure.

Step	Action	Result
1	Power to ACE node is lost.	Generates loss of ACE communications event and ACE/CEEACE and contained component block icons turn red in Monitor Mode of Control Builder on Server.
2	Restore power to ACE node.	Wait for ACE node to return to operation (Boot).
3	In Monitor mode on Control Builder, right-click the ACE block icon and select. Snapshot->Restore Controller from Snapshot from shortcut menu.	Opens Restore Controller Snapshot dialog.
4	Click the Continue button.	Restores ACE data using the snapshot files and icons turn blue.
5	Right-click CEEACE icon and select Activate->Selected CEE(s), and its IOMs, CMs and Applicable Function Blocks from the shortcut menu.	Calls up Change State dialog.
6	Click the Yes button to continue.	Activates components and icons turn green.
7	This completes the power failure recovery procedure.	

Sequential Control Module Creation

Creating and Saving a Sequential Control Module

Introduction

Sequential Control Modules (SCM) are made up of Handlers. Handlers are made up of Transitions and Steps that, when combined, form a procedural process. The actions (Steps) execute expressions (Outputs) in an SCM based on conditions (Transitions) being met. One Step cannot occur until the previous Transition condition is met.

In contrast, a Control Module is a group of blocks which perform their functions during one time cycle.

Refer to the following references in the *Control Builder Components Theory* for more detailed explanations of the differences between Control Modules and Sequential Control Modules:

- *Some Underlying Concepts*
- *Control Module and Sequential Control Module FBs schedule*
- *Component Categories and Types, Overview*



WARNING

All edits done on project-related objects must be reloaded to the controller before those edits can be seen in the controller.

Sequential Control Module Creation

Creating and Saving a Sequential Control Module

Common SCM Functionality

A Common SCM is one that can control several equipment units, but only one at a time.

The SCM must be assigned to the equipment before controlling it. This assignment can be done at either configuration or run time.

The choices of equipment that a Common SCM can be assigned to are configured at configuration time using an Alias Table. A user may define aliases and the associated references in the Alias Table. These references represent parameters of the equipment that the SCM could be assigned to at run time. The references are called "instance parameters". Once defined in the Alias Table, the aliases could be referenced by an SCM expression. At run-time the user can select a column of references, or instance, from the Alias Table, to tie the aliases to the parameters of specific piece of equipment. Once the alias reference is selected, the SCM is assigned to the equipment referred to by the selected instance. The SCM can then command this equipment.

All of the Read and Write requests generated by the SCM step output / transition condition expression, which reference the aliases in the SCM, will be re-directed to the currently selected equipment. Once the SCM is done with the selected equipment, the user can select another instance in the Alias Table, causing the SCM to control another piece of equipment. All of the commands that the SCM sends to the alias will now be sent to the newly selected equipment. This is called Dynamic Indirection.

For more information on Common SCM Functionality, refer to the Control Builder Components Theory.

Creating a Sequential Control Module

To create a sequential control strategy, a Sequential Control Module must first be created. Then Steps and Transitions are inserted and connected (see Figure 22).

Follow the steps in the table below to create a new Sequential Control Module (SCM).

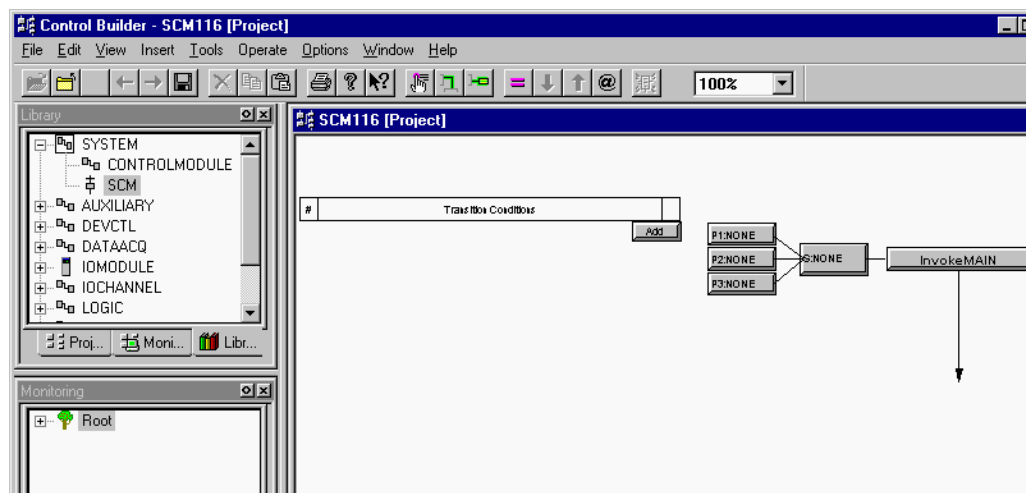


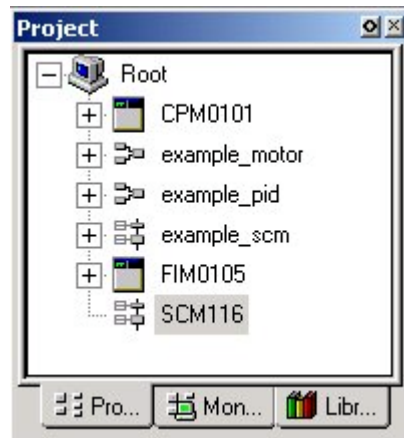
Figure 34 Control Builder SCM Frame

Step	Action
1	Set up the Control Builder with both the Library and Project Trees visible. See Opening and navigating a tree window in this guide. Alternate Method: In place of steps 1-3, select File -> New -> Sequential Control Module.
2	Click on and expand the System Library on the Library Tree.

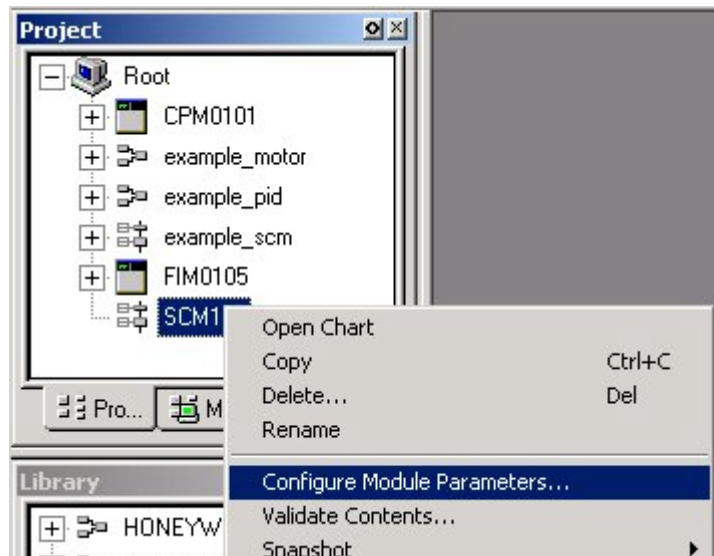
Sequential Control Module Creation

Creating and Saving a Sequential Control Module

- 3 Drag and drop an SCM onto the Project Root

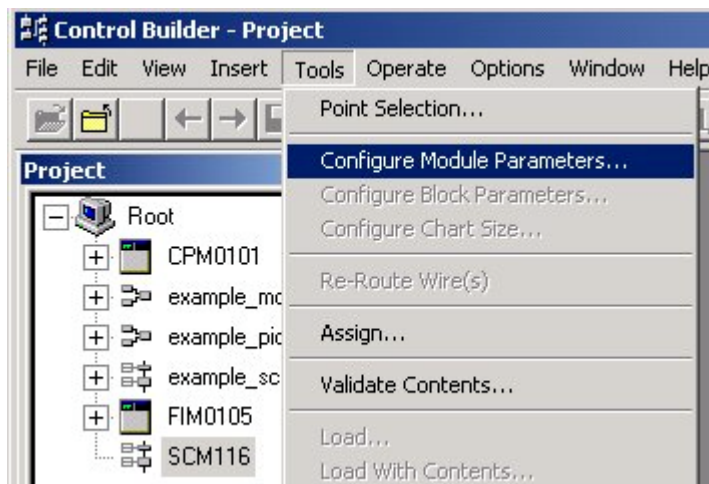


- The new SCM appears under the Root Project Tree. SCM names are sequentially numbered (for example, SCM54, SCM55, etc.).
 - The new SCM is automatically saved to disk.
- 4 Right-click on the new SCM to display the selection options.



- 5** Click on Configure Module Parameters.

Alternate method: Click Tools -> Configure Module Parameters.



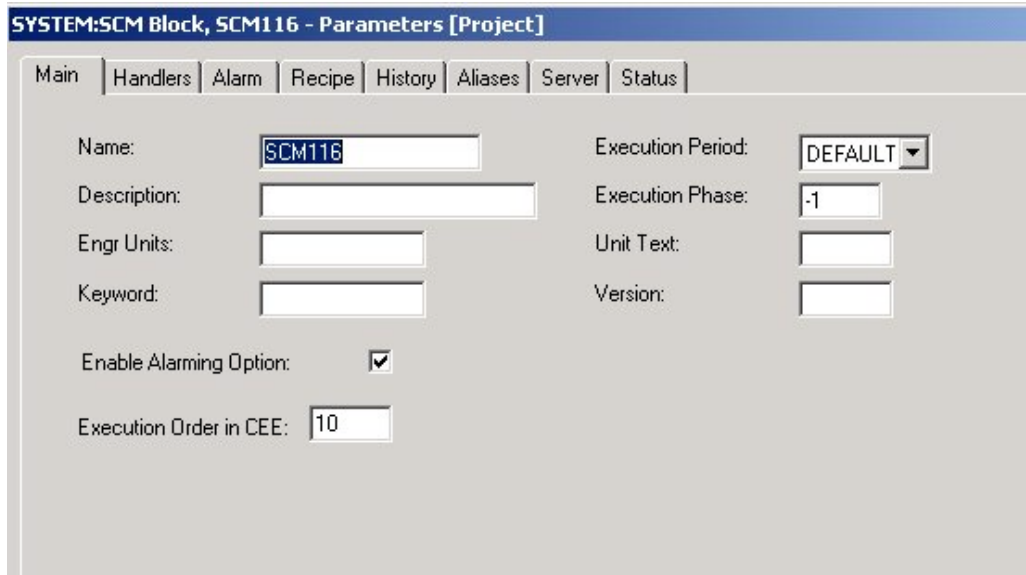
The Sequential Control Module Parameter Configuration form is open for input.

Alternate method: Instead of steps 4 & 5, double-click an empty area of the SCM Control Drawing (with drawing already open) to access the SCM Parameter Configuration form (shown in Figure 23).

- 6** Enter the new SCM name in the Name field.
- 7** Click on the appropriate tabs to customize the SCM as required.
- For example, click the Server tab and configure Server parameters.
- 8** Using the F1 key to access context sensitive Help, fill in the parameter fields on each tab as required.
- 9** Click on OK.
- 10** If necessary, double-click on the newly-named SCM on the Project Tree Window to open the SCM. Note that the new name now appears at the top of the SCM.

Sequential Control Module Creation

Creating and Saving a Sequential Control Module



SYSTEM:SCM Block, SCM116 - Parameters [Project]

Main | Handlers | Alarm | Recipe | History | Aliases | Server | Status

Name: Execution Period:

Description: Execution Phase:

Engr Units: Unit Text:

Keyword: Version:

Enable Alarming Option: ☒

Execution Order in CEE:

Figure 35 SCM Parameter Configuration Form

Assigning SCM to CEE

Before you create and configure Steps and Transitions in your SCM, you should assign the SCM to a CEE. Follow the steps in the table below to assign the SCM to a CEE.



ATTENTION

- The SCM should be assigned to a CEE before adding Steps and Transitions or an error condition can result.
- All edit windows (such as SCM charts) should be closed before assigning the SCM to a CEE or a lock contention results.

Step	Action	Result
1	Click Tools -> Assign. Alternate method: Click the  button on the toolbar.	The Controller Assignment window opens.
2	Click the appropriate SCM from the list of Available Modules - CMs/SCMs on the left side of the window.	
3	If your system has multiple controllers, click the destination CEE from the window section labeled Select a CEE. If you have only one CEE, it will be selected by default.	
4	Click Assign in the center of the window.	After a few seconds, your SCM will appear in the section of the window labeled Assigned Modules.
5	Click Close.	Your SCM now appears in the Project tree under and connected to your CEE.

Creating Instances of Steps and Transitions

A Sequential Control Module is composed of Handlers and Handlers are composed of Steps and Transitions. This section describes how to create each.



ATTENTION

An Invoke Transition is already located on the Main Handler and is named "InvokeMAIN." All SCM Handlers are required to have one and only one Invoke Transition which is always the first block in the sequential control strategy.

- Unlike other Transitions, the Invoke Transition does not need transition conditions, however, you may add conditions if you want the SCM automatically invoked under specific conditions.
- The Invoke Transition can be used to start the SCM automatically if the condition expressions and gate logic cause a TRUE result.
- See [Adding Transition Conditions and Step Outputs](#).

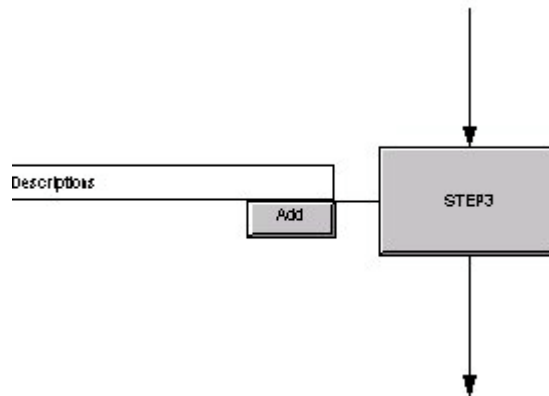
Creating Steps

Follow the steps in the table below to create an SCM Step.

Step	Action
1	Make sure that an SCM drawing is open. If the SCM drawing is not open, double-click the SCM in the Project Tree to open it. See Creating and Saving a Sequential Control Module .
2	Open the SCM branch on the Library Tree.

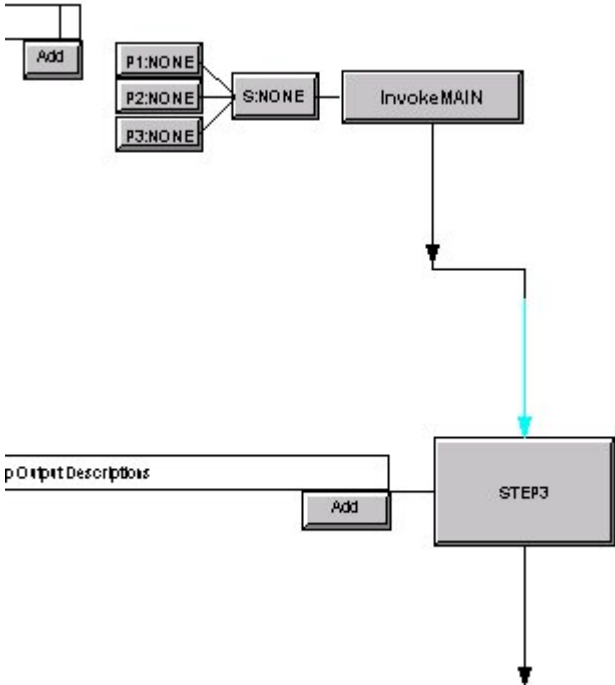


Step	Action
3	Drag and drop a Step onto the SCM control drawing. Position the Step under the Invoke Transition. Place the Step so that its input does not touch the output pin on the Invoke Transition. Connections between pins are not made unless they are explicitly wired together. If the pins touch, they look connected, even though they have not been wired together.



Sequential Control Module Creation

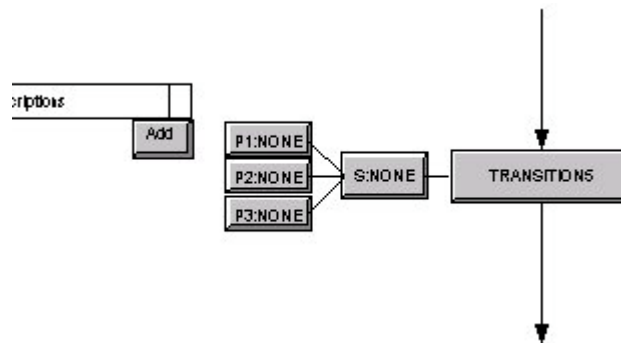
Creating Instances of Steps and Transitions

Step	Action
4	Select Insert -> Wire to wire the output pin of the Transition block above to the input pin of the Step block. Refer to Connecting and Disconnecting SCM Blocks. Alternate methods: - Click on the Wire toolbar button. - Double-click on the desired pin. 
5	Right-click the SCM Step, then click SCM Step Object -> Configure Module Parameters...
6	Enter the desired parameters on each tab of the configuration form. While in each entry field, press the F1 key to view Help Topics for the field. Refer to Configuring the Step/Transition Parameter Configuration Form.
7	Click OK.

Creating Transitions

Follow the steps in the table below to create an SCM Transition.

Step	Action
1	Make sure that an SCM is open. If the SCM is not open, double-click the SCM on the Project Tree to open it. See Creating and Saving a Sequential Control Module .
2	Open the SCM branch on the Library Tree.
3	Drag and drop a Transition onto the SCM control drawing. Position the Transition under the preceding Step.



Sequential Control Module Creation

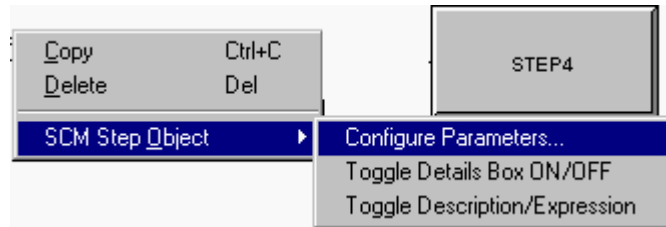
Creating Instances of Steps and Transitions

Step	Action
4	Select Insert -> Wire to wire the output pin of the Step block above to the input pin of the Transition block. Refer to Connecting and Disconnecting SCM Blocks. Alternate methods: • Click on the Wire toolbar button. • Double-click on the desired pin.
5	Right-click the SCM Transition, then click SCM Transition Object -> Configure Module Parameters.... Alternate Method: Double-click on the TRANSITION block to open the parameter configuration form. Tip: If editing an existing set of expressions, double-click on the desired expression to open the parameter configuration form to the tab that contains that expression.
6	Enter the desired configuration parameters on each tab of the configuration form. While in each entry field, press the F1 key to view Help topics for the field. • Refer to Configuring the Step/Transition Parameter Configuration Form.
7	Click OK.

Configuring the Step/Transition Parameter Configuration Form

Follow the steps in the table below to configure Step and Transition parameters using the Parameters Configuration form. Note that separate Parameters Configuration forms are used for configuring Steps and Transitions.

Step	Action
1	Right-Click on the desired Step/Transition block then click SCM Step/Transition Object -> Configure Module Parameters on the drop-down menu. OPTION: Double-click on the Step/Transition Object to access the Parameter Configuration form. NOTE: A Step block is used for this particular example.



- 2 Make the necessary changes to the Main page and click OK. While in each entry field, press the F1 key to view the Help topic for the field.

Step	Action
3	Select the other tabs and enter other configuration parameters as required. While in each entry field, press the F1 key to view Help topics for the field.
4	Click OK to close the Parameter Configuration form and return to the control chart.

Adding Transition Conditions and Step Outputs

Adding Transition Conditions

Follow the steps in the table below to add conditions to a Transition.



ATTENTION

All Transitions, except the Invoke Transition (that is, InvokeMAIN), require conditions. Conditions are optional for the Invoke Transition.

Step	Action
1	On the Transition block, click on the ADD button. Each click adds a single condition to the Transition.

#	Transition Condition Descriptions	
		Add
		P1:NON
		P2:NON
		P3:NON

The ADD button was clicked twice to add two conditions in the example below.

#	Transition Condition Descriptions	
1		P1:NON
2		P2:NON
		P3:NON
	Down	Up
	Del	Add

Step	Action
2	Right-click on the Transition and then click SCM Transition Object -> Configure Parameters to display the Parameters Configuration form. Alternate method: Double-click on the specific Transition Condition Description field (for example, #1) to display the Parameters Configuration form and proceed to step 4. NOTE: Double-clicking on specific areas of the Transition block (such as the #1 Description area) brings up the respective Parameters Configuration tab for that area.

- 3 Click the appropriate "Cond #" tab, then enter an expression to meet your specific strategy requirements.
- See the *Experion PKS Control Components Reference, TRANSITION BLOCK*.
 - Refer to [Using Expression Builder Buttons on Step/Transition forms](#).

Sequential Control Module Creation

Adding Transition Conditions and Step Outputs

Step	Action
4	Click the “Gates” tab and configure the gate logic to meet your specific needs.

SCM:TRANSITION Block, TRANSITION5 - Parameters [Project]

Configuration Parameters | Monitoring Parameters | Block Preferences

Main | Cond. #1 | Cond. #2 | Gates | Block Pins

Gate Type:

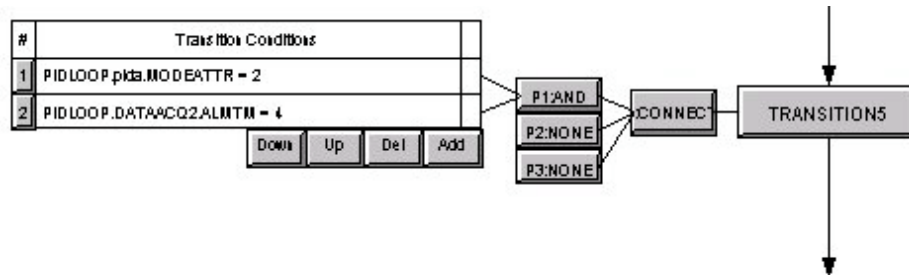
Primary Gate (P1) Type: AND

Primary Gate (P2) Type: NONE

Primary Gate (P3) Type: NONE

Secondary Gate (S) Type: CONNECT

- 5 Shown is a Transition with its conditions configured as a one input AND gate.



- 6 Click OK to return to the Control Drawing.



ATTENTION

Click on the top line of the Transition details box in the Control Drawing to alternate between displaying Transition Condition Descriptions and Transition Conditions.

Using Expression Builder Buttons on Step/Transition forms

When building expressions within an SCM, a graphical keypad is provided that displays all supported SCM expression operators and functions.

- You may select an operator or function and have it deposited in the expression with a mouse click.
- You may select a number from the numerical keypad and have it deposited in the expression with a mouse click.
- You may select the “Fetch Enums” button along with the “No. Enumerations” list box to specify enumerations within the expression.
- You may press the Points button to access the Point Selection dialog to find a desired point name and parameter when referencing a particular parameter expression. Refer to [Using the Point Selection Tool](#).



ATTENTION

Double-check the gate logic when performing Moves and Deletes.

- Moving an expression may change its gate assignment.
-

Moving Up/Down Expressions

Follow the steps in the table below to move up or down an expression.

Step	Action
1	Click the expression that you wish to move up or down in the corresponding STEP or TRANSITION block.
2	Press the Up button or Down button as desired. Each click causes the selected expression to move up one row or down one row as directed.

Deleting Expressions

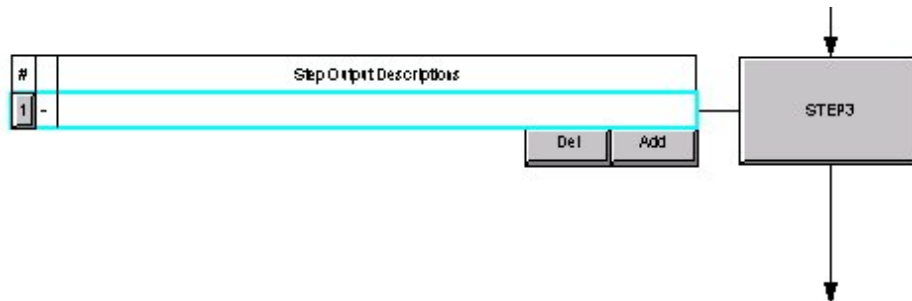
Follow the steps in the table below to delete an expression.

Step	Action
1	Click on the expression that you wish to delete in the corresponding STEP or TRANSITION block.
2	Press the Del button to delete the selected expression.
3	Select Yes in the Condition Deletion Confirmation dialog to complete the delete procedure.

Adding Step outputs

Follow the steps in the table below to add Step outputs to a Step.

Step	Action
1	On the Step block, click on the ADD button. Each click adds a single output to the step. The ADD button was clicked once to add one step output in the example below.



- Right-click on the Step then click SCM Step Object -> Configure Parameters to display the Parameters Configuration form.

Alternate method: Double-click on the specific Step Output field (for example, #1) to display the Parameters Configuration form and proceed to step 4.

NOTE: Double-clicking on specific areas of the Step block (such as the #1 Step Output area) brings up the respective Parameters Configuration tab for that area).

Step	Action

3	Click on the appropriate OUT # tab. Out #1 is shown in this example.

Tips:

- Select the Points button to access the Point Selection dialog which is used to select points.
- Select the Fetch Enums button for help in remembering an ordinal value associated with an enumerated parameter.

The screenshot shows a software interface for configuring a step block. The title bar reads 'SCM:STEP Block, STEP3 - Parameters [Project]'. There are three main tabs: 'Configuration Parameters', 'Monitoring Parameters', and 'Block Preferences'. Under 'Configuration Parameters', there are sub-tabs: 'Main', 'Out. #1' (which is active), 'Stop Condition', 'Interrupt Condition', and 'Block Pins'. The 'Output Details' section contains a 'Description' label with an empty text box, a 'Type' dropdown menu currently showing 'NULL', and an 'Output Expression (Ex: "CM.Block.Param := A + B")' label with a large empty text area. Below the expression area is a numeric keypad with buttons for digits 0-9, a decimal point, and various mathematical and logical operators (+, -, *, /, (,), =, >, <, >=, <=, <>, AND, OR, NOT). At the bottom, there are buttons for 'Fetch Enums' and 'Points...', and two dropdown menus labeled 'No Enumerations:' and 'Functions:'.

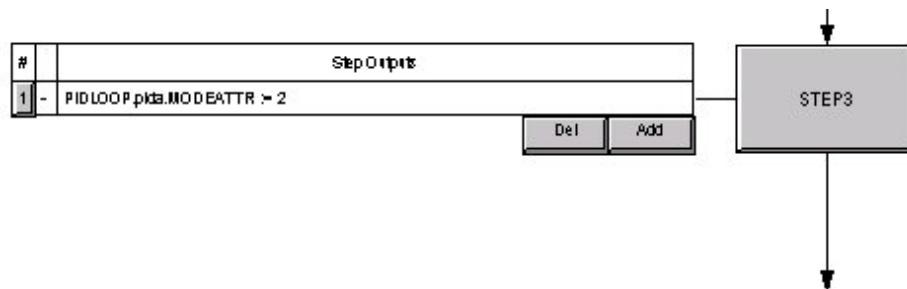
4	Enter a description and a destination expression.

Sequential Control Module Creation

Adding Transition Conditions and Step Outputs

Step	Action
Output Details Description: Change Modeattr to Pgm Output Expression (Ex: "CM.Block.Param := A + B"): PIDLOOP.pida.MODEATTR := 2 Type: NULL	

- 5 Click on OK to return to the Control Drawing. The resulting Step is shown here.



In this sample procedure, the MODEATTR parameter of block PIDA in the PIDLOOP Module was set to 2 (PROGRAM).



REFERENCE

- See the *Experion PKS Control Builder Components Reference, STEP Block* for a complete listing of the valid syntax for Step expressions. See additional Step Block information in *Control Builder Component Theory, STEP Block*
- Refer to [Using Expression Builder Buttons on Step/Transition forms](#) for assistance when using the Expression Builder keypad.
- If errors occur in your expressions, refer to the *Control Builder Notifications Reference* for a detailed explanation of the error.



ATTENTION

Click on the top line of the Step details box to alternate between displaying Step Output Descriptions and Step Outputs.

Adding Step Stop and Interrupt conditions

Follow the steps in the table below to add Stop and Interrupt conditions for a Step.

Step	Action
1	Double-click on the Step to display the Parameters Configuration form.
2	Click on the Stop Condition tab.

The screenshot shows the 'SCM:STEP Block, STEP4 - Parameters [Project]' dialog box. The 'Stop Condition' tab is active. The 'Condition Option' checkbox is unchecked. The 'Condition Details' section includes a 'Description' field, a 'Force Permit' checkbox, a 'Force Request' dropdown menu set to 'NONE', and a large text area for the 'Condition Expression'. Below the text area is a keypad with mathematical operators (+, -, *, /, {, }), comparison operators (=, >, <, >=, <=, <>), logical operators (AND, OR, NOT), and numeric keys (0-9, .). At the bottom, there are buttons for 'Fetch Enums' and 'Points...', and dropdown menus for 'No Enumerations' and 'Functions'.

- 3 Click on the Condition Option check box so it is checked.
- 4 Complete the Expression that will determine your Stop condition and give this condition a description.

Sequential Control Module Creation

Adding Transition Conditions and Step Outputs

Step	Action
SCM:STEP Block, STEP4 - Parameters [Project] Configuration ParametersMonitoring ParametersBlock Preferences MainOut. #1Stop ConditionInterrupt ConditionBlock Pins ☒ Condition Option Condition Details: Description: LoopBack Operator Error Force Permit☐ Force Request: NONE Condition Expression (Ex: "A > B" or "C = n"): PIDALoop.PIDA.OP > 109 + - * / { } = > < >= <= <> 0 1 2 3 4 5 6 7 8 9 . Fetch Enums No Enumerations: Points... AND OR NOT ^ ? : := Functions:	

5 Click OK to return to the Control Drawing.



REFERENCE

- The Interrupt Condition is created in the same way by clicking on the Interrupt Condition tab.
 - Refer to [Using Expression Builder Buttons on Step/Transition forms](#) for assistance when using the Expression Builder keypad.
 - If errors occur in your expressions, refer to the *Control Builder Notifications Reference* for a detailed explanation of the error.
-

Connecting and Disconnecting SCM Blocks

Transition outputs are connected to Step inputs and Step outputs are connected to Transition inputs. The same procedure is used to connect Steps and Transitions as is used to connect Blocks within Control Modules. See [Connecting Blocks with Insert Wire](#) in the Control Module Creation section of this guide.

- Begin by connecting the output of the Invoke Transition to the input of the first step using the described procedure.
- Continue connecting the alternate Steps and Transitions.

Adding Additional Handlers

Introduction

There are two types of SCM Handlers:

- Normal
- Abnormal

The Main Handler is the default Handler created when the SCM is initially created. There can only be one Main Handler. It is a Normal Handler. The Interrupt Handler is also considered a Normal Handler.

Abnormal Handlers are the mechanism SCMs used to manage alarms and events such as abort and hold conditions.

The Invoke Transition can be used to specify the conditions under which the Handler will run.

This section describes how to add Handlers to your SCM.

Sequential Control Module Creation

Adding Additional Handlers

Creating a new Handler

Follow the steps in the table below to add a new Handler to an SCM. Make sure your SCM is open on the Control Drawing. Alternate Method:

Step	Action
1	From the Library tree, drag and drop a Handler from the SCM group to the Control Drawing. Alternate Method: Select Insert -> New SCM Handler.



Step	Action
2	The Parameters Configuration form for the Handler block appears.

SCM:HANDLER Block, HANDLERA - Parameters [Project]

Main

Name: HANDLERA

Description:

Handler Type: HOLD

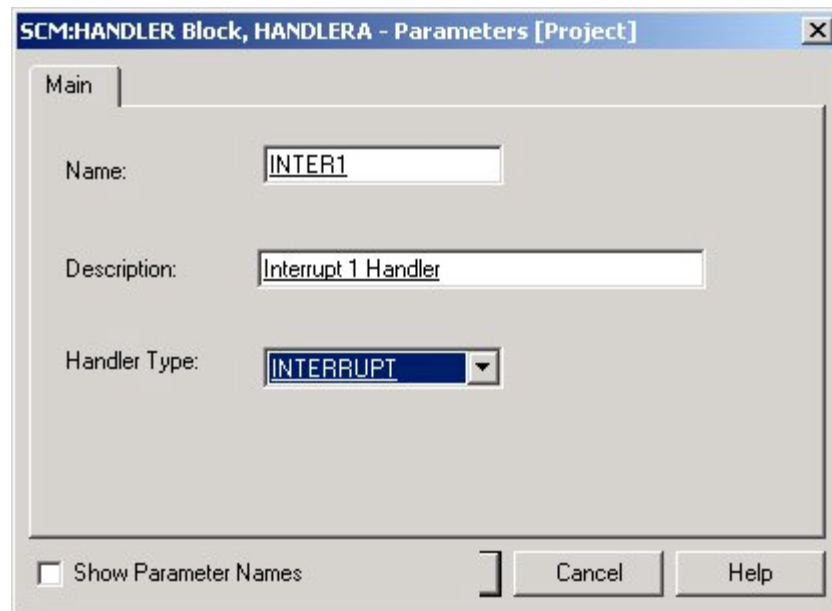
☐ Show Parameter Names

OK Cancel Help

Sequential Control Module Creation

Adding Additional Handlers

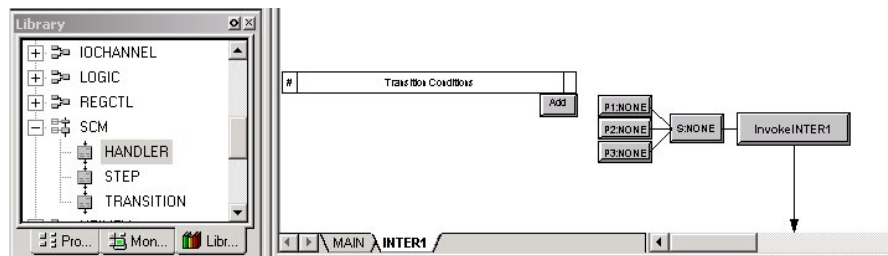
Step	Action
3	Enter a meaningful name and description. Enter a Handler Type from the drop-down list box.



Interrupt 1 Handler was selected.

INTER1 was entered as the new Name.

4	Click OK.
5	The Handler tab reflects the new Handler name.



6	Add Step and Transition blocks to the new Handler you just created per your strategy requirements and wire the blocks together.

Loading the SCM

Follow the steps in the table below to load your SCM.



ATTENTION

The SCM must be assigned to a CEE and all edit windows (such as SCM charts) must be closed before attempting to load.

Step	Action	Result
1	Open the Project Tree in Control Builder.	
2	Click the SCM.	
3	Click Tools -> Load. Alternate method: Click the Load  toolbar button.	A message box will appear, which will tell you exactly what will happen as a result of this command. This command causes the objects to be loaded to your controller and also loads the objects to the Server.
4	Click Continue.	In a few moments the load will complete. If there are any errors, a box will appear to give you details of the problem(s).

Operating an SCM

Introduction

Control Builder uses specific colors and State conditions to indicate the flow of a Sequential Control Module. The following section describes how to differentiate between these colors/states. It also shows what these colors/states mean as the SCM is operating.



ATTENTION

It is possible to change the color of the faceplate for SCM blocks, however, it is not advised. SCM blocks display predetermined colors during execution.

Monitoring the SCM in Station

Control Builder Chart Visualization allows an SCM chart to be viewed on a Station detail display. This permits a process control operator to use the chart to better monitor and control the module operation.

For information on Control Builder Chart Visualization, refer to the *Control Building Guide* section *SCM Chart Visualization Functionality*:

- *Basic Chart Visualization Design Concepts*
- *Some SCM Chart Operation Considerations*

SCM states

The table below gives a brief review of the states that an SCM may exhibit. For a full description of all the SCM States and how an SCM transitions from one to another, see the *Experion PKS Control Builder Components Theory*, *SCM (Sequential Control Module) Block*.



ATTENTION

The current state of the SCM is shown on the SCM title bar.

State	Description
INACTIVE	The SCM Block EXECSTATE is INACTIVE. Block configuration parameters are being edited. This is the first step after IDLE.
VALIDATED	The SCM Block EXECSTATE is Active.
RUNNING	The SCM is executing its Main or Interrupt Handlers.
ABORTED	The SCM has just executed its Abort Handler.
HELD	The SCM is not executing Main or Interrupt Handlers but is waiting for a Stop or Abort.
STOPPED	The SCM is not executing Main, Interrupt, Hold, or Stop Handlers. It is waiting for an Abort condition.
COMPLETE	The SCM is finished.
INTERRUPTING	The SCM is executing its Interrupting Handler.

Follow the steps in the table below to activate and operate an SCM.

Step	Action
1	Make sure that the SCM has been downloaded.
2	Make sure all externally referenced regulatory loops, such as PID, are active. These would be contained in Control Modules referenced by the SCM's Transitions and Steps. Note: Make sure the CEE is active. Refer to Activating the CEE .
3	Open the loaded SCM from the Control Builder Monitoring Tree. The SCM you loaded will now appear in the Monitoring Tree. Notice there are a few differences between the Project Tree and the Monitoring Tree objects. • The objects in the Monitoring Tree (such as CPM, CEE, IOMs, SCMs, CMs) are green or blue. – When an object is green from the Monitoring Tree, that means the object is running or active. – When it's blue, it means that the object is not running, or inactive.

Sequential Control Module Creation

Operating an SCM

Step	Action
4	Note which Steps and Transitions are evaluated. A green connection indicates the Transition/Step is evaluating. A white line indicates it is not.
5	The current state of the SCM can be viewed in the SCM title bar. The state should be INACTIVE.
6	Double-click on a blank (empty) area of the SCM to access the Parameters Configuration form. Alternate method: Click Operate -> Sequential Control Module Status.
7	Select the Status tab. This form shows the current SCM state and includes a combo box you can use to issue commands to the SCM.
8	Select Active from the SCM Command drop-down box and click Yes to change the SCM state from Inactive to Idle.

SYSTEM:SCM Block, SCM116 - Parameters [Monitoring]

Main | Handlers | Alarm | Recipe | History | Server | Status

Command: ACTIVE

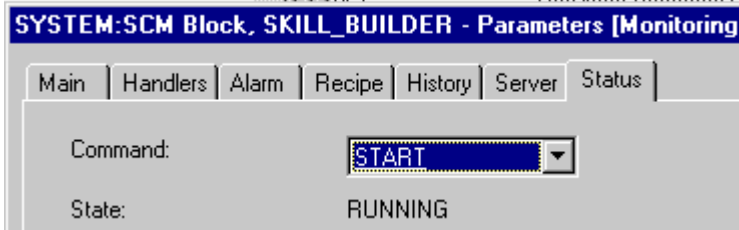
State: IDLE

Execution: OK

Execution Code: NONE

Execution Description: OK

The SCM goes to the IDLE State. You may see VALIDATING and VALIDATED for a moment.

Step	Action
9	Select Start from the SCM Command drop-down list box and click Yes to change the SCM state. 
10	The SCM goes to the RUNNING State. Close the Parameters Configuration form. The body of the active Step and Transition should be filled in green. The body is the box with the name of the Step or Transition, not the cells that contain conditions.



ATTENTION

Active Steps and Transitions are:

- green – if they are currently being completed
- red – if they cannot be completed; possible causes include:
 - the device being commanded by a step output is not “owned” by the SCM
 - the CM or SCM being referenced is not active
 - the MODE attribute of the CM or SCM being referenced is OPERATOR, not PROGRAM
 - the MODE of the device may not be properly set for the command to succeed
- yellow – if output has partially succeeded
 - an attempt was made to store a value to a parameter that was above or below the legal range
- blue – if they are already completed
- gray – if they have yet to be completed

The SCM will keep trying to complete any steps that are red.

Database Maintenance

Deleting CM and SCM (Optional)

Deleting a CM



ATTENTION

The loaded CM exists in two databases. The loaded CM exists in the controller database that can be viewed from the Monitoring Tree of Control Builder. The loaded CM also exists in the “engineering database” that can be viewed from the Project Tree Window of Control Builder.

To truly delete a CM, the delete action must take place both from the Monitoring Tree View and from the Project Tree Window.

Follow the steps in the table below to delete a CM from the controller database.

Step	Action
1	Set up the Control Builder with Monitoring Tree Window visible and click the CM you wish to delete.
2	If the CM is Active, click Operate -> Inactivate -> Selected Item and then select Yes in the Change State dialog box to deactivate the CM.
3	Click Edit -> Delete. Alternate method: Press the <Delete> key.
4	Click Delete Selected Objects to delete the CM. The deleted CM will no longer appear in the Monitoring Tree Window.

Follow the steps in the table below to delete a CM from the “engineering database” from the Project Tree Window.

Step	Action
1	Set up the Control Builder with Project Tree Window visible and click the CM you wish to delete.
2	Click Edit -> Delete. Alternate method: Press the <Delete> key.

Database Maintenance

Deleting CM and SCM (Optional)

Step	Action
3	Click Delete Selected Objects to delete the CM. The deleted CM will no longer appear in the Project Tree View.

Deleting a SCM



ATTENTION

The loaded SCM exists in two databases, the controller database and the engineering database. The Monitoring Tree Window of Control Builder is the controller database. The Project View of Control Builder is the engineering database.

