



# Process Expert

## Control Participant Services

### User Guide

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As part of a group of responsible, inclusive companies, we are updating our communications that contain non-inclusive terminology. Until we complete this process, however, our content may still contain standardized industry terms that may be deemed inappropriate by our customers.

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# Safety Information

## Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

### ⚠ DANGER

**DANGER** indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

### ⚠ WARNING

**WARNING** indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

### ⚠ CAUTION

**CAUTION** indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

### NOTICE

**NOTICE** is used to address practices not related to physical injury.

## Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

# About the Book

## Document Scope

This document describes the interactions with Control Expert and Advantys, which are referred to as the *Control Participant*, when opened from within EcoStruxure Process Expert for the engineering and maintenance of systems.

It is written for users who are familiar with the engineering of systems by using EcoStruxure Process Expert, Control Expert, and Advantys.

## Validity Note

This document is valid for EcoStruxure Process Expert 2021 or later. It supersedes any previous version.

## Related Documents

Title of documentation	Reference number
EcoStruxure™ Process Expert - Security Deployment Guide	EIO0000004234 (eng)
EcoStruxure™ Process Expert User Guide	EIO0000001114 (eng)

You can download these technical publications at <https://www.se.com/myschneider>, *Document Downloads* section.

Registration required.

## mySchneider Support Portal

Visit <https://www.se.com/myschneider> for support, software updates, and latest information on EcoStruxure Process Expert.

Registration required.

## Product Related Information

The examples in this manual are given for information only.

### **⚠ WARNING**

#### **UNINTENDED EQUIPMENT OPERATION**

Adapt examples that are given in this manual to the specific functions and requirements of your industrial application before you implement them.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

**NOTE:** Templates shown in examples throughout this manual may differ from the actual templates contained in the supplied Schneider Electric libraries.

### **⚠ WARNING**

#### **LOSS OF CONTROL**

- Perform a Failure Mode and Effects Analysis (FMEA) of your application, and apply preventive and detective controls before implementation.
- Provide a fallback state for undesired control events or sequences.
- Provide separate or redundant control paths wherever required.
- Supply appropriate parameters, particularly for limits.
- Review the implications of transmission delays and take actions to mitigate.
- Review the implications of communication link interruptions and take actions to mitigate.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and fault conditions) according to the safety analysis and applicable codes, and regulations.
- Apply local accident prevention and safety regulations and guidelines.<sup>1</sup>
- Test each implementation of a system for proper operation before placing it into service.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

<sup>1</sup> For additional information, refer to NEMA ICS 1.1 (latest edition), *Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control* and to NEMA ICS 7.1 (latest edition), *Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems* or their equivalent governing your particular location.

# Participant Language Settings

## Control Expert and Advantys Display Language Setting

### Required Display Language Setting

When Control Expert and Advantys are used as Participants of EcoStruxure Process Expert, their display language must be set to English. If any other language is set when either one is opened from within the software, adverse collateral effects occur.

# Presentation

## Using Control Expert And Advantys As Control Participant

### Interacting with Control Expert

Control Expert (also referred to as Control Expert *Classic*) and Advantys Configuration Software (ACS) can be opened from within EcoStruxure Process Expert and act as the Control Participant.

Most of the time, the software manages interactions between the platform and Control Expert/ACS automatically in the background. However in the following stages, Control Expert and/or ACS open so that you can perform the necessary tasks to complete the system engineering life cycle:

- Refinement
- Configuration
- Execution (online refinement)

The number of Control Expert instances (see EcoStruxure™ Process Expert, Installation and Configuration Guide) that you can open simultaneously can be configured in the **Hosting** section of the System Server configuration Wizard.

**NOTE:** ACS is only used for the configuration stage.

**NOTE:** The Topology Manager of Control Expert is not available.

**NOTE:** After you close a Control Participant window, it takes a few moments for the corresponding processes to end in the background. During this time, a busy icon is shown in the notification panel. However, there may be a short additional delay before you can open another Participant window.

### Working with Several Clients

**NOTE:** When one or more users work on components of the same system simultaneously (for example, Participant projects, the application, project containers, topological entities), locking mechanisms may restrict certain concurrent actions (see EcoStruxure™ Process Expert, User Guide). In such case, check the **Notification Panel** (see EcoStruxure™ Process Expert, User Guide) for details.

### Scope of the Services

This manual describes the scope of the interactions with Control Expert and ACS, and the limitations related to the use of Control Expert/ACS as a Participant within the software.

Information on how to perform the different tasks is only provided when the topic is not covered by the Control Expert or ACS help. Refer to their help for the other tasks.

### Opening the Control Expert and ACS Help

Open the help by selecting **Help** from the menu of the Control Expert and ACS windows when open.

Also, you can access their respective help when Control Expert and ACS windows are closed by clicking the ? icon (see EcoStruxure™ Process Expert, User Guide) in the client toolbar.

# Using Control Expert and Advantys Separately

## Overview

You can use Control Expert and Advantys that are installed by EcoStruxure Process Expert as standalone applications. To open them, use their desktop shortcut or Windows Start menu entry.

## Security Editor Settings

When you start Control Expert on a computer on which you have already started the EcoStruxure Process Expert system server or a client, a window opens, which requires that you log in by entering credentials.

The Control Expert log-in requirements are dictated by the policy that is selected in the **Security Editor**.

The log-in window opens because starting the EcoStruxure Process Expert system server or a client modifies the settings of the **Security Editor** for the local Control Expert as follows:

- In the **Policies** tab, **Login** is set to **Security on, avoidable login** with **ehdcs\_admin** as **Fixed profile**.
- The following users with their associated profile are created:
  - User: **ehdcsadmin**, profile: **ehdcs\_admin** (system server and engineering client computers)
  - User: **ehdcsoperator**, profile: **ehdcs\_operator** (operation client computers)

To open the **Security Editor**, from the Windows Start menu, click **EcoStruxure Control Expert > Security Editor**.

For details on how to use the **Security Editor**, refer to *Access Security Management* in the help of Control Expert (*Operating Modes*).

**NOTE:** The specific settings that are configured by EcoStruxure Process Expert in the **Security Editor** must be used for the software to function correctly. Do not modify these settings on the computer while EcoStruxure Process Expert is running.

## Differences in Functionality Compared to Standalone Version

When you use Control Expert on a computer on which EcoStruxure Process Expert is installed, the following differences apply compared to a version of Control Expert that is installed separately:

- The **PLC** menu is renamed **Controller**.
- Project backup files (.BAK) and context restoration files (.ZTX) are not created anymore.

Actions that you perform in Control Expert opened in standalone mode have no relation with EcoStruxure Process Expert systems.

# Configuration of Control Expert

## Control Expert Settings

### Project Settings Applied During the Build Process

The table describes the values of the properties that are set by the software when you build a Control Participant project by using the **Build All** command (see EcoStruxure™ Process Expert, User Guide). These settings override the values that are set in the project containing the configuration, page 43.

Property label	Property value set by Build All command	Comment
<b>Overlapping of address generates</b> (enumeration)	<i>Nothing</i>	To access the property, click <b>General &gt; Management of build messages</b>
<b>Create New data block on line</b> (check box)	<i>True</i> (selected)	To access the property, click <b>General &gt; Build settings</b>
<b>Data dictionary</b> (check box)	<i>True</i> (selected)	When supported by the CPU selected in the configuration.  To access the property, click <b>General &gt; PLC embedded data</b>
<b>Only HMI variables</b> (check box)	<i>True</i> (selected)	Selected to improve the online build performance and memory usage of the controller. This is because the Control Expert variables that are encapsulated in the templates of the Global Templates library, and that are designed to be accessed from Supervision services, use the attribute <i>HMI variable</i> .  To access the property, click <b>General &gt; PLC embedded data</b>
<b>Program Viewer information</b> (check box)	<i>True</i> (selected)	Allows you to view the contents of a section during runtime, using navigation services (see EcoStruxure™ Process Expert, Runtime Navigation Services , User Guide ).  To access the property, click <b>General &gt; PLC diagnostics</b>
<b>Allow dynamic arrays [ANY_ARRAY_XXX]</b> (check box)	<i>True</i> (selected)	To access the property, click <b>Variables</b>
<b>Allow multi-assignment [a:=b:=c] (ST/LD)</b> (check box)	<i>True</i> (selected)	To access the property, click <b>Program &gt; Languages &gt; Common</b>
<b>Safe Signature management</b>	<b>Automatic</b>	Applies only to M580 safety Control projects (see EcoStruxure™ Process Expert, User Guide).

### Other Project Settings

You can customize properties by using the **Project Settings** command in the **Tools** menu of the project containing the configuration, page 43.

By default, the software sets values for the following properties.

Property label	Value	Comment
I/O Scanning mode (enumeration)	<i>Enhanced</i>	The setting allows using I/O scanning with NOC communication modules, which generate device DDT structures compatible with the software.  To access the property, click <b>General &gt; Build settings</b> .
Force references initialization (check box)	<i>False</i> (cleared)	Variables of type Reference that are not initialized in the <b>Data Editor</b> are initialized by default with the NULL value. In such case, they are assigned by the REF function in the logical Participant project (the application program).  To access the property, click <b>Variables</b> .
Preload on build changes (check box)	<i>False</i> (cleared)	Select it when you configure a controller supporting the property. It avoids displaying <b>#Bad parameter</b> in Supervision pages after making online changes in the deployed Control Participant project.  To access the property, click <b>General &gt; PLC embedded data</b>  <b>NOTE:</b> Also configure the <b>Effective Build changes time-out (sec)</b> setting when you select the <b>Preload on build changes</b> property.
Upload information (check box)	<i>True</i> (selected)	Unselected to reduce the memory consumption in the upload memory area.  To access the property, click <b>General &gt; PLC embedded data</b> .
Usage of Process Namespace (check box)	<i>False</i> (cleared)	For M580 safety Control projects, the setting is not supported and the check box must be cleared to be able to save changes that you have made by refining the project.  To access it, click <b>General &gt; PLC embedded data</b> .
Time Stamping Mode (enumeration)	<i>System</i>	Use this setting to build Control Participant projects that contain mappings to Modicon X80 I/O modules.  To access the property, click <b>General &gt; Time</b> .  <b>NOTE:</b> If the CPU does not support this setting, change it to <i>Applicative</i> . In this case, source time stamped events (system time stamping) cannot be accessed by the OPC Factory Server interfacing with Supervision. For more information, refer to the <i>Applicative Time Stamping</i> topics in the help of Control Expert

# Installing DTMs and Type Libraries

## Overview

When a DTM that you require to complete the configuration and refinement stages is not available in the **Hardware Catalog**, you need to install it manually in Control Expert.