To truly delete a SCM, the delete action must take place both from the Monitoring View and from the Project View. If the SCM is just deleted from the Monitoring View, it will not be deleted from the engineering database.



ATTENTION

In order to delete an SCM the SCM must be Inactive. To transition a SCM from its Running state to its Inactive state, several steps are required:

6. If the SCM Invoke Transition is not blank, the SCM Invoke Transition must be forced off. Make sure all conditions in the Invoke Transition are forced off if the Invoke Transition is an OR block.
 7. The SCM must be aborted and reset so that it may transition to its Idle state.
 8. The SCM state must be set to Inactive.
-

Follow the steps in the table below to delete a SCM from the controller.

Step	Action
1	Set up Control Builder with the Monitoring Tree Window visible.
2	Double-click the SCM (you wish to delete) to open the SCM.
3	If the Invoke transition is blank, skip steps 4-8. Otherwise, the initial transition of the SCM must be forced off.
4	Double-click the Invoke (initial) transition to display the Parameters Configuration form.

Step	Action
5	From the Cond#1 Tab of the Parameters Configuration form: - Click Force Permit. - When asked, "Change Online Value?", click YES. - Set Force Request equal to TOOFF.
6	Click OK.
7	For each condition of the Invoke Transition, repeat steps 4-6.
8	To abort the SCM, click Operate -> Sequential Control Module Status -> Status Tab -> Abort.
9	To set the SCM to idle, click Operate -> Sequential Control Module Status -> Status Tab -> Reset.
10	To set the SCM inactive, from the Operate Menu, click Inactive.
11	Close the SCM.
12	Select the SCM you wish to delete.
13	From the Edit Menu, click Delete. Alternate method: Press the <Delete> key.
14	Click Delete Selected Objects to delete the SCM.

The deleted SCM will no longer appear in the Monitoring Tree Window.

Follow the steps in the table below to delete a SCM from the "engineering database" or the Project Tree Window.

Step	Action
1	Set up the Control Builder with the Project Tree Window visible and click the SCM you wish to delete. The SCM must be closed first before deleting.
2	Click Edit -> Delete. Alternate method: Press the <Delete> key.
3	Click Delete Selected Objects to delete the SCM.

Database Maintenance

Deleting CM and SCM (Optional)

SCM Special Considerations

Purpose

Like all other powerful programming tools, the SCM allows the creation of situations that may be difficult to resolve, such as an endless loop. The Invoke Transitions of Handlers allow several scenarios where the SCM may seem to behave unexpectedly, and what is happening may not be obvious at first glance. This allows design flexibility and in special cases, such configurations may be needed.

Instances

SCM is Configured with a MAIN and a CHECK Handler

Situation:	The Check Handler contains only one invoke transition and this transition is configured in a way that it is always true (or the fetched external variables make it true all the time). Once the SCM is activated it will appear in STATE = IDLE. However the Invoke Transition of the MAIN Handler has a state of DISABLED (not being evaluated, not green). Also the SCM does not respond to INACTIVE or START commands.
Explanation:	The CHECK handler is reinvoked every cycle, because its transition is true. Reinvocation of a CHECK handler in state IDLE is an intended feature, allowing re-arbitration of devices multiple times if the CHECK handler is used for arbitration of devices and other preparations before execution of the MAIN sequence. The explanation can be confirmed by setting <code>SCM.RstProcessed = TRUE</code> while watching the CHECK handler in Control Builder. Occasionally the color of the CHECK invoke transition will change back to gray and then to blue again, sometimes blue will stay on (depends of timing of communication and how fast the SCM is executing).

SCM Special Considerations

Instances

Resolution:	Select the invoke transition of the CHECK Handler and bypass one or more conditions to make the transition false. To avoid this situation in the future refine the CHECK invoke transition, so that it is not permanently true. If reinvocation from IDLE is not desired at all, include a condition <code>SCM.STATE <> IDLE</code> in the invoke transition. Another solution with a slightly different behavior is achieved, if a condition <code>SCM.COMMAND = NONE</code> is included. This will render the START condition ineffectual, but the commands INACTIVE and START will be honored by the SCM.

ABORT Handler Defined with Multiple Transitions and Steps

Situation:	ABORT Handler was defined with multiple Transitions and Steps, and one of the transitions in the ABORT handler had a configuration error. (indicated by <code>.ConfigSts</code>). As a consequence, <code>SCM.ABORT.ConfigSts = SEVEREWARN</code>. After an ABORT was given, the SCM entered the ABORT handler and stuck in front of the transition having the configuration error. This situation is indicated by its STATE being DISABLED and its gray color.
Explanation:	The SCM can potentially be a very large and complex set of objects; therefore hierarchical principles of error propagation and the principle of graceful degradation are used. The SCM allows execution, even if the entire configuration is not completely valid.
Resolution:	75. Change <code>SCM.MODE</code> to SingleStep. 76. Set <code>SCM.TARGETSTEP[1]</code> to a Step ID after the failed transition. 77. Set <code>SCM.Command = RESUME</code>. 78. Change <code>MODE</code> back to AUTO. Before starting a SCM, verify the <code>ConfigSts</code> of all Handlers. Disable Handlers in WARNING or SEVEREWARN. Handlers in ERROR are automatically disabled by the SCM. If you have multiple handlers of the same type, select one with a good configuration.

Define any Handler with Multiple Steps and Transitions

Situation:	One of the Transitions has no conditions defined and all gates are configured with NONE. This is a valid default configuration. However, at runtime the Transition will always be false and can never be cleared.
Explanation:	There is no bypass/force feature on a Transition level.
Resolution:	If the Handler is not the ABORT Handler, an ABORT command should resolve the problem. In any case, the resolution recommended in ABORT Handler Defined with Multiple Transitions and Steps will work. In difference to that example, there is no configuration error or warning.

SCM Special Considerations

Instances

Appendix A –Smart Transmitter Integration with PM I/O

Introduction

Honeywell Smartline Transmitters can be integrated into the Experion PKS control system by employing Process Manager I/O components. The following sections describe the Smart Transmitter I/O Processor (IOP) and the installation considerations for integrating smart transmitters into the PM I/O subsystem.

Smart Transmitter Interface IOP

About digital integration

The Smart Transmitter Interface IOPs (STI IOP and STIMV IOP) provides digital integration of various Honeywell Smartline Transmitters into the Experion PKS system. The STI IOP supports single-PV transmitters and the Smart Transmitter Interface Multivariable (STIMV).IOP supports both single-PV and multi-PV transmitters, (See [Multivariable Field Device Integration](#) for additional information).

A Smartline Transmitter can be set in analog or **Digital Enhanced (DE)** mode. DE mode offers bidirectional communication (read/write capability) between the system and the transmitter. In DE mode, it is possible to monitor and manipulate the transmitter from the operator station.

Examples of Honeywell Smartline transmitters are:

- ST 3000 Pressure transmitter
- STT 3000 Temperature transmitter
- MagneW 3000 Flowmeter
- SCM 3000 Smart Coriolis Flowmeter
- SMV 3000 Smart Multi-Variable transmitter

Each Smart Transmitter IOP (also referred to as the STI or STIM) can accommodate a maximum of 16 inputs from transmitters operating in the DE mode. The STI IOP accommodates sixteen single-PV transmitters. The STIMV IOP accommodates four

Appendix A –Smart Transmitter Integration with PM I/O

Smart Transmitter Interface IOP

multi-PV field devices with up to four PVs each, or some mix of single PV and multi-PV field devices that equals 16 inputs per IOP.

STI IOP Features

The Smart Transmitter IOP provides the following features:

- Single window access to Smartline Transmitter data, including
 - Access to Smart Transmitter database using standard parameter access mechanisms (point and parameter),
 - Access to both Process Variable (PV) and Secondary Variable (SV) and PV conversion to user selected engineering units,
 - Support for reranging transmitters from the operator station or a control language program,
- Bad database protection to ensure the integrity of measurement data,
- Transmitter status access and alarm support,
- Range checking and PV filtering,
- Off-line configuration of Smartline Transmitters, including transmitter tag ID,
- Transmitter database upload, download, and checkpoint save,
- Display of transmitter self-diagnostic messages, serial and revision numbers, and the scratch pad,
- PV source selection—PV can be from the transmitter, a manually entered PV, or a program substituted PV, and
- Digital enhanced format makes the transmitter signal immune to noise.

By combining the Smart Transmitter IOP and Smart Transmitters operating in the Digital Enhanced (DE) mode, the transmitter operation and database become part of the Experion PKS system.

These capabilities are aimed at improving the overall efficiency of the process plant operation by combining the central control room equipment with field equipment performance. A more complete list of digital integration features is outlined below.

Reranging

Reranged from the Smart Field Communicator (SFC), Smart Configuration Toolkit (SCT), or operator station, both the Upper Range Value (URV) and Lower Range Value (LRV) are accessible and modifiable.



ATTENTION

The Smart Field Communicator (SFC) is a hand-held, battery-powered unit and the Smart Configuration Toolkit (SCT) is a Windows-based PC application which are used for communication directly with the transmitter's database. Both the SFC and the SCT can be connected to the transmitter's output signal lines at any termination point,

Bad database protection

Bad Database Protection and Traffic Detection refers to the ability of the system to detect receipt of a bad database by comparing the database elements sent by the transmitter with the IOP memory database. If a mismatch of the database occurs, the transmitter database is flagged—and gives a bad PV signal to operator station to ensure that the control loop does not use a bad database.

The Smartline Transmitter broadcasts part of its database three times each second. The IOP compares the database received from the transmitter to the database stored in the IOP. If they do not match, the IOP flags the mismatched database and gives a bad PV signal to the operator station to ensure that the control loop does not use the bad database.

The Smart Transmitter IOP performs traffic detection — these are changes to the transmitter database from the hand held Smart Field Communicator (SFC). When the parameter being changed affects the PV, the IOP reports the bad PV to the operator station and the Experion PKS System. This action prevents the control loop from operating on a bad database. It also alerts the system operator of the change to the transmitter database, which could impact the process operation.

Alarming

Digital integration of Smartline Transmitters gives full support of Experion PKS process and system alarm mechanisms. The user can also configure alarm limits for Secondary Variables through additional point configuration. For example, you can configure a high temperature alarm for the ST 3000 pressure transmitter's Secondary Variable to detect any abnormal sensor temperature condition.

Off-Line or on-line configuration

With Control Builder, transmitter configuration forms are available to build the transmitter database off-line. You can access the engineering personality off-line to construct the transmitter database—communication with the transmitter is not needed at this time. Refer to [Creating PM I/O STIMV IOP](#) for a procedure.

With the transmitter on-line, you can change transmitter parameters while monitoring a control strategy in Control Builder. Refer to [Changing Parameters while Monitoring](#) for a procedure.

Transmitter diagnostics

Smartline transmitters perform self-diagnostic functions. The results of the diagnostics are reported to either the Smart Field Communicator (SFC), when queried, or to the Station. The transmitter self-diagnostics information is displayed on the Point Detail display.

Signal noise immunity

A conventional 4-20 mA field instrument signal is subject to distortion caused by electrical noise or radio frequency interference. With digital communication, transmitter data is sent as a 24-bit floating point number. Noise immunity is achieved by filtering the noise from the signal by clearly separating signal levels—20 mA for logical zero and 4 mA for logical one. The transmission of data is determined to be either good or corrupted when a severe interference is present. This feature ensures the certainty of data used in a control loop.

Smart Transmitter Integraton

What is required?

The following is a complete checklist of tasks that must be accomplished to integrate the Smartline Transmitter and STI IOP into the Experion PKS system.

Hardware considerations

The following hardware is required for Smartline Transmitter integration:

- STI or STIMV IOP—the Smart Transmitter Interface I/O Processor.
- FTA—the Field Termination Assembly connecting the field wiring to the IOP.
- FTA cable—the cable connecting the IOP and the FTA.
- Smartline 3000 Transmitter—a transmitter that can transmit in DE mode.
- Smart Meter (optional)—provides local display of the Smartline Transmitter output and loop diagnostics.
- Smart Field Communicator (optional)—hand-held device for local checkout of transmitter.
- Smart Configuration Toolkit (optional) –a Windows-based PC application for local checkout of the transmitter.

Bench check

The following is a list of tasks performed when bench checking, calibrating, and commissioning a Smartline 3000 Transmitter. The optional bench check procedure consists of the following:

- Unpack the transmitter.
- Check the contents.
- Connect a power source to the transmitter (with a 250 Ω resistor).
- Connect Smart Meter to the loop (optional).
- Run a communications check with the SFC or SCT.
- Check the operating status with the SFC or SCT.
- Check the configuration database with the SFC or SCT.
- Write to the scratch pad with the SFC or SCT.
- Check to be sure you have a transmitter with an adequate range for your application.

Commission loop

Communication check and commissioning the transmitter consist of the following:

- Test the communication loop to verify that the transmitter's configuration is consistent with the system's configuration.
- Check the operating status of the transmitter and loop.
- Check the output of the transmitter to be sure you are receiving the correct signal at its destination point.

Startup consists of the following:

- Calibrate zero on the transmitter to system conditions (except STT).

DE communication protocol

DE versus analog format

The Smartline Transmitters can be set in Digital Enhanced (DE) or analog communication format. Communications between an SFC, SCT or operator station and a transmitter communicating in analog format features a half-duplex, variable length message with a wake up pulse for on-demand requests and responses. While messages travel back and forth, the transmitter's output varies between 4 and 20 mA. For this reason, when in **analog format** your control loop must be in manual mode during SFC communications so the data exchange does not interfere with the control loop.



ATTENTION

In Digital Enhanced format, there is no need to put the control loop in manual mode when using SFC or SCT communication.

The Smartline Transmitters in DE format broadcast a new PV three times per second. When configured for Secondary Variable (SV) broadcast, the SV is transmitted every eighth broadcast, rather than the PV.

All communications between the Smart Transmitter IOP and the Smartline transmitters are in bit-serial form using the Honeywell DE (digital enhanced) protocol. The communication format for the transmitter is selectable through the **DECONF (DE configuration format)**. The possible DECONF entries from the Control Builder are defined in Table 8.

Table 8 DECONF Parameter

DECONF Entry from Control Builder	Definition
Analog	Not supported by Smart Transmitter IOP
Pv	Transmitter communicates only the PV (4-byte format)
Pv_Sv	Transmitter communicates the PV and the Secondary Variable (SV) (4-byte format)
Pv_Db*	Transmitter communicates the PV and the database (6-byte format)
Pv_Sv_Db*	Transmitter communicates the PV, SV, and the database (6-byte format)
* The use of these two formats is recommended for single PV and multivariable transmitters because they offer database mismatch detection and on-process mismatch recovery.	

Communication between an SFC, SCT, or a Smart Transmitter IOP and a transmitter communicating in the digital enhanced format features one of the message formats in Table 8, depending on the operation being performed.

The DE message formats are selectable from the SFC and SCT using different designations: “single range,” “dual range,” and “single range with secondary variable.” Select “Single Range with Secondary Variable” if the secondary variable is required. A second selection gives a choice of “w/DB (6- byte mode)” or w/oDB (4-byte mode).” Table 9 compares the DE message format and failsafe parameters as seen from the SFC and control builder.

Table 9 Comparison of Control Builder and SFC/SCT DE Configuration

If CB Entry is . . .	Then comparable SFC/SCT entry is . . .	
DECONF	Multivariable Field Device	Single PV Transmitters ^(see notes)
PV	Refer	Single or Dual Range, 4-Byte
PV_SV	to	Single Range W/SV, 4-Byte
PV_DB	Multivariable field	Single or Dual Range, 6-Byte
PV_SV_DB	device integration	Single Range W/SV, 6-Byte
NOTES: 1. 4-Byte – In R230, download is OK, but upload cannot be performed. In R300 and later, upload and download can be performed; the transmitter is automatically switched to 6-Byte mode. 6-Byte – Upload and download can be performed. 2. FAILSAFE is not applicable from the Universal Station, but is user-configurable from the SFC: • upscale • downscale • freeze slot output		

Broadcast 4-Byte Format (PV)

The 4-byte format is used for accessing the transmitter's process variable without database. It features one byte for flags, which includes transmitter status and some configuration data, and three bytes for process variable data. Flags include: Status, Failsafe Mode, 4/6 Byte Format, Variable Type (PV only, or PV and SV).

Broadcast 6-Byte Format (PV, SV, and Database)

Figure 36 illustrates the 6-byte message format. The 6-byte format is normally used for accessing the transmitter's PV, SV, and database. It is similar to the 4-byte mode format, but includes two additional bytes of transmitter database information to support both on-demand database upload requests from an SFC or SCT and passive database collection by the Smart Transmitter IOP. One of the two additional bytes is transmitter database so that a new database is received and compared with the database in IOP memory every few seconds, depending on the transmitter type. Table 10 lists the maximum broadcast database size and time for each transmitter type.

Flags include: Status, Failsafe Mode, 4/6 Byte Format, Variable Type (PV and Database, or PV, SV, and Database). The identification byte (fifth byte) contains the specific database location identifier. The database byte (sixth byte) contains one byte of database. SV is broadcast on every eighth broadcast in place of the PV.

Table 10 Maximum Transmitter Broadcast Database size and Time

Transmitter Type	Database (bytes)	Time (Seconds)
ST 3000 (Pressure)	80	31
STT 3000 (Temperature)	92	35
MagneW 3000 (Flowmeter)	125	47
SMV 3000 Multivariable	up to 202	up to 74
SCM 3000 Multivariable Flowmeter	up to 255	up to 93

Appendix A –Smart Transmitter Integration with PM I/O

DE communication protocol

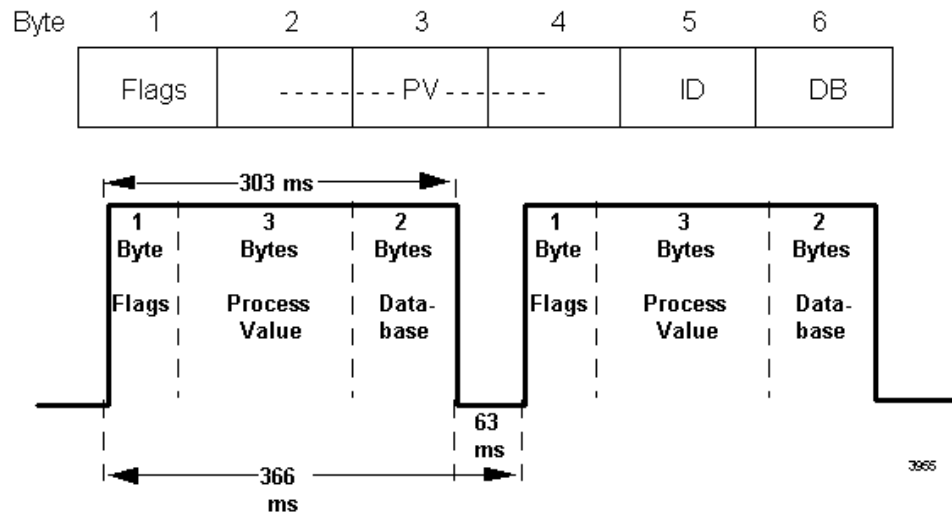


Figure 36 Typical Timing for the 6-Byte Message Format



TIP

For the Smart Transmitter interface, select the 6-byte format with Secondary Variable (SV) and database (PV_SV_DB), to take full advantage of the benefits of bidirectional digital integration

Smart device communication architecture

The Instrument Society of America Standard Practices Group # 50 established a standard for a digital, serial, bi-directional communication protocol for intelligent sensors and actuators mounted in an industrial process area. The standard defines a “four layer” architecture: The Physical Layer, the Data Link Layer, the Application Layer, and the User Layer.

The Physical Layer defines the characteristics of the physical connection among nodes that are required to transport data from one device to another. Key elements of the physical layer include: topology of the network and its limitations, modulation techniques, data rates, redundancy requirements, and physical media types.

The Data Link Layer defines the media access control and data movement and scheduling function. This layer also addresses mechanisms for error detection and retry policy.

The Application Layer defines the user interface message formats and services available with this communication protocol.

The User Layer defines the application oriented database, such as analog input and control functions.

The layers of the Honeywell DE Protocol are defined in the following paragraphs.

Physical layer

The **Physical Layer of DE Protocol** defines the mechanical and electrical characteristics of the DE Protocol physical interface. The physical connection between the Smart Transmitter IOP FTA and the Smartline Transmitter is through a twisted pair wire. The field devices are typically powered from 24 Vdc.

Information is exchanged by **NRZ (Non-Return-to-Zero) modulation** of the loop current. Changes in loop current can be sensed at the field device or across a 250 ohm (load) resistor placed in series with the loop and physically located between the field device and supply return. Note that the signal will be inverted when sensed across any series device. Active communicating host devices (SFC, SCT or operator station) must be electrically connected across the 4-20 mA wires feeding the field device (transmitter), with a minimum of 250 ohms resistance between it and the loop power supply.

The resistance inserted into the loop should be a minimum of 250 ohms. Larger resistance values can be used, provided they still meet the overall system requirements.



WARNING

Make sure you do not power starve the field device. A steady and reliable power source is recommended for all field instruments.

Signaling levels

With the introduction of the DE Protocol, the traditional analog signal used to communicate the PVs from the transmitters to the controllers has been greatly altered. The continuous 4-20 mA analog PV has been replaced by a continuous digital PV signal.

logic 0 = 20 mA (5 V, typically across 250 ohm load resistor)

logic 1 = 4 mA (1 V, typically across 250 ohm load resistor)

The communication signal's rise and fall times are intentionally slow in order to reduce potential crosstalk problems within large wire bundles.

$T_{(rise)} = \sim 0.5 \text{ ms}, \pm 20\% (0-63.2\%)$

$T_{(fall)} = \sim 0.5 \text{ ms}, \pm 20\% (0-63.2\%)$

Performance considerations

The signaling and data rate is 218.5 bps, $\pm 1\%$. The $\pm 1\%$ tolerance is the sum of all error contributors on a communication link (slave and host, for example). It is typically assumed that the field transmitters contain lower cost/performance resonators with worst case tolerances of $\pm .99\%$ and that the host devices contain higher cost/performance crystals with worst case tolerances of $\pm 0.005\%$. It also takes into consideration, performance with long cable lengths and a worst case timing jitter of 1/4 bit.

Data link Layer

The **Data Link Layer of DE Protocol** defines the data flow initialization, control, termination, and error recovery. The Data Link Layer protocol is half-duplex, bit-serial, byte oriented. For every request from a master, there must be a response from the slave. Allowances for up to three retries are incorporated for harsh or noisy environments.

The following gross status responses result in a retry from the transmitter:

- Nack
- Busy
- Illegal response

The following communication error/faults result in a retry:

- Bad checksum
- Bad parity
- Incomplete message
- Framing error
- No transmitter response

Application Layer

The **Application Layer of DE Protocol** functions include:

- Detailed Transmitter Status
- Digital PV/Transmitter Status
- Bad PV Protection
- Bad Database Protection
- Long PV Dropout
- Database Download
- Database Upload
- Initial Database Check — Power up
- Database Mismatch
- SFC Traffic Detect

Floating Point Format

The Honeywell Floating Point Format is 24 bits (3 bytes) in length for PV and SV representation and includes the following:

- One Sign bit (0 = positive, 1= negative)
- Seven bits of Exponent (excess 64)
- Sixteen bits of Mantissa
- Fixed implied binary point

The number is stored in three bytes as shown below.

Sign	Exponent	Mantissa
1 bit	7 bits	16 bits

The resolution of a number (worst case) is 1/32768 or 0.003% of any number.

Error Checking

The DE protocol incorporates two means of enhancing error detection to ensure that the original information is correctly received by the system:

- **Field Device Status**—The DE protocol requires that an indication of the field device status be transmitted with every digital PV value. As a result, the system will never control on a PV from a known bad field device.
- **Information Redundancy**—Redundancy is the addition of noninformation carrying bits so that calculations can be made at the receive end to determine whether the group of bits, including the redundant bits, are the same as those transmitted.

Noise Immunity

In DE protocol, increased noise immunity is gained by using a digital communication baud rate that is low in frequency relative to its environmental noise. The DE protocol transmits at a rate of 218 baud. The advantages of this are

1. High frequency noise can be easily filtered out with simple RC filters (on the Smart Transmitter IOP board).
2. It is less likely that burst noise will last long enough or contain enough energy to interfere with the signal.

Noise immunity is also gained by selecting significantly large and different voltage/current levels to represent a logical 1 and 0. For the DE protocol, these levels are 4 mA/1 volt and 20 mA/5 volts.

IOP functions

The primary function of the **Smart Transmitter Interface I/O Processor (STI and STIMV IOPs)** is to provide up to sixteen independent bidirectional channels of communication between the operator station and the Smartline Transmitters in DE mode.

The Smart Transmitter IOP functions include:

- Ground-referenced transmitter power for each input channel.
- Filtering input signals for high frequency noise suppression and surge limiting.
- Slew rate limiting for outputs to Smartline transmitters to minimize cross talk and interference with other system signals.
- Receiving and decoding serial input data on each channel.
- Sending configuration commands to Smartline transmitters.
- Converting digital input representation into Engineering Units (EUs).
- Making processed input data available to devices on the I/O Link in the form of EUs and/or percent of range.
- Maintaining local database of configuration and processing information.
- Checking received data against specified limits, maintaining alarm flags, and generating alarm events.
- Providing an orderly, initialized state of limited operation, and accepting downline loaded configuration data from higher-order devices on the I/O Link to establish full functionality.
- Interface to the I/O Link, with full support of the I/O Link protocol.
- PV Source selection.
- Optional IOP redundancy
- Power-on database validity detection

The **two DE Processors** on the IOP each provide communication with eight DE Smartline transmitters. As illustrated in Figure 37, each DE processor consists of

- A processing unit, comprised of a Motorola MC68HC11 single chip microcomputer, 32 K bytes of ROM, and 8 K of RAM.
- Eight data receivers, which provide input signal conditioning (noise filtering, surge limiting, and so on) for the serial data inputs on the processing unit.
- An output channel selector and driver, which allows the DE processor to talk (output) to any one of its eight connected devices.

The IOP's 8 K byte Shared Memory provides a mailbox through which the I/O Link Processor and the two DE Processors can communicate. Access to the shared memory is under the control of the I/O Link Processor.

The IOP's Field Termination Assembly (FTA) includes 250-ohm range resistors to convert the 4-20 mA current signals from Smartline Transmitters in DE mode, and the 4-20 mA output signals from the IOP itself, into 1-5 volt signaling levels.

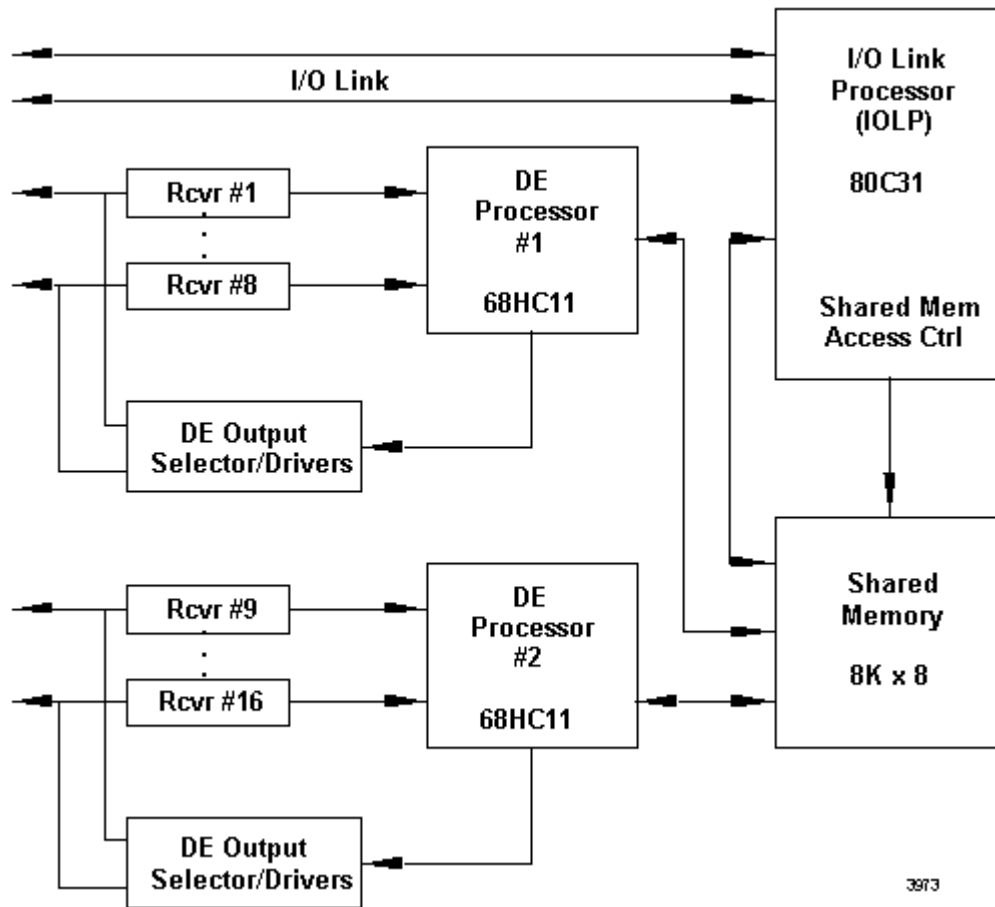


Figure 37 Smart Transmitter IOP Functional Block Diagram

Input signals are stripped of high frequency noise by single pole 12 kHz RC filters on the IOP.

DE Processor functions include:

- Error detection
 - 5 time bit sample
 - 4 of 5 sample voting
 - Parity (odd)
 - Framing (1 stop req. >1.4 stop bad)
 - Data context checks
 - Checksum on database
- Database formatting
 - floating point to IEEE
 - Packed BCD to ASCII
- Two copies of PV, SV, and database for each slot
 - Last complete valid copy
 - Active copy (currently being received)
- Pass valid PV, SV, and database to I/O link processor via shared RAM

IOP and Transmitter Database

The transmitter database can be configured at the operator station and downloaded to the transmitter, or the transmitter database can be uploaded to the IOP, as required, when the Smart Transmitter point is in the inactive state. During normal operation (when the Smart Transmitter point is in the active state), each time that the transmitter broadcasts the PV value to the IOP, it also sends the one byte of its database (depending on the selected DECONF mode) to the IOP. This allows the IOP to compare the stored database to the newly received database to check for database discrepancies (mismatch). If a discrepancy is detected, the PV is set to NaN and the status is set to DBCHANGE. The user can easily correct the discrepancy by uploading or downloading the database.

Appendix A –Smart Transmitter Integration with PM I/O

IOP functions

All key transmitter parameters can be accessed from the operator station including

- Upper and Lower Range Values
- Damping
- PV type
- DE (Digital Enhanced communications) configuration variables
- Status of the Transmitter
- Transmitter's serial number and software revision number
- Transmitter's scratch pad

The user can access these variables through the point's Detail Display.

The Smart Transmitter IOP maintains a copy of the transmitter's database. When a transmitter failure occurs, the database can be downloaded to the transmitter. This database download feature can significantly reduce the downtime of a control loop by reducing the time to get a replacement transmitter into operation.

The Smart Transmitter IOP also allows the user to access the detailed status of a transmitter. The operator station displays the transmitter status and the scratch pad information that has been entered, including any maintenance notes. This remote diagnostic feature greatly improves the safety of maintenance personnel, by reducing the need to physically access transmitters located in hazardous areas.

Calibration of the transmitter can also be accomplished from the operator station. This function allows on-line adjustment of the transmitter's working ranges so that the reference points for a measurement are accurate.

In addition, a Smart Field Communicator (SFC), which is a hand-held device, can also be physically connected to the appropriate FTA in the control cabinet to communicate with Smartline Transmitters without disrupting the process, as required (refer to the *Operating Guide for Smart Field Communicators*).

ST device point building

See [Creating PM I/O STIMV IOP](#) for details on building point displays for smart transmitters.

IOP cabling and FTA wiring

The Smart Transmitter is connected to a Field Termination Assembly (FTA) in the control cabinet through twisted pair wires on a point-to-point basis. The FTA is cabled to the Smart Transmitter Interface I/O Processor board (either STI or STIMV IOP).

Selection of cable lengths should follow Honeywell's guidelines. The FTA cable is not to exceed 50 meters. See the following sections on redundant, intrinsically safe, and nonredundant Smart Transmitter IOPs, for Honeywell recommended cabling.

FTA wiring

The field termination assembly (FTA) for the smart transmitter is the same as that used for high level analog inputs. There are two types of FTA: one supports redundant IOPs, and the other does not. The redundant and the nonredundant versions of the FTA can use screw-type or Weidmuller compression type termination.

Figures 3 through 6 illustrate the FTA and circuit wiring for the nonredundant Smart Transmitter IOP. Figures 8 and 9 illustrate circuits for the redundant Smart Transmitter IOP.

Notice the SFC connection points on the FTA in Figure 38.

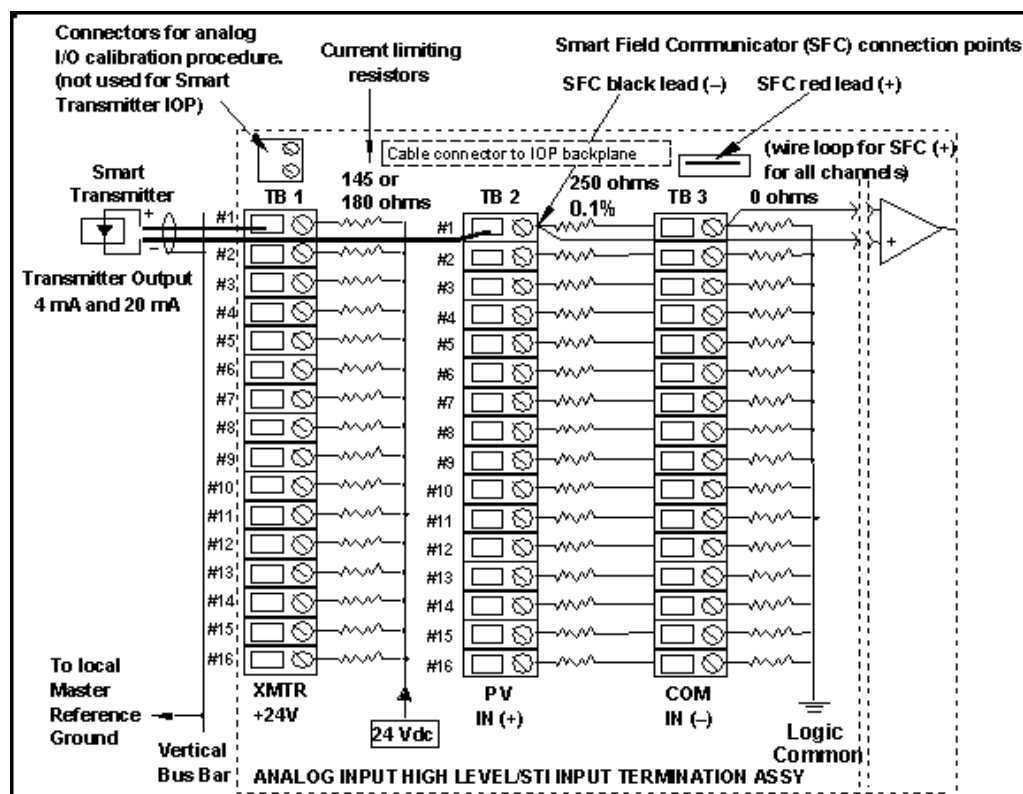


Figure 38 FTA Model MU-TAH02 Schematic – Nonredundant IOP

Appendix A –Smart Transmitter Integration with PM I/O
IOP cabling and FTA wiring

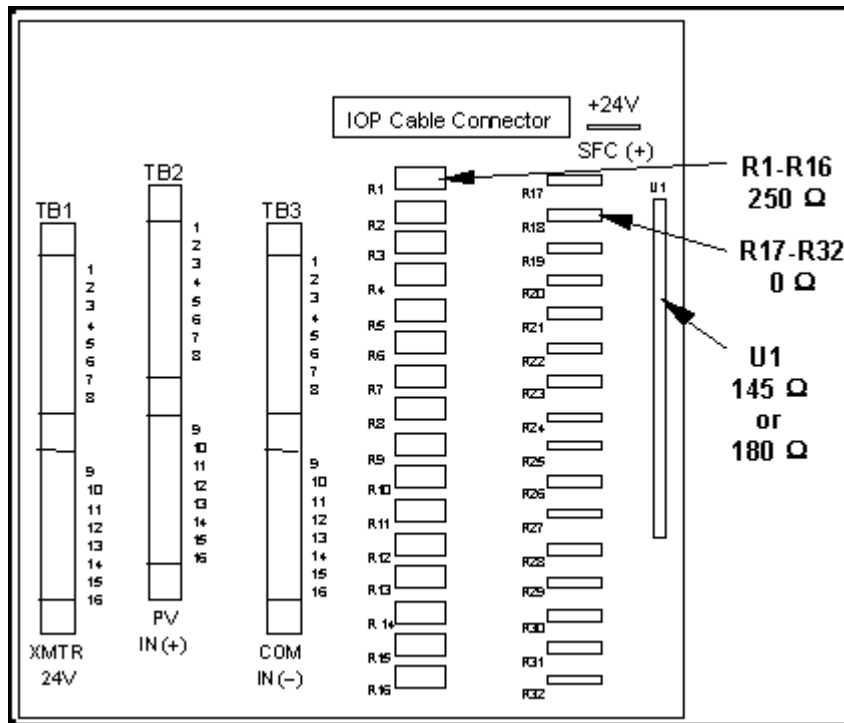


Figure 39 FTA Model MU-TAH02 Physical Layout – Nonredundant IOP



ATTENTION

For schematic diagrams and assembly layouts of other applicable FTAs, see AI Wiring in Appendix C and HLAI GI Wiring in Appendix D of the [Control Hardware Installation Guide](#).

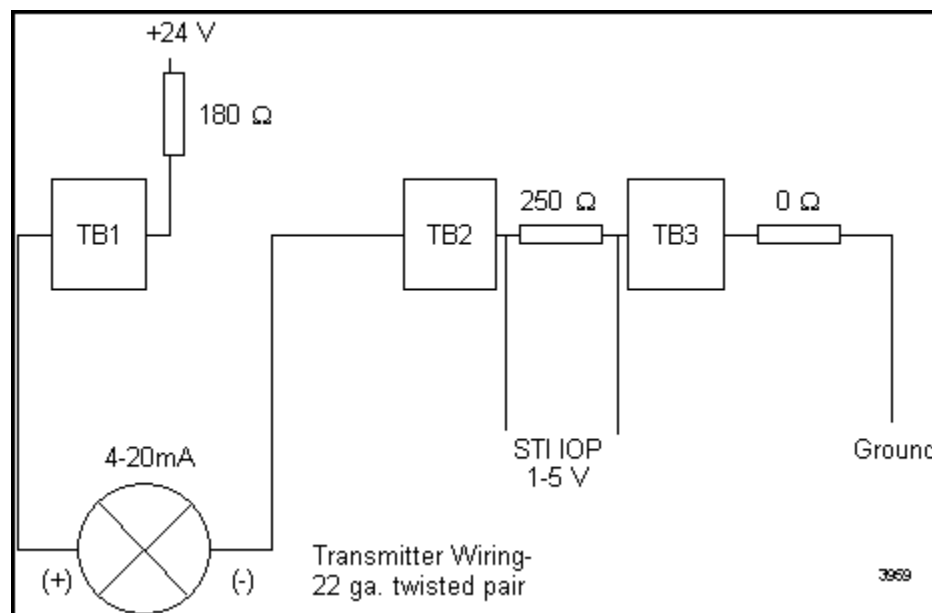


Figure 40 Nonredundant IOP Circuit for Smart Transmitter (Non-I.S. Environment)

Appendix A –Smart Transmitter Integration with PM I/O
IOP cabling and FTA wiring

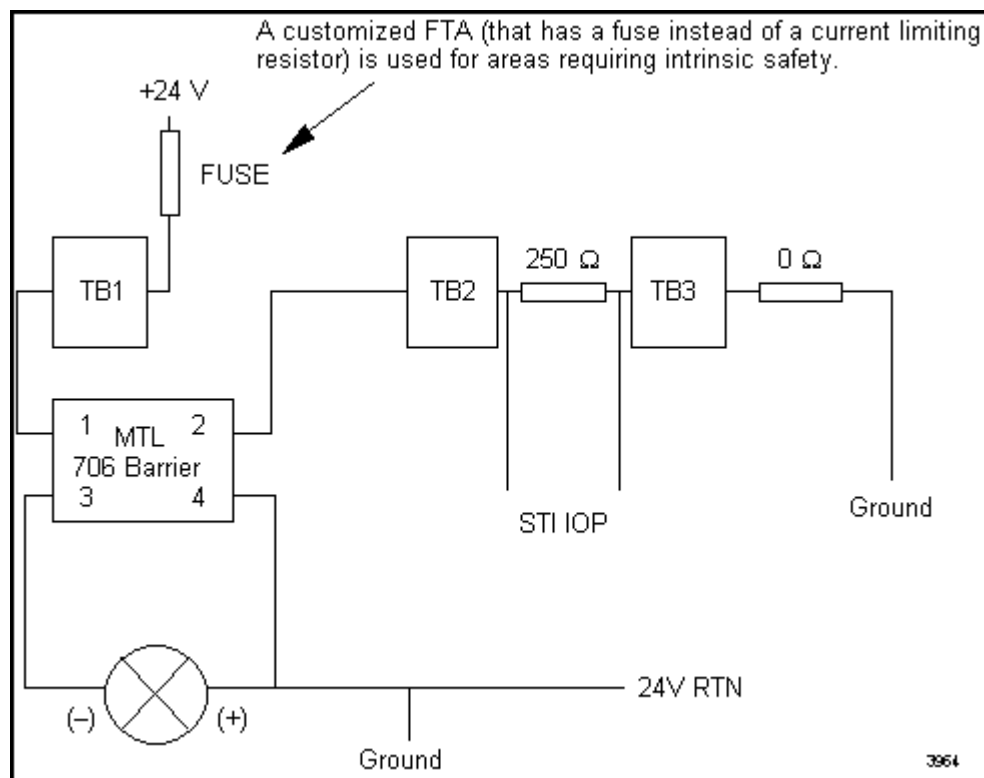


Figure 41 Nonredundant IOP Circuit for Smart Transmitter (I.S. Environment)

Redundant IOPs

The Smart Transmitter IOPs are available as redundant partners. Either one of the partner IOPs operates as the primary and the other backs up the primary. Each of the partners connects to the process through a single Field Termination Assembly (FTA).