You can also install manually in Control Expert the type libraries (Libset) that you require.

Perform the installation on each computer of the EcoStruxure Process Expert infrastructure on which Control Expert is installed.

For more information on the installation and configuration of DTM and type libraries, refer to the Control Expert help.

## Installing DTM by Using a Setup

The table outlines the steps that you need to perform to install DTM on a computer by using their setup.

Step	Action
1	<p>Verify that engineering and operation clients are closed, the system server is stopped, and that the server console is closed.</p> <p><b>NOTE:</b> The server console may be minimized to a tray icon. In such case, click <b>Exit</b> in the context menu of the tray icon.</p>
2	Verify that Control Expert (standalone version) is closed.
3	Extract the installation files to disk.
4	Double-click the setup of the DTM and follow the instructions on screen.
5	Open Control Expert standalone version and update the DTM <b>Hardware Catalog</b> .
6	Close Control Expert (standalone version).

## Installing DTM by Using EDS Files

To install a DTM for an EtherNet/IP device by using EDS files, open the EtherNet/IP addition wizard of Control Expert (standalone version).

Before using the wizard, verify that engineering and operation clients as well as the system server console are closed.

After installation is completed, update the DTM **Hardware Catalog** of Control Expert (standalone version).

For details, refer to the topic that describes *adding an EDS file to the hardware catalog* in the Control Expert help.

## Installing DTMs by Using GSD Files

To install a DTM for a PROFIBUS device by using GSD files, open the PROFIBUS **GSD Addition** wizard of Control Expert (standalone version).

The table describes the steps that you need to perform to install a DTM on a computer by using GSD files.

Step	Action
1	Verify that engineering and operation clients are closed, the system server is stopped, and that the server console is closed. <b>NOTE:</b> The server console may be minimized to a tray icon. In such case, click <b>Exit</b> in the context menu of the tray icon.
2	Extract the GSD files to disk if needed.
3	Open Control Expert (standalone version).
4	Open the <b>DTM Browser</b> and verify that the PRM Master and communication DTMs are installed.
5	In the <b>DTM Browser</b> , right-click <b>Host PC</b> and click <b>Add</b> .
6	In the <b>Add</b> window, select <b>PRM Master</b> and click <b>Add DTM</b> .
7	In the <b>DTM Browser</b> , right-click the PRM Master and click <b>Device menu &gt; Additional Functions &gt; Add GSD In Library</b> . Result: The <b>GSD Addition</b> wizard opens.
8	Follow the instructions on screen.
9	Once installation is completed, update the DTM <b>Hardware Catalog</b> .
10	Close Control Expert (standalone version).

## Installing Type Libraries

To install a different version of the Libset, use the **Libset Installer** of Control Expert (standalone version).

Before using the installer, verify that engineering and operation clients as well as the system server console are closed.

For details, refer to the topic describing the *Libset* in the Control Expert help.

# Control Participant Services in the System Engineering Life Cycle

## General Information

### Working Inside Control Expert and Advantys Configuration Software

#### Overview

When working inside Control Expert and Advantys Configuration Software (ACS), acting as a software Participant, some menus and commands may not appear, be disabled, or should not be used.

#### General Guidelines

When Control Expert displays a modal dialog box (overlay, which does not allow you to use the main Participant window until you acknowledge or close it), do not put the computer to sleep. Doing so may discard unsaved changes because of an interruption of the client/server communication.

Before saving your work and closing the Participant, refer to the help of the task that you are completing.

#### Participant Window Mode

The Control Expert and ACS windows open as floating window. You can embed (see EcoStruxure™ Process Expert, User Guide) it in the client.

## Data Type Equivalence

### EcoStruxure Process Expert Data Type Equivalence

The table lists the IEC data types supported by Control Expert and their equivalent in the software.

Control Expert data type	Lower limit	Upper limit	Size	Software data type
Bool	0	1	1 bit	Boolean
Byte	0	FF	8 bits	Byte
Date	–	–	–	Date
DInt	-2,147,483,648	2,147,483,647	32 bits	Integer
DT	–	–	8 bytes	DateTime
Dword	0	FFFFFF	32 bits	UnsignedInt
Ebool	–	–	1 byte	Boolean
Int	-32768	32767	16 bits	Short
Range	–	–	–	–
Real	–	–	32 bits	Float
String	–	–	8 bits	String
Time	–	–	–	Duration
TOD	–	–	32 bits	Time
UDInt	0	4,294,967,295	32 bits	UnsignedInt
UInt	0	65,535	16 bits	UnsignedShort
Word	0	FFFF	16 bits	UnsignedShort

#### NOTE:

- The software converts the data types automatically to Control Expert supported types.
- For information on the data types that the software uses, refer to *Software Capabilities, Supported Data Types* (see EcoStruxure™ Process Expert, User Guide).

# Generation Stage

## Section Layout Management Example

### Overview

This topic illustrates the way the software manages the layout of function blocks in FBD sections when you generate again a section after changing the element selection and parameters of an instance.

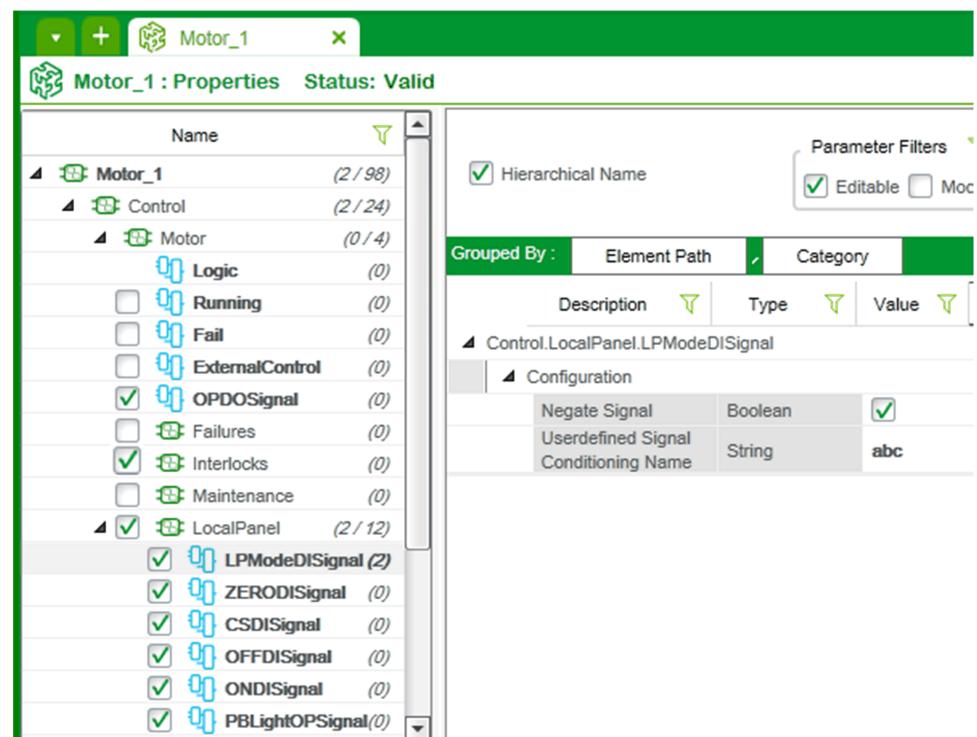
Using two instances of the \$Motor sample template having an identical final configuration, the example compares the position of function blocks that are generated during subsequent generations with the position of those that are generated by a one-step generation.

For information on the process, refer to Generating Participant Projects After Changes (see EcoStruxure™ Process Expert, User Guide).

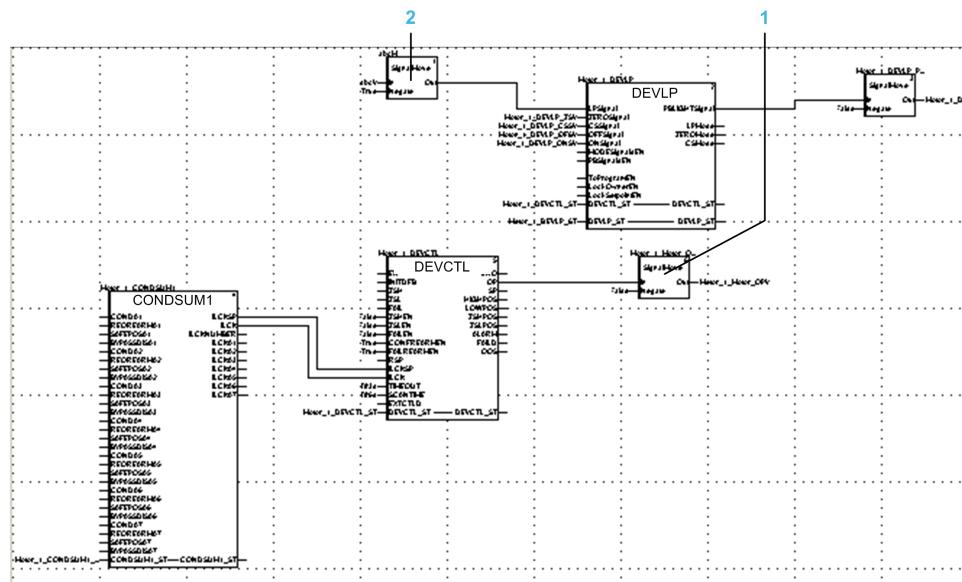
**NOTE:** Figures of sections of Control Expert that appear in this topic show DFBs with some non-legible text such as pin names. The purpose of these figures is to illustrate the position of DFBs; the text is not relevant in this context.