Both the primary and backup IOPs receive all data from the operator station or from the process simultaneously, and should the primary IOP fail, the backup IOP takes over automatically, becoming the new primary IOP. Such a failover is transparent to the remainder of the system, except for operator station displays that show IOP status information. A failover is completed in 100 milliseconds or less.

At the operator station Detail Status display, you can request that the primary and backup roles for the partner IOPs be exchanged. To do this, select the IOP, then select RUN STATES, SWAP PRIMARY, and ENTER.

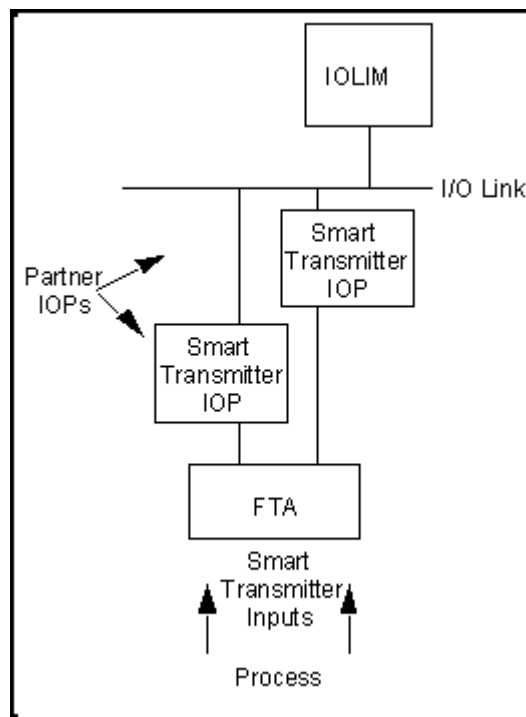


Figure 42 Redundant Smart Transmitter IOP Signal Flow

Appendix A –Smart Transmitter Integration with PM I/O

IOP cabling and FTA wiring

Synchronization of the database in the partner IOPs is verified as the backup IOP checks that the primary IOP received and responded to each data item sent on the I/O Link, and by periodic comparisons of the databases in both IOPs.

Smart Transmitter IOPs monitor the inputs from the FTA. A diagnostic routine verifies that the physical interconnection between the partner IOPs is functional.

In a redundant configuration where a STIMV IOP is used, both IOPs must be STIMV IOPs. See Upgrading STI IOP to STIMV IOP for more information.

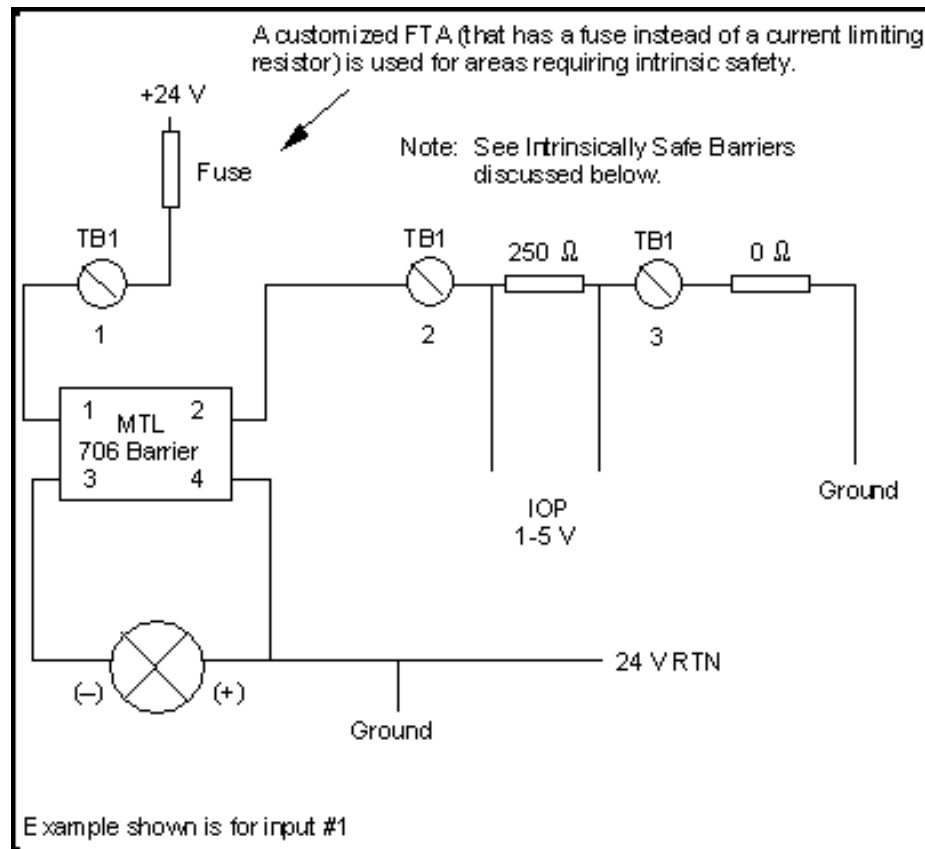


Figure 43 Redundant Smart Transmitter IOP Circuit (I.S.) – Screw Type FTA

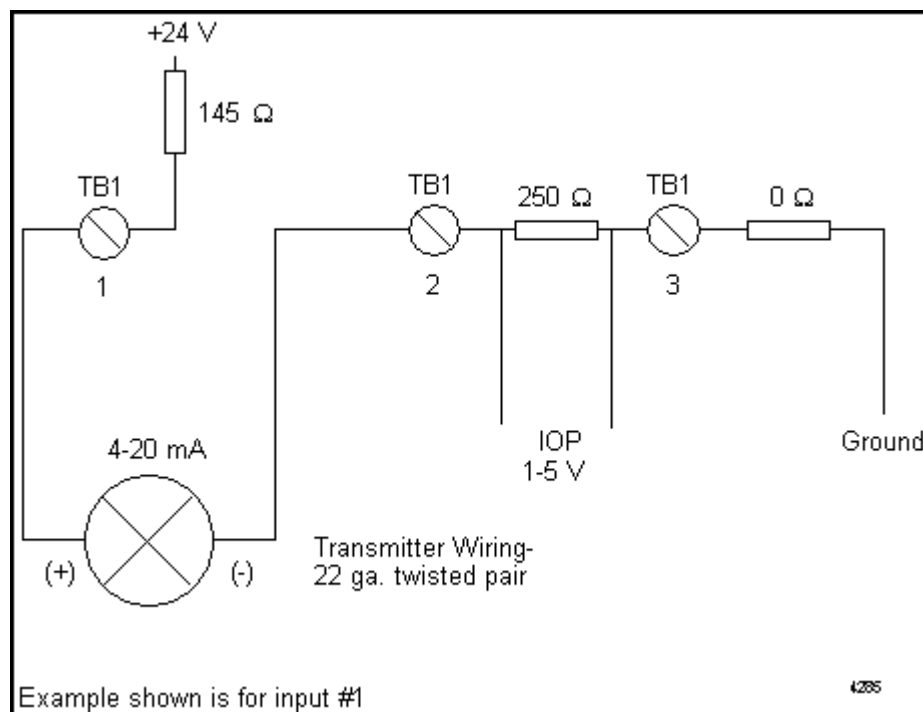


Figure 44 Redundant Smart Transmitter IOP Circuit (Non-I.S.) – Screw Type FTA

Intrinsically Safe Barriers

Intrinsic safety barriers can be implemented using traditional Zener barriers or using Galvanic Isolation/Intrinsic Safety Field Termination Assemblies (GI/IS FTAs) that are available with PM IO.

On the GI/IS FTAs, plug-in modules, called isolators, incorporate galvanic isolation and intrinsic safety functions. The GI/IS FTAs are always fully populated with isolators to provide a one-to-one details for the GI/IS FTAs (model numbers: GAIH13-compression type and GAIH83-crimp type). The GI/IS FTA Specification and Technical Data provides additional information correspondence with the respective IOP. The Smart Transmitter GI/IS FTA has 16 isolators. Appendix D in the [Control Hardware Installation Guide](#) provides complete drawings and wiring (document number GA03-100).

The following paragraphs discuss traditional Zener barriers.

Honeywell has tested five intrinsically safe barriers to handle bidirectional (two-way) communications for Smartline Transmitters interfaced with a Smart Transmitter IOP to provide a few safe operations.

The current mirror barriers approved by Honeywell include:

- MTL 706 and 3046
- Elcon CS-I-7042
- Pepperl & Fuchs KHD3-IST/EX 1 or KHD3-ISV/EX 1
- Stahl 9001/51-280-091-00

The galvanic isolation barrier approved by Honeywell, is not as wide ranging as the current mirror barriers and is used primarily in Europe:

- Stahl 9603/712213 C854

It is the user's responsibility to verify that any part used has the appropriate safety rating. When installing Honeywell suggested I.S. barriers with bidirectional mode you must make the following power accommodations:

3. Barrier leads must get 24 volts directly. There must be no resistance in the 24 volt lead.
4. Barriers themselves draw power. You may have to allocate as much as 100 mA per transmitter to compensate for this power draw.



ATTENTION

For Division 1 applications requiring the use of Intrinsic Safety Barriers, a special FTA (without a 180 Ω current limiting resistor) is required. Also, the particular model of barrier must be selected carefully so that it will not filter out the digital communication. Consult your Honeywell representative for further information and recommended barrier models. Refer to Figures 5 and 7 for the MTL 706 Barrier.

MTL 706 and 3046 IS - The MTL 706 barrier is recommended for use with Smart Transmitter IOP. The barrier passes communication bidirectionally and works properly with the SFC or DE meter in any location. It provides a regulated voltage of 23.6 Vdc out to the field for any power supply voltage between 22.3 Vdc and 35 Vdc. The barrier will handle at least 200 ohms of line resistance. A sample barrier demonstrated a maximum dc current mirror error of 0.0007%. Like most barriers, the bias current required to operate the barrier is roughly twice the signal current.

The MTL 3046 IS barrier is also acceptable. It will pass communications bidirectionally and has plenty of voltage and resistance margins to handle most applications.

Elcon CS-I-7022/IIS/ST - This barrier operates properly with any loop resistance between 0 to 170 ohms. The power supply considerations is not an issue with this barrier because it operates from an 120 Vac line. It generates internally a 24 Vdc transmitter supply.

Pepperl & Fuchs KHD3-IST/EX or KHD3-ISV/EX 1- The two barriers are twins. The ISV version has a voltage (as opposed to a current) output; otherwise, they are identical. Both barriers were tested over a power supply range of 18.5 volts to 35 volts and loop resistance of 0 to 220 ohms. They both performed acceptably under all conditions.

Stahl 9001/51-280-091-00 - This current mirror barrier is an acceptable barrier. Check the manufacturers catalog to verify the exact model number for your application.

Stahl 9603/712213 C854 - The Stahl 9603/712213 C854 galvanic isolation barrier is acceptable for service with Smartline Transmitters, the Smart Transmitter IOP, and the IOLIM, with certain limitations. These limitations include the following:

5. The Smartline Transmitters cannot be located more than 1,000 to 1,500 feet of wiring from the I.S. barrier. The voltage available to the field device is only 12.4 volts during communications. This limits the resistance of field wiring to 70 ohms for the ST 3000 Pressure Transmitter and 20 ohms for the STT 3000 Temperature Transmitter. These are quite low values, but 20 ohms is equivalent to 1,000 double feet of 20 AWG or 1,500 double feet of 18 AWG.
6. Since the barrier can draw over 200 mA, it cannot be powered from the FTA. The Stahl I.S. Barrier card file must be powered directly from the 24 volt power supply. The 24 V power to the card file requires separate fusing. In addition, the amount of power required for the barriers must be considered in the overall power budget for the system.
7. Using the SFC on the safe (control room) side of the barrier will require that the power return and the signal ground be tied together somewhere in the system. This is required because the SFC signals with a current and needs a current return path. There is no such limitation when using the SFC on the hazardous side of the barrier.

Check the manufacturer's catalog to verify the exact model number for your application.

Field wiring to transmitter

For field wiring of the smart transmitter, refer to the user manual for that specific field device.

Multivariable field device integration

STIMV IOP

Multivariable (multiple PV) smart field devices are supported using the Smart Transmitter Interface Multivariable (STIMV) IOP. The STIMV IOP supports all Honeywell Smartline field devices, but certain precautions must be followed when integrating multivariable field devices.

FTA wiring rules

Multivariable field devices are wired for integration the same way you would any other Smartline transmitter.

If the field device will provide multiple inputs (PVs), the FTA screw terminals used for the transmitter's DE output connection identify the physical slot for the transmitter's PVs. In this case, be sure

- No other Smartline transmitters are connected to contiguous FTA screw terminals that are allotted as logical slots for the transmitter's other PVs.
- Contiguous logical slots allotted for the transmitter's other PVs do not cross over IOP boundaries from 8 to 9 or wrap around an IOP boundary from 8 to 1 or 16 to 9

For example, a multivariable field device physically connects to one STIMV slot (the base slot). The user allocates up to three additional contiguous slots, depending on the number of inputs (PVs) desired from the field device. Figure 45 illustrates the configuration of a 4-input multivariable field device.

Appendix A –Smart Transmitter Integration with PM I/O

Multivariable field device integration

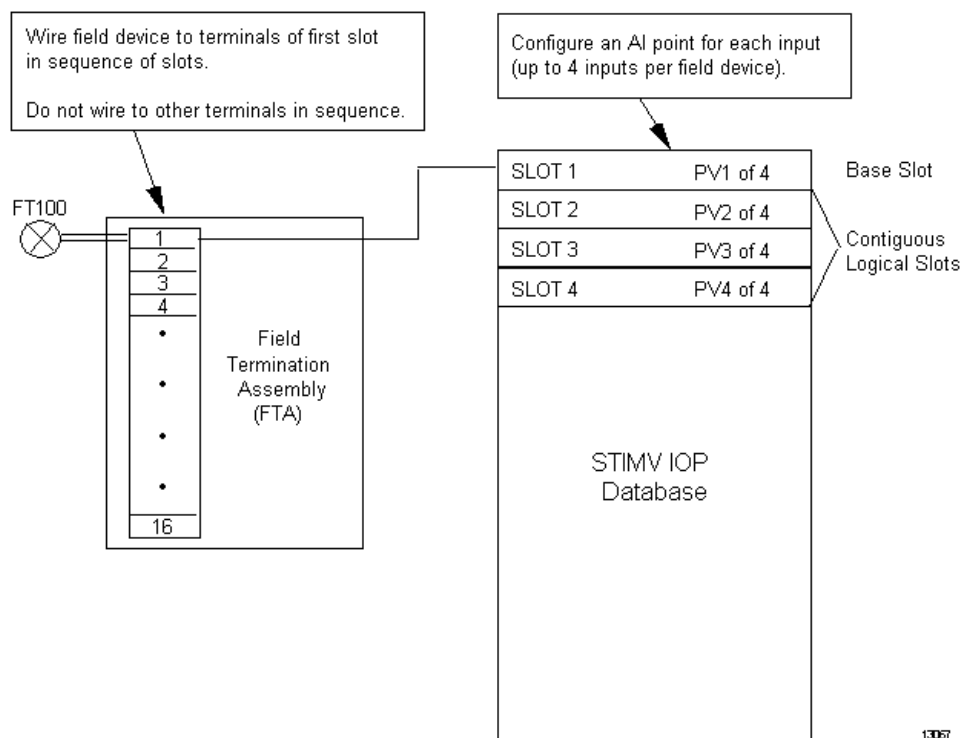


Figure 45 Multivariable Field Device Slot Requirements



ATTENTION

For schematic diagrams and assembly layouts of other applicable FTAS, see AI Wiring in *Appendix C* and HLAI GI Wiring in *Appendix D* of the *Control Hardware Installation Guide*.

Configuration rules

Follow these rules when integrating multivariable field devices:

- No field device should be physically wired to the FTA screw terminals belonging to any slot other than the first slot in a logical sequence of slots.
- When assigning contiguous slots for a field device, you must adhere to the STIMV IOP's DE processor slot boundaries, that is, the contiguous logical slots must fall in the range of 1-8 or 9-16. *The contiguous slots cannot overlap boundaries (from slot 8 to 9) or wrap around (from 8 to 1 or 16 to 9).*
- The STITAG parameter must be identical and nonblank across all logical slots configured for use by a multivariable field device. If the STITAG parameter is null or all blanks, the IOP assumes it is a single variable field device.

The STIMV IOP determines the number of PVs being sent by a transmitter based on the number of contiguous, identical STITAG parameters.

If the STIMV IOP detects contiguous slots with the same STITAG parameters, it recognizes the first slot in the sequence as the base slot for the field device. On page 2 of the Point Detail display, the base slot is referred to as PV 1 of n , where n is the total number of contiguous slots with identical STITAG parameters. The base slot should have the hardwired connection to the transmitter. The remaining slots allocated should not have a hardwired connection.

If you use the SFC or SCT to configure the number of PVs to be sent by the field device, the configuration must match the number of slots allocated in the IOP (slots with identical STITAG parameters).

- FTA communications are through the base slot, however, only the slot being implemented needs to be set active. For example, if you want the percent solids for the SCM 3000, you must allocate three slots, but only the slot for PV 4 needs to be active.
- After adding or deleting logical slots, you must download from the base slot that is physically connected to the field device in order to change the number of PVs being transmitted (DECONF).
- In order to download configuration of any slot in a multivariable field device, you must make all of the associated slots INACTIVE.
- Upload of a multivariable transmitter that is in analog or 4-byte mode must be performed from PV 1.

DECONF parameter

The DECONF parameter of the base slot and each contiguous logical slot for a multivariable transmitter must agree as defined in Table 11. If they do not agree, a DECONF database discrepancy results. Note that if using an SFC or SCT, the comparable entries listed in Table 2 must also agree for the base slot and each logical slot of a multivariable transmitter.

Table 11 DECONF Parameter Entry Rules

If PV1 is . . .	The PV n must be . . .
PV	PV
PV_SV	PV
PV_DB	PV_DB
PV_SV_DB	PV_DB
where $n = 2, 3, \text{ or } 4$	



ATTENTION

SV is available only for PV1.

Field device in analog or 4-byte mode

Attempting to upload a multivariable transmitter that is in analog or 4-byte mode from a slot other than PV 1, causes a Transmitter Status error message to appear:

COMMAND ALLOWED ONLY ON FIRST
SLOT OF MULTIPLE PV XMTRS

The error message appears because the STIMV point, before performing the upload, attempts to download the DECONF configuration to establish the 6-byte digital mode, but DECONF changes can only be made from PV 1.

Appendix A –Smart Transmitter Integration with PM I/O

Multivariable field device integration

In response to the above error message, the user should do the following:

Step	Action
1	Perform an upload or download from PV1, changing DECONF to 6-byte digital mode.
2	Perform an upload from PV n .

DECONF configuration rules

The following rules apply to the DECONF parameter for multivariable transmitters

- Perform upload or download of DECONF from the base slot of a multislot configuration (PV 1 of n).
- Download a change in the DECONF parameter of any slot in a multislot configuration from the Detail display of PV 1 of n .

A DECONF parameter change to turn PV 2, 3, or 4 ON (which is equivalent to building a point for the given transmitter PV) can only be downloaded from PV 1. If you try to download a DECONF change from the Detail display of PV 2, 3, or 4, you will get an error message

If a transmitter sends PV data that overlaps another transmitter's data, the following error indications appear

- DECONF appears in the DATABASE DISCREPANCY area of the Detail display, indicating a database mismatch,
- DBCHANGE appears as the transmitter STATE on the Detail display,
- this Transmitter Status message appears on the Detail display:

CONFIGURATION MISMATCH
MULTIPLE DEVICES ASSIGNED TO SLOT

- one or two asterisks appear in the x of n display for all logical slots associated with the conflicting devices.

Operator intervention is required to clear the discrepancy by disconnecting the offending device or reconfiguring the number of PVs to eliminate the slot overlap (see Table 11 for how to configure DECONF to specify the number of PVs).

PVCHAR parameter

PV characterization is assumed to be Linear for all multivariable field device PVs associated with inputs without recognized base units.

PVEUHI/PVEULO parameter

Use the $mx+b$ equation to convert the PV to engineering units other than the base engineering units.

SENSRTYP parameter

For each slot of a multivariable device, select the SENSRTYP specified in the user manual for the transmitter.

Note that many slots of multivariable transmitters have a real SENSRTYP other than the configuration choices (SPT_DP, SPT_AP, SPT_GP, STT or SFM). For these slots, choose SFM for the SENSRTYP. When the transmitter is connected, the TRANSMITTER STATUS field on the point detail display will indicate the actual SENSRTYP.

STI EU parameter

For multivariable transmitter slots with SENSRTYP of SPT_DP, SPT_AP, SPT_GP, or STT, choose the preferred STI_EU (engineering units). For slots with SENSRTYP of SFM, select BLANK or CM/HR if BLANK is not available. When BLANK (or CM/HR) is selected, the limit values URL, LRL, URV, and LRV are always displayed in the base engineering units specified in the transmitter user manual.

The 8-character EUDESC parameter can be used to indicate the correct units of the PV to the operator.



ATTENTION

All points of a multipoint transmitter should be made INACTIVE when altering the database of any or all points in the transmitter.

Download

Each logical slot associated with a field device controls its own configuration parameters. On a per-slot basis, the user can change parameters in the transmitter database and download them from the slot's Detail display (DNLOADDB command) with the exception of DECONF.

Upload and download of DECONF can only be performed from the base slot (PV1 of *n*).

In order to perform a download to a multivariable transmitter, you must make all of the slots INACTIVE that are associated with the multivariable transmitter. If you attempt to download before all of the multivariable transmitter's associated slots are INACTIVE, the following error message appears:

```
COMMAND ALLOWED ONLY IF ALL  
PVS INACTIVE ON THIS MULTI-PV TRANSMITTER
```

Database discrepancies

Each slot indicates database discrepancies associated with that slot's parameters. To resolve smart transmitter database discrepancies, do the following:

Step	Action
1	Perform an upload.
2	If an upload does not resolve the discrepancies, perform a download.

Upgrading STI IOP to STIMV IOP

The STIMV IOP is a direct replacement for the STI IOP. Due to differences between the two types of IOP, certain precautions must be taken when upgrading the STI IOP to the STIMV IOP.

“Smart Transmitter Interface” is the descriptor on the card edge of the **STI IOP**.

“Smart MV Transmitter Interface” is the descriptor on the card edge of the **STIMV IOP**.

CAUTION

In a redundant configuration where a **STIMV IOP** is used, both IOPs must be **STIMV IOPs**. A hot failover upgrade of a STI IOP to the new STIMV IOP is allowed; however, the upgrade procedure should be used to **replace both primary and secondary** STI IOPs with STIMV IOPs. Failover from a primary STIMV IOP to a secondary STI IOP is not permitted.

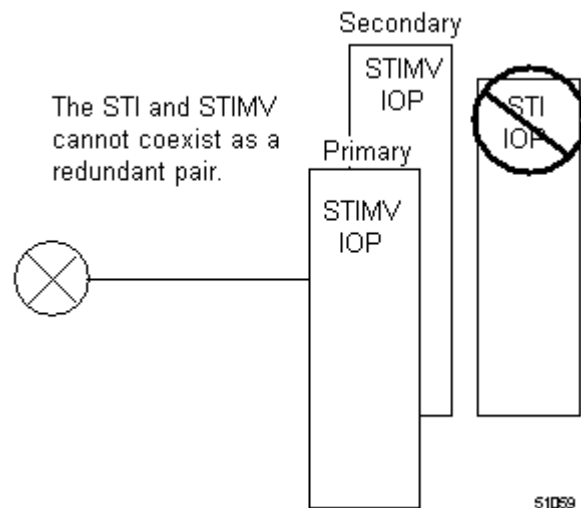


Figure 46 STIMV Redundancy Restriction

Synch error

The IOP box on the Status Display indicates an illegal redundant IOP configuration with a red S and red BKP. The S indicates a database synchronization error.

When a STIMV is the primary and an STI IOP is the secondary, the secondary database will not synch to the primary database, preventing redundant STI and STIMV operation. Replacing the secondary with a STIMV IOP clears the synch error.

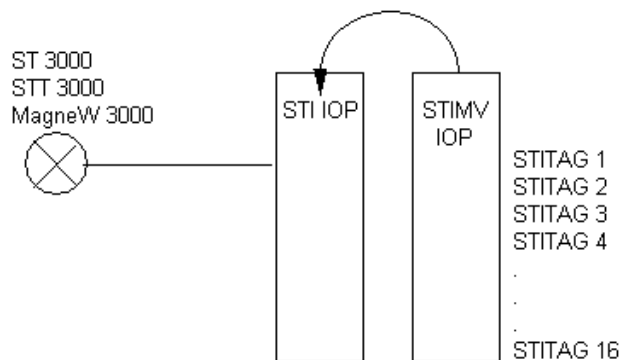


ATTENTION

Before replacing an STI IOP with a STIMV IOP, ensure that all STITAG parameters for ST 3000, STT 3000, or MagneW 3000 transmitters associated with the IOP are unique. Performing this step prevents certain database discrepancies from occurring following the upgrade.

If you allow adjacent slots to have identical STITAG parameters, the STIMV IOP interprets the PVs as being from a single multivariable transmitter and a slot configuration overlap occurs.

A slot configuration overlap occurs because the PV data sent by the transmitters overlaps the database of what the IOP believes is a single transmitter database. To resolve slot configuration overlaps, the user should change the STITAG parameters to reflect the IDs of the transmitters connected to the IOP.



Before replacing an STI IOP with a STIMV, ensure that all STITAG parameters for ST 3000, STT 3000, and MagneW 3000 transmitters are unique.

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Figure 47 Check STITAG Before Upgrading STI with STIMV

Appendix B – Hierarchy Building

Hierarchy Building Overview

Hierarchical building allows the creation of a Hierarchical View of a process from top down, or bottom up. The Hierarchy may reflect the Plant Data Model.

Containment View, in Control Builder's tree view, shows the containment relationship among all configured CM(s), SCM(s) as well as all basic blocks contained by the CM or SCM containers. The Assignment View will show the Assignment relationship among all blocks and basic blocks contained by its container.

Parameter Projection allows the projection of parameters of an embedded block upward onto its container. When this container CM/SCM is embedded in another CM container, the projected parameters can then be exposed as pins on the faceplate of this embedded block in the new container, and connections can be graphically made to these pins. Projected Parameters are defined as if they are the inherent parameters and will have all the attributes of the origin parameters, but will be referenced by their new names. The actual connections are made to the inherent origin parameters.

Hierarchy Tree Views

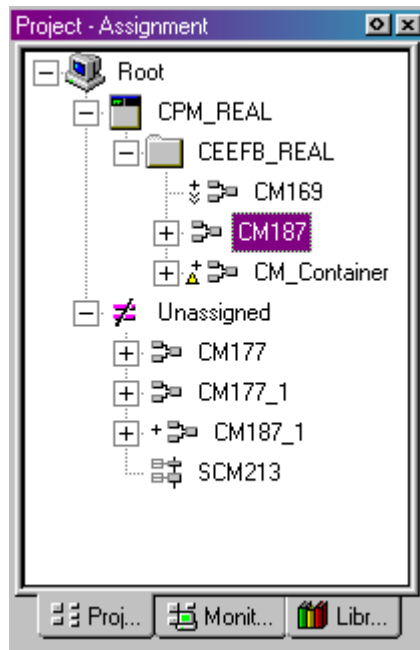
To show the views of both assignment and containment relationships among the configured blocks in the Experion PKS system, two tree views are created: Assignment View and Containment View. To switch between these two views select Project/Monitoring tree and make the selection using a right mouse click of the View menu. The title bar of the tree view indicates the current view.

Assignment View

Assignment View shows the blocks involved in assignment as well as basic blocks contained by the containers. All unassigned blocks will be placed under Unassigned group rather than under the root. CM(s)/SCM(s) contained by a container CM will be shown under its assignment parent in this view rather than under its container CM. A "+" sign is used to indicate that the associated CM is a container.

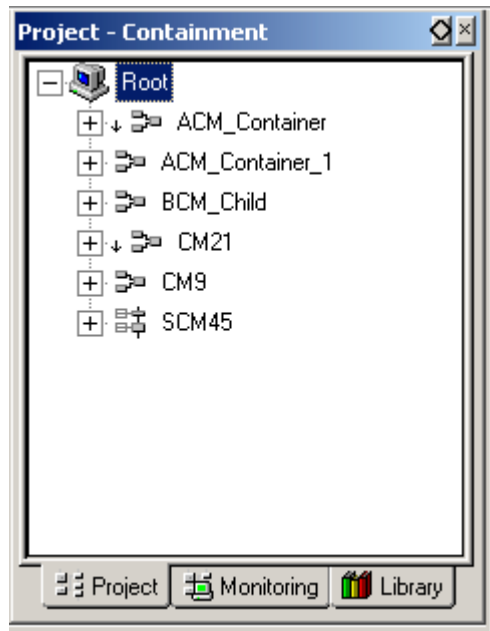
Appendix B – Hierarchy Building

Hierarchy Tree Views



Containment View

Containment View shows only the CM(s)/SCM(s) and contained blocks. The contained blocks can be CM(s), SCM(s), and basic blocks.



Because Containment Tree View doesn't show the assignment relationships among the configured blocks, some blocks (for instance, CEE, DEVICE, etc.) won't appear on the Containment Tree View. As a result, the following operations will not be available on Containment Tree View:

- Snapshot
- Device Match/Unmatch
- Device Replacement

CM/SCM Containment

Functional Description

As a major part of the hierarchical building, CM/SCM containment allows the user to contain CM(s)/SCM(s) into another CM. The contained CM(s)/SCM(s) will remain as a tagged object, and as a result, the operation of containment does not affect the contained block's execution. In other words, the contained CM/SCM will still execute in its assigned CEE. Containment only encapsulates a potentially complex strategy and allows the user to define the process view based upon the actual data flow.

There are several ways to contain/uncontain CM(s)/SCM(s). However, neither operation will change the assignment parent of the intended CM(s)/SCM(s); the selected CM(s)/SCM(s) will remain unassigned if it is not assigned before the containment/uncontainment operation.

Containment operation alone won't cause delta flag for both the dropped block and the container CM. Only when the connections are made will the delta flag be set for the associated blocks.

Containing CM/SCM

In a CM container chart, a contained CM(s)/SCM(s) is indicated by a containment graphic on the left uppermost corner of the block's faceplate, as illustrated in the following figures.

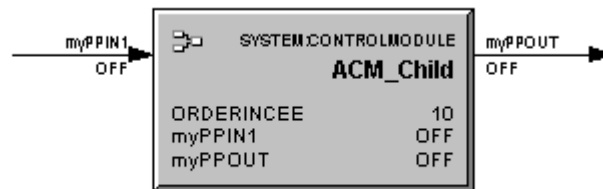


Figure 48 Block Symbol of a Contained CM

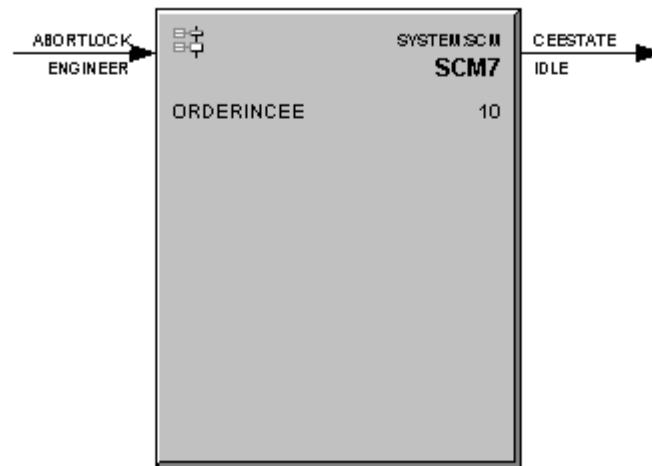


Figure 49 Block Symbol of a Contained SCM

The containment relationship does not require the contained blocks to be assigned to the same execution environment. In the figure below, the container CM, ACM_Container, itself is unassigned, but its containment children, ACM_Child and BCM_Child, are assigned to CPM2001717 and CPM1 respectively. In the assignment view the container CM, ACM_Container, is indicated by a “+” icon next to the name of the block on the tree.

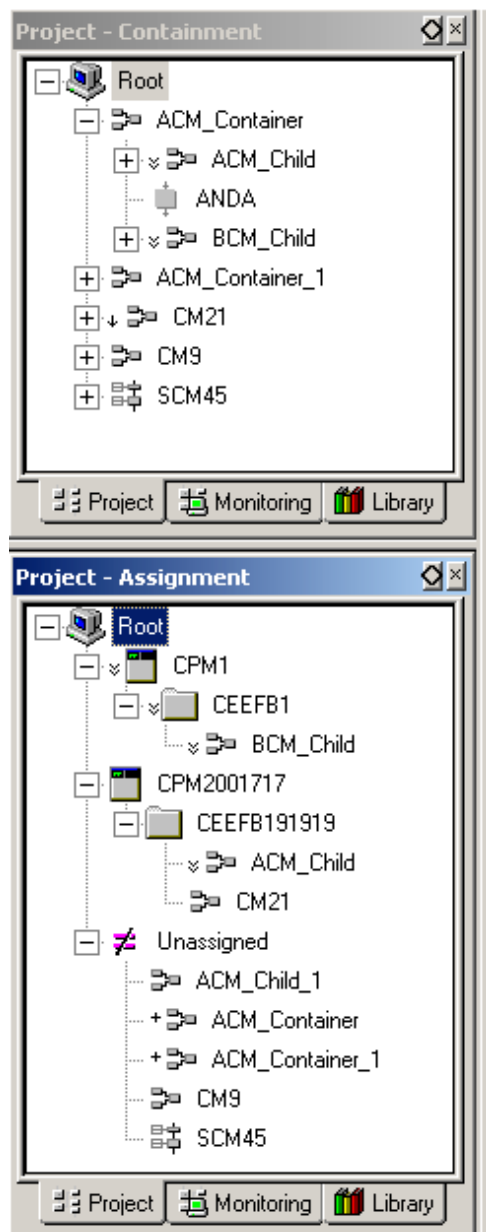


Figure 50 Containment and Assignment Tree Views

There are two possible ways to perform a containment operation, Drag and Drop and Module Containment Dialog.

After a user template is contained by a container user template, the contained user template will be specialized from the source user template. The propagation of this contained user template will cause all derived container user templates and instances to have a derivation version of this contained CM.

For example, all CMs in the illustrations below are user templates. Before containment:

- CM_UT_Container_1 is derived from CM_UT_Container and
- CM_UT_Container_1_1 is derived from CM_UT_Container_1.

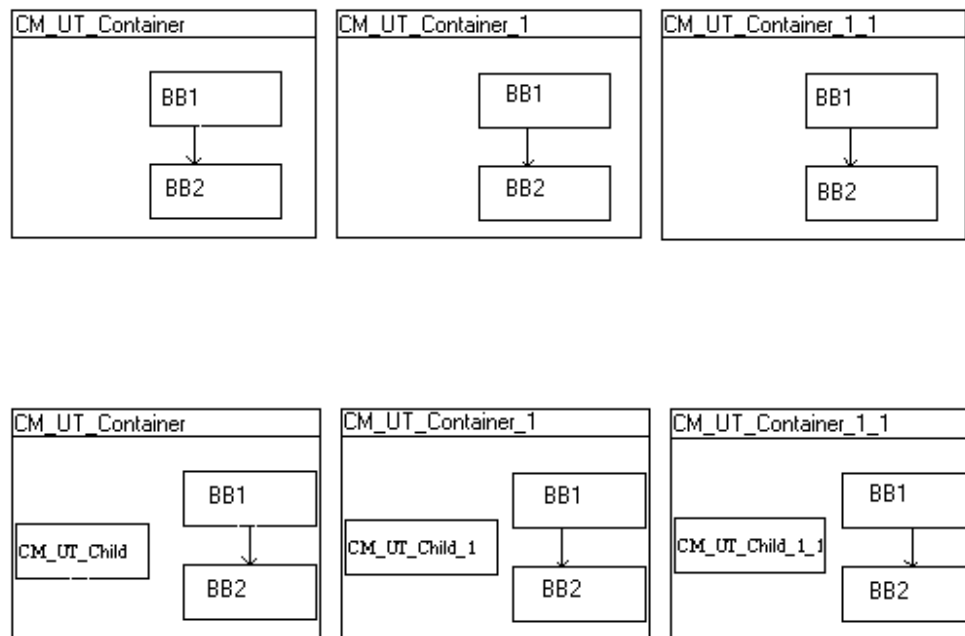


Figure 51 User Template Containment

Appendix B – Hierarchy Building

CM/SCM Containment

After a user template UT_Child is contained into CM_UT_Container, CM_UT_Container has a specialized CM_UT_Child contained, all derivation children of CM_UT_Container, CM_UT_Container_1 and CM_UT_Container_1_1, are propagated with this new contained block.

An error will occur if an attempt is made to delete CM_UT_Child_1 or CM_UT_Child_1_1 because they all become parent defined and the user templates can't be deleted. The error will appear as "This operation is not valid at this level for a parent-defined element."

Drag and Drop

In order to contain CM(s) or SCM(s) into another CM, drag the intended blocks from any project tree view and drop onto a CM in project Containment View or a project CM chart, even if the intended CMs/SCMs are already contained. CM blocks in the Assignment View cannot be the destination of a containment operation because the View only reflects the assignment configuration model of Experion PKS system.

The containment parents cannot be changed for loaded contained CM(s)/SCM(s) unless these blocks are deleted from monitoring side first. The containment operation must be on the project tree.

The following table lists all possible drag and drop operations for containment. The Source column indicates the starting point of the dragged block, and the Destination column indicates the view or chart where the dragged block is dropped.

The dragged items can only be CM(s) and SCM(s) and the destination blocks are CM(s) only. Neither operation is supported in a Monitoring tree.

Table 12 Drag and Drop Operations for Containment

	Source	Destination
1	CM/SCM in Assignment View	CM in Containment view
2	CM/SCM in Assignment View	CM Chart
3	CM/SCM in Containment view	CM in Containment view
4	CM/SCM in Containment view	CM Chart
5	CM/SCM system profile or user template from the Library Tab	CM in Containment view
6	CM/SCM system profile or user template from the Library Tab	CM Chart

7	CM/SCM system profile or uncontained user template from the Library Tab	A CM User-Template in the Containment view, Library Tab
8	CM/SCM system profile or uncontained user template from the Library Tab	A CM user-template chart

Module Containment Dialog

Module Containment Dialog may be used to contain multiple CMs/SCMs into another CM. A container will be indicated by a “+” sign.