### Generating Motor Facets at Once

The figure shows the configuration of instance **Motor\_1** in the **Application Explorer**.



The figure shows the section layout after assigning the set of candidate Control facets of instance **Motor\_1** to an FBD section and generating it. Function blocks encapsulated in the assigned facets occupy positions as they are defined by the \$Motor template.



**1** **SignalMove** function block generated by selecting the **OPDOSignal** element

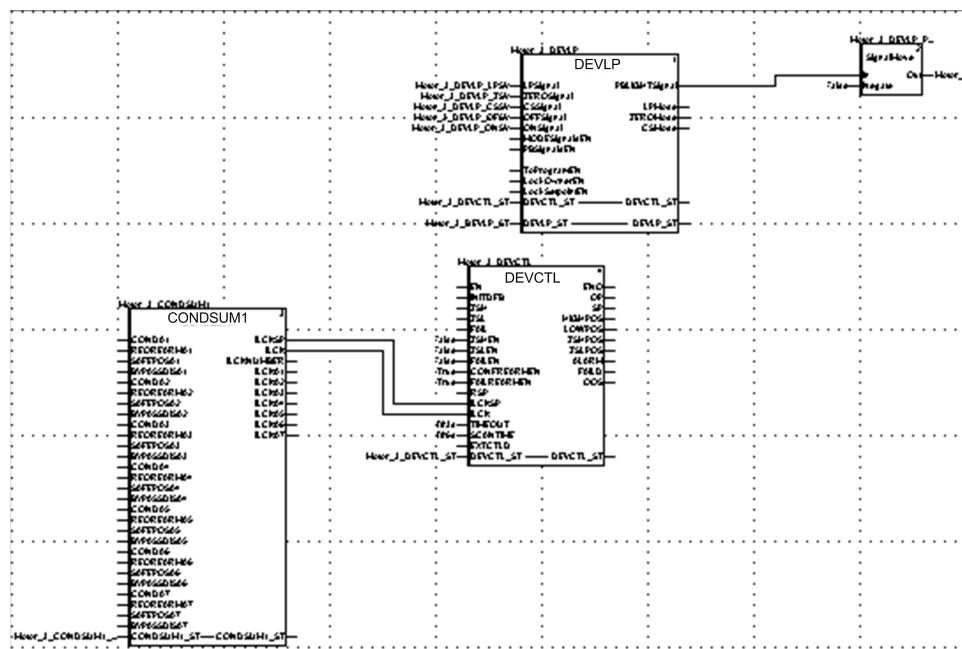
**2** **SignalMove** function block generated by enabling the signal negate function of the selected **LPModeDISignal** element

## Generating Motor Facets in Steps - First Generation

To start with, instance **Motor\_3** has the same configuration as instance **Motor\_1** except for the following:

- The optional **OPDOSignal** element is not selected.
- The signal negate function of the **LPModeDISignal** element is not enabled.

The figure shows the section layout after assigning the set of candidate Control facets of instance **Motor\_3** to an FBD section and generating it. Function blocks encapsulated in the assigned facets occupy positions as they are defined by the \$Motor template.



## Selecting the OPDOSignal Element and Performing Second Generation

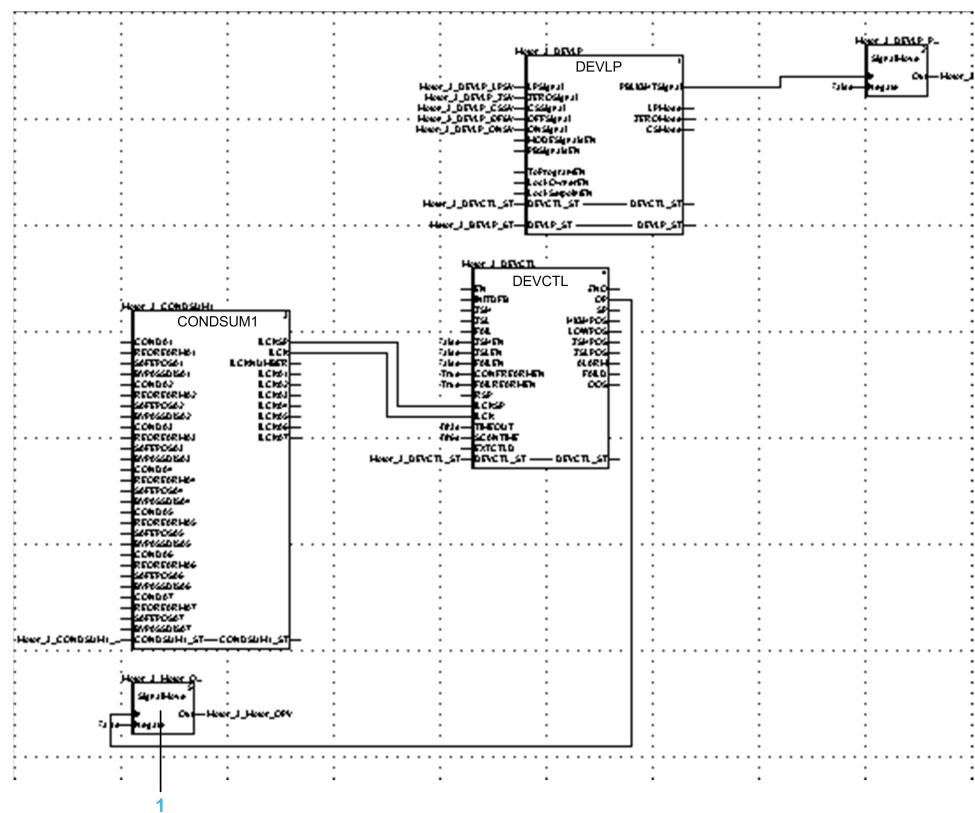
The figure shows the **Motor\_3\_Motor\_OP** facet that has been created by selecting the optional **OPDOSignal** Element and assigning it to the FBD section.