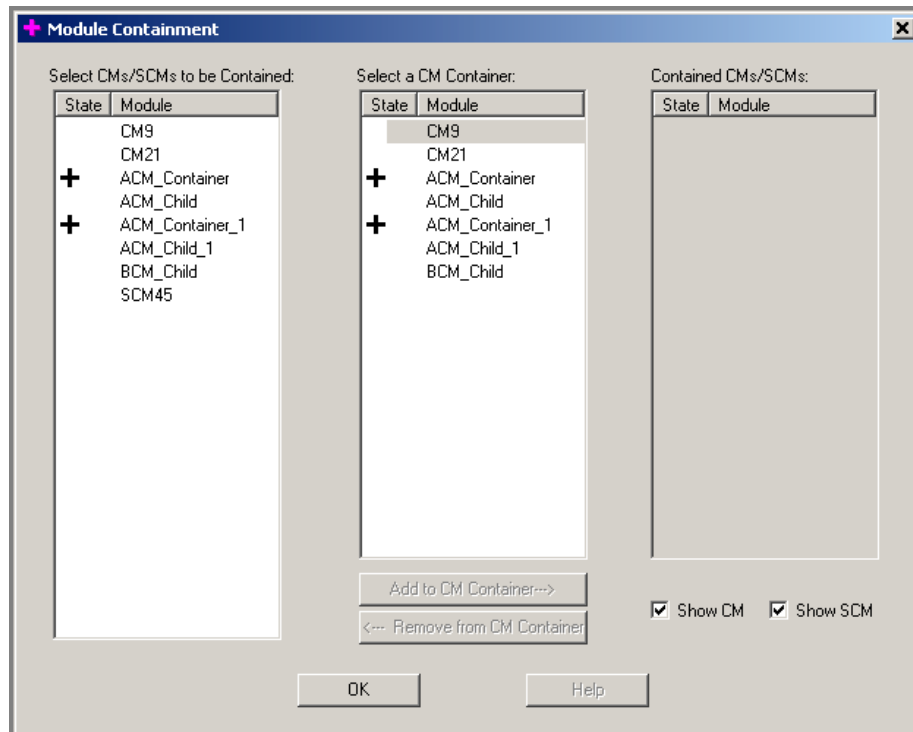


Figure 52 Module Containment Dialog

When the container CM in the middle section is selected, the right section of the dialog will display all contained CM(s)/SCM(s) by the selected container CM. Select Add to CM Container.

Uncontaining CM/SCM

Uncontaining CM/SCM undoes a containment operation. This operation applies to only control strategies.

There are three possible ways to perform an uncontainment operation, Drag and Drop, Module Containment Dialog and Uncontain menu option.

Drag and Drop

To uncontain using drag and drop, drag the CM/SCM from any project tree view or CM chart and drop into another CM in project Containment View. In this case the previously contained block will be uncontained from its previous containment parent and contained by a new container CM. The selected contained block may also be dropped onto the root of the Containment Tree View.

Table 13 Drag and Drop Operations for Uncontainment

	Source	Destination
1	CM/SCM in Containment view	CM in Containment view
2	CM/SCM in Assignment View	CM in Containment view
3	CM Chart	CM in Containment view
4	CM/SCM in Containment view	CM Chart

Module Containment Dialog

Module Containment Dialog also be used to uncontain multiple CM/SCMs into another CM. A container will be indicated by a “+” sign.

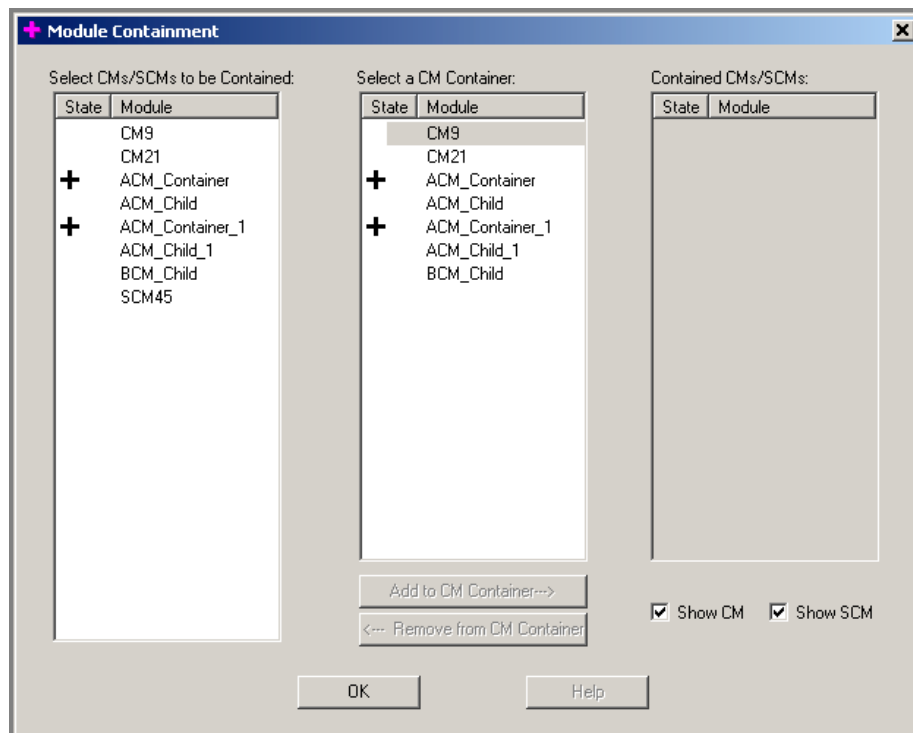


Figure 53 Module Containment Dialog

When the container CM in the middle section is selected, the right section of the dialog will display all contained CM(s)/SCM(s) by the selected container CM. Select Remove from CM Container.

Uncontain Menu Option

To uncontain a CM/SCM within a CM chart, right click the item to be uncontained and select Uncontain. The selected CM/SCM may not be loaded. If the CM/SCM is loaded the menu item will not be available.

Uncontain Blocks with Projected Parameter(s)

Appendix B – Hierarchy Building

CM/SCM Containment

Two rules apply when uncontainment blocks with projected parameter and blocks with connections:

- Contained CM/SCM cannot be deleted if it is defined as an origin block;
- Uncontain will be prevented if the CM/SCM to be uncontained has graphical connections.

Rule Examples

In this example, CM3 is contained by CM2 that is contained by CM1; P1 is a projected parameter that is defined as projected parameter on CM1, CM2 and CM3. The origin parameters for CM2.P1, CM3.P1 are defined as CM3.P1 and CM3.BB3.P1 respectively.

When making a connection between CM2.BB1.P1 and CM2.P1, an obvious graphical connection is created. But there is also a read only parameter connection created between CM1.BB1.P2 and CM3.BB3.P1 where CM3.BB3.P1 is the absolute origin for the Projected Parameter CM2.P1.

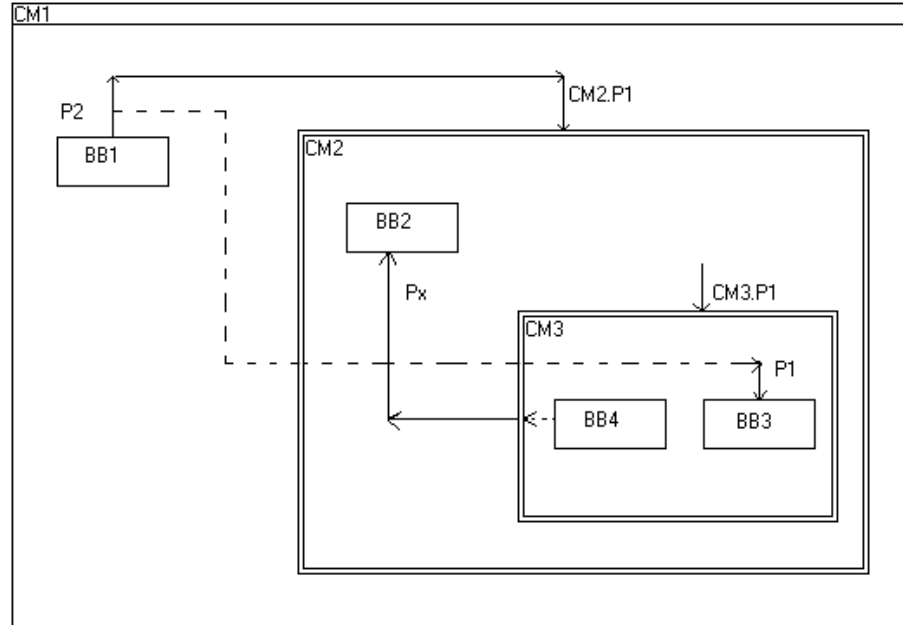


Figure 54 Uncontain Blocks with Projected Parameters

8. When uncontain CM3, an error will be displayed,

“CM3 cannot be uncontained because CM3.BB3.P1 is defined as an origin parameter”.

In order to uncontain CM3, the user needs to redefine the origin or empty the origin for CM2.P1 so that CM3 is not an origin block.

9. When uncontain CM2, an error will be displayed,

“CM2 cannot be uncontained because there is a graphical connection to its projected parameter(s)”.

Deleting the connection between CM1.BB1.P2 and CM2.P1 first will allow the user to proceed with the uncontain operation.

The same error will occur when uncontain CM2 if there is a parameter connector on CM2.P1 whose source is CM1.BB1.P2, in which case CM2.P1 is a passive end of a graphical connection as indicated by the charts below.

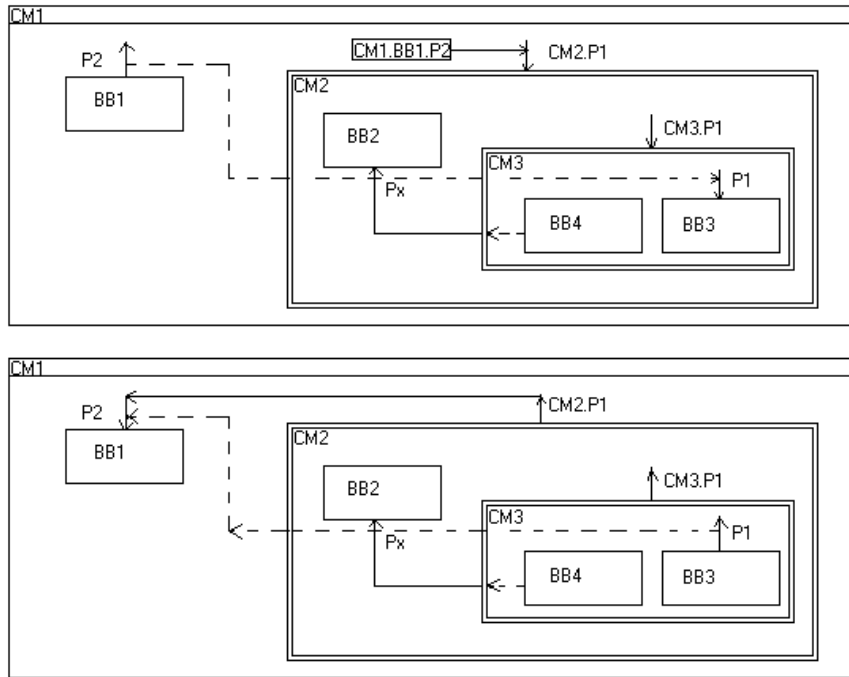


Figure 55 Uncontain Blocks with Projected Parameters

10. If CM2.P1 is used as a parameter connector to CM1.BB1.P2 however, as indicated by the chart below, because CM2.P1 is the passive end of a connection from a parameter connector, uncontainment CM2 will be allowed and the parameter connector will remain after the uncontainment CM2 operation.

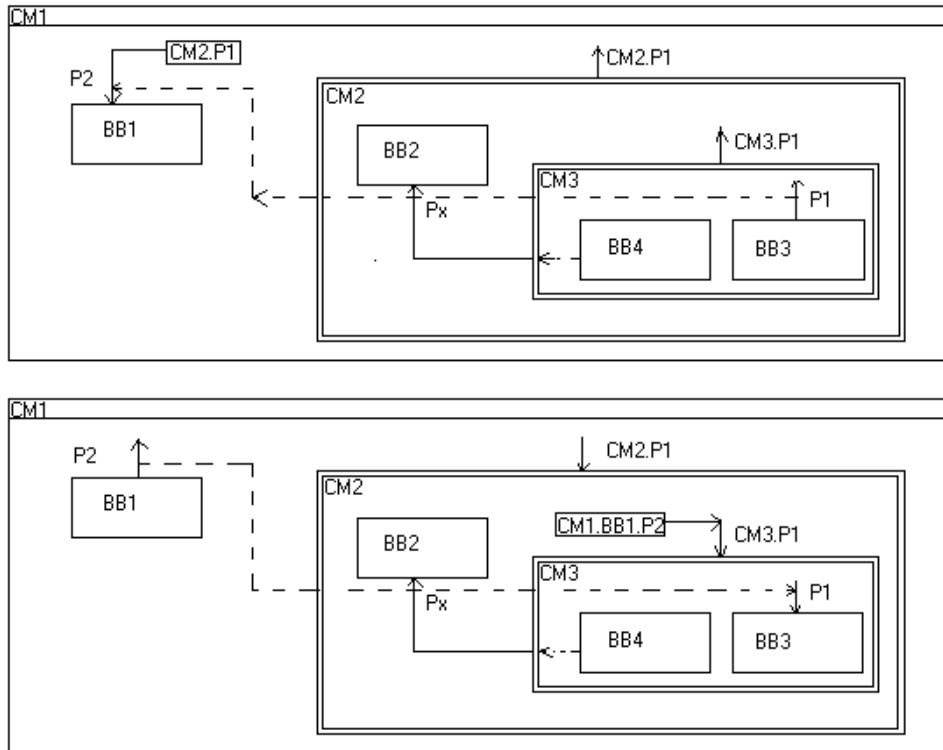


Figure 56 Uncontain Blocks with Projected Parameters

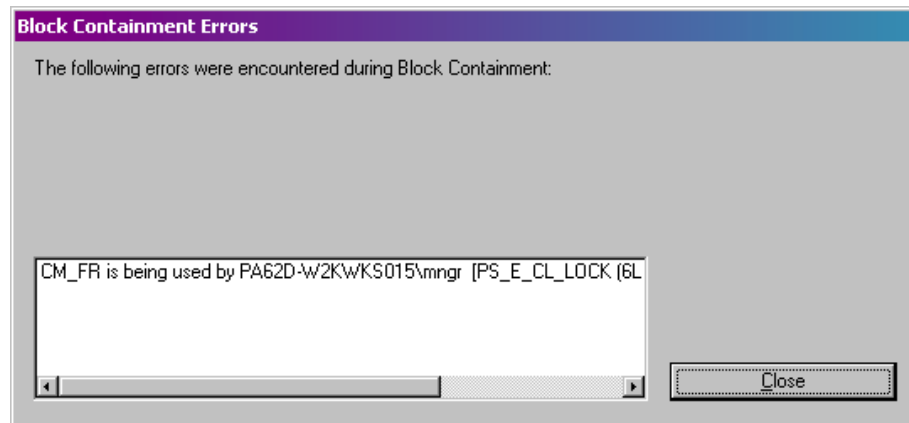
11. If CM1.BB1.P2 is used as a parameter connector to CM3.P1 as indicated by the chart above, uncontained CM2 is allowed.

Error Scenarios for Containment/Uncontainment Operations

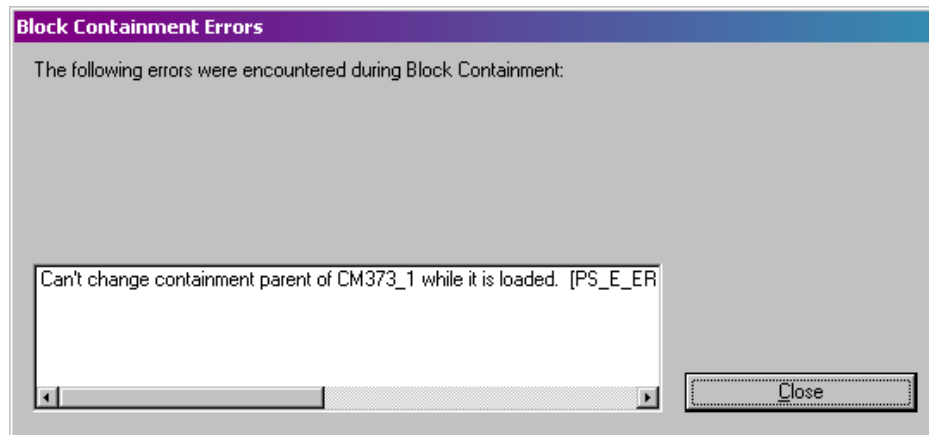
Regardless of the method used to contain or uncontain control modules, both the source and destination blocks will be locked by the containment operation. If the involved blocks are already locked by other operations, an error message will be displayed:

Appendix B – Hierarchy Building

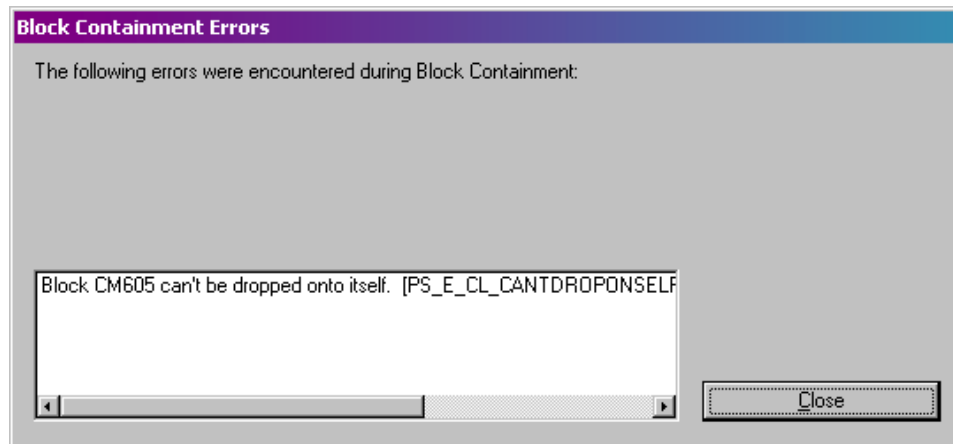
CM/SCM Containment



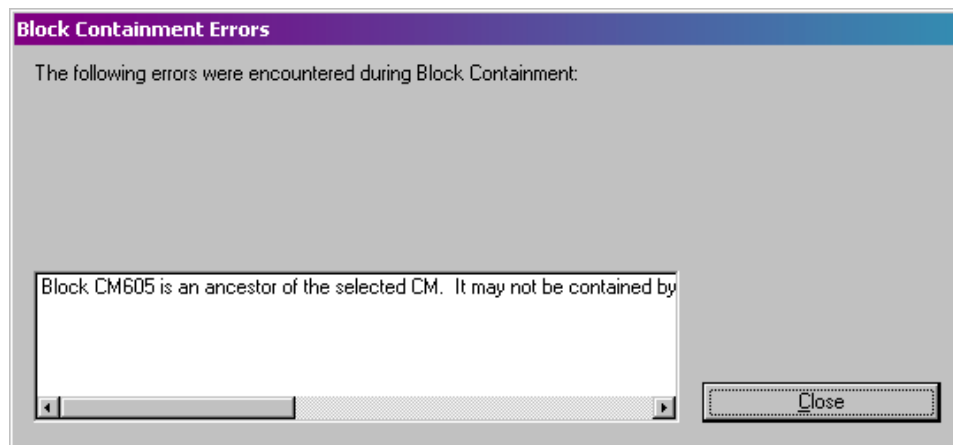
If the control module is loaded, its containment parent cannot be changed and an error will occur:



When using Module Containment Dialog, if the control module is selected to be both source and destination of the containment operation, the following error will occur: (this operation is prevented for drag and drop operation)



If a container CM selected is contained by one of its contained blocks, the following error will occur:



Operations of Container and Contained CM(s)/SCM(s)

Even after a CM(s)/SCM(s) is contained by a container CM, it remains a tagged object, with all the attributes of a tagged object. For instance, the contained CM(s)/SCM(s) can be loaded individually and has its own server point, its own execution state, etc. However, because it is contained by a container CM, some new operations are also supported.

Editing a Container or Contained CM/SCM

The mechanism of editing a container CM or contained CM/SCM from tree view remains the same, assuming that they are not locked by other transactions.

Editing a contained CM/SCM from its container chart can be done in two ways:

Edit Operations	Paths
Edit the form of a contained block	79. Double click on the contained block 80. Right mouse click on the contained block and select Configure Parameters menu item. 81. Select the contained block and select Tools -> Configure Block Parameters
Edit the chart of a contained block	Right mouse click on the contained block and select Open Chart.

The assumption is that the contained block is not locked by another edit session. However, if the contained block is locked by another edit session, depending on the sequences of the operations involved, different error messages will be displayed to indicate the errors.

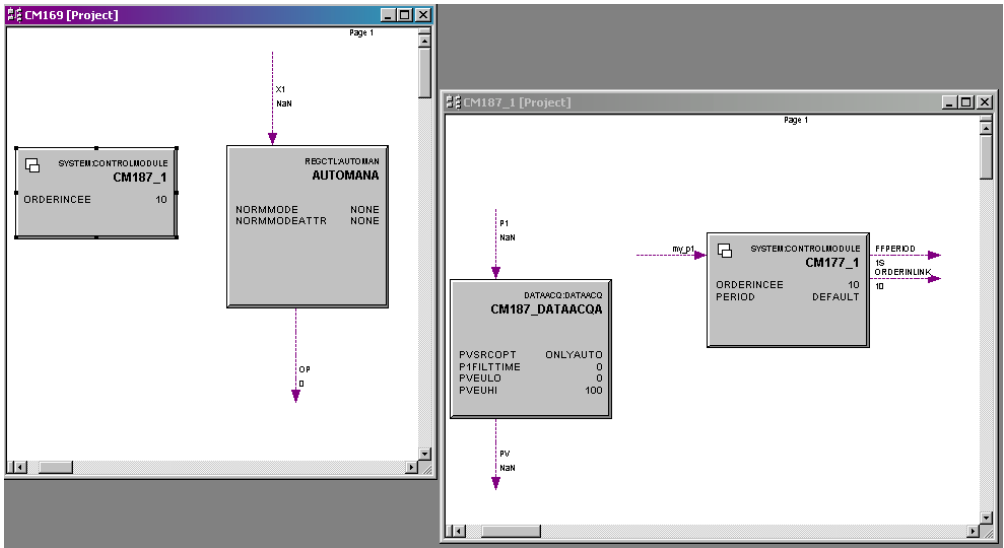


Figure 57 Contained CM/SCM Edit Example

Using the previous figure as an example, the following table lists the potential errors that may occur as a result of wrong sequence of operations and the ways to resolve the problems.

Table 14 Editing errors

Scenarios	Operation	Error Message	How to Resolve
1	Step 1: Open the chart of container CM169; Step 2: Move or make connections to the contained block CM187_1 within CM169 chart; [At this time, CM187_1 is locked by CM169 transaction] Step 3: Double click on CM187_1 faceplate	CM187_1 is locked by CM169, please save CM169 and try again	Save CM169 chart and double click on CM187_1 [Save CM169 will unlock CM187_1 so that a new transaction can be started by CM187_1]
2	Step 1: Open the chart of container CM169; Step 2: Double click on CM187_1 to open its chart; <i>[At this time, CM187_1 is locked by its own transaction]</i> Step 3: Move, delete, uncontain or make connections to the contained block CM187_1 within CM169 chart	CM187_1 is locked by xxxx User, please resolve the problem and try again	Close the chart of contained block CM187_1

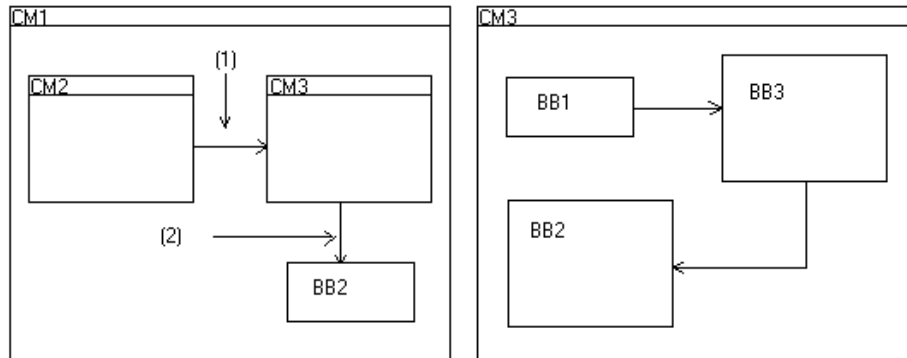
3	Step 1: Open the chart of container CM169; Step 2: Move or make connections to the contained block CM187_1 within CM169 chart; <i>[At this time, CM187_1 is locked by CM169 transaction]</i> Step 3: Double click on CM187_1 on the tree or right mouse click on CM187_1 on the tree and select Configure Module Configuration	CM187_1 is locked by CM169, please save CM169 and try again	Save the chart of container CM169 [Save CM169 will unlock CM187_1 so that a new transaction can be started by CM187_1]
4	Step 1: Open the chart of container CM169; Step 2: Double click on CM187_1 to open its chart; <i>[At this time, CM187_1 is locked by its own transaction]</i> Step 3: Double click on CM187_1 on the tree or right mouse click on CM187_1 on the tree and select Configure Module Configuration	CM187_1 is locked by xxxx User, please resolve the problem and try again	Save the chart of container CM169 [Save CM169 will unlock CM187_1 so that a new transaction can be started by CM187_1]

Normally, if a block is loaded and its configuration has been changed, a delta flag will be added next to the block's icon on the tree to indicate that there are changes. To resolve the differences, the user needs to reload the block from Project Tree. However, in Hierarchy Building, new rules are introduced to avoid unnecessary load if the changes are related to contained CM(s)/SCM(s),

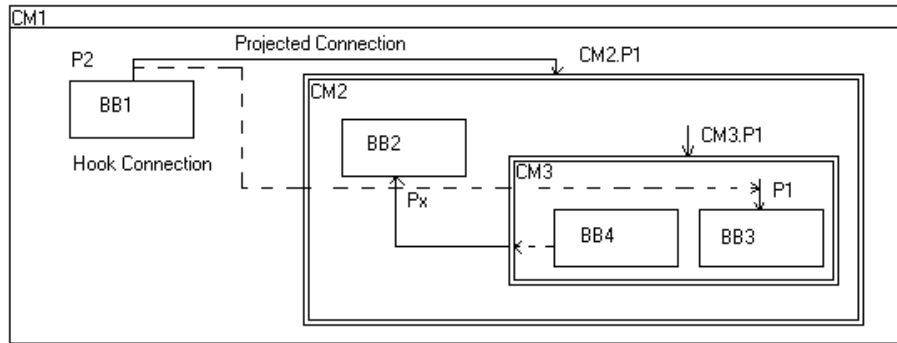
- Changes made to a contained CM/SCM won't affect its container CM, therefore, no delta flag will be added for the container CM
- Graphical changes, such as blocks being moved within the chart, won't cause any delta flag

Example 1: In this example, CMx indicates control module containers and BBx indicates basic blocks.

When making the connection (1), there will be delta flag for CM3 but no delta flag for CM1. When making connection (2), there will be delta flags for both CM1 and CM3 (this will happen if there is a back initialization connection). Any changes made within CM3 won't cause delta flag for CM1.



Example 2: In this example, CM3 is contained by CM2 that is contained by CM1; P1 is a projected parameter that is defined as projected parameter on CM1, CM2 and CM3. The origin parameters for CM2.P1, CM3.P1 are defined as CM3.P1 and CM3.BB3.P1 respectively. Making the connection between CM1.BB1.P2 and CM2.P1 will cause a delta flag for both CM1 and CM3, but not CM2 as a read only connection will be made between CM1.BB1.P2 and CM3.BB3.P1.



Assign/Unassign a Container or Contained CM/SCM

The containment operation does not have any impact on the assignment/unassignment of both the container CM or contained CM(s)/SCM(s). They can all be assigned to different execution environments.

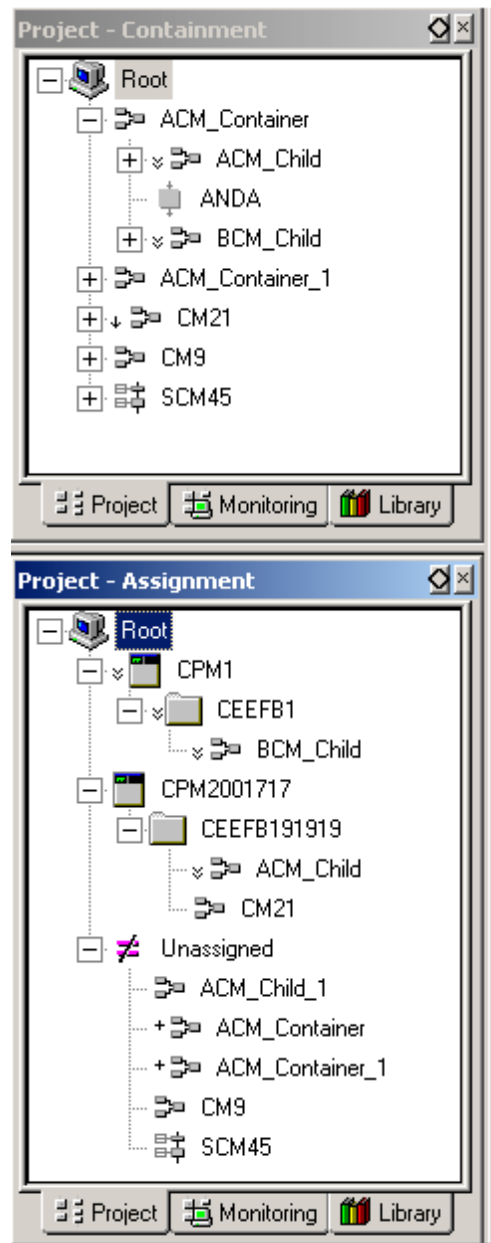


Figure 58 Example for Assign/Unassign

In this example, ACM_Container contains ACM_Child and BCM_Child that are assigned to CPM2001717 and CPM1 respectively. CM_Container itself is unassigned. If CM_Container contains just ACM_Child, BCM_Child and no basic blocks, CM_Container does NOT have to be assigned in order to be loaded. In this case, ACM_Child and BCM_Child will execute in their respective execution environments and CM_Container will not have an execution state, therefore, on the monitoring tree, the icon of CM_Container will be gray as showed below. However, CM_Container will become a server point and can be accessed in server.

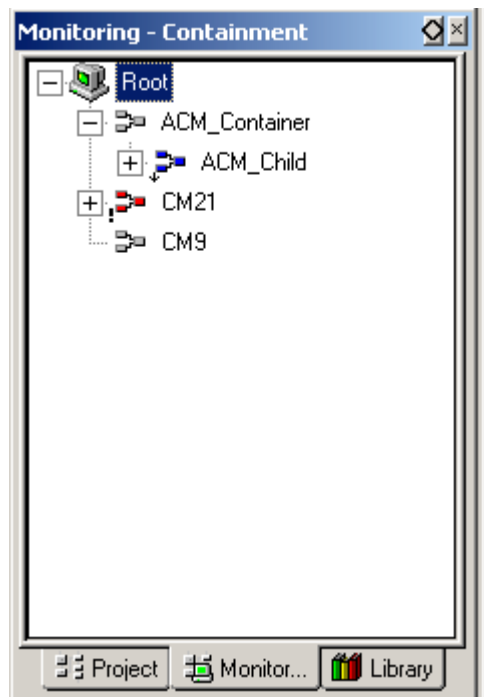


Figure 59 Example for Auto Load

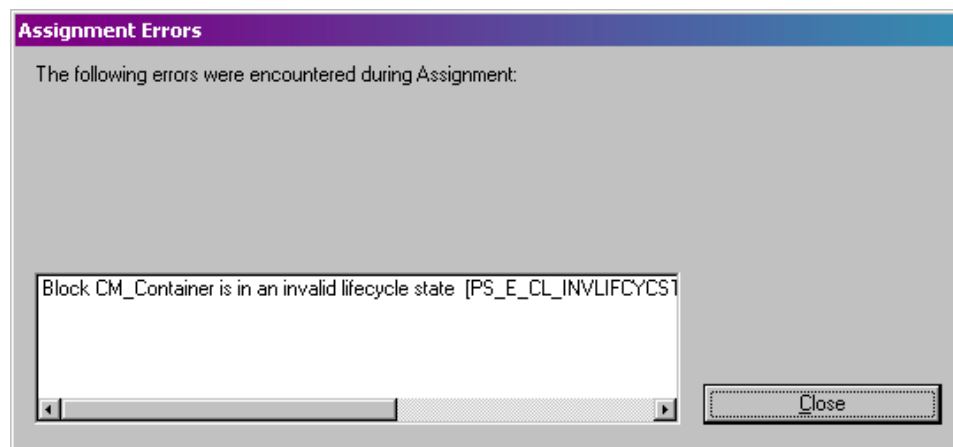
Because CM_Container is unassigned and does not contain any basic blocks, it will be automatically loaded when either ACM_Child or BCM_Child is loaded. But loading CM_Container does NOT cause ACM_Child and BCM_Child to be loaded automatically. The user could also load CM_Container manually from Containment View. Again, because CM_Container is unassigned and has no execution state, the icon for CM_Container on the monitoring tree will be gray.

Appendix B – Hierarchy Building

CM/SCM Containment

However, if CM_Container contains basic blocks, it has to be assigned to a control execution environment in order to be loaded.

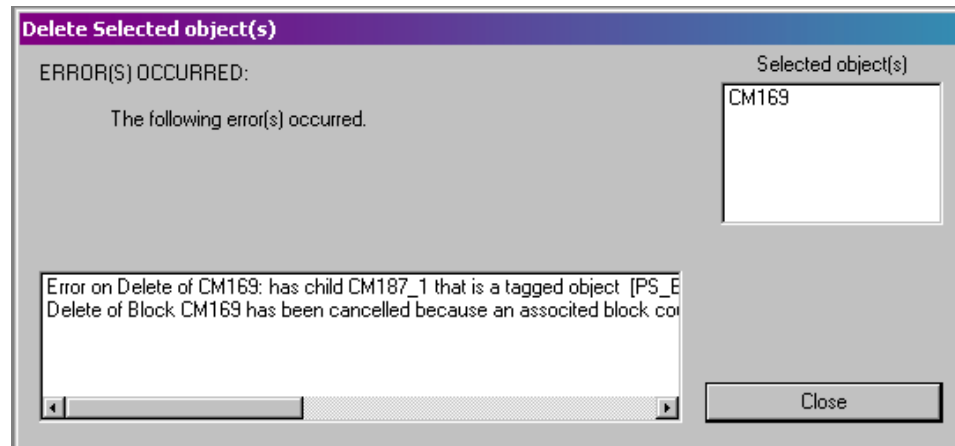
If the contained CM(s)/SCM(s) or container CM is already loaded, it cannot be assigned or unassigned, this is consistent with the existing restriction that a block cannot be reassigned if it is already loaded. The following error will occur to indicate the error,



An unassigned CM can be contained by another CM, and projected parameters can be configured on this unassigned CM. When contained by another CM, this unassigned CM behaves the same as any other contained CM/SCM, except that it doesn't have an execution environment.

Delete a Container or Contained CM/SCM - Deletion without Projected Parameter

The deletion of a container CM requires that all contained CM(s)/SCM(s) blocks be deleted first, this is consistent with the existing behavior where all tagged blocks must be deleted before an assignment parent can be deleted. An error message will be displayed if the deletion is attempted,



If a container CM block together with its contained CM(s)/SCM(s) blocks is selected to be deleted, the contained CM(s)/SCM(s) will be deleted programmatically before the container CM to comply with the rule specified above.

For user template, if the embedded user template has only embedded derivation children, the deletion of this embedded user template will delete all its embedded derivation children.

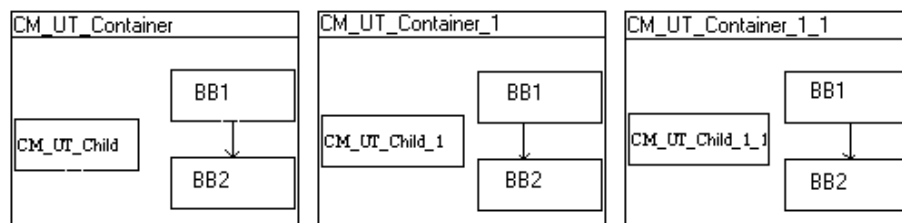


Figure 60 Example 1 for User Template Deletion

In this example, CM_UT_Container_1 is derived from CM_UT_Container and CM_UT_Container_1_1 from CM_UT_Container_1 and CM_UT_Child1, CM_UT_Child_1_1 and CM_UT_Child are template defining. All derivation children as well as instances of derivation children of CM_UT_Child are contained by other user templates. In this case, the deletion of CM_UT_Child will delete all its derivation children, CM_UT_Child_1 and CM_UT_Child_1_1.

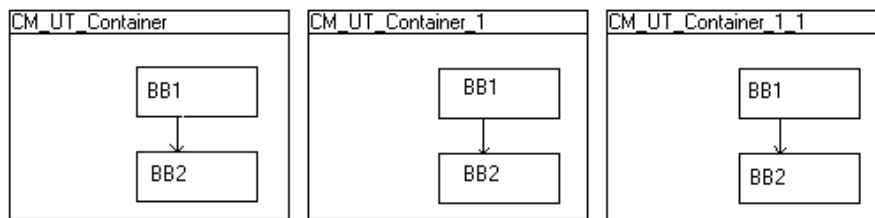


Figure 61 Example for 2 User Template Deletion

If the embedded user template to be deleted has non-embedded derivation children, or non-embedded instances (in other words, derivation children or instances are not contained by other user templates or control modules) the deletion will be prevented. In the above example, if CM_UT_Child has a non-embedded derivation child CM_UT_NONEMBED_Child, deletion of CM_UT_Child will cause an error,

“The selected block CM_UT_Child has non-embedded children block CM_UT_NONEMBED_Child, please resolve the problem and try again.”

CM_UT_NONEMBED_Child must be deleted before CM_UT_Child can be deleted. And the deletion of this user template will delete all its derivation children.

Delete a Container or Contained CM/SCM - Deletion with Projected Parameter

In this example, CM3 is contained by CM2 that is contained by CM1. P1 is a projected parameter that is defined as projected parameter on CM1, CM2 and CM3. The origin parameters for CM2.P1, CM3.P1 are defined as CM3.P1 and CM3.BB3.P1 respectively.

When making the connection between CM1.BB1.P2 and CM2.P1, besides the graphical connection, there is also a read only connection made between CM1.BB1.P2 and CM3.BB3.P1 because the CM3.P1 as the origin of CM2.P1, itself is a projected parameter.

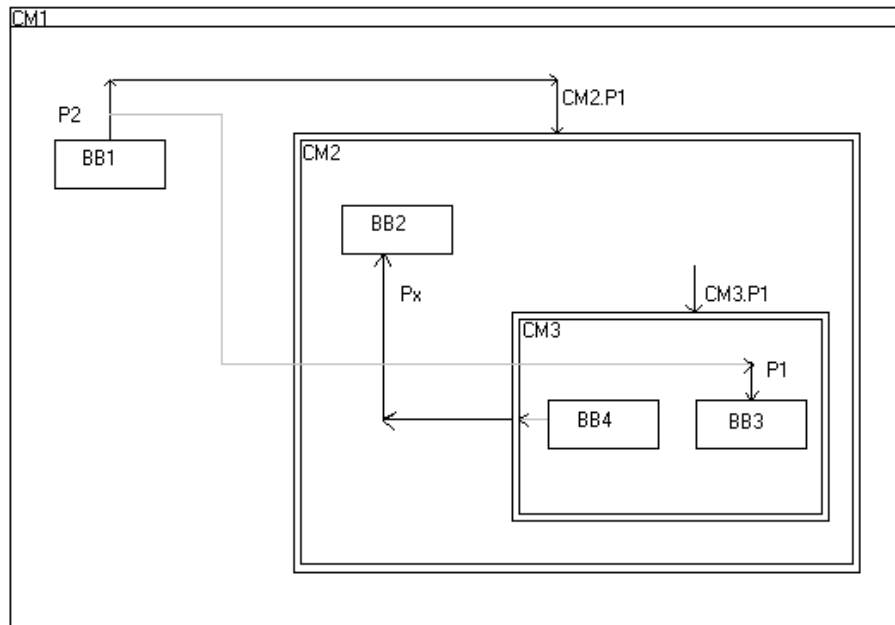


Figure 62 Example for Block Deletion involving Projected Parameter

12. When deleting CM3, an error will be displayed,

“CM3 cannot be deleted because CM3.BB3.P1 is defined as an origin parameter”.

In order to delete CM3, the user needs to redefine or empty the origin of CM2.P1 so that CM3 is not a origin block. If both CM2 and CM3 are selected for deletion, the operation will be allowed because the parent is in the scope of the operation.
13. When deleting CM2, the graphical connection between CM1.BB1.P2 and CM2.P1 as well as the read only connection between CM1.BB1.P2 and CM3.BB3.P1 will be deleted.
14. If CM2.P1 is configured as parameter connector to CM1.BB1.P2, deleting CM2 will cause the connection to CM1.BB1.P2 dangling. “???????” will be shown in the parameter connector box.

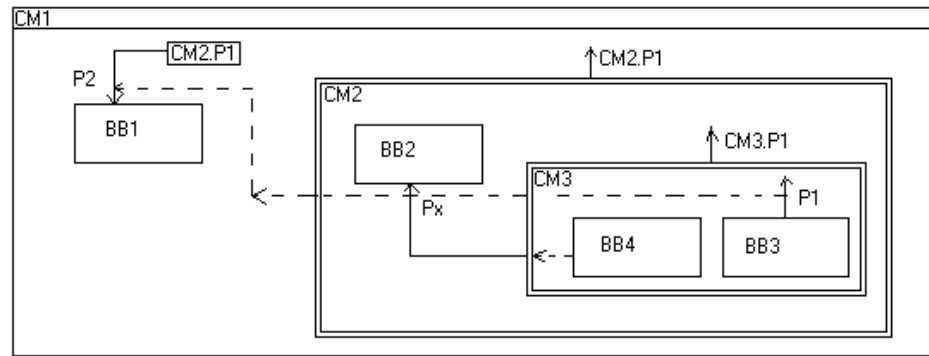


Figure 63 Example for Block Deletion involving Projected Parameter

15. If CM1.BB1.P1 is configured as parameter connector to CM2.P1 as indicated by the chart below, deleting CM2 will cause the parameter connector to CM2.P1, CM1.BB1.P1 deleted.

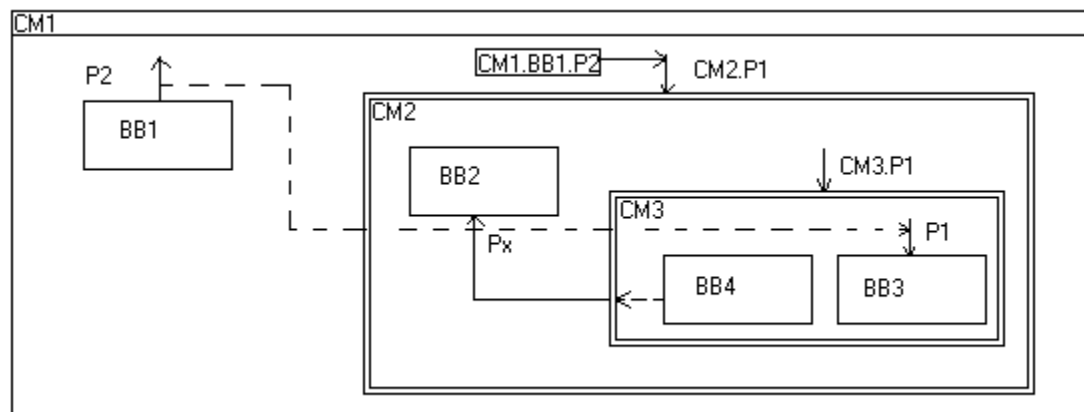


Figure 64 Example for Block Deletion involving Projected Parameter

Delete a Container or Contained CM/SCM - Deletion of the Loaded Container or Contained CM/SCM from the Loaded Side

If a container CM is deleted from monitoring, all monitoring instances of the contained CM/SCM's will be placed under the root. This will break up parameter projection chains under projected connections but the corresponding read-only connections will stay. If a container CM is deleted from monitoring, all dependent basic blocks will be deleted as well. If the container CM is reloaded, the projection chain will be re-established and the contained CM/SCM will be underneath the container CM.



TIP

CMs can be deleted individually from the loaded side regardless of whether they are contained or container. However, container CMs cannot be deleted from the projected side unless all contained CMs/SCMs are deleted first.

Copy a Container or Contained CM/SCM

When a container CM is copied, all contained CM(s)/SCM(s) are copied in addition to the dependent blocks. Unique names will be assigned for the contained CM(s)/SCM(s), all named connections and the origins of projected parameter will be resolved.

Projected parameters will be maintained on copy, for instance, if CM1 has a projected parameter with origin CM1.PIDA.PV, after copy, the new CM1_1 will have a projected parameter named CM1_1.PIDA.PV.

The existing mechanism for resolving Substitute Name and Substitute Connections will be invoked if they are involved in the copy operation. If a projected CM/SCM or container has projected parameter defined on it and is copied, the projected parameter definition and any projected connections are copied to the new block or container.

In this example, CM3 is contained by CM2 that is contained by CM1. P1 is a projected parameter that is defined as projected parameter on CM1, CM2 and CM3. The origin parameters for CM2.P1, CM3.P1 are defined as CM3.P1 and CM3.BB3.P1 respectively.

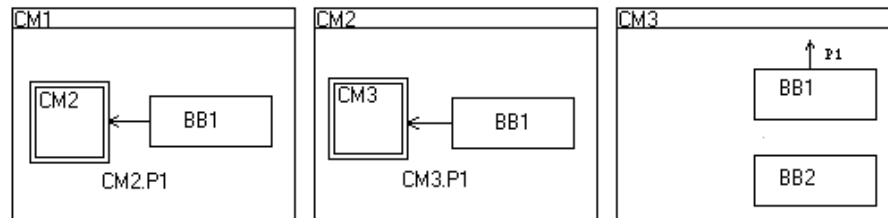
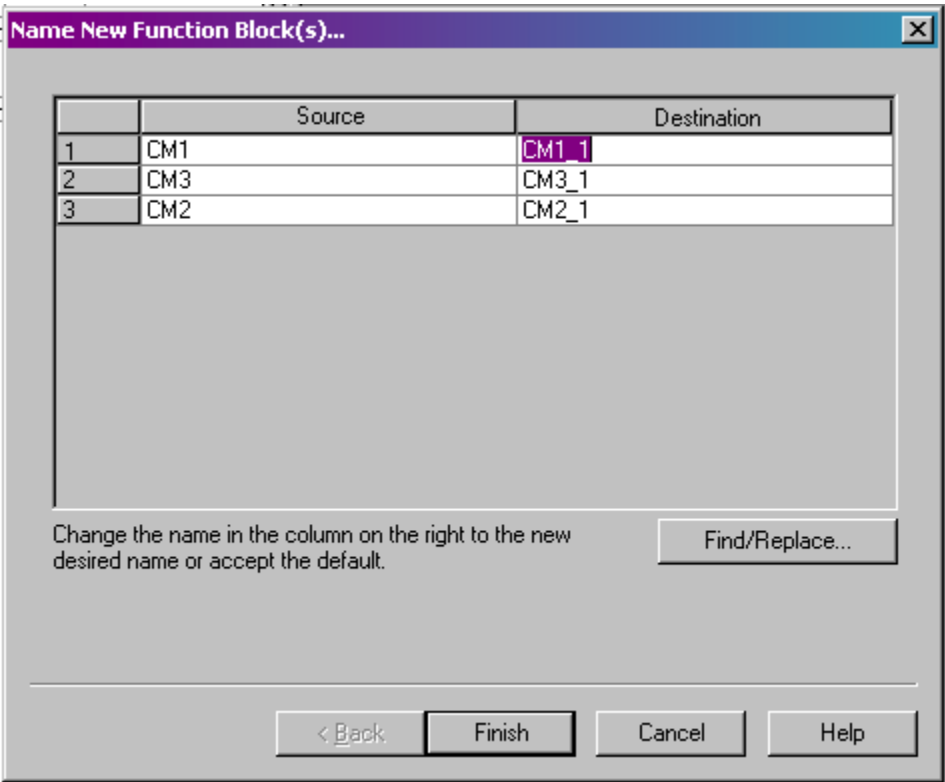


Figure 65 Example 1 for Block Copy

When copying CM1, the following dialog will be displayed so blocks involved in the operation can be renamed.



If no changes are made, the new blocks as well as their projected parameter will look like the following after the copy operation,

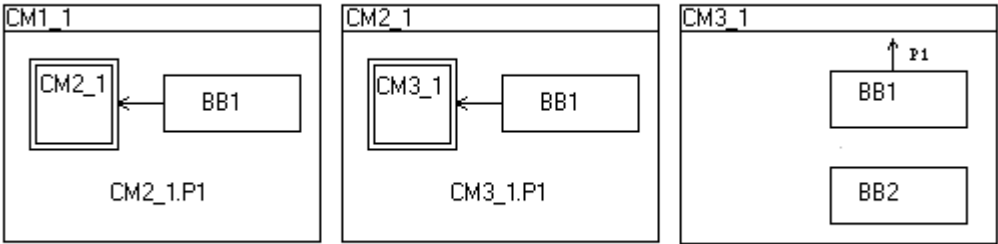
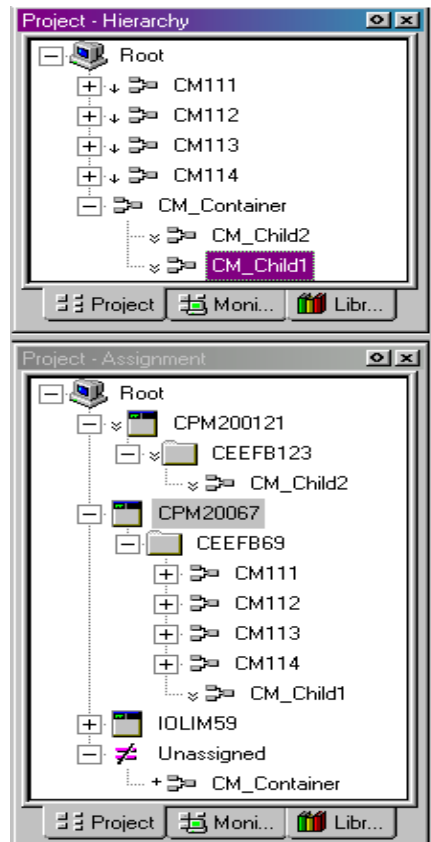


Figure 66 Example 2 for Block Copy

Load/Load with Contents

Even if a CM/SCM is contained by a container CM, the contained CM/SCM remains to be a tagged object and can be loaded without its container CM being loaded first. The contained CMs/SCMs can in fact be executed in different execution environments.

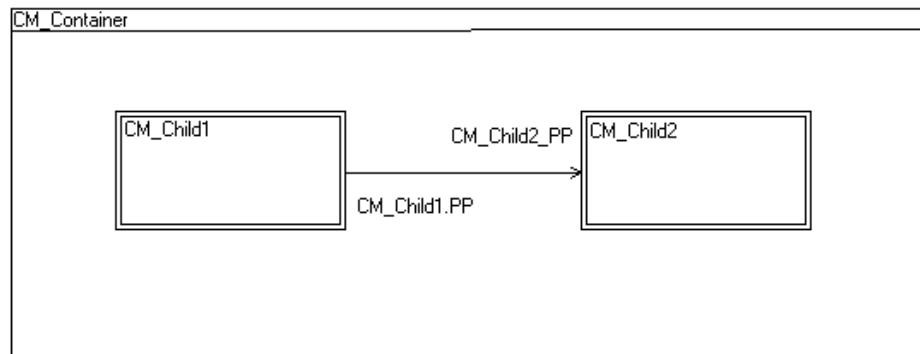
The user is able to load an unassigned container CM if it doesn't contain any basic blocks and its contained blocks are properly assigned. This unassigned container CM will have its own server point, therefore can be accessed in Server. Once loaded, the unassigned CM will appear on the Monitor Tab of the Containment view. The icon is gray because the unassigned CM does not have an execution state. Because this CM is not assigned and there isn't an Unassigned category for Monitoring Tab, this CM will not be found in Assignment Tree View.



In the example, the unassigned CM_Container contains just two control module blocks CM_Child1 and CM_Child2.

Appendix B – Hierarchy Building

CM/SCM Containment



If a container CM_Container is selected for Load with Contents, depending on which tree view the load is originated, two different sets of contents will be selected for loading. If Load with Contents for the container starts from Assignment Tree View, the load list contains only the selected container CM_Container. In the example, the results of Load and Load with Contents of CM_Container will be identical if the operation starts from the Assignment Tree View as shown in the figure below.

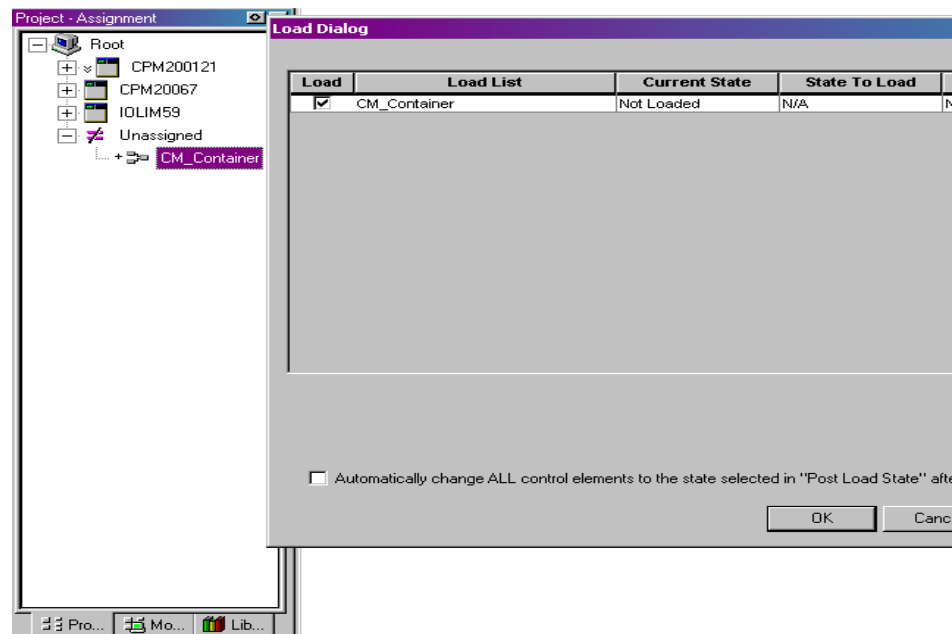


Figure 67 Load Dialog from Assignment Tree View

However, if Load with Contents is originated from Containment Tree View, both the container CM and all contained CM(s)/SCM(s) are selected for loading.

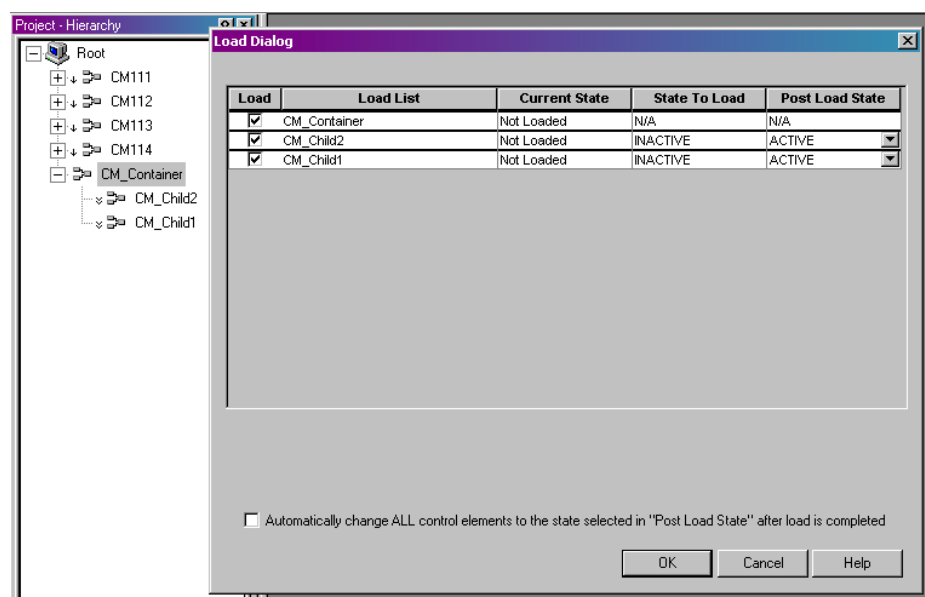
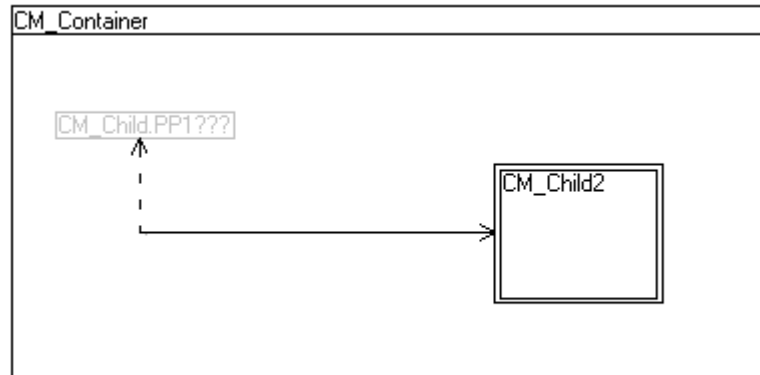


Figure 68 Load Dialog from Containment Tree View

As stated earlier, if an assigned CM is to be loaded and it's container CM is unassigned (and has no basic block) and has not been loaded, the container CM is automatically loaded. In this example, CM_Child2 is selected to load and CM_Container will be loaded automatically. After the load, the CM_Container chart on the monitoring side will look like this:

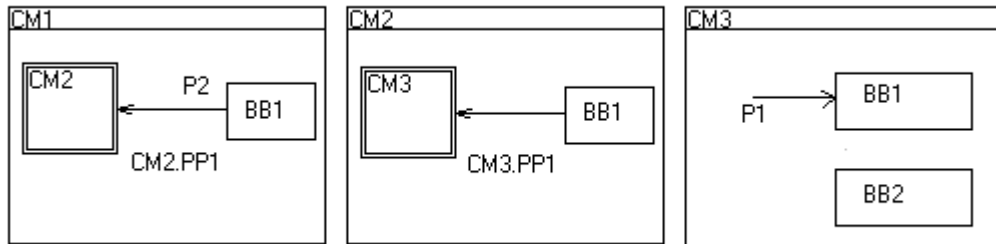
Appendix B – Hierarchy Building

CM/SCM Containment



Because CM_Child1 is not loaded, there is a read-only parameter connector indicating the other end of the connection.

Another example involves partially loading the hierarchies. In this example, CM3 is contained by CM2 that is contained by CM1. PP1 is a projected parameter that is defined as projected parameter on CM1 and CM2; P1 is a projected parameter defined on CM3. The origin parameters for CM2.PP1, CM3.PP1 are defined as CM3.PP1 and CM3.BB1.P1 respectively.



If only CM1 and CM3 are loaded, the real connection between CM1.BB1.P2 to CM3.BB1.P1 will be loaded to the controller. However, since CM2 is not loaded, on the loaded side, the CM1 chart will not have CM2 contained. A warning will be displayed to indicate that the containment parent for CM3, that is CM2 is not in the load list.

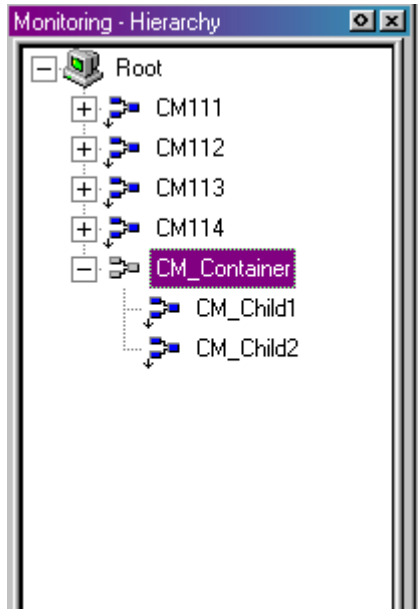
If the user loads only CM1 and CM2, because the origin block CM3.BB1 is not loaded, the “real” connection between CM1.BB1.P2 to CM3.BB1.P1 will not be loaded to the controller.

After the CM is loaded, the configured projected parameters on this CM can be accessed in Server just as any other inherent parameters. These projected parameters can also be used in server history configuration and sever scriptors.

Activate/Inactivate

The contained CM(s)/SCM(s) can be activated/ inactivated as independent blocks and the activation/ inactivation of the container CM has no impact on the activation/inactivation of the contained CM(s)/SCM(s). Likewise, containment does not affect the alarms generated by each CM/SCM regardless whether the selected tagged block is a container CM or container CM/SCM.

However, the container CM can be selected and “Activate this Item and its Contents” or “Inactivate this Item and its Contents” option from the Containment Tree View can be used to activate/inactivate both container CM and contained CM(s)/SCM(s) at the same time. However, if the container CM_Container were unassigned, as illustrated below, the container CM_Container does not have an execution state, therefore, only Activate/Inactivate Selected Item(s)’ Contents menu option is exposed. Selecting the menu item will cause CM_Child1 and CM_Child2 to be activated or inactivated (if they are active).



Upload

The containment of CM(s)/SCM(s) has no impact on the upload of both the container CM or contained CM(s)/SCM(s) if they are all assigned. If the container CM is not assigned, Upload operation will be disabled. Upload with Contents only apply to CMs with all contained CMs assigned.

Update to Project/Update with Contents to Project

As independent blocks, the container CM as well as contained CM(s)/SCM(s) can be selected individually for Update to Project operation. If the container CM is selected in Containment Tree View of the monitoring tab, Update with Contents (to Project) allows the user to do the update for both container and contained blocks at the same time. In the example below, Update to Project with Contents for CM1 will cause the contents for CM1, CM2 and CM3 updated to project. Update to Project for CM1 will only update BB1 contained by CM1 and its connections.

Once the contained CM/SCM is loaded, its containment parent cannot be changed. Therefore, the hierarchy cannot be changed once the contained CM/SCM is loaded. However, the basic blocks can be deleted from the control strategy without any restriction. In the example, if BB2 is deleted from CM3 on the project side and an

Update with Contents for CM1 or Update to Project for CM3 is performed, a BB2 will be created and contained into CM3.

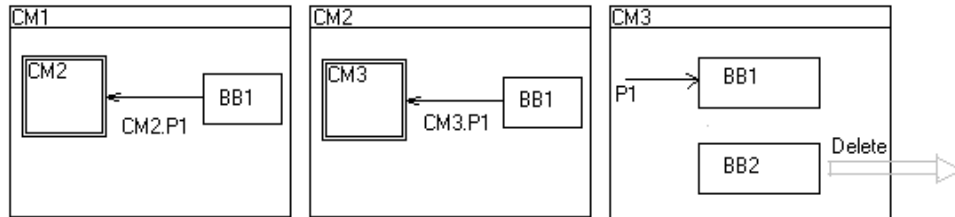
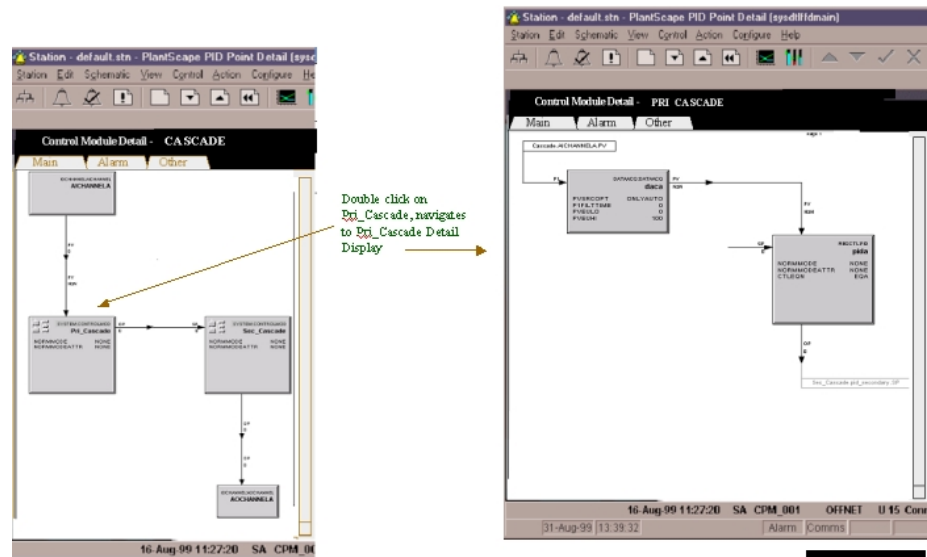


Chart Visualization

Since a CM chart can be embedded in a Station Display using Chart Visualization, and multiple charts shouldn't be opened at the same time in Station Display, the purpose of right-clicking "Navigation to Source" is to navigate to the detailed display of the selected CM/SCM as if the name of the selected CM/SCM was typed and the F12 function key selected. Double-clicking the contained CM/SCM invokes the block's form.



Appendix B – Hierarchy Building

CM/SCM Containment

Performance Restrictions

The number of levels for CM/SCM containment is limited to 5.

Parameter Projection Overview

Naming and Renaming

The Parameter Projection function provides the ability to create a parameter on a block and assign the new parameter to another parameter in the system. The new user-defined parameter is called a 'projected parameter' because it projects the value and attribute from another parameter (called its 'origin parameter') onto itself.

The projected parameter will look and act just like an inherent parameter of the block on which it was defined. For instance, the projected parameter can be nominated as a Pin or block faceplate parameter just like an inherent block parameter can. It can also be accessed like any inherent parameter of the CM/SCM. But it will reflect the value and attributes of its assigned origin parameter. When a connection is made to the projected parameter, the connection, which is loaded to the controller, is really a connection made to the absolute origin parameter of the projected parameter.

Parameter projection also allows the projection of a parameter over multiple levels of containment, but this requires a projection of this parameter on each containment level. In other words, the projection of a parameter cannot skip the projection levels. The resulting projection chain will project the absolute origin over one or more intermediate levels of containment up to an upper level projected CM/SCM. Although the origin blocks can only be those blocks contained by the CM on which the projected parameter is defined, a projection chain can be modified when the origin parameter of any projected parameter that participates in the projection chain is deleted or redefined, in which case all upwards connections associated with the modified origin will be deleted or remade.

Definition of Projected Parameter and Assignment of Origin Parameter apply to the Project side only. No configuration changes to the projected parameter can be made on the Monitoring side.

Common

The name of a projected parameter may be modified at any time during configuration and should follow the same naming conventions and rules for its uniqueness just as any parameter. It may be the same name as the origin parameter or some other user-meaningful name.

Table 15 Common naming conventions for projected parameter

Projected Parameter	Description
Max string size	The string size of a projected parameter name must not exceed the maximum string size for alias and projected parameter names currently implemented as 255 char.
Name parts	A projected parameter name may be compound from up to three parts.
Name part separator	Parts must be separated by a dot.
Valid character	Each part must start with a alphabetic char and may be followed by an alphabetic or numeric character.
Valid examples	MyProjParam MyP123 P1.P2.P3 MyPP.Aaa.bbbbbb
Invalid examples	'123' - Name must start with an alphabetic character 'MyPP1.P2.P3.P4' - Too many parts 'MyPP1.123.P3' - Second part doesn't start with an alphabetic character 'MyPP1.123-P3' - Invalid character in second part

The table below describes the validation performed to confirm that the name of a projected parameter does not conflict with any other name in the system.

Table 16 Projected parameter name validation

Projected Parameter Name	Full Name (Unique Identifier)	Validation
Part1	Tag.Part1	Check against other parameter: 'Part1' must not conflict with an inherent or another projected parameter of the CM/SCM. Check against basic blocks: Note: There is no reason to permit that Part1 is also used as a basic block name contained by the CM/SCM.
Part1.Part2	Tag.Part1.Part2	Check against other Parameter: 'Part1.Part2' must not conflict with an inherent or another projected parameter of the CM/SCM. Check against basic blocks: If a basic block named 'Part1' exists inside the CM/SCM then 'Part2' must not conflict with an inherent parameter name of this basic block.
Part1.Part2.Part2	Tag.Part1.Part2.Part3	Check against other Parameter: 'Part1.Part2.Part3' must not conflict with an inherent or another projected parameter of the CM/SCM. Check against basic blocks: If a basic block named 'Part1' exists inside the CM/SCM then 'Part2.Part3' must not conflict with an inherent parameter name of this basic block.

Validation

The following items in the system must be validated to avoid name confliction:

- Parameter name must not conflict with the name of an inherent parameter of the projected CM/SCM (as well as Instances and derivation children in case of user template).
- Parameter name must not conflict with an existing projected parameter of the projected CM/SCM (as well as Instances and derivation children in case of user template).
- Parameter name must not conflict with the name of a basic block contained by the projected CM/SCM (as well as Instances and derivation children in case of user template).
- Parameter name has to be checked as is currently done for aliases in terms of string size and use of valid characters.

Origin Parameter Overview

Once an origin is assigned, it defines the behavior of the projected parameter. The projected parameter may be used as if it is the absolute origin in terms of rules for connections and pin/faceplate exposure. Since the origin of a projected parameter can be a projected parameter itself, an origin can be projected multiple levels. Such capability will facilitate top-down design of control strategies.

Restrictions: Substitute parameter and alias parameters of SCM cannot be defined as the origin parameter.

Empty Origin Parameter

Empty origin is indicated by a symbol appended to the name of the projected parameter, allowing the configuration of a projected parameter without assigning an absolute origin. The external interface to a block can be defined and connected to its peers before anything about its internal implementation is defined.

In the case of user templates, because origin is not defined, it is not template defining. As a result, the user could define different origin to the same projected parameter for derivation children and instances. However, if the origin is defined as an existing parameter, for user template, the origin will be template defining and the origin will be propagated to all derivation children and instances.

In summary, empty origin will:

- Allow an projected parameter to be template defined but the corresponding origin parameter is not;
- Make it easy to fix broken projection chains, i.e. when projected CM/SCMs, which participate in a projection chain, are missing during import, the chain can be fixed by unassigning the missing origin parameter rather than failing the import operation;
- Provide top-down design capability.

Assigning / Unassigning / Reassigning the Origin Parameter

The origin parameter may be assigned, unassigned or reassigned at any time during configuration. The origin parameter can be redefined by clearing the existing origin.

Assignment, unassignment, or reassignment will affect the following:

Affected Item	Results
Corresponding projected parameter	• Delta flag will be set for the projected CM/SCM. • The corresponding faceplate parameter value will be updated. • The corresponding block pin value will be updated.
Projected connections (graphical connections as well as parameter connectors)	• Delta flag will be set on the block that owns the projected connection.
Read-only connections	• Delta flag will be set on the block that owns the read-only connection.
Each projected parameter upwards the projection chain	• Delta flag will be set projected CM/SCM that owns the projected parameter. • The corresponding faceplate parameter value will be updated. • The corresponding block pin value will be updated.

Origin Parameter Assignment:

If a projected parameter with an empty origin is involved in connections, the assignment of a valid origin parameter will create read-only connections between the absolute origin parameter of the projected parameter and the other end of the connections.

Assignment of an origin parameter whose absolute origin is not defined will be allowed without any restrictions.

Origin Parameter Unassignment:

The unassignment of an origin parameter with a valid absolute origin will delete read-only connections formed between the absolute origin parameter and the other end of the projected connection. Performing unassignment needs validation to be sure that all connections can be deleted. If the validation fails the unassignment operation may not be permitted.

Origin Parameter Reassignment:

Origin parameter reassignment consists of two steps: clear the current origin parameter and define a new origin parameter. If the assignment validation or the unassignment validation fails, the reassignment operation will fail and the original origin parameter will remain.

Validating the Origin Parameter

Table 17 Validation Rules for the Unassignment Operation

Origin to be Modified	Unassignment Validation
Empty origin (origin not defined)	No validation needed
Projected parameter of a contained block whose immediate origin is a projected parameter with absolute origin undefined .	(Rationale: the absolute origin is already/still unassigned)
Absolute origin parameter from a dependent block.	For the corresponding projected parameter and all projected parameter upwards the projection chain: 82. The owning block can be locked successfully. 83. For all existing projected connections, the read only
546	connections on the absolute origin parameter can be deleted successfully. Experion PKS Control Building Guide Honeywell R201 01/04

Origin to be Modified	Unassignment Validation
Projected parameter from a contained block whose immediate origin is a projected parameter with absolute origin undefined .	

Table 18 Validation Rules for the Assignment Operation

New Origin	Assignment Validation
Empty origin (origin not defined).	No validation needed (Because: the absolute origin is not specified)
Projected parameter from a contained block whose immediate origin is a projected parameter with absolute origin undefined .	
Absolute origin parameter from a dependent block.	For the corresponding projected parameter and all projected parameter upwards the projection chain: 84. The owning block can be locked successfully. 85. Exposed faceplate pins must match with symbol attributes of the absolute origin. 86. For all existing projected connections, a read-only connection can be formed successfully on the absolute origin parameter.
Projected parameter from a contained block whose immediate origin is a projected parameter with absolute origin undefined .	

16. Assumes current origin is defined
17. An assignment operation will not necessarily define an absolute origin parameter, i.e.: when the new origin is an unassigned projected parameter.

Changing the Value

The value of a projected parameter is the projected value of its absolute origin. When the the value of a projected parameter is changed on either project side or monitoring side, the value of the absolute origin parameter will be changed. If the validation for this operation fails, then the value change will not be permitted.

If the absolute origin for a projected parameter has not been defined, then the value will not be shown and cannot be changed.

Using the Projected Parameters Tab

Configuration Form Overview

The configuration form for projected parameter can be accessed by a tab in the Configure Module Parameter dialog box of the projected CM/SCM. The form displays a list of all defined projected parameters for the projected CM/SCM and the following information about each parameter:

- Name of the projected parameter
- Origin parameter
- Parameter description

The configuration form provides the ability to add, modify, and delete a projected parameter to the projected CM/SCM. All fields are read-only on the monitoring side.

Appendix B – Hierarchy Building

Using the Projected Parameters Tab

SYSTEM:CONTROLMODULE Block, CM1 - Parameters [Project]

Block Pins | Configuration Parameters | Monitoring Parameters | Block Preferences | Template Defining

Main | Server History | Server Displays | Version | Identification | Dependencies | Projected Parameters

	Parameter Name	Origin	Description	Absolute Origin
1	myPPIN1	CM1.ANDA.IN[1]	Input	CM1.ANDA.IN[1]
2	myPPOUT	CM1.ANDA.OUT	Output	CM1.ANDA.OUT

Please use Insert Row button to add Projected Parameter, Delete Row(s) button to delete Projected Parameter(s) and Esc key to undo any newly made changes.

Insert Row Delete Row(s)

☐ Show Parameter Names

OK Cancel Help

Figure 69 Configuration Form for Projected Parameters

Table 19 Grid Columns and Cell Validation

Column	Behavior	Cell Validation
Parameter Name	The name field of the projected parameter is an edit box and shows the name of the projected parameter defined by the user. The ESCAPE key can be used at any time during the edit session to restore the entry for the current field.	The entry must follow the naming rules for projected parameter definition. If the validation fails, an error message will appear.
Origin	The origin parameter field will be an edit box with point picker access. An origin parameter name can be entered or the point picker invoked to select a parameter from a list of all system parameters. For multi-level of projection, the Origin shows the immediate origin of the projected parameter. The ESCAPE key can be used at any time during the edit session to restore the entry for the current field.	The entry must follow the validation rules for origin parameter. If the validation fails, an error message will appear. Upon successful validation, concerned connections will be reconnected and the parameter description field will be updated to show the description of the just assigned origin. If at this point the projected parameter name field is empty then a default parameter name will be assigned.
Description	The parameter description field is be a static field that is set and refreshed when the corresponding origin is shown or changed.	No validation required.

Appendix B – Hierarchy Building

Using the Projected Parameters Tab

Column	Behavior	Cell Validation
Absolute Origin	The Absolute Origin field is read-only. For one-level of projection, the Absolute Origin is the same as the immediate origin. For multi-level projection, Absolute Origin is the starting point of the parameter projection chain.	No validation required.

Symbol Attributes

A Projected parameter is exposed as a pin on the faceplate of the projected CM/SCM so it can be graphically connected to another parameter. A projected parameter can also be exposed on the block's faceplate as a configuration or monitoring parameter. Once a projected parameter has been defined, it appears in the symbol attributes pages for selection as a faceplate pin or parameter where it is listed in the choice list along with the block's standard parameters.

In the following screen capture of the Block Pins Configuration Tab, the parameter myPPIN1 and myPPOUT are projected parameters defined on ACM_Child. These parameters have been exposed as pins on the ACM_CHILD block. The Configuration and Monitoring Parameters Tabs also have this projected parameter as a selection parameter in the left hand list box as a faceplate parameter.

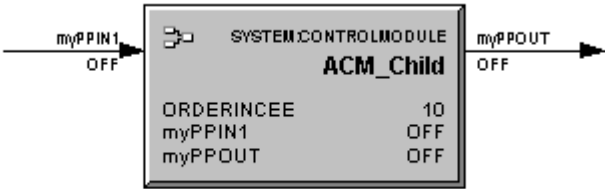
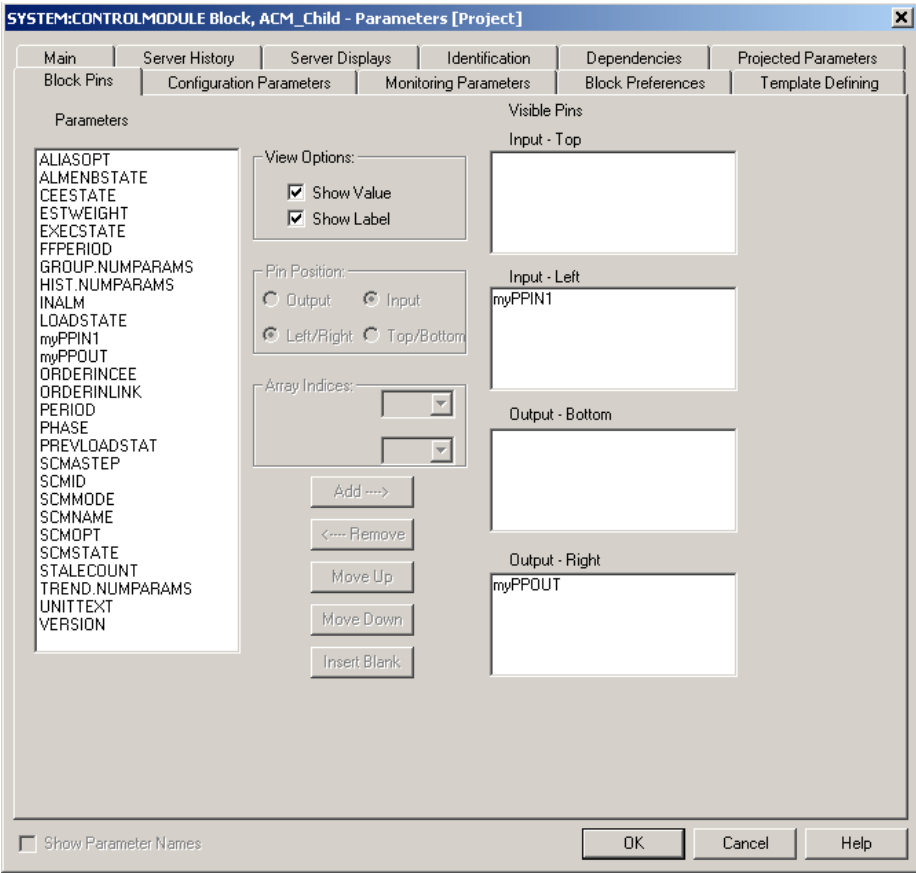


Figure 70 Projected Parameters as Block Symbol Attributes

The value of a projected parameter may change when:

- The value of its absolute origin is changed.
- The absolute origin has been changed, i.e. an origin at an intermediate level is reassigned.

If the value of a projected parameter is being changed, the system must verify:

- An absolute origin is defined.
- The absolute origin block can be locked successfully when the value change form opens.
- The value of the absolute origin parameter can be changed successfully.

Adding a Projected Parameter

To add a new projected parameter, select the Insert button. Edit the fields to define the name and origin of the newly defined projected parameter.

If the origin is defined, but the name field is left empty, a unique name for the projected parameter will be automatically generated.

Validation will take place when the cursor is moved to another control. If the validation fails, an error message will be displayed.

Deleting a Projected Parameter

Use the Delete key to delete:

- The projected parameter, that currently has the focus on the grid control
- Multiple projected parameter, if multiple rows have been selected in the grid control

Validation Rules for Deletion:

- The projected parameter must not be used as an origin for another projected parameter.
- The projected parameter must not be exposed as a pin on the faceplate.
- The projected parameter must not be exposed as a faceplate parameter.

If the validation fails, deleting the projected parameter is not permitted.

Printing Projected Parameters

Projected parameter appear in the printing reports for the projected CM/SCM in the parameters section as regular parameters, except it is indicated that they are actually projected parameters and the reports will display their corresponding origin parameter assignment, if any.

Alias Configuration	
ALIASOPT	OFF
Projected Parameters	
myPPIN1	ACM_Child.ANDA.IN[1]
myPPOUT	ACM_Child.ANDA.OUT
Connections	
-- No Connections --	

Projected Parameter Connections

Functional Description

Projected parameters may be used to expose a pin on the faceplate of the projected CM/SCM that may be connected to another inherent parameter or projected parameter either graphically or via a parameter connector or expressions in calculation, step and transition blocks.

A connection that has a projected parameter at one or both ends always appears on the chart (or form) as it is created, with the projected parameter name. In all cases, a read-only parameter connector is displayed at the origin parameter to note that a connection has been formed to the origin parameter, as illustrated in the following figure. If the projected parameter is the passive end of a connection, a cross reference is displayed if the option is enabled. If a connection is made or deleted on a projected parameter, the delta flag of the blocks with the owning end of the absolute origin connection is set to indicate that an additional load operation is necessary to reflect the new connection to the controller. Projected parameter may participate in a connection as any parameter can.