FBD Section - Assignments						
Facet	Facet Template	Path	Order	Assignment	Generation	
Motor_3_DEVCTL	SDEVCTL_UL	Control\Motor	0	Assigned	Generated	
Motor_3_CONDSUM1	SCONDSUM1_UL	Control\Interlocks	1	Assigned	Generated	
Motor_3_DEVLP_LPS	SDISignal_UL	Control\LocalPanel	2	Assigned	Generated	
Motor_3_DEVLP_ZS	SDISignal_UL	Control\LocalPanel	3	Assigned	Generated	
Motor_3_DEVLP_CSS	SDISignal_UL	Control\LocalPanel	4	Assigned	Generated	
Motor_3_DEVLP_OFS	SDISignal_UL	Control\LocalPanel	5	Assigned	Generated	
Motor_3_DEVLP_ONS	SDISignal_UL	Control\LocalPanel	6	Assigned	Generated	
Motor_3_DEVLP_PBS	SDOSignal_UL	Control\LocalPanel	7	Assigned	Generated	
Motor_3_DEVLP	SDEVLP_UL	Control\LocalPanel	8	Assigned	Generated	
Motor_3_Motor_OP	SDOSignal_UL	Control	9	Assigned	Non Generated	

The section is then generated again.

Blocks encapsulated in **Non Generated** facets that are created by selecting optional elements are positioned at the end of the section content and at the outer left; as opposed to where defined by the \$Motor template (see callout (1), page 17).

The figure shows the position of the function block encapsulated in the **Motor\_3\_Motor\_OP** facet after the second generation of the section.



1 SignalMove function block generated by selecting the **OPDOSignal** element

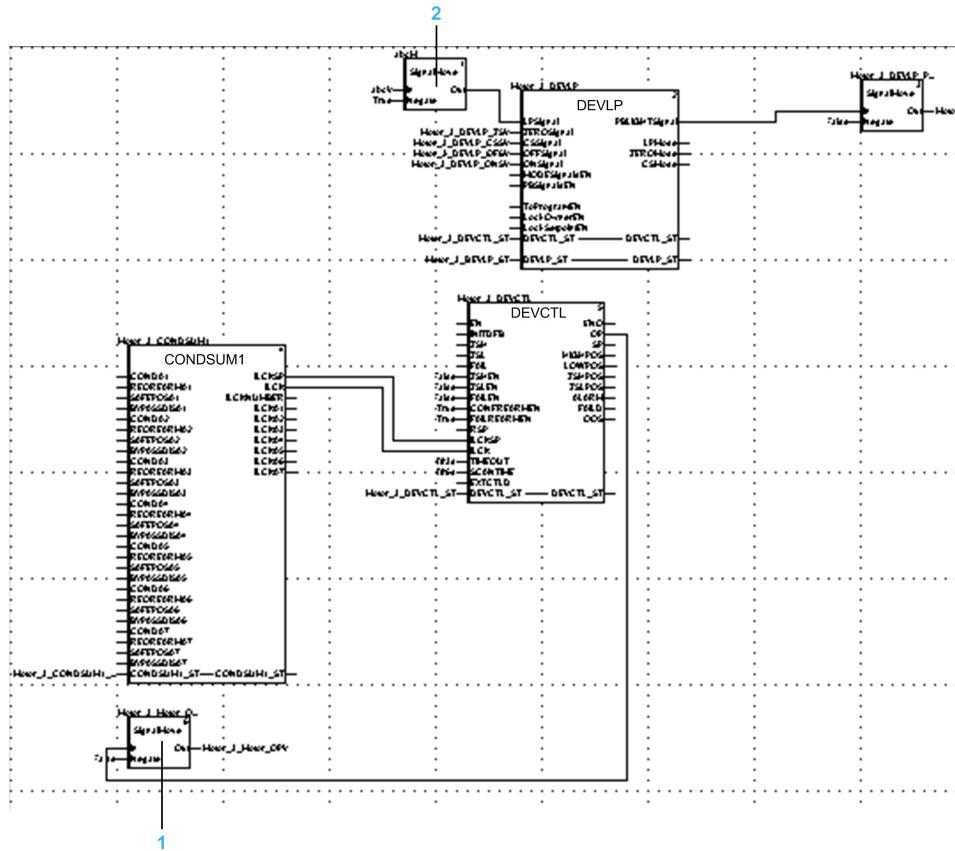
## Negating the LPModeDISignal Element Signal and Performing Third Generation

The figure shows the status of facets **Motor\_3\_DEVL\_LPS** and **Motor\_3\_DEVL\_LP** facets that has changed to **Out Of Date** after enabling the signal negate function of the **LPModeDISignal** element. No new facets have been created.