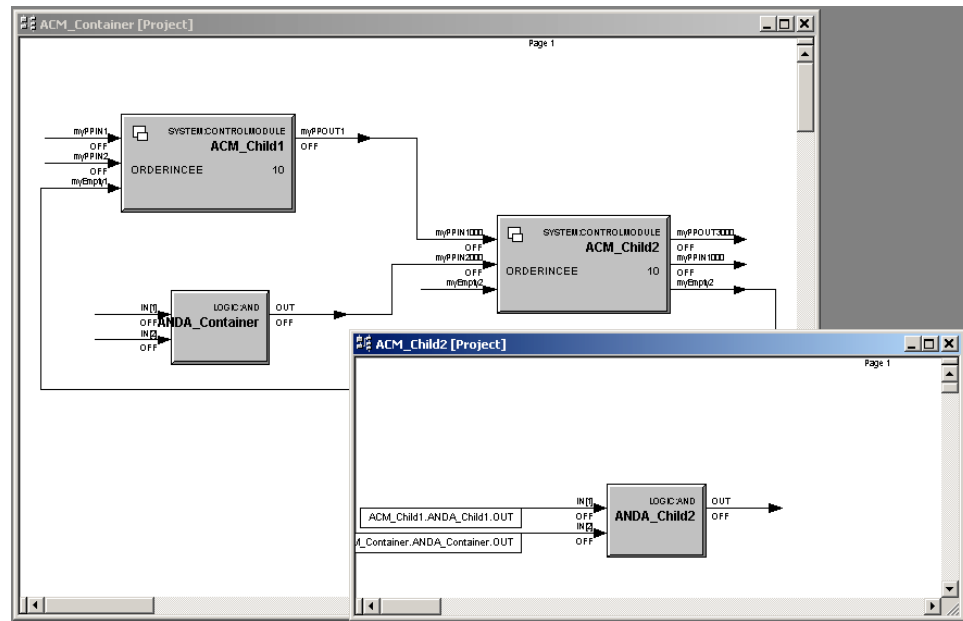


Figure 71 Projected Connection Examples

Read-Only Connections

If a connection is made to a projected parameter with a defined absolute origin, an additional read-only connection is created between the absolute origins. Read-only connections can't be created between projected parameters or between projected parameter and inherent parameter.

The read-only connection can be loaded to the controller, but projected connections cannot. Making and deleting a read-only connection sets the Delta Flag of the block that owns the absolute origin connection, indicating that an additional load operation is necessarily if this block is in another CM/SCM.

Validation

Connection	Validation
Connections with Projected Parameter when Absolute origins are not defined	If a projected connection is to be made and at least one end of the connection has no absolute origin defined, the connection will be allowed with the following validation: If the projected parameter has been exposed as a pin, a minimum validation will be performed, that is, an input pin can't be connected to an input pin and an output pin can't be connected to an output pin, regardless of what the origin parameter might be. Other connection rules are applied when the absolute origin is defined.
Connections with Projected Parameters, when Absolute origin is defined	If a connection is made to a projected parameter and the absolute origin of the parameter on both ends are defined, then the system must verify: A read only connection can be made successfully between the absolute origins using existing rules. If the validation fails, then the connection may not be permitted.

Point Picker

The Point Picker displays projected parameters in the parameter list along with the block’s standard parameters.

In the following screen capture of the Point Picker tool, the parameter MYALIAS on the right is a projected parameter defined on pidloop.pida.

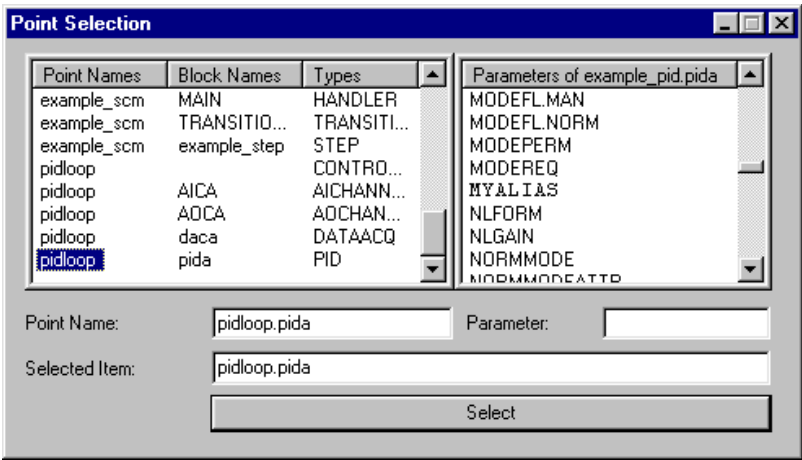


Figure 72 Projected Parameters in Point Picker

The Point Picker shows only the parameters of the contained blocks that include both contained basic blocks and contained CMs/SCMs.

Projected Parameter for User Templates

Propagation

Projected parameter definitions are template defining and propagated from parent templates to derived templates and instances. Origin assignment for a projected parameter is template defining if origin is defined, and changes to the origin assignment in the template propagate to its derived templates and instances. Because symbol attributes propagate and are template defining, the pin and faceplate projected parameter assignments automatically propagate to derived templates and instances.

Scenarios and Examples

The following diagram is an example of projected parameters on templates. Template T1 is created and a projected parameter, PP1, is defined on the template. Then template T2 is derived from template T1, and it inherits projected parameter PP1 definition and its origin assignment to FB.X.

Next a projected parameter named PP2 is defined on the derived template T2 and assigned to FB.Y on T2. If another projected parameter is defined on T1, it cannot be named PP2 because projected parameter definitions are always template defining and will propagate to derived templates and instances.

Because of this conflict, the new projected parameter is named PP3 and assigned to origin parameter FB.Y. The origin parameter assignment propagates to the derived template T2. Before allowing the assignment, the system ensures that there is not a conflict on derived templates and instances. In this case, FB.Y is already assigned on the derived template T2, but it is not connected so there are no rules preventing the multiple assignment.

Appendix B – Hierarchy Building

Projected Parameter for User Templates

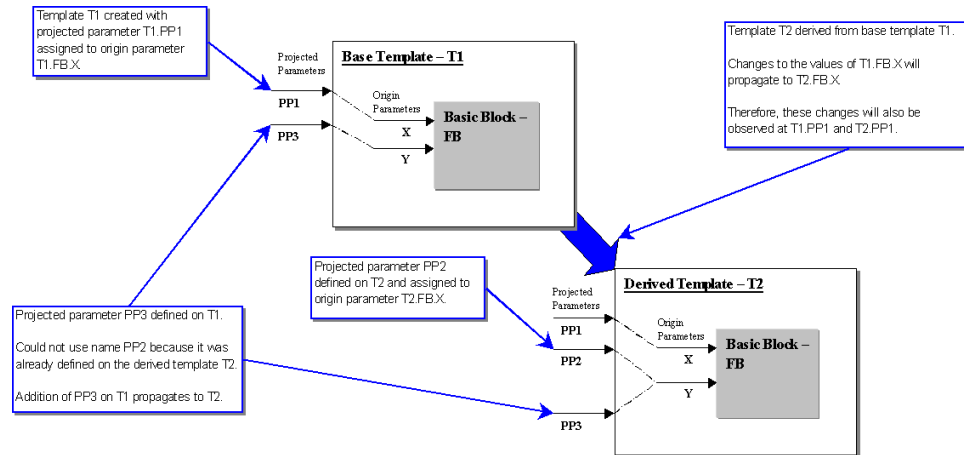


Figure 73 Projected Parameters in Templates

Block Operations Involving Projected Parameter

Loading Block with Projected Connections

Loading of tagged block is allowed even if the origin blocks are not loaded. However, an error will occur if the to-be-loaded CM has projected parameters with origin undefined, and the load will fail.

Update to Project

The containment relationship can't be changed once the hierarchy is loaded, so Update to Project operation does not involve updates for containment relationship.

If a projected CM/SCM is updated to project, all its projected parameters are checked to ensure that the projection chain downwards to the origin is valid, which includes the validation of both origin parameters and projected connections.

If a projected connection is updated during the update operation, the corresponding read only connection is updated as well on the project side.

Read only connections are not updated to project directly. Only projected connections will be updated.

If Update to Project operation fails for any reason, the projected parameter will remain, but the origins of the projected parameter will be emptied.

Substitute Names Dialog Box

The Substitute Names dialog box is divided into two tabs with Substitute Blocks as the default tab.

The Substitute Blocks tab will contain a grid to assign substitute names for blocks.

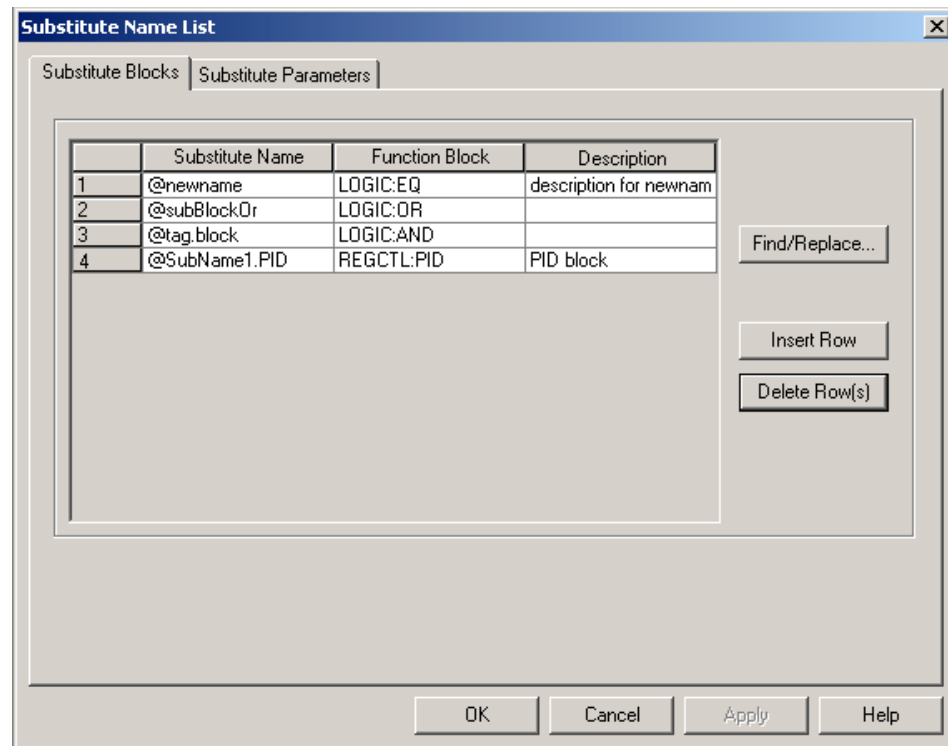


Figure 74 Substitute Blocks tab

The Substitute Parameter tab will have a grid to support the substitute names for parameters (substitute parameters). Substitute parameter names provide a placeholder for a parameter value; tag.parameter or tag.block.parameter, where a substitute block name provides a placeholder for a tag or tag.block.

Appendix B – Hierarchy Building

Substitute Names Dialog Box

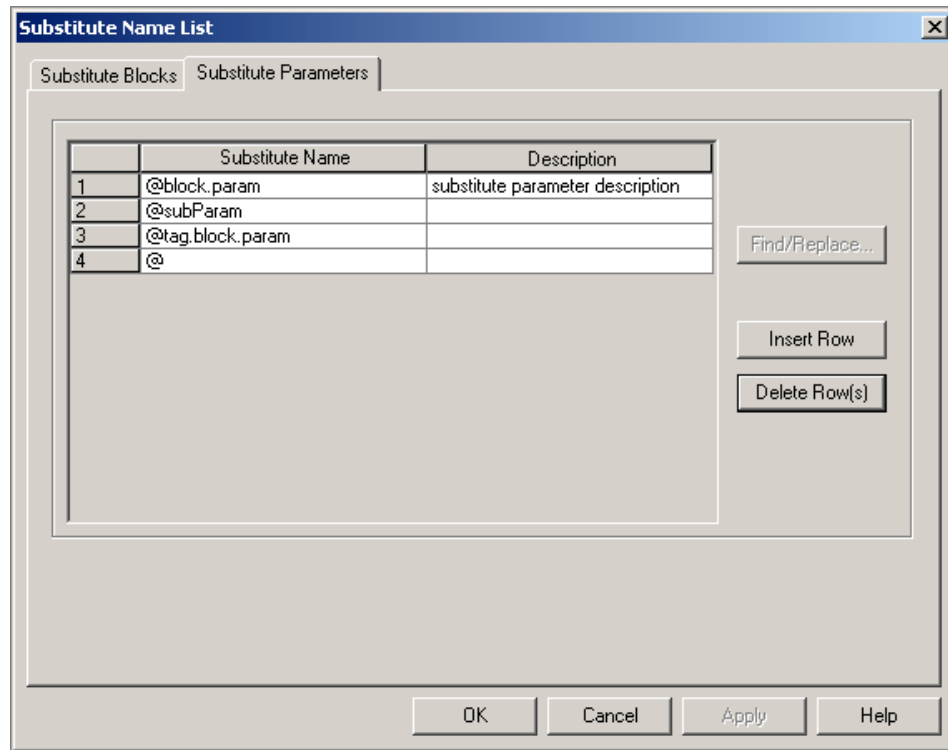


Figure 75 Substitute Parameters tab

Using the Point Picker

The Point Picker Dialog consists of three tabs:

- Points (Standard Point Selections)
- Substitute Blocks
- Substitute Parameters

In the Points tab shown below, AASubTest is the point selected and its associated parameter choices.

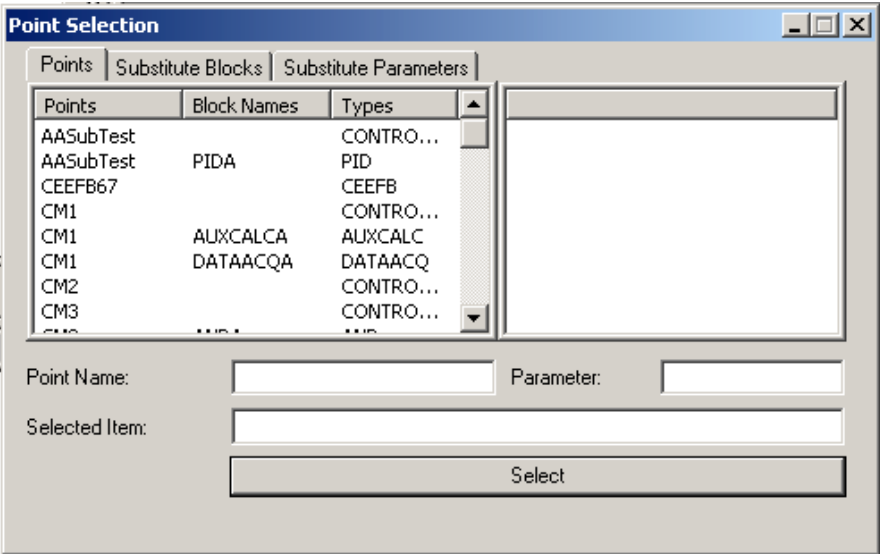


Figure 76 Points tab

The Substitute Blocks tab shows the substitute block names and their type.
@MyThing3 is the substitute block selected and the associated parameter list for type
PID.

Appendix B – Hierarchy Building

Substitute Names Dialog Box

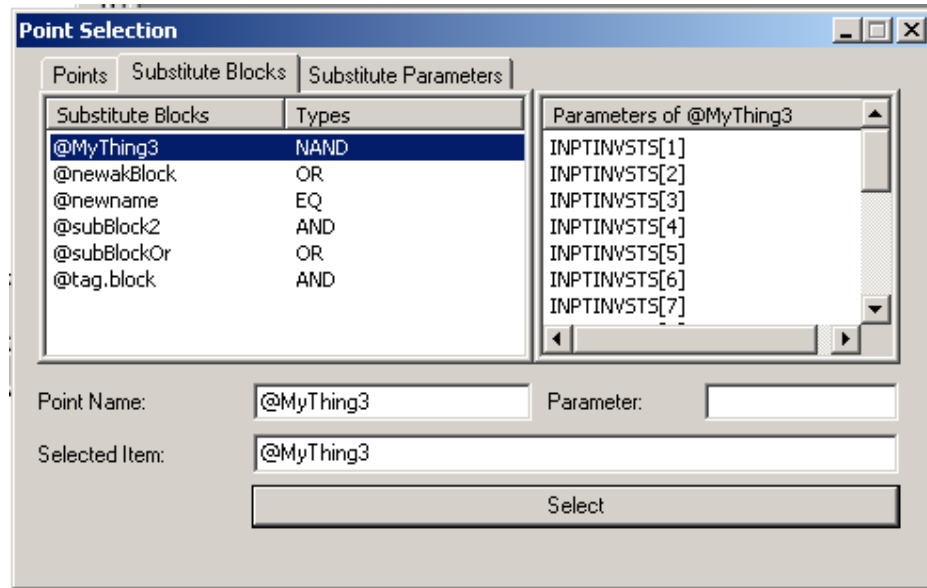


Figure 77 Substitute Blocks tab

In the Substitute Parameters tab shown below, @MyThing.PID1.PV is a substitute parameter.

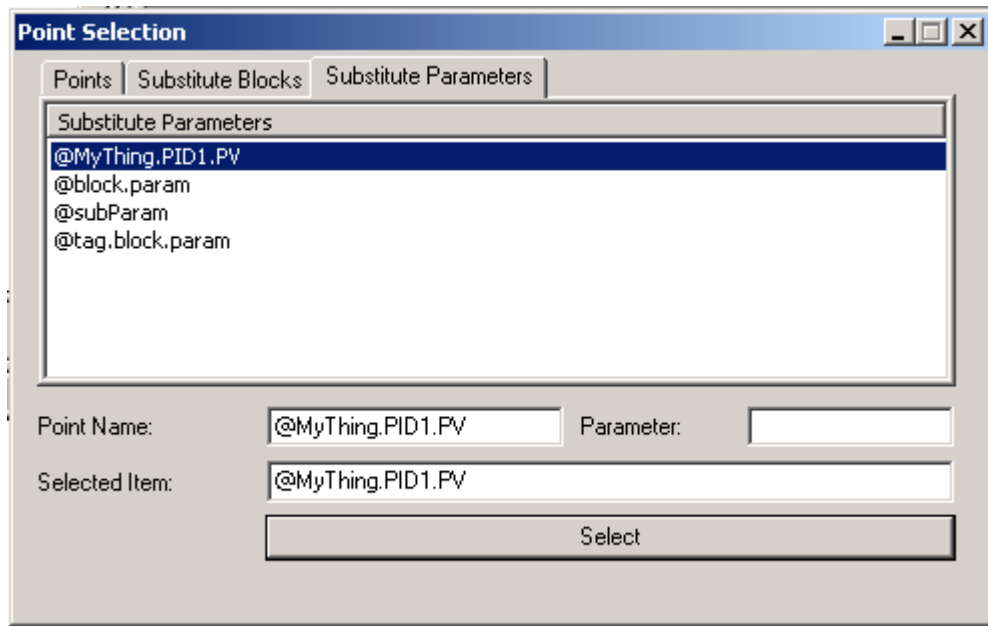


Figure 78 Substitute Parameters tab

Resolve Substitute Connections

The Resolve Substitute Connections dialog box supports substitute blocks and parameters. Substitute parameters must be assigned an origin before connections/names can be resolved. The Function Block column will read N/A for substitute parameters.

Importing/Exporting

Containment

For instances, the Import/Export applies to the selected contained CM(s)/SCM(s). For User Template, Import/Export applied to both the selected CM(s) and its contained CM(s)/SCM(s) if any. Because the containment relationship lives on the contained CM/SCM, if the container CM is imported after the contained CM/SCM is imported, the containment relationship is not established.

Projected Parameter

For instances, the Import/Export applies to the selected contained CM(s)/SCM(s). For User Template, Import/Export is applied to both the selected CM(s) and its contained CM(s)/SCM(s) if any. Because the containment relationship lives on the contained CM/SCM, if the container CM is imported after the contained CM/SCM is imported, the containment relationship is not established.

If a new parameter is added to a function block during development and the name conflicts with a projected parameter name defined prior to this addition in a previous version of the Experion PKS software, the new developer defined parameter will be given precedence. The projected parameter is renamed and all references of this projected parameter are updated.

Strategy Import Export Dialog Box

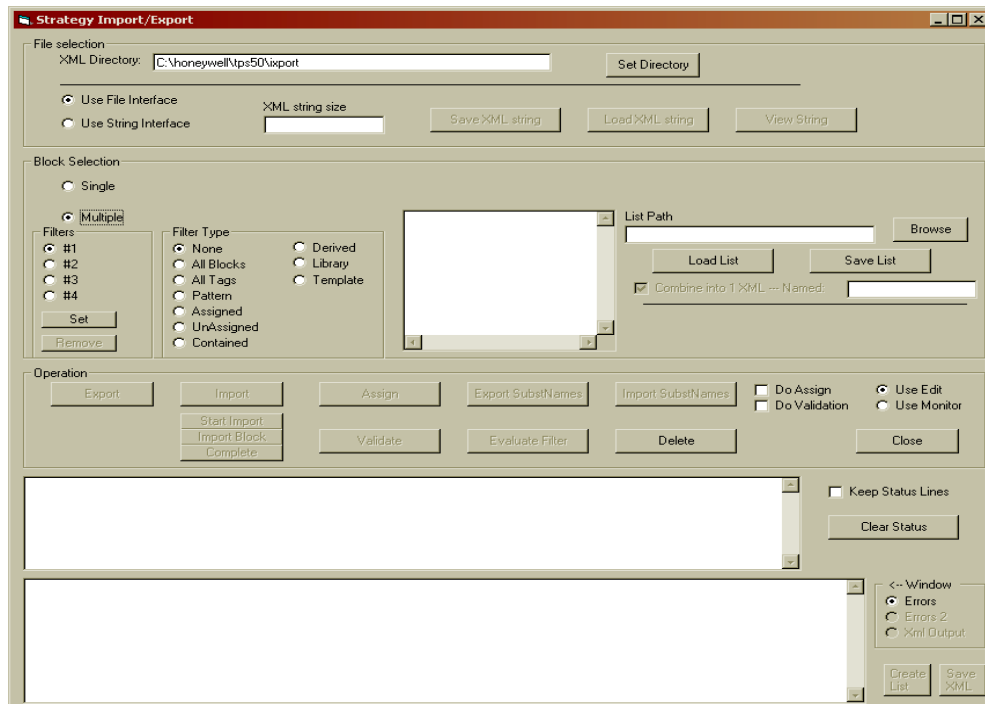


Figure 79 Strategy Import Export Dialog Box

When Multiple is chosen in the Block Selection list, all Filter Types are displayed.

To set a Filter Type, select the Evaluate Filter button. Then select Xml Output from the Window selection list to display the results of the Filter in the bottom window.

Case	Validation
Filter Type = All Blocks	Displays all the tagged, and basic blocks in the database including blocks at all levels in a hierarchy.
Filter Type = All Tags	Displays all the tagged blocks in the database including tagged blocks at all levels in a hierarchy.

Appendix B – Hierarchy Building

Importing/Exporting

Case	Validation
Filter Type = Contained, and entering a CM in the list box.	Displays all the blocks contained by the CM.

For instance, if all the blocks in the database as seen using Control Builder are as shown in the first figure below:

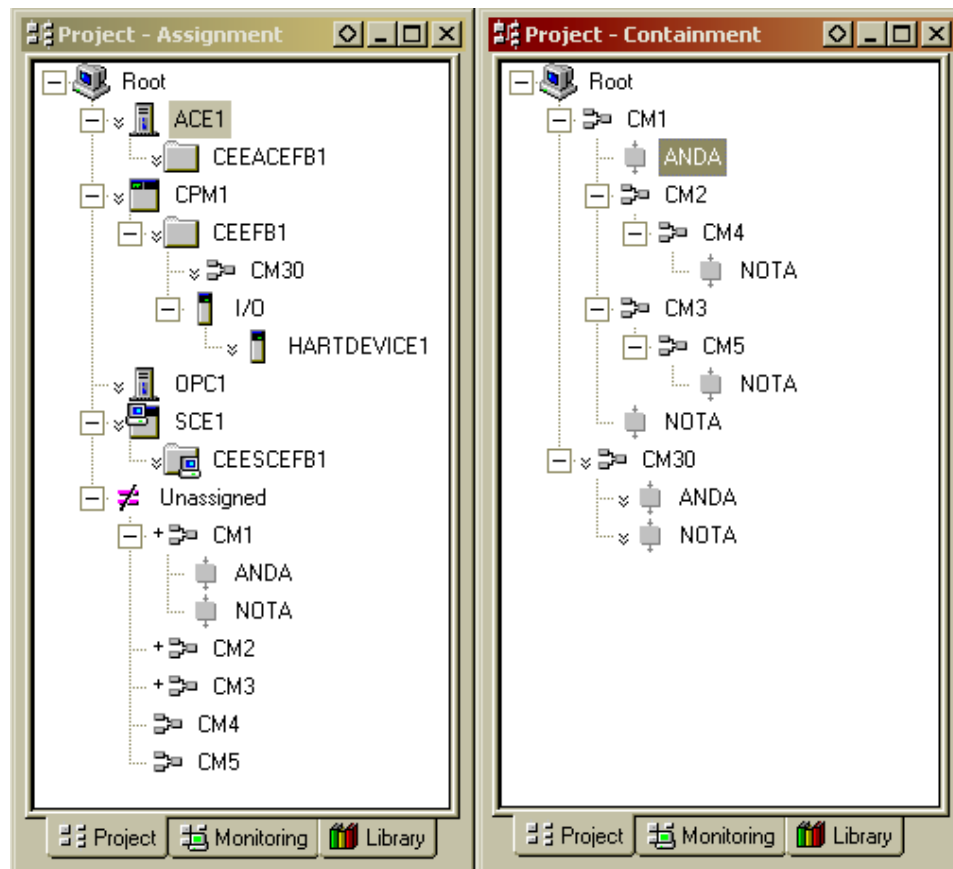


Figure 80 Control Builder view of blocks

...the XML Output in the dialog box (with various Filter Type settings) should resemble the following figures:

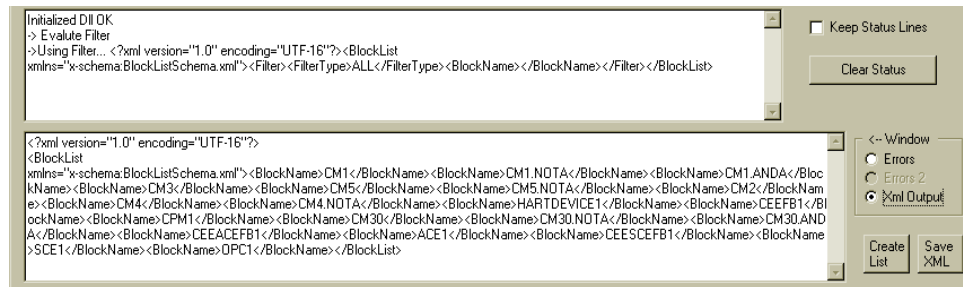


Figure 81 View of XML Output, set to All Blocks

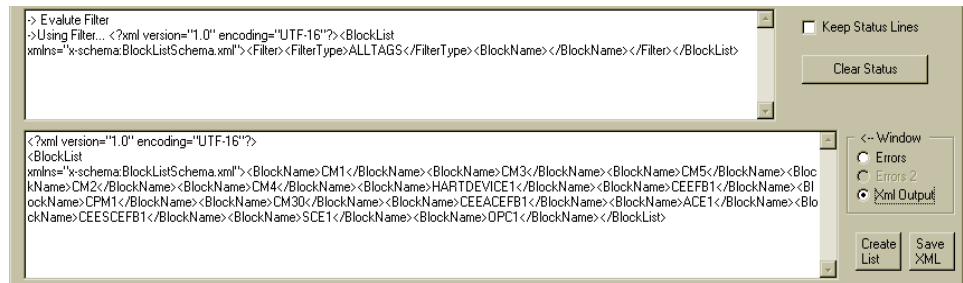


Figure 82 View of XML Output, set to All Tags

Appendix B – Hierarchy Building

Importing/Exporting

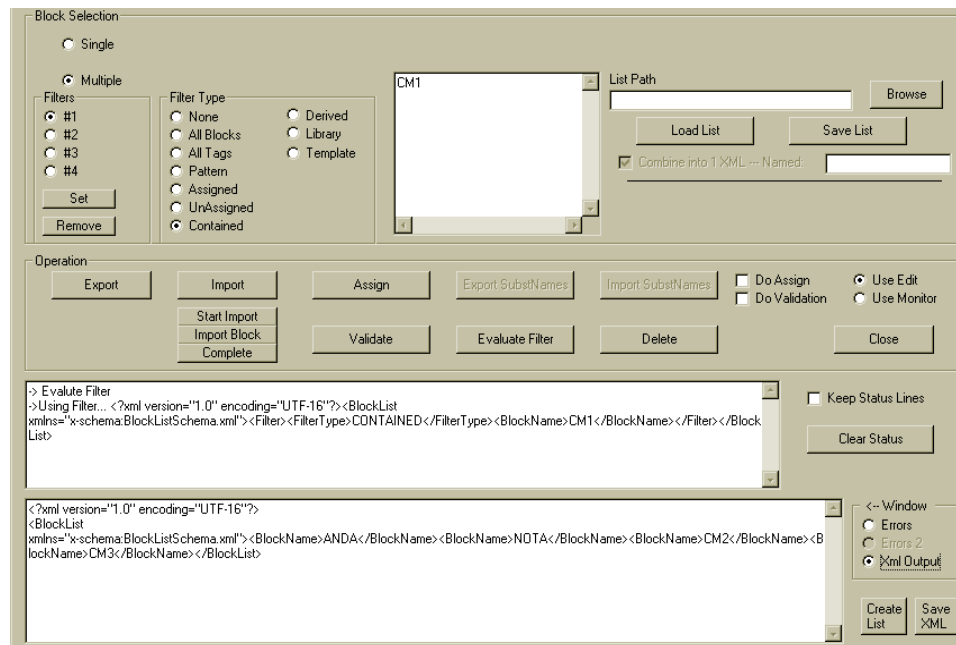


Figure 83 View of XML Output, set to Contained

Appendix C – User Templates

Library Tree Overview

Template Libraries are viewed as trees in Control Builder. New Template Libraries can be created and named, and templates can be moved into these libraries.

Two views of Template Libraries are available:

- Derivation View – All derived templates are shown as children of the template they are derived from, and in their current user library.
- Containment View – Shows the libraries and their templates in list form. Container templates will show their contained basic blocks.

Derivation View

The following figure shows a tree with Derivation View. Note that some templates appear twice in this view; once under the system template from which they are ultimately derived and once under the user library in which it currently resides. User basic block templates (also known as “standalone” templates) also show up in two places.

In this example, CMT12, CMT13 and CMT14 are all derived from the system template CONTROLMODULE. CMT144 is derived from CMT14. GENLINTLVL1 is a function block template derived from the GENLIN system template. CMT13, CMT14 and CMT144 appear under both the SYSTEM library and the USER library.

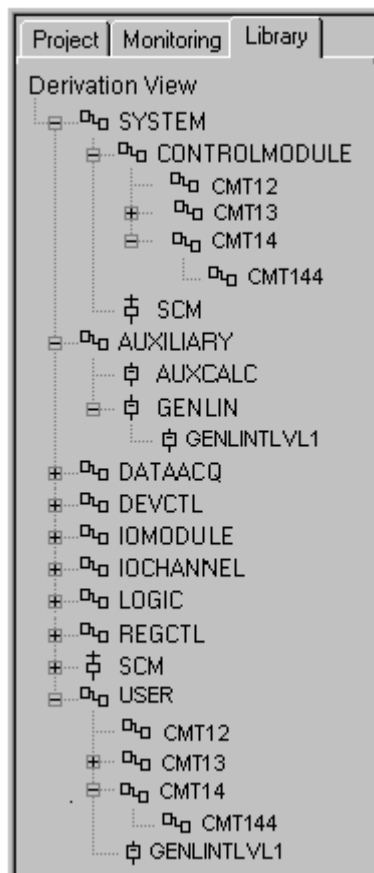
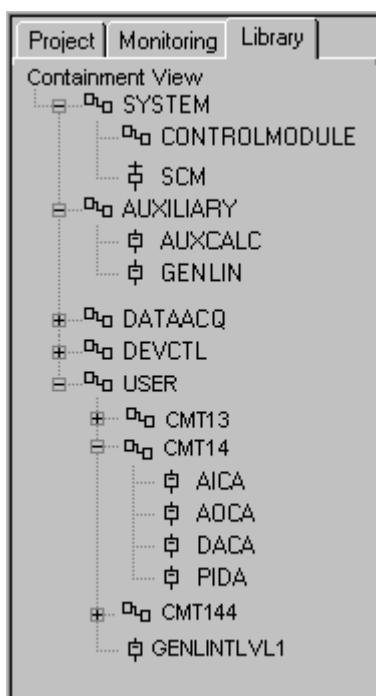


Figure 84 Derivation View

Containment View

The following figure shows a tree with Containment View. Note that templates placed into the user library appear in this view under User. Note that even though CMT144 was derived from CMT14, it appears at the same level in this view.



Using the Library Tree



TIP: Most Operations supported from the Library Tree are limited to Independent Objects.



TIP: Honeywell System Templates cannot be modified, deleted, or copied. They can only be specialized and instantiated.

Switch between Derivation and Containment View

- Menu item: View -> Derivation View, View -> Containment View
- Right-click mouse: select Derivation View or Containment View

Configure Module Parameters (user templates only)

- Menu item: Tools -> Configure Module Parameters...
- Right-click mouse: select Configure Parameters...

Open Control Drawing for Edit (user templates only), allowed for SCM and CM templates

- Menu item: File -> Open
- Double-click to open chart.
- Right-click mouse: Open Chart

Copy (user templates only)

Within a user template, Honeywell template library tree, or between library trees a new block can be created with same derivation hierarchy as original block. (Copy differs from Specialization in this regard.)

- Drag and Drop: CTRL + mouse drag/drop
- Copy and Paste: CTRL-C + CTRL-V
- Right-click mouse -> select Copy
- Menu item: Edit -> Copy / Edit -> Paste
- Multiple basic blocks may be selected for copy by clicking the mouse on the objects while holding the Shift key, or drawing a selection rectangle

Move Library (user templates only)

Templates may be moved between user libraries or from a system library to any user library. Templates may only be moved from a user library to a system library if the template is ultimately derived from a system template in that library

- Drag and Drop: CTRL + mouse drag/drop

Specialize

Within a user template or Honeywell template library tree. A new block is created that is derived from the original block. (Specialize differs from Copy in this regard.)

- Right-click mouse -> Make Template
- Menu item: File -> Make Template From xxx (where xxx is name of selected block)

Change Parent

Within a user template library tree (or Honeywell template library tree). The derivation hierarchy is modified based on the destination of the drag and drop operation.

- Right-click mouse -> Change Parent. A destination block or the library must be selected from the “Change Parent” dialog.
- Menu item: Tools -> Change Parent ...
- Use the Change Parent Template Wizard. Refer to

Using the Change Parent Template Wizard.

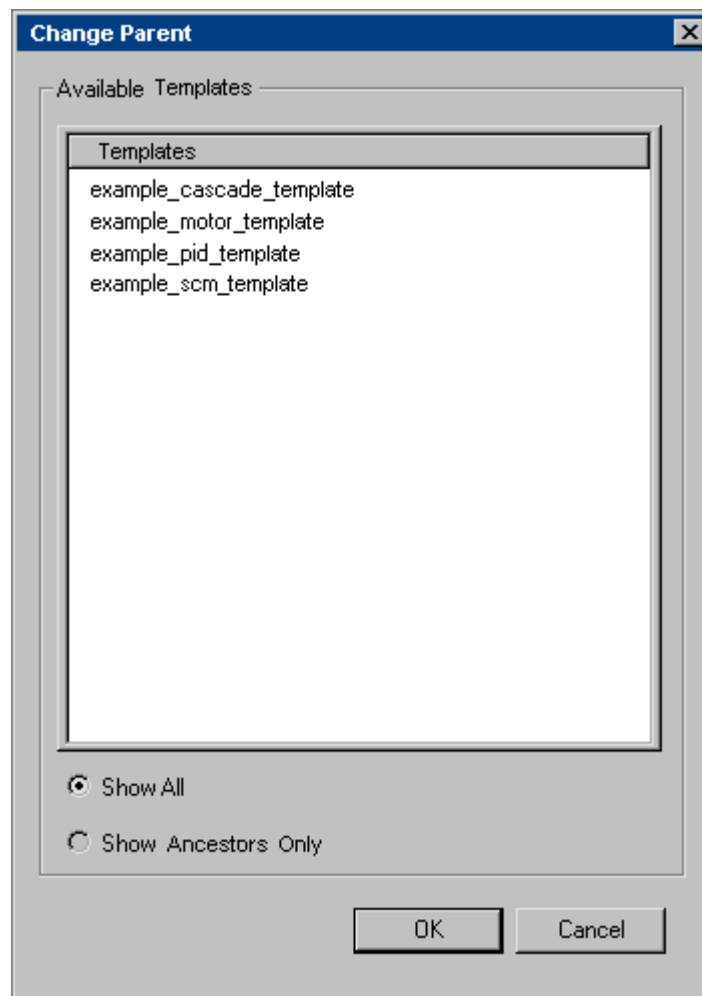


Figure 85 Change Parent Dialog Box

Instantiate (as a tree operation, this applies to container blocks only)

- Drag and Drop: CTRL + mouse drag/drop
- Right-click mouse -> Instantiate
- Menu item: File -> Make Instance From xxx (where xxx is name of selected block)

Promote (user function block templates only)

Make an independent template from an embedded function block template.

- Right-click mouse -> Promote
- Menu item: File -> Make Standalone Template From xxx (where xxx is name of selected block)

Delete (user templates only)

Deletes only the user template. This operation is not allowed if there are any derived templates and instantiated children.

- CTRL-X
- DEL key on keyboard
- Right-click mouse -> Delete
- Menu item: Edit -> Delete

One or more blocks may be selected. For Delete to complete, the templates must be confirmed by name.

Delete library (Not functional in this release.)

Deletes the library and contained templates only if instances or specialized templates don't exist in other libraries. Honeywell static libraries cannot be deleted. CCL libraries can be deleted if no instances or specialized templates in other libraries exist.

- CTRL-X
- DEL key on keyboard
- Right-click mouse -> Delete
- Menu item: Edit -> Delete

Appendix C – User Templates

Using the Library Tree

One or more blocks may be selected. For Delete to complete, the libraries must be confirmed by name.

Identification

The Identification tab is located on the configuration parameters form. The following information will be presented on the tab:

The screenshot shows a Windows-style dialog box titled "SYSTEM:IDENTCM Block, IDENT_TMPL - Parameters [Library]". It has a tabbed interface with the following tabs: Main, Server, Identification (selected), Dependencies, Configuration Parameters of Interest, and Template Defining. The Identification tab contains several input fields and labels:

- Name:** IDENT_TMPL
- Description:** (empty field)
- Version Label:** 1.4
- Created By:** (empty field)
- Date Created:** (empty field)
- Last Modified By:** (empty field)
- Date Last Modified:** (empty field)
- Library:** USER
- System Template:** SYSTEM:IDENTCM
- Base Template:** SYSTEM:IDENTCM
- Block Comment 1:** Identification comment field.
- Block Comment 2:** Another block comment field.
- Block Comment 3:** Third user comment for block.
- Block Comment 4:** Fourth user comment for block.

At the bottom left, there is a checkbox labeled "Show Parameter Names" which is currently unchecked. At the bottom right, there are three buttons: OK, Cancel, and Help.

The values of template-defining parameters (that is, template-defining attributes defined at *this* level of the derivation hierarchy) are shown in bold text. Any change of this value will propagate to *all* derived templates and instances.

The values of template-defined parameters (that is, those labeled as template-defining at a higher level) are grayed out and in bold text.

Dependencies

The Dependencies tab is on the configure parameters form. Selecting the Dependencies tab brings up the following dialog, which shows the derivation hierarchy of this template and the sub-templates and instances that are dependent on it.

- The derivation hierarchy (the list of base templates, and base templates of the base templates, ultimately winding back to the original Honeywell system template).
- A list of sub-templates derived from the template.
- A list of instances instantiated from the template and their current life cycle state (loaded, assigned).

Template names are preceded by their library name. Column widths may be adjusted to view longer library and template names. The list may be sorted by dependency type, life cycle state, or the module name. The tree view shows the exact derivation relationship of all dependants.