FBD_Section - Assignments						
Facet	Facet Template	Path	Order	Assignment	Generation	
Motor_3_DEVCTL	\$DEVCTL_UL	Control\Motor	0	Assigned	Generated	
Motor_3_CONDSUM1	SCONDSUM1_UL	Control\Interlocks	1	Assigned	Generated	
Motor_3_DEVLP_LPS	SDISignal_UL	Control\LocalPanel	2	Out Of Date	Generated	
Motor_3_DEVLP_ZS	SDISignal_UL	Control\LocalPanel	3	Assigned	Generated	
Motor_3_DEVLP_CSS	SDISignal_UL	Control\LocalPanel	4	Assigned	Generated	
Motor_3_DEVLP_OFS	SDISignal_UL	Control\LocalPanel	5	Assigned	Generated	
Motor_3_DEVLP_ONS	SDISignal_UL	Control\LocalPanel	6	Assigned	Generated	
Motor_3_DEVLP_PBS	SDOSignal_UL	Control\LocalPanel	7	Assigned	Generated	
Motor_3_DEVLP	\$DEVLP_UL	Control\LocalPanel	8	Out Of Date	Generated	
Motor_3_Motor_OP	SDOSignal_UL	Control	9	Assigned	Generated	

During a subsequent generation, when sufficient space is available, the software positions blocks encapsulated in **Out Of Date** facets as defined in the template referencing them.

The figure shows the position of the function block encapsulated in the **Out Of Date Motor\_3\_DEVL\_LPS** facet after the third generation.

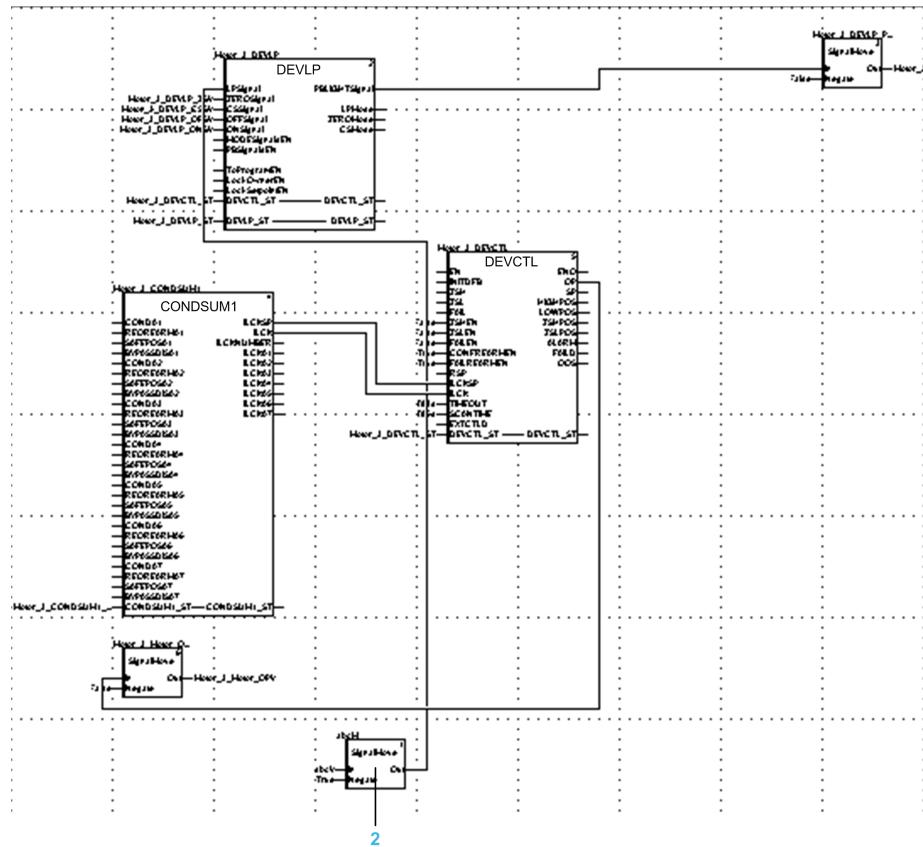


**1** **SignalMove** function block generated by selecting the **OPDOSignal** element.  
The block was generated by the second generation

**2** **SignalMove** function block encapsulated in the **LPModeDISignal** element, created by enabling the signal negate function and performing the third generation (**Motor\_3\_DEVL\_LPS** facet). The block occupies a position as defined in the template referencing its facet.