Appendix C – User Templates

Using the Library Tree

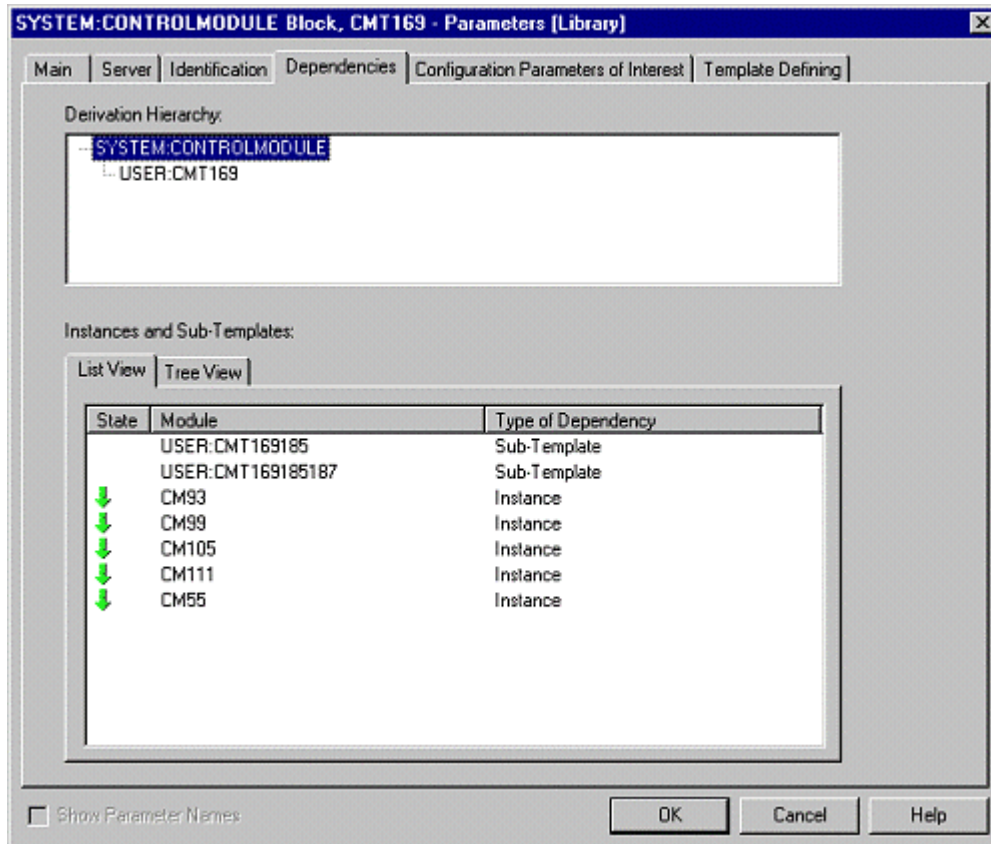


Figure 86 Dependencies Tab, List View

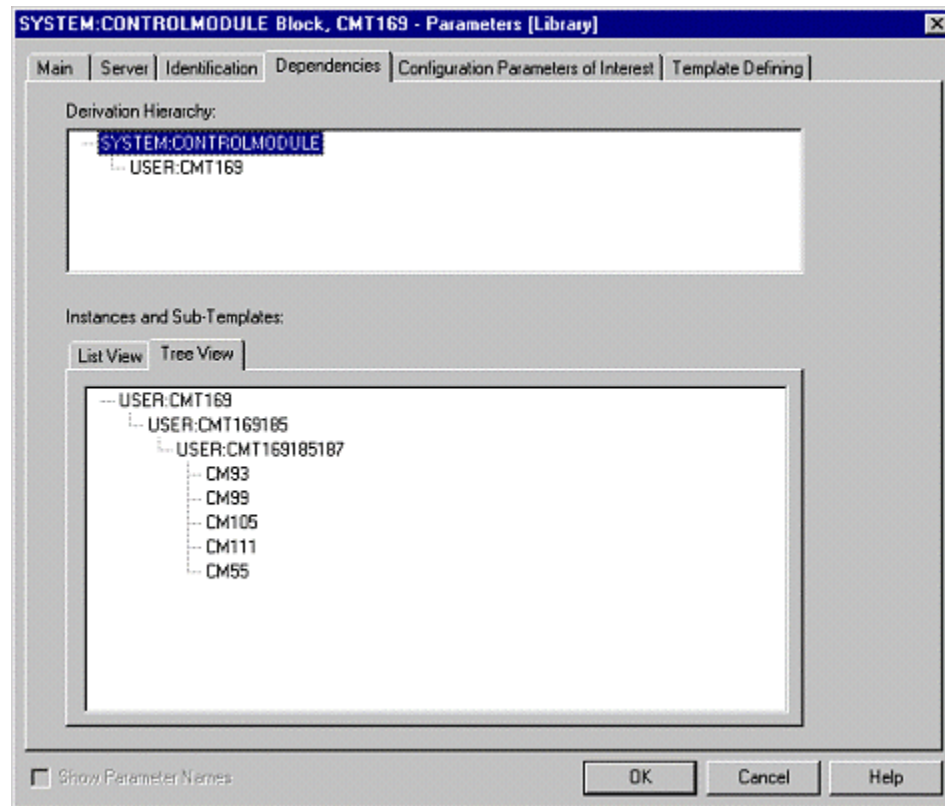


Figure 87 Dependencies tab, Tree View

Import/Export template (user templates only)

- Menu item: File -> Import, File -> Export

Modify/Move Library

Changes the library name or associated tab window name.

- Double-click mouse over the library name. Create Library dialog appears. Confirm the change when prompted.

Appendix C – User Templates

Using the Library Tree

Move Library (Not functional is in this release.)

Moves Library to another tab window.

- Drag and Drop: (CTRL + mouse drag/drop) to another tab window. Confirm the move when prompted.

Project/Monitor Tree Overview

The Project/Monitor Tree View allows Instances or strategies to be viewed as trees, showing the assignment relationships in a window in the Control Builder.

If any differences remain between the Project and Monitor databases after an update operation has completed, a yellow delta symbol will appear on the project tree. These differences may be due to a difference in the user template definitions of the strategy in project vs. the definition used at the time the corresponding strategy was loaded to Monitor. If the delta symbol appears, the project must be reloaded to synchronize the project and monitor databases.

Identification Tab

Requesting Configuration Parameters brings up the configuration form, including the Identification tab.

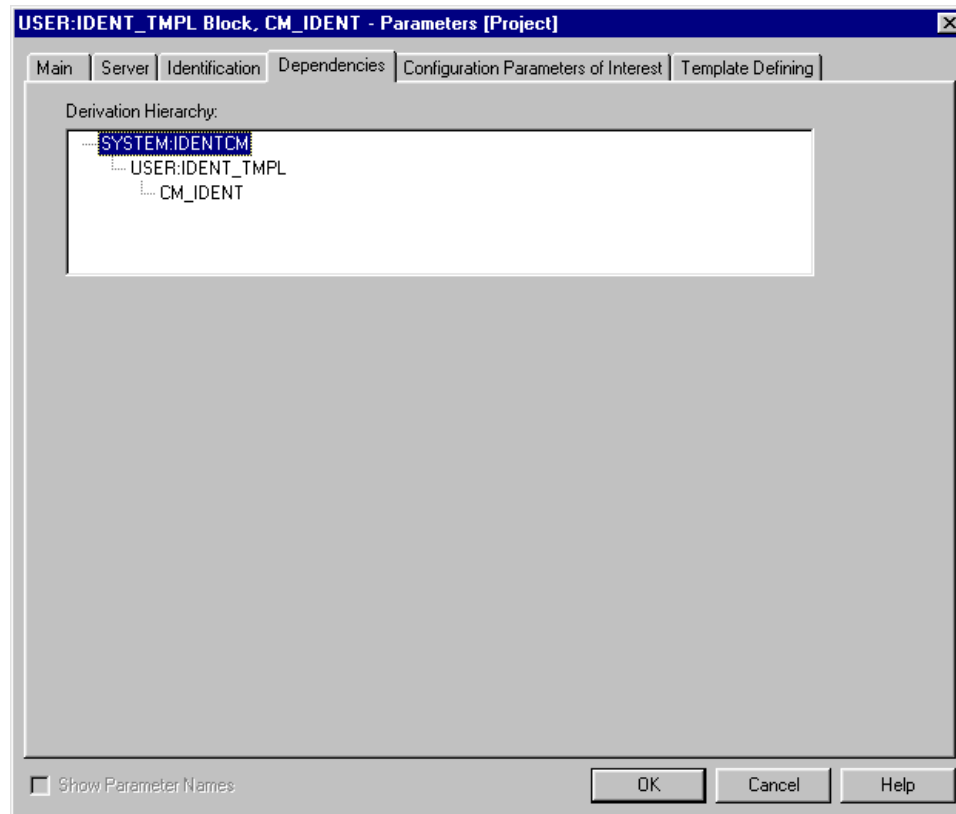
The screenshot shows a dialog box titled "USER:IDENT_TMPL Block. CM_IDENT - Parameters [Project]". It has several tabs: "Main", "Server", "Identification" (which is selected), "Dependencies", "Configuration Parameters of Interest", and "Template Defining". The "Identification" tab contains the following fields:

- Name: CM_IDENT
- Description: (empty)
- Version Label: 1.4
- Created By: (empty)
- Date Created: (empty)
- Last Modified By: (empty)
- Date Last Modified: (empty)
- Template Version Label: 1.4
- System Template: SYSTEM:IDENTCM
- Base Template: USER:IDENT_TMPL
- Block Comment 1: Identification comment field.
- Block Comment 2: Another block comment field.
- Block Comment 3: Third user comment for block.
- Block Comment 4: Fourth user comment for block.

At the bottom left, there is a checkbox labeled "Show Parameter Names" which is currently unchecked. At the bottom right, there are three buttons: "OK", "Cancel", and "Help".

Dependencies Tab

Shows the derivation hierarchy for the strategy.



Using Control Drawings

Opening a Control Drawing

- Double-click on the template in the Library Tree.
- Select the template in the Library Tree -> select File -> Open
- Select the template in the Library Tree -> right-click mouse -> Open

Copying a Control Drawing

One or more basic block templates may be copied from one Control Drawing to another. Connections to templates outside of the set of blocks being moved are deleted. Connections within the set of blocks and substituted connections are retained.

- Drag and Drop: (CTRL + mouse drag/drop)
- Copy and Paste: CTRL+C -> CTRL+V
- Right-click mouse -> select Copy
- Menu item: Copy/Paste

Appendix C – User Templates

Using Control Drawings

Appendix D – Bulk Edit Parameters Utility

Overview

Bulk Edit Parameters is a utility which allows you to change the value of multiple parameters in a single operation by importing a prepared list of edits.

The Bulk Edit Parameters utility is a feature in Control Builder that allows you to pick tagged object parameters (points) and the parameter values you wish to change. These parameter values can be saved in a spreadsheet file, (or similar) format. The spreadsheet file is then opened in Excel (or a similar application) so that parameter values can be edited as desired. Using the bulk edit parameters utility, the file with its changes is “read” back into the ERDB updating the parameter values.

Editing of simple data type parameters are supported, such as: strings – including enumerations, integer, float, Boolean and arrays of those types. Project parameters are also supported using the edit utility. Binary “Blob” data types are not supported.

Using the Bulk Edit Parameter Utility

A “Create Bulk Edit List” function is accessed as an option in the Control Builder “Tools” menu. An interactive dialog allows you to select points and parameters from the database to be included in the bulk edit list. These points and parameter values are identified to be modified and are saved in a spreadsheet file format, (or one of two other file formats). Note that the current ERDB value for the selected parameters is written to the file.

Once the bulk edit list file has been created and saved, you can open the file in the appropriate application, (Excel, Access or Notepad) and then edit or modify the parameter values. Save the bulk edit list file with the changes. You then use the Bulk Edit Parameter utility to “Read” the bulk edit list file, with the modified values, in Control Builder and update the monitor or ERDB parameter values for each point as required.

The following sections provide more details on the Bulk Edit Parameters utility and give examples on its use.

If your system is licensed for QVCS

If your system configuration includes Qualification and Version Control System, then you must have sufficient privilege to execute QVCS operations, and must be able to

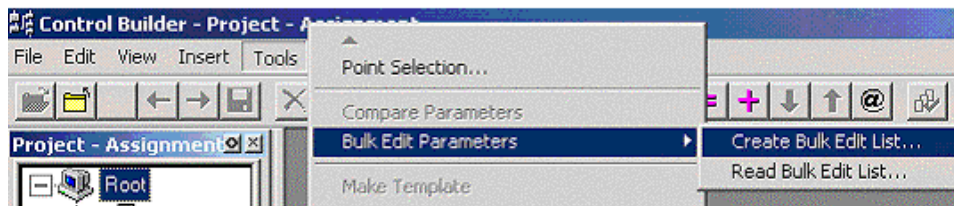
check out the objects if modifying the ERDB. If loaded objects are modified and later checked into the ERDB by operations that copy loaded data, (this function will not automatically check in the modified objects to the ERDB), the object could become unloadable, depending on the setting of the fallback qualification state. You should verify the qualification state of any objects modified in this way, and either correct the qualification state or roll back to an earlier, qualified version.

Create Bulk Edit List

Accessing Create Bulk Edit List dialog

The Create Bulk Edit List dialog is accessed through the Control Builder “Tools” drop-down menu.

Select: Tools > Bulk Edit Parameters > Create Bulk Edit List ...



Launching Create Bulk Edit List dialog

Create Bulk Edit List dialog

The following figure shows the Create Bulk Edit List dialog. The features of this dialog are described in the following table.

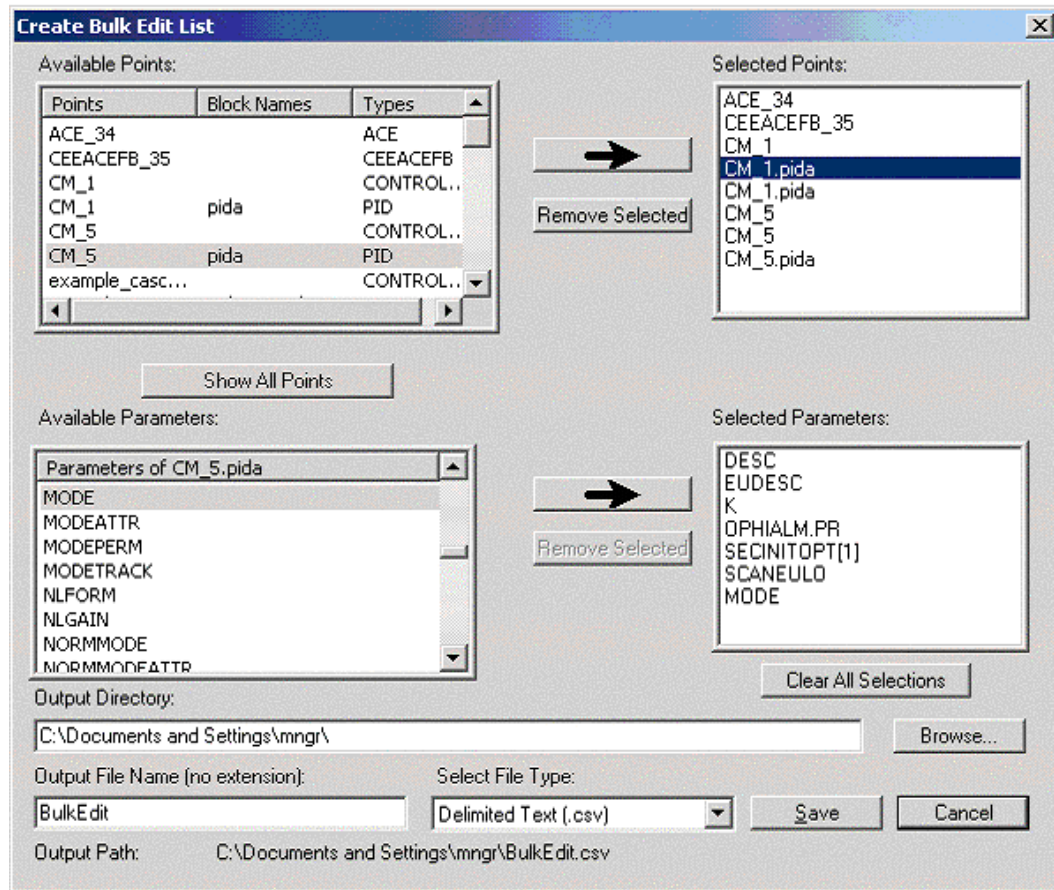


Figure 88 Create Bulk Edit List Dialog Features

Dialog Feature	Description
Points :	
Show All Points	This command button is used to populate the “Available Points” selection list with the names of all points in the database. Alternative selection is available using the Browser component.
Available Points	This “point picker” style listview is populated when the the “Show All Points” command button is selected. The right arrow

Appendix D – Bulk Edit Parameters Utility

Create Bulk Edit List

and “Remove Selected” buttons on the right of the listview are enabled when the list is populated, allowing you to copy the currently highlighted point name to the “Selected Points” list. Multiple selection of point names is allowed by using the Shift or Ctrl keys.

The point may also be copied by double-clicking on a point name. The data copied will be the “full” point.block name of the selected row.

Selected Points

This list contains the currently selected points to be written to the spreadsheet in “point.block” form. The list is sorted alphabetically as points are added to the list. Selections may be removed at any time by selecting a row and then either double-clicking or using the “Remove Selected” button. This list may alternatively be populated by using the browser to select points with one or more queries.



Adds the highlighted point(s) in the “Points” list to the “Selected Points” list.

Remove Selected

Removes the highlighted selection from the “Selected Points” list.

Parameters:

Available Parameters

This list is populated with applicable parameters as points are added to the “Selected Points” list. The “Available Parameters” list functions as a source for adding parameter names to the “Selected Parameters” list. Parameter names are added either by using the right arrow selection button to copy the currently highlighted value (in the “parameters” list), or by double clicking on a parameter name.

Selected Parameters

This list contains the names of all the parameters to be written to the spreadsheet for each point. Parameters may be deselected by using the “Remove Selected” button, or by double clicking on a parameter name in the list. An empty cell for all points indicates that the last appropriate point name was deselected after selecting the parameter(s).



Adds the highlighted parameters(s) in the “Parameters” list to the “Selected Parameters” list.

Remove Selected

Removes the highlighted selection from the “Selected Parameters” list.

Dialog Feature	Description
Other Features:	
Clear All Selections	Allows both the Selected Points and Selected Parameters lists to be cleared.
Output Directory	Displays the directory for the storage location of the output file.
Browse...	Displays a directory selection dialog that allows you to choose a different storage location for the output file. The selected directory is displayed in the “output directory” edit box.
Output File Name (No Extension)	Specifies the name of the file to be saved. The file type (and the extension for the name) are selected in the “Select File Type” field.
Output Path	Shows the current full pathname to the output file as assembled from the Output directory, file name, and file type controls.
Select File Type	This drop-down menu allows the selection of the supported output file types and sets the filename extension for the output file.
Save	Creates the output file (spreadsheet, Access database or text), and saves it to the output directory location. The first row of the table will contain the column headers and “Point name”. The remaining columns are set to the selected parameter names. Parameter values for row-column intersections that are invalid will be set to the “empty” (null) value. Excel limitations restrict the total number of different parameters that can be exported to 255, and the total number of points (rows) to 65525.
Cancel	Closes the Bulk Edit List dialog without creating or saving an output file.
Help	Activates Knowledge Builder help.

Typical use example

The following procedures outline the steps for building a Bulk Edit list and saving it in a spreadsheet or database file format.

Build a bulk edit list

Appendix D – Bulk Edit Parameters Utility

Create Bulk Edit List

Step	Action	Result/Comment
1	Log on to Control Builder as an engineer or manager.	Control Builder application window opens.
2	Select: Tools > Bulk Edit Parameters >Create Bulk Edit List ...	The Create Bulk Edit List dialog appears on screen.
3	Click on the “Show All Points” button to populate the “Points Available” list.	The list should fill with all available points in the ERDB. Note that if there are very many points available, the search may take some time so the cursor changes to an hourglass until the list is populated.
4	Select a point in the “Available Points” list.	The “Available Parameters” list will be populated with parameters appropriate to the selected point. (Note: the “Available Points” list permits multiple selections. In the event of multiple selections, the last point in the list controls the “Available Parameters” list).
5	With a point selected, the upper “right arrow” button will become enabled. Pressing this button will copy all selected points to the “Selected Points” list.	The upper “Remove Selected” button becomes enabled when one or more list entries in the “Selected Points” list are selected.
6	Points can be removed from the “Selected Points” list by highlighting the point and clicking on the upper “Remove Selected” button.	Point names are removed from the “Selected Points” list.
7	Multiple rows of a point name may be added to the “Selected Points” list.	This is to allow limited sequencing of parameter changes (e.g. set mode to auto, set sp, set mode to cascade). This can only be accomplished by placing the point in multiple rows of the output spreadsheet, since parameters may only appear once per row. Note that duplicate field names are disallowed by Access and the other database protocol file formats.
8	The “right arrow” and Remove Selected”	Attempts to duplicate an entry will result

buttons are used to select or deselect parameters in the “Available Parameters” and “Selected Parameters” list. (Similar to the point selection lists above.)

in the existing entry being highlighted in the “Selected Parameters” list, but not the addition of a duplicate list element.

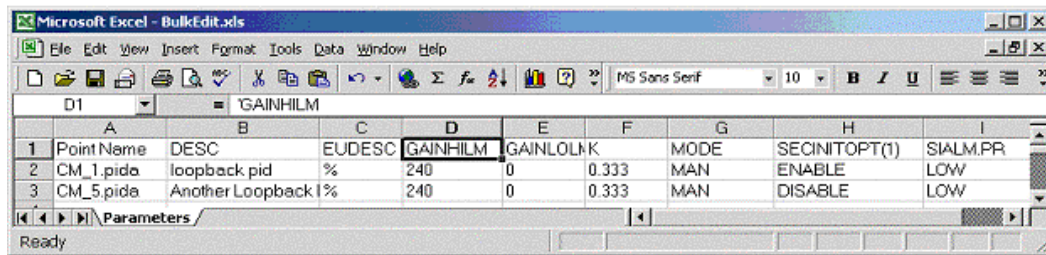
Note that the “Selected Parameters” list does not permit duplicate entries.

Create bulk edit list output file

Step	Action	Result/Comment
1	Select a directory for the location of the output file (using the Browse button) or type in the output file pathname.	You can navigate to either a local directory or a mapped network drive. If selected with Browse, the selected directory appears in the “Output Directory” edit control. You can also type in the pathname to the directory into the edit control.
2	Type a name for the output file in the “Output File Name (no extension)” edit control.	It is not necessary to type in a file extension. It is selected using the “Select File Type” dropdown in the next step. Note that the file pathname is indicated in the “Output Path” field at the bottom left of the dialog to indicate the actual output file name and directory that will be used.
3	Select the file type from the “Select File Type” drop down.	This specifies the format of the output file. Supported types are: Excel, Access, and delimited text. The file type is appended to the content in the “Output Path” field
4	The “Save” button is enabled ONLY if there is sufficient data entered: Output File Name, File Type and Output Directory, and at least one point and one parameter are in the “selected” lists	Pressing this button will cause the selections in the “Selected Points” and “Selected Parameters” lists to be used in the construction of a properly formatted output file of the chosen file type. The cursor will change to an hourglass while file output creation is in progress.
5	The “Clear All Selections” button may be used to empty both “Selected” lists in the event you wish to start over to create a new bulk edit list.	This is useful to create multiple output files without the need to close and open the Create Bulk Edit List dialog.

Edit List File Examples

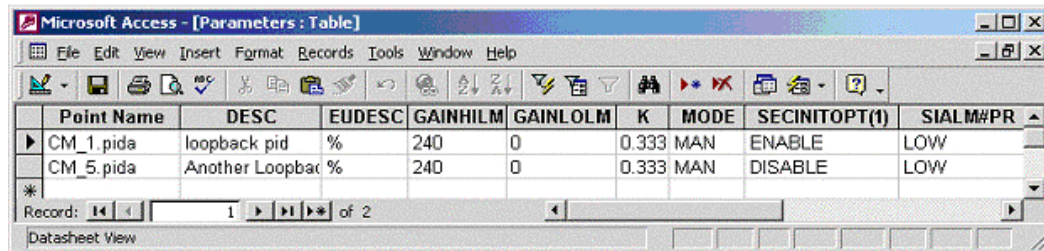
The results of creating an edit list file can be seen in the following figures. The first figure shows the arrangement of the points, parameters and their values as displayed in an Excel spreadsheet file format, (.xls extension).



	A	B	C	D	E	F	G	H	I
1	Point Name	DESC	EUDESC	GAINHILM	GAINLOLM	K	MODE	SECINITOPT(1)	SIALM.PR
2	CM_1.pida	loopback pid	%	240	0	0.333	MAN	ENABLE	LOW
3	CM_5.pida	Another Loopback	%	240	0	0.333	MAN	DISABLE	LOW

Figure 89 Bulk Edit List as Shown in MS Excel File Format

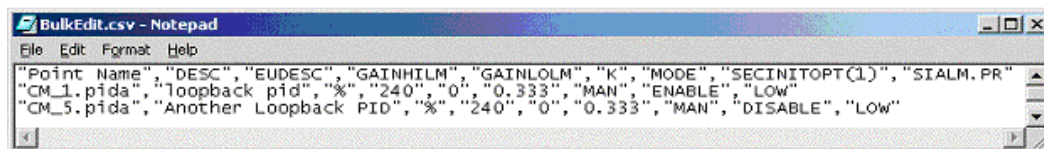
The next figure shows an edit list as created using the Microsoft Access database file type format option, (.acs extension).



	Point Name	DESC	EUDESC	GAINHILM	GAINLOLM	K	MODE	SECINITOPT(1)	SIALM#PR
▶	CM_1.pida	loopback pid	%	240	0	0.333	MAN	ENABLE	LOW
	CM_5.pida	Another Loopback	%	240	0	0.333	MAN	DISABLE	LOW

Figure 90 Bulk Edit List as Shown in Microsoft Access File Format

The next figure shows an edit list as created using the Delimited Text file type option, (.csv extension) and viewed using Notepad.



```

"Point Name","DESC","EUDESC","GAINHILM","GAINLOLM","K","MODE","SECINITOPT(1)","SIALM.PR"
"CM_1.pida","loopback pid","%",240,0,0.333,"MAN","ENABLE","LOW"
"CM_5.pida","Another Loopback PID","%",240,0,0.333,"MAN","DISABLE","LOW"

```


Figure 91 Bulk Edit List in a Comma Delimited Text Format

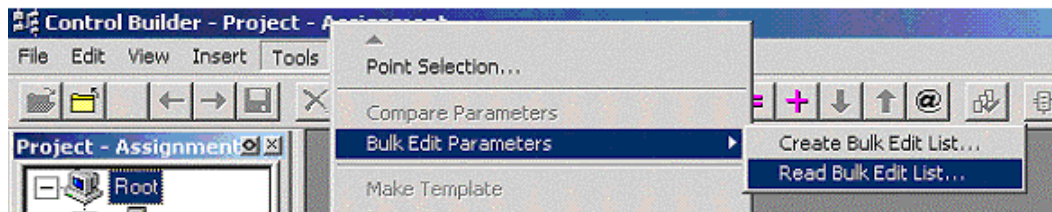
Read Bulk Edit List

The Read Bulk Edit List function is used once you have made changes and saved an edit list file. You use the Read Bulk Edit List to “Read” the file, with the modified values, in Control Builder and update the monitor or project parameter values for each point as required.

Accessing the Read Bulk Edit List dialog

The Read Bulk Edit List dialog is accessed through the Control Builder “Tools” drop-down menu.

Select: Tools > Bulk Edit Parameters > Read Bulk Edit List ...



Read Bulk Edit List dialog

The following figure shows the Read Bulk Edit List dialog. The features of this dialog are described in the following table.

Appendix D – Bulk Edit Parameters Utility

Read Bulk Edit List

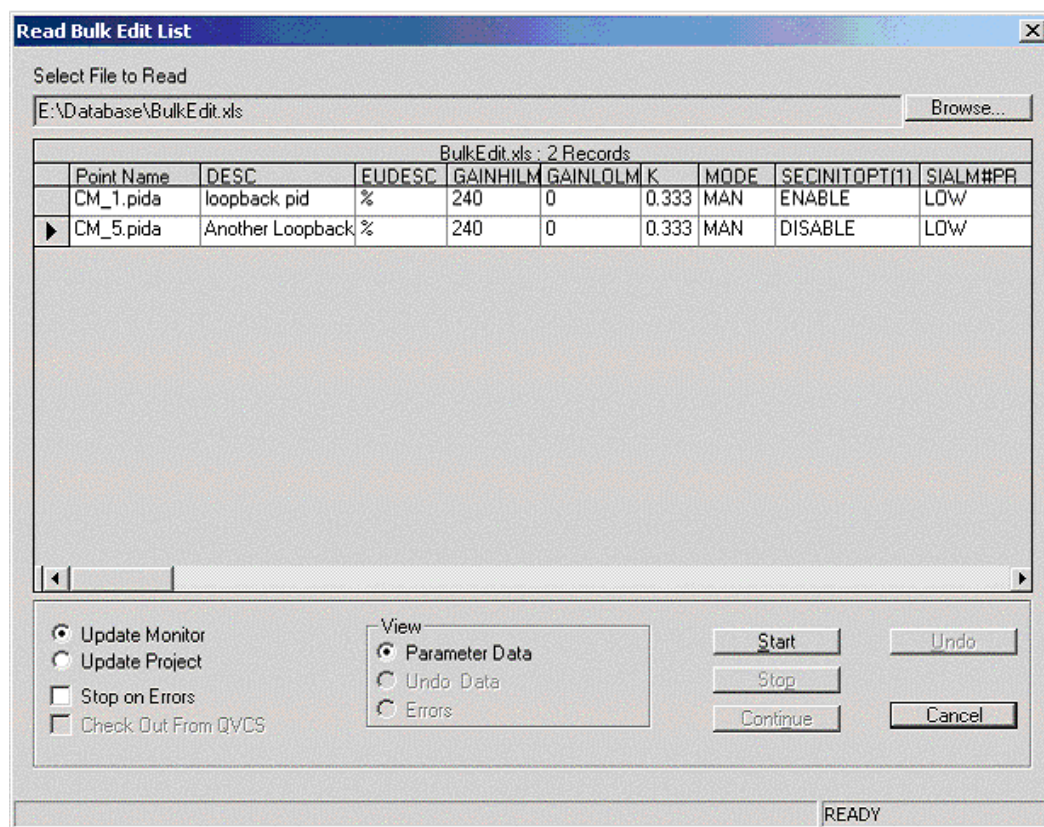


Figure 92 Read Bulk Edit List Dialog Features

Dialog Feature	Description
Select File to Read	Read-only view of the full pathname to the file to read.
Browse	Displays the file selection dialog for selecting the file in the "Select File to Read" control.
Data Grid	Displays the data read from the Excel spreadsheet, or other file formats.
Update Monitor / Update Project	Selects the target environment for the update operation. Update Monitor – Updates parameters loaded to controller function blocks. Note that not all parameters can be

	updated in active controllers, (for example PVEUHI and PVEULO)
	Update Project – Updates parameters stored in the Engineering Repository Database.
Stop on Errors	Determines whether errors encountered during the read process cause the update operation to stop or continue until it is completed.
Check Out From QVCS	This is enabled only if QVCS is licensed.
	It allows the import process to check out any objects not currently checked out during update in “Update Project” mode.
View	Determines the arrangement and type of data to be displayed in the Data Grid area.
Parameter Data	Displays the data in the Bulk Edit List file currently in use. The data is displayed in the same format as the original output file, one point name per row.
Undo Data	Displays the results of the update. It shows one row per point and parameter as shown in the following figure, with: – the original parameter value, – the requested parameter value, – the new parameter value.

Appendix D – Bulk Edit Parameters Utility

Read Bulk Edit List

Select File to Read
E:\Database\BulkEdit.xls Browse...

BulkEdit.xls : 16 Records

Point Param	Old Value	Requested Value	New Value
CM_1.pida GAINLOLM	0	0	0
CM_1.pida K	0.333	0.333	0.333
CM_1.pida MODE	MAN	MAN	MAN
CM_1.pida SECINITOP	ENABLE	ENABLE	ENABLE
CM_1.pida SIALM.PR	LOW	LOW	LOW
CM_5.pida DESC	Another Loopback PID	Another Loopback PID	Another Loopback PID
CM_5.pida EUDESC	%	%	%
CM_5.pida GAINHILM	240	240	240
CM_5.pida GAINLOLM	0	0	0
CM_5.pida K	0.333	0.333	0.333
CM_5.pida MODE	MAN	MAN	MAN
CM_5.pida SECINITOP	DISABLE	DISABLE	DISABLE
CM_5.pida SIALM.PR	LOW	LOW	LOW

☐ Update Monitor
☒ Update Project
☐ Stop on Errors
☐ Check Out From DVCS

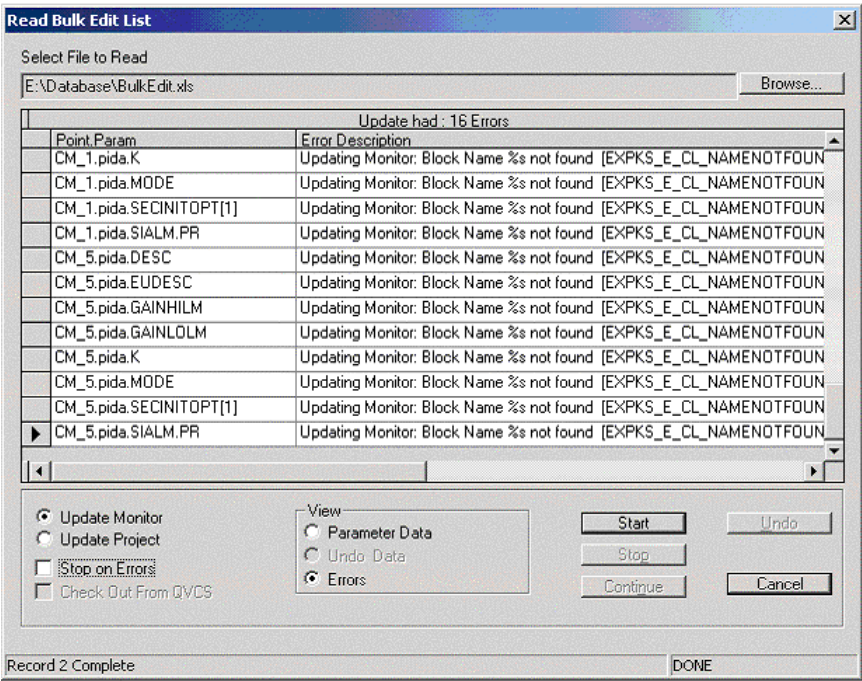
View
☐ Parameter Data
☒ Undo Data
☐ Errors

Start Stop Continue Undo Cancel

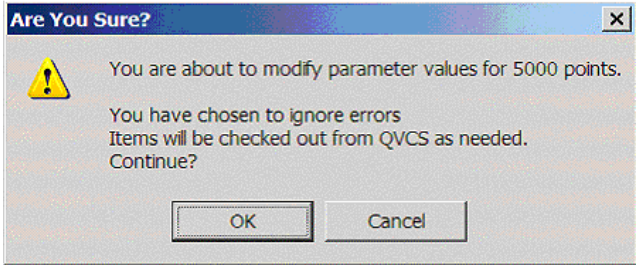
Record 2 Complete DONE

Errors

Displays any errors that occurred during the parameter update operation.



Start Enabled when an appropriate file is selected and read into the grid, it starts the update processing of the list. When selected, a confirmation dialog will be shown with the selected options (Monitor or Process, Stop on Errors, etc.) and a warning that multiple updates will be made to the parameter values in the system.



Stop Will stop the update process at the completion of the current data grid row.

Appendix D – Bulk Edit Parameters Utility

Read Bulk Edit List

Continue	Enabled any time the update process has stopped with pending rows remaining in the data grid. Allows the current process to continue.
Undo	Causes the process to restart and resets the values of all points updated so far. The utility resets all values that were changed back to the previous values before the current file read operation.
Cancel	Enabled any time updates are not active, closes the dialog.
Status Bar	Displays the current state of the import process, including the point being processed.
Help	Activates Knowledge Builder help.

To read a bulk edit list (A typical use example)

The following procedure outlines the steps to read an edit file list and update the parameter values of selected points.

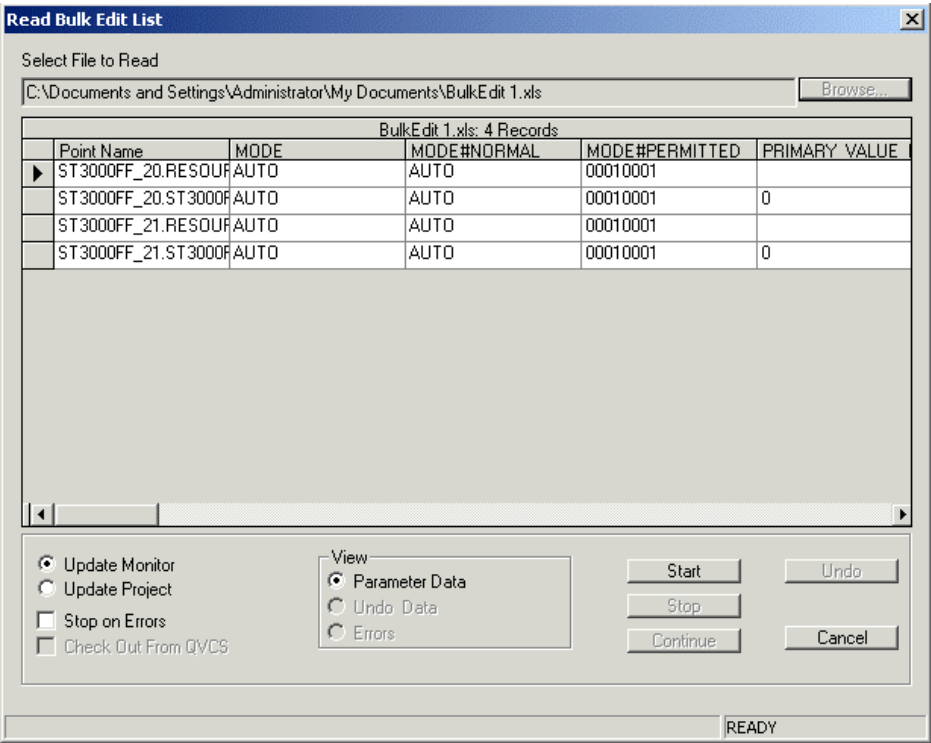
Step	Action	Result/Comment
1	Log on to Control builder as an engineer or manager.	Control Builder application window opens.
2	Select: Tools > Bulk Edit Parameters > Read Bulk Edit List ...	The "Read Bulk Edit List" Dialog appears on screen. Initially the dialog shows an empty grid and only the "Browse..." and "Cancel" command buttons enabled. "View" options are all disabled. The right pane of the status bar displays a "NOT READY" status.
3	Select an edit list file to read. Press the "Browse" button to display a file selection dialog and navigate to the desired file directory.	The file selection dialog shows only file types that are supported by the utility: Excel Spread Sheet, Microsoft Access Database, and Delimited Text (.csv). Attempting to open a spreadsheet that does not contain the expected format will result in an error dialog, and the status will remain "NOT READY".
4	When a valid file is chosen, the selection	The selected file is read into the grid in

dialog closes with the “OK” button

the Read Bulk Edit List dialog, and the Start button is enabled.

The status bar indication changes to “READY”. The Grid display updates to show the content of only the “Parameters” spreadsheet (sheets containing any other names are ignored). The Grid caption displays the file name and the number of records (points) in the sheet. The “Parameter data” view becomes enabled and selected, and the “Start” command button is enabled.

Note that the grid data is read only (to prevent inadvertent discrepancies between the list used and the actual update values), but it will allow you to inspect the data in the edit list file for the update session.



Appendix D – Bulk Edit Parameters Utility

Read Bulk Edit List

5	Choose to update either of the two environments: • Update Monitor values or • Update Project values	Option selectors are located at lower left of dialog.
6	Choose either processing behaviors: • Check the “Stop on Errors” box to stop processing at the first error, or • Uncheck the “Stop on Errors” box to continue processing to the end of the list before stopping.	If errors occur during the update operation, the “Errors” control will be enabled.
7	If “Full Qualification and Versioning” are licensed, the “Check Out From QVCS” checkbox is enabled. Click on check box to enable this feature.	If the “Check Out From QVCS” check box is checked, project parameters are automatically checked out so that they may be updated during the update operation. “Check Out From QVCS” check box is ignored if “Update Monitor” mode control is selected.
8	Press the “Start” button to initiate the update operation on a background priority.	The “Stop” button becomes enabled, and the “Start” button becomes disabled. As updated values are processed, the completed row is displayed in the left status bar pane, and the row selector indication in the grid advances. If the “Stop” button is pressed, or if “Stop on Errors” is checked and an error occurs, then the update operation pauses at the end of the current row. The “Undo,” “Continue” and “Cancel” buttons are enabled. The “Undo” button is enabled only if any updates have succeeded. (It is possible that all attempted updates have resulted in errors.) If any updates have been processed, the

“Undo Data” view option is enabled.

If any errors have occurred the “Errors”
View Option is also enabled

9 When the update operation has completed (all spreadsheet rows have been processed), the “Start” button is enabled and the “Continue” button is disabled

10 Selecting the “Undo Data” View option will display the update results in the grid.

This is a list by Point.Parameter of the old, requested and new values.

11 If the “Undo” button is pressed, the undo list is processed, starting with the last row and working backwards to the first.

Appendix D – Bulk Edit Parameters Utility

Read Bulk Edit List

Appendix E – User Defined Symbols

Introduction

User Defined Symbols (UDS) may be created in Control Builder as an alternative representation of the standard Control Builder Symbols. The following figure shows the default or standard symbol used to represent an AND logic block in Control Builder.



Figure 93 Standard Control Builder symbol

Depending on the application, the representation that is desired may be different. For example, the Power Generation group uses SAMA standard symbols when documenting control strategies. The following figure shows an alternate UDS that could be used to represent an AND logic block in Control Builder.



Figure 94 Alternate Control Builder symbol

The ability to define custom symbols provides increased flexibility, and where documentation is required to follow specific guidelines for symbols, significant cost savings can be achieved.

In addition to the custom symbol support, flexibility in the formatting and content of headers and footers of chart printouts is available. These help provide a consistent user documentation style and content. An example for the type of layout for a printed chart is shown below.

Appendix E – User Defined Symbols

Viewing Symbol Library

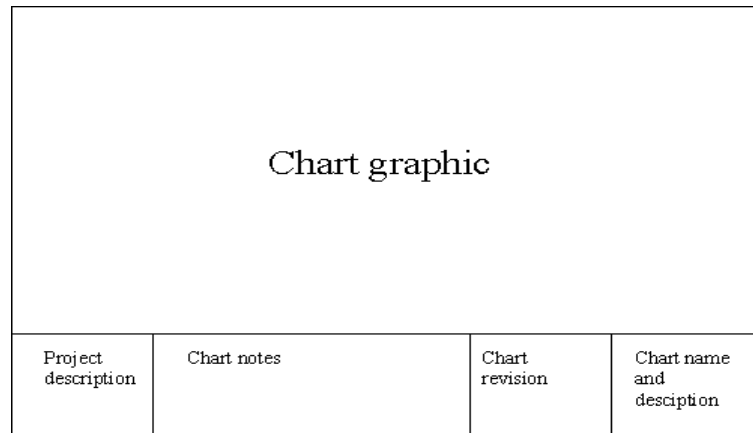


Figure 95 Example Chart Layout

Viewing Symbol Library

A system library that contains a set of standard SAMA symbols is provided with the Symbol Library that is included with Control Builder. You cannot change these symbols, but you can assign a given symbol to a selected function block. You can also add new symbols to the Symbol Library or delete user symbols from the library as well as reload an image from the source file or export an image to another file location.

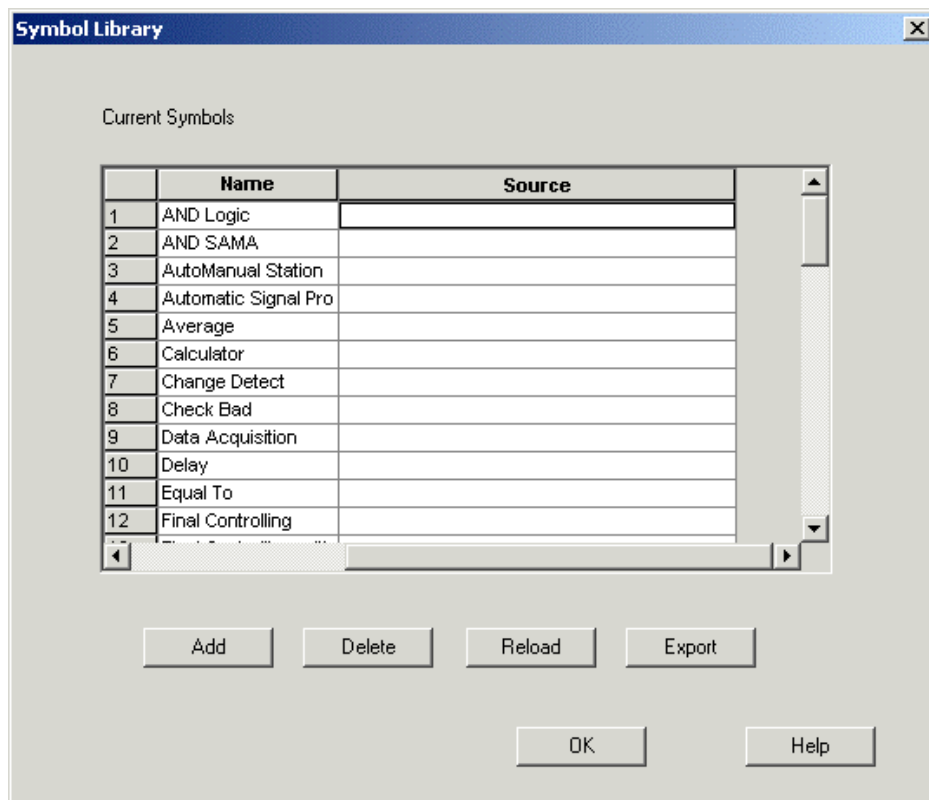
Prerequisites

- You have installed Experion PKS R200 or greater software and have launched the Control Builder Application.
- You have logged on with a security level of Manager. Access to the Symbol Library is restricted to inhibit unauthorized modifications.

Considerations

- You are familiar with interacting with applications in a Windows environment.
- You can access the **Symbol Library** from the **Tools** menu or right-click in the **Project, Monitoring or Library** tab.

Step	Action
1	Right-click in Project tab and select Symbol Library .
2	View Symbol Library dialog on top of Control Builder.



3	See other procedures in this section to Add, Delete, Reload, or Export a symbol.
4	This completes the procedure. Go to another procedure in this section or click the OK button to close the dialog.

User Defined Symbol Creation Considerations

Supported graphics formats

You can create User Defined Symbols using any standard graphics program. The following table lists the Graphics image file formats that are supported. Experion PKS does not provide support for creating the image files. There are many graphic programs available, ranging from the fairly basic capabilities of the Windows Paint program, to sophisticated applications such as Adobe Illustrator, Corel Draw, Corel Paint, etc. Use the program that you are most familiar with, and that meets any specific requirements for certain features.

Table 20 Supported graphics formats

File Type	File Extension	Description
Windows Bitmap	BMP	Raster image
Graphics Interchange Format	GIF	Raster image
Joint Photographic Experts Group	JPG	Raster image
Exchangeable Image File	EXF	Raster image
Portable Network Graphics	PNG	Raster image
Tag Image File Format	TIF	Raster image
Windows Metafile	WMF	Vector image
Enhanced Metafile	EMF	Vector image

Image considerations

- When creating a symbol image, be sure you consider how the symbol will appear on a display, as well as in print.
- A symbol should have a distinct boundary so that any connections to other symbols can be easily seen.
- Typically text should not be included as part of the image as that can be generated programmatically when the symbol is displayed or printed.

- Consider the size of the image, as very large or small images may not scale cleanly or may not fit well with other symbols. Also, the size is important, if faceplate parameters and pins will be defined for the symbol. Note that the actual size of the symbol is determined by the size of the image, not the location of the symbol borders within the image. Typically, the image should be sized such that the symbol borders are quite close to the height and width of the image.
- The careful use of color is also a factor, as too much color can be confusing.

Examples

As an example, consider a symbol for the logical AND block.

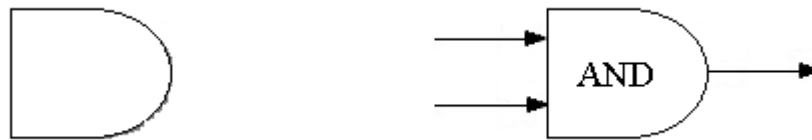


Figure 96 AND Block example

The very basic shape shown on the left is a good example for a user defined symbol. It has a clearly defined border and no text.

The shape shown on the right is not as good because it reduces flexibility of the number of connection pins, and the “AND” text cannot be changed with the actual name assigned to the control block.

Using the symbol on the left, and by defining its attributes, the following could be the resulting display:



Figure 97 User symbol with displayed attributes

An example of a chart displayed with standard Experion PKS symbols, and the same chart displayed with a mix of UDS (in this example, based on SAMA) and standard Experion PKS symbols is shown in the following figures.

Appendix E – User Defined Symbols

User Defined Symbol Creation Considerations

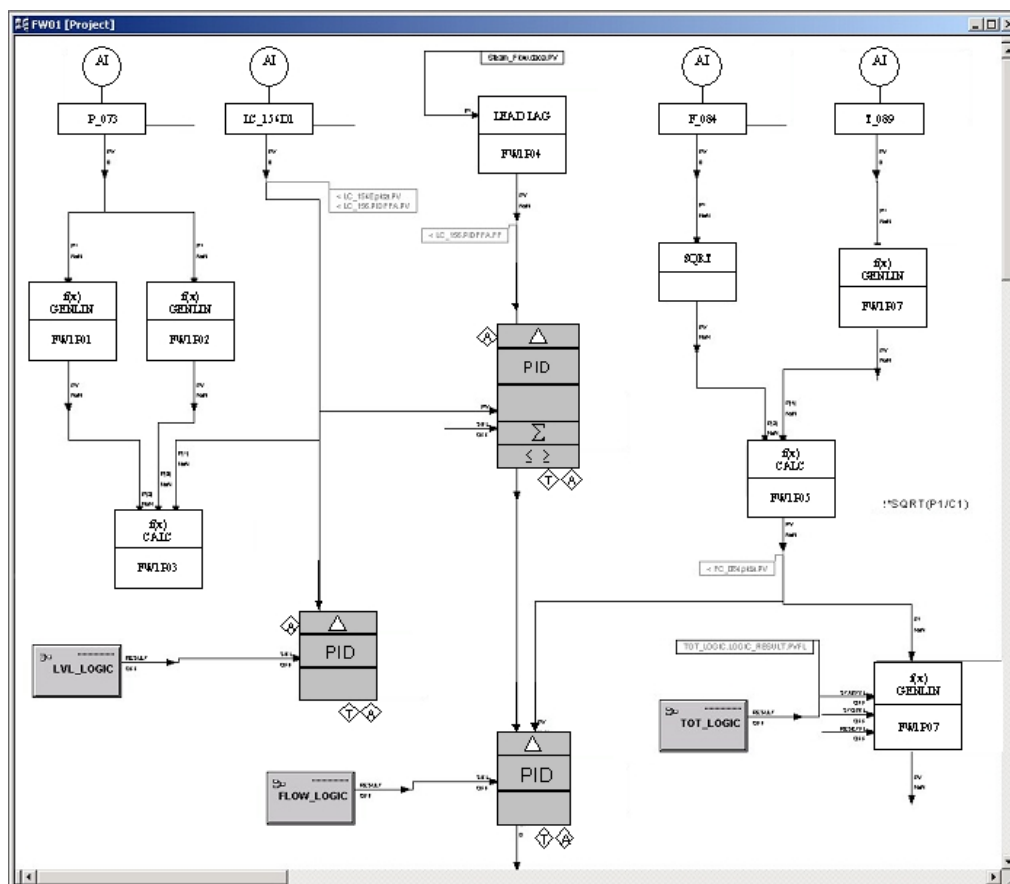


Figure 99 Chart with user defined symbols

Adding Symbol To Library

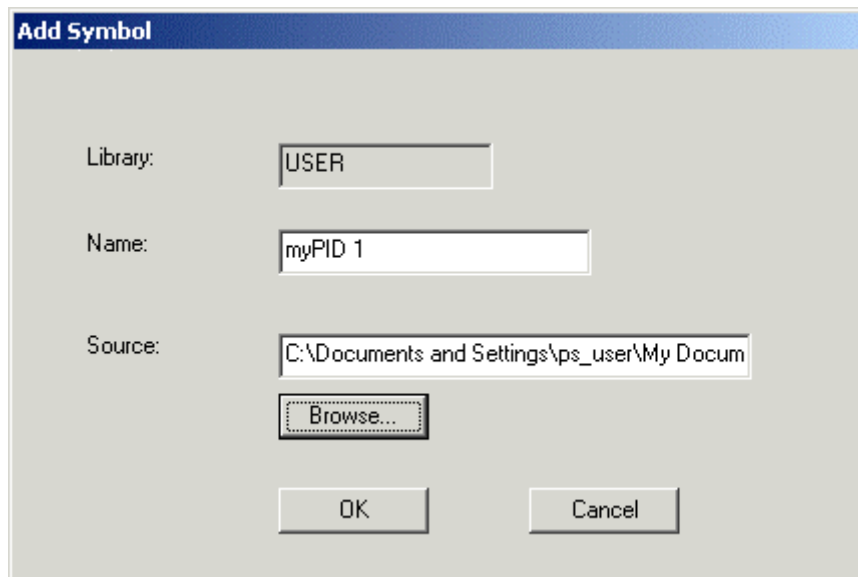
Prerequisites

You have completed the previous *Viewing Symbol Library* procedure.

Considerations

The symbol to be added is in a compatible graphics format as noted in the table above.

Step	Action
1	In Symbol Library dialog, click the Add button.
2	In Add Symbol dialog Name box, key in desired name for UDS consisting of up to 49 characters.
3	In Source box, key in directory location where UDS symbol graphic file is stored or click the Browse button to use the Select Image File dialog to navigate to the location. The following illustration is for example purposes only.



- Click the **OK** button to add the named image to the User Library within the Symbol Library.

Step	Action
5	In the Symbol Library dialog, scroll the Current Symbols list to find the image just added in the USER Library.
6	Repeat this procedure on add other symbols as required.
7	This completes the procedure. Close the Symbol Library dialog or go to another procedure in this section.

Deleting Symbol From User Library

Prerequisites

You have completed the previous [Viewing Symbol Library](#) procedure.

Considerations

- The symbol to be deleted resides in the User Library within the Symbol Library.
- The symbol to be deleted is not referenced by a block in the control strategy. You can not delete an image if it has been assigned to a block in Control Builder.

Step	Action
1	In Symbol Library dialog, scroll the Current Symbols list to find the image you want to delete from the USER Library.
2	Click the name of the image to be deleted.
3	Click the Delete button. Click the Yes button to acknowledge the action.
4	Click the OK button to confirm the action.
5	Check that image is deleted from the Current Symbols list.
6	This completes the procedure. Close the Symbol Library dialog or go to another procedure in this section.

Reloading User Defined Symbol

Prerequisites

You have completed the previous [Viewing Symbol Library](#) procedure.

Considerations

- The symbol to be reloaded resides in the User Library within the Symbol Library.
- Once you add a symbol to the User Library within the Symbol Library, the original graphic file is not used by Experion PKS. This means the original file may be moved, renamed, or deleted, and there is no impact on the ability to display the symbol. This also means that any changes made to the original file will not be reflected in the displayed symbol unless the Reload function is invoked.

Step	Action
1	In Symbol Library dialog, scroll the Current Symbols list to find the image you want to reload in the USER Library.
2	Click the name of the image to be reloaded.
3	Click the Reload button.
4	Click the OK button to acknowledge the image has been reloaded from the source listed.
5	This completes the procedure. Close the Symbol Library dialog or go to another procedure in this section.

Exporting Symbol

Prerequisites

You have completed the previous [Viewing Symbol Library](#) procedure.

Considerations

The exported symbol is the version that resides in the Symbol Library on the ERDB and not the one that resides in the source file.

Step	Action
1	In Symbol Library dialog, scroll the Current Symbols list to find the image you want to export.
2	Click the name of the image to be exported.
3	Click the Export button.
4	In Save As dialog, navigate to file location where exported image is to be stored. Click the Save button.
5	Click the OK button to acknowledge the location where the image has been stored.
6	This completes the procedure. Close the Symbol Library dialog or go to another procedure in this section.

Assigning Symbol To Block

You assign a user defined symbol to a block through the **Block Preferences** tab on the block's configuration form.

Prerequisites

You have installed Experion PKS R200 or greater software and have launched the Control Builder Application.

Considerations

- You have added any symbols you want to use to the User Library within the Symbol Library. See the previous

Appendix E – User Defined Symbols

Assigning Symbol To Block

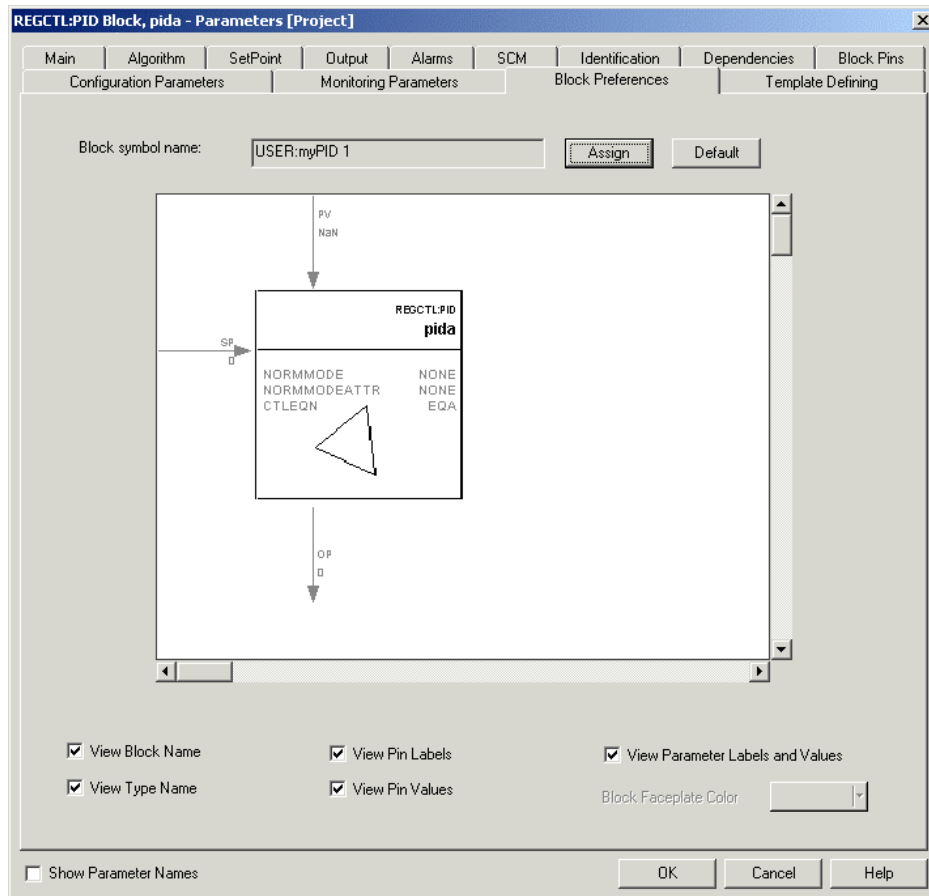
[Adding Symbol To Library](#) procedure for details.

- You have created a Control Module with contained blocks.
- When changing the block-associated symbol, all defined attributes for that block such as faceplate parameters and pins remain unchanged, but may be repositioned.
- The symbol name for an assigned user defined symbol appears in the **Block symbol name** box on the **Block Preferences** tab and cannot be modified.
- You can click and drag the block name and type name as a linked pair to reposition them on assigned symbol on the **Block Preferences** tab.
- You can click and drag input and output pins to reposition them on assigned symbol on the **Block Pins** tab.
- You can click and drag parameter listings to reposition them on the faceplate of assigned symbol on the **Configuration Parameters** and **Monitoring Parameters** tabs.

Step	Action
1	In Project tab, click the + sign for the Control Module icon that contains the function block you want to assign a symbol to. For example, click the + sign for the example_pid control module icon to expose its blocks.
2	Right-click the icon for desired block and select Configure Block Parameters . For example, right-click the pida block icon contained in the example_pid control module.
3	Click the Block Preference tab.
4	Click the Assign button.
5	On Assign User Symbol dialog, use vertical scroll bar to view contents of symbol library, click name of desired symbol, click the OK button to select the symbol and close the dialog.
6	The assigned symbol is now displayed in the view box. Use configuration functions on the tab to change the appearance of the block as desired. Click the Help button for information about the functions. The following illustration is for example purposes only.

Step

Action



- 7 Configure **Block Pins**, **Configuration Parameters**, and **Monitoring Parameters** as you would for any block. See [Using the Parameters Configuration Form](#) for more information.
- 8 Do you want to revert to the standard Control Builder symbol for this block?
 - If the answer is **Yes**, click the **Default** button to replace the assigned user symbol with the standard one. Click the **Yes** button to acknowledge the action.
 - If the answer is **No**, go to the next Step.

Step	Action
9	On the configuration form, click the OK button to save the changes and close the form.
10	This completes the procedure.

User Defined Template Considerations

If you wish to replace the default symbol for all instances of a block, you can assign a UDS to a user defined template for the block. That template (instead of the system template) is then used anytime that block type is instantiated.

When you configure a user template, be aware that any block preferences, block pins, configuration parameters, and monitoring parameters that are defined are treated as template defining attributes, and cannot be altered when the template is instantiated. For example, if a parameter, say IN(1), is defined as an input block pin on the template, it will appear on all instances, and it cannot be deleted or moved for an instance. Other pins can be added and moved, but that pin will remain unless it is deleted or moved on the user template.

The template defining characteristic is also extended to the display and placement of the block and parent template name, and also the symbol assignment itself. That is, the symbol assigned to an instance of a block cannot be changed for that block, except by changing the assignment on the user template.

QVCS and UDS

As for any parameter for an object, the changing of the symbol assignment is subject to the normal restrictions imposed by the Qualification and Version Control System (QVCS). That is, the object must be checked out before a change in the assignment (or in any of its attributes such as pins, faceplate parameters, etc.) can be made.

The actual symbol (in the Symbol Library) is not subject to QVCS controls. Thus, changes may be made to the appearance of a symbol without having to check out all of the objects that reference that symbol. Because the symbol that is displayed does not affect the functionality of the block, there is no loss of qualification state criteria.

Automatic Pin Definition and UDS

A feature that is supported by Control Builder is the automatic generation of pins. This occurs when a parameter connection is made to a block that does not have the parameter

exposed as a pin. In this case, Control Builder will automatically add that parameter as a pin. This pin will be added to the end of the list of pins, and becomes part of the attribute definition for that block. A side effect of this behavior is that the pin that is automatically generated may not appear “connected” to the graphic for a UDS. If this occurs, it is a simple matter to configure the placement of the pin using the methods described for configuring pins.

Tree Displays and UDS

For navigation of the **Project**, **Monitoring** and **Library** tabs, their contents are displayed in tree controls that display an icon and name for each object. A sample of a **Library** tab with some of the icons is shown in the Figure below.

The set of icons that are used for display are limited to a few different graphic symbols. This set of icons remains the same regardless if any objects in the trees have been assigned a UDS. This means that no special icons are used to distinguish those objects in the trees that have a UDS assigned to them, nor can the icons be changed. The assignment of a UDS only affects the display and printing of a chart.

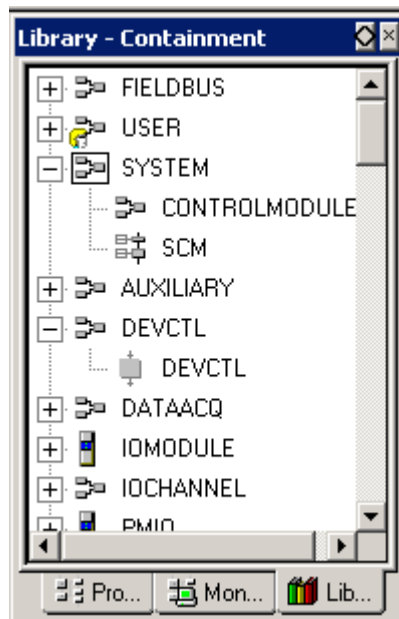


Figure 100 Sample icons displayed in tree view

Specifying Chart Header and Footer Layouts

Capabilities are available to format the layout of the header and footer that are included with the chart printout. These include flexibility in defining the font used for printing (selectable for each text element), the location of the element on the page, and additional elements that can be included.

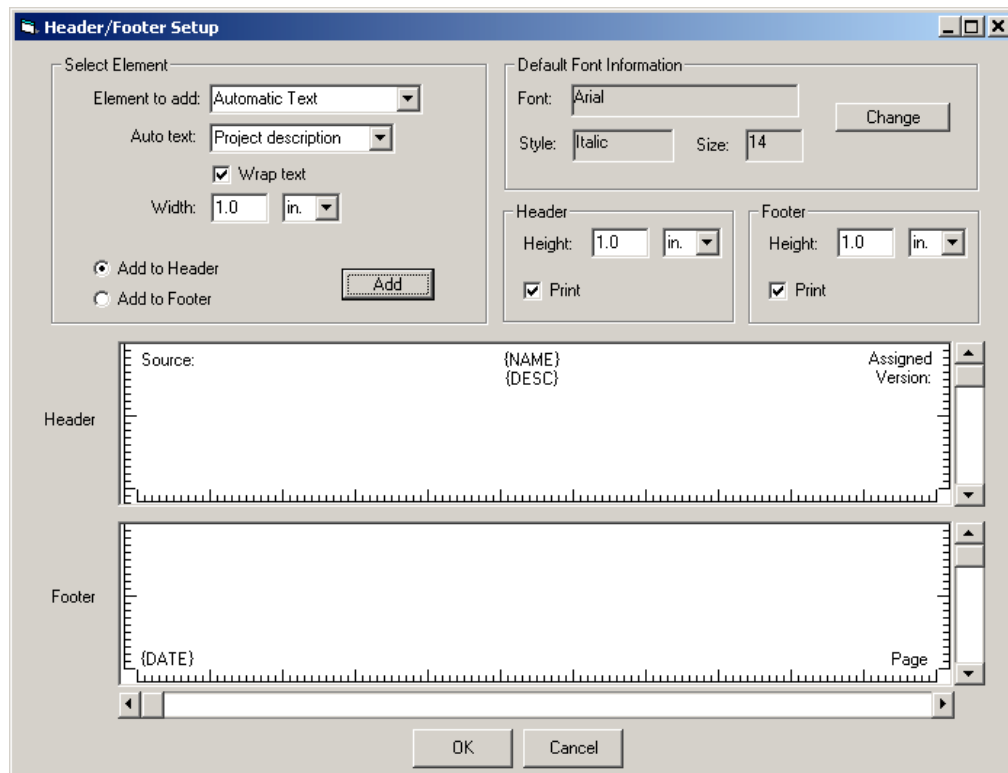


Figure 101 Header/Footer Layout dialog

Select Element frame

The Select Element frame determines what type of element will be added to the header or footer. The available elements in the “Elements to add” list are:

- Bitmap
- Automatic text

- User text
- Vertical line
- Horizontal line
- Rectangle
- Chart Border

Depending on the type of element selected, the contents of the frame will change to allow the entry of necessary information for that element. Examples of each element's definition are shown in the following Figures.

Select where the element is to be added, either in the header or in the footer, and then when satisfied with the setup, select “Add”. The element is then added to the specified section of the report (where it can then be located to the precise location).

The exception to this process is the “Chart Border” element. This element is not added, but simply specified whether it is to be printed or not. If it is to be printed, then specify if the border is to be placed just around the chart area, or placed around the header and chart, the footer and chart, or the entire page.

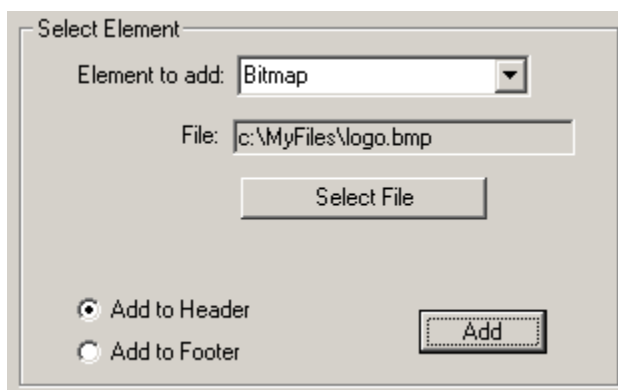


Figure 102 Definition of a bitmap

The 'Select Element' dialog box is shown with the following settings:

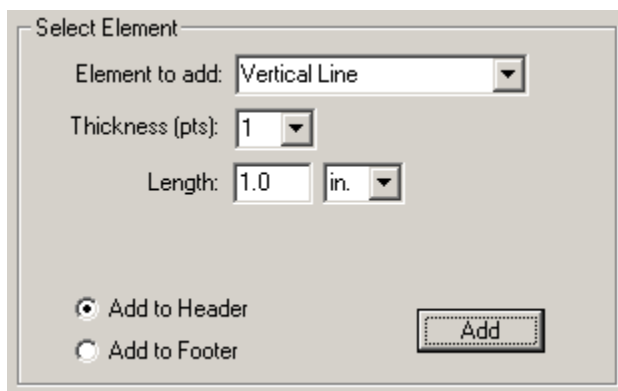
- Element to add: Automatic Text
- Auto text: Project description
- Width: 1.0 in. (with a unit dropdown set to 'in.') and a checked 'Wrap text' checkbox.
- Alignment: Left
- Radio buttons: 'Add to Header' is selected, 'Add to Footer' is unselected.
- An 'Add' button is located at the bottom right.

Figure 103 Definition of automatic text

The 'Select Element' dialog box is shown with the following settings:

- Element to add: User Text
- Text: anything the user enters
- Width: 1.0 in. (with a unit dropdown set to 'in.') and a checked 'Wrap text' checkbox.
- Alignment: Left
- Radio buttons: 'Add to Header' is selected, 'Add to Footer' is unselected.
- An 'Add' button is located at the bottom right.

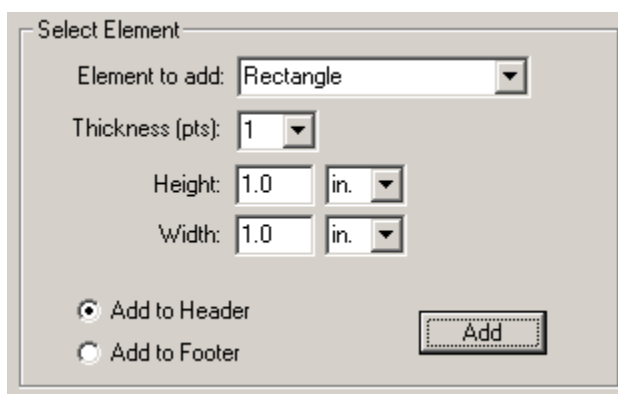
Figure 104 Definition of user text



The dialog box is titled "Select Element". It contains the following fields and controls:

- "Element to add:" dropdown menu with "Vertical Line" selected.
- "Thickness (pts):" spinner box with the value "1".
- "Length:" spinner box with the value "1.0" and a unit dropdown menu with "in." selected.
- Two radio buttons: "Add to Header" (selected) and "Add to Footer".
- An "Add" button.

Figure 105 Definition of a line



The dialog box is titled "Select Element". It contains the following fields and controls:

- "Element to add:" dropdown menu with "Rectangle" selected.
- "Thickness (pts):" spinner box with the value "1".
- "Height:" spinner box with the value "1.0" and a unit dropdown menu with "in." selected.
- "Width:" spinner box with the value "1.0" and a unit dropdown menu with "in." selected.
- Two radio buttons: "Add to Header" (selected) and "Add to Footer".
- An "Add" button.

Figure 106 Definition of a rectangle

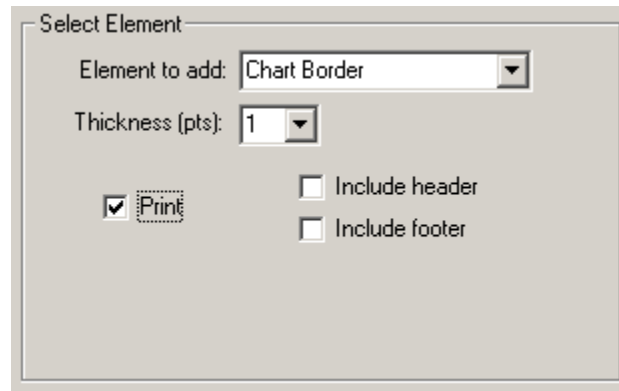


Figure 107 Definition of the chart border

Default Font Information Frame

When an automatic text or user text element is added, the Default Font Information frame will be displayed with these settings.

To change the current default, select “Change”, and the standard font selection dialog will be displayed. It is possible to change the font for a text element once it has been added by displaying the properties dialog.

Header and Footer Frames

The header and footer definitions determine if the header or footer will be printed, and what the height of each one is, in either inches or centimeters. Note that you can have elements defined in the header or footer, and if “Print” is not selected, that information will not be printed.

Defined elements display

This area is where defined elements are displayed, and where they can be positioned by dragging them to the desired location.

To delete an element from the report, select it and press the **Delete** key on the keyboard.

To move an element to another location within its specified header or footer, perform a drag and drop operation.

To change an element’s properties such as font, size, etc., right-click on it and the properties dialog for that element will be displayed. The properties dialogs allow the user

to change the properties that were assigned when the element was added, and they also allow precise positioning of the element. Examples of each of the properties dialogs are shown the following Figures.

For automatic text and user text, option **wrap text** can be checked. If this option is checked, then the user specifies the width of the text box in which the text will be displayed. If the specified text is longer than the space defined, the text will be split into another line immediately below the first line. This splitting will continue until all of the text is printed. The location where the text is split is where a space exists. If no space exists in the text within the width of the text box, the text is split at the location that fills the width. If **wrap text** is not specified, the text will be printed on one line, and if the text is long, overprinting may occur with other elements. Care must be taken to ensure that text is not allowed to overprint to the side of, or below the current element.

Text alignment can be specified for left, center, or right. For fields that do not have **wrap text** specified the length of the field expands to accommodate the text. When **left** alignment is selected, the field will expand to the right. When **right** is selected, the field will grow to the left. When **center** is specified, the field will grow equally to the left and the right. If **wrap text** is specified, then the alignment of the text takes place within the width of the field.

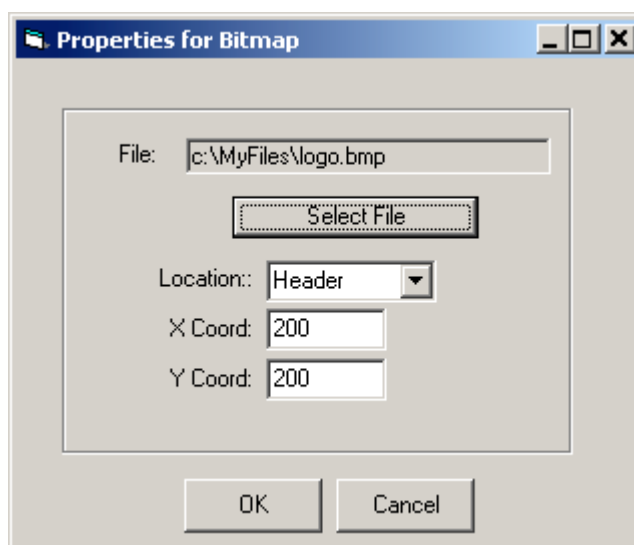


Figure 108 Properties for Bitmap dialog

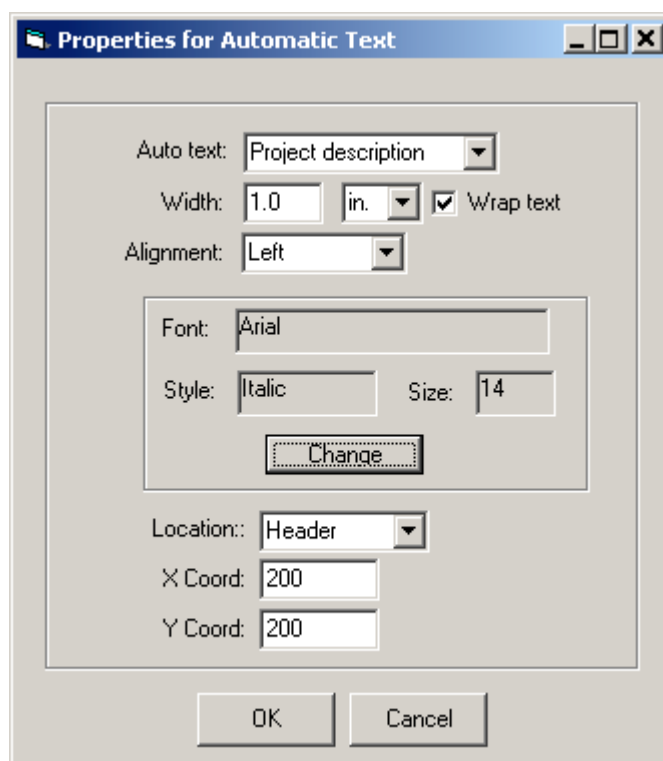


Figure 109 Properties for Automatic Text

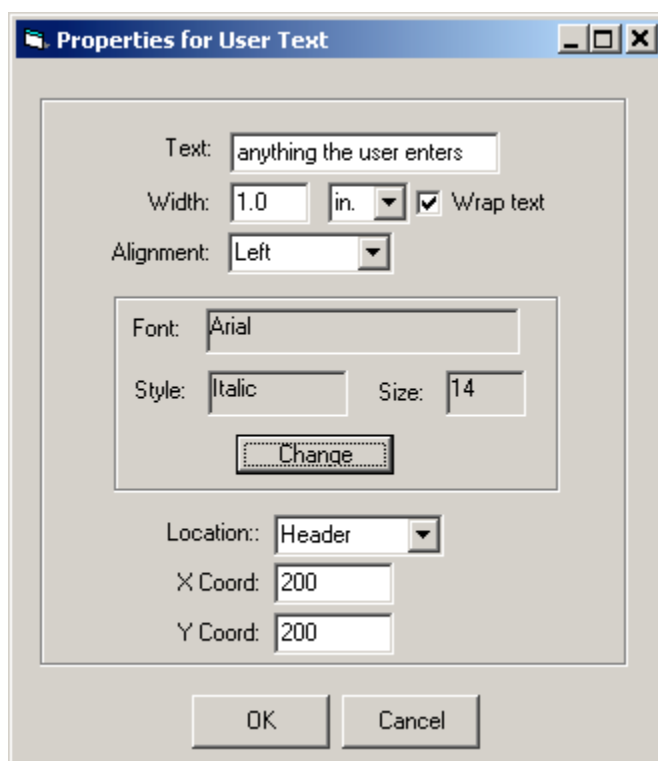


Figure 110 Properties for User Text

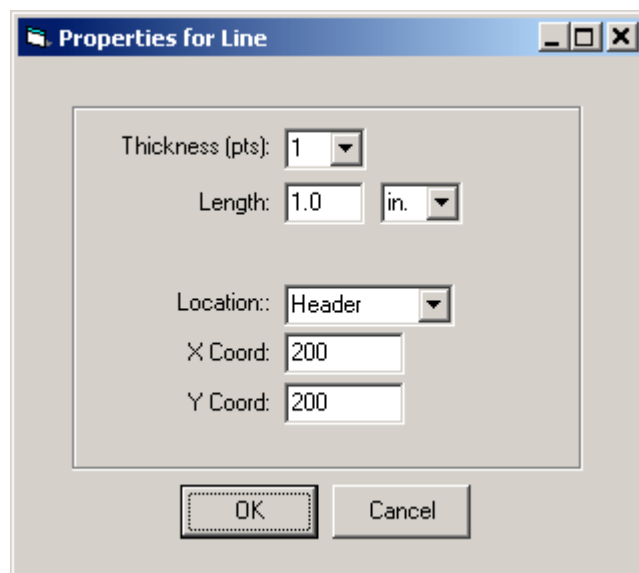


Figure 111 Properties for Line

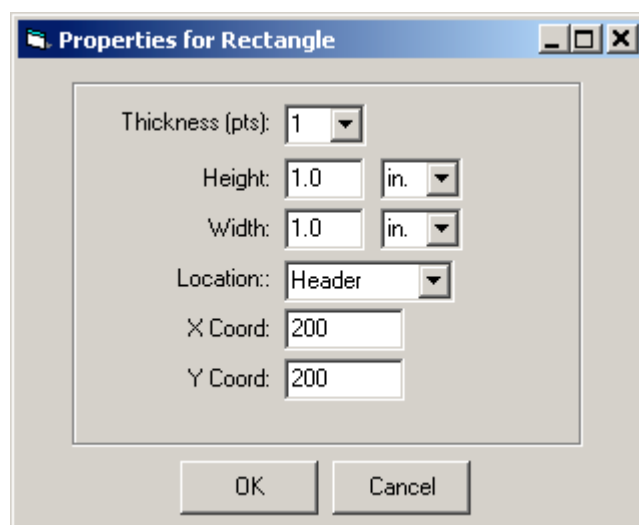


Figure 112 Properties for Rectangle

Printing a Chart

A single chart or multiple charts can be printed by highlighting it in the tree or having it open, and then selecting **File > Print > Charts** from the menu, or pressing Ctrl +P.

File > Print > All Project Tree Charts and **File > Print > All Monitoring Tree Charts** are also supported.

Charts print at the same scale that is specified for its display (as selected by the drop down scale factor on the Control Builder tool bar). The scale that the chart is printed at does not change the scale of the header or footer, or any information in the header and footer. Also, if the **All Project Tree Charts** or **All Monitoring Tree Charts** print option is selected, all of the charts are printed at 100%. The choices for the “zoom” factor are 500%, 300%, 200%, 150%, 120%, 100%, 80%, 50%, and 20%.

Appendix E – User Defined Symbols

Printing a Chart

Fax Transmittal		Fax No.: (602) 313-4842
Reader Comments		
To:	Automation College	
From:	Name _____ Title: _____ Company: _____ Address: _____ City: _____ State: _____ Zip: _____ Telephone: _____ Fax: _____	Date: _____ _____ _____ _____ _____ _____
Control Building Guide, Release 201, 01/04		
Comments: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____		
You may also call 800-822-7673 (available in the 48 contiguous states except Arizona; in Arizona call 602-313-5558), email us at College.Automation@honeywell.com , or write to: Honeywell International Inc. Automation and Control Solutions 1100 Virginia Drive Fort Washington, PA 19034		
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Honeywell International Inc.
1100 Virginia Drive
Fort Washington, PA 19034