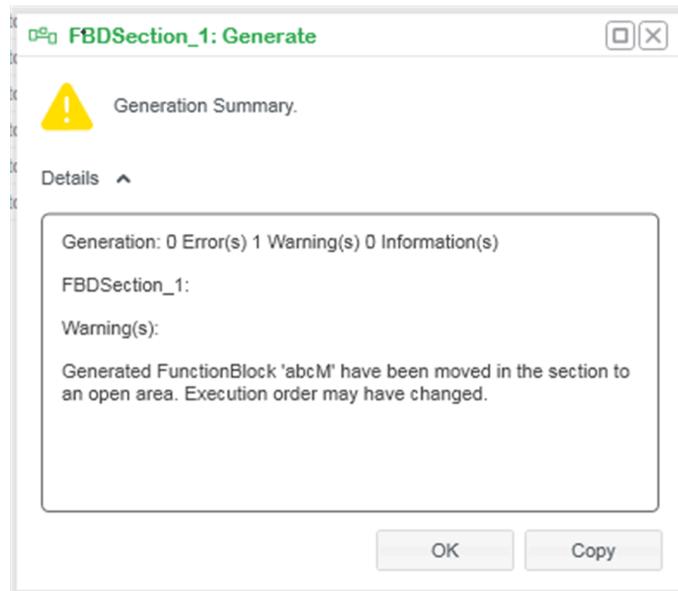
**NOTE:** If you move the **DEVLP** function block to the left during refinement before performing the third generation, it occupies the space initially allocated to the *SignalMove* function block (2) encapsulated in the **Motor\_3\_DEVL\_LPS** facet. In such case, the software positions the new function block at the end of the section content but at its original horizontal position (X axis).

The figure shows the position of the *SignalMove* function block encapsulated in the **Out Of Date Motor\_3\_DEVL\_LPS** facet after the third generation if you move the **DEVLP** function block left before generating.



**2** *SignalMove* function block encapsulated in the **LPMODEDISIGNAL** element, created by enabling the signal negate function and performing the third generation.

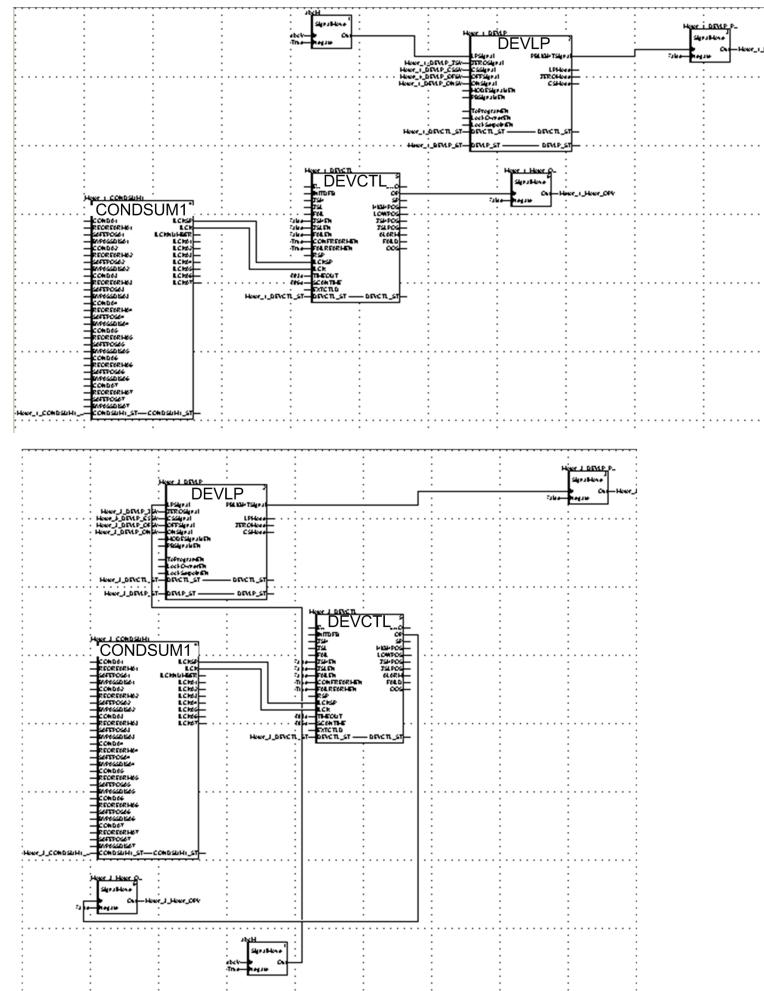
After generating this type of **Out Of Date** facets, if the software has moved a function block to the end of the section content, it displays a summary message. The message indicates the name of the function blocks that were moved. It also informs you that the execution order of these function blocks may have been changed.



Similarly, the summary message is also displayed when the software generates **Inconsistent** facets and moves their function block.

## Comparing Function Block Layouts - Summary

The figure shows side by side the two function block layouts generated separately for instances **Motor\_1** (top) and **Motor\_3** (bottom).



**NOTE:** For instance **Motor\_3**, the use case that is shown is when the **DEVLP** function block is moved to the left during refinement before performing the third generation.

## Assigning Facets of Another Instance to an Existing FBD Section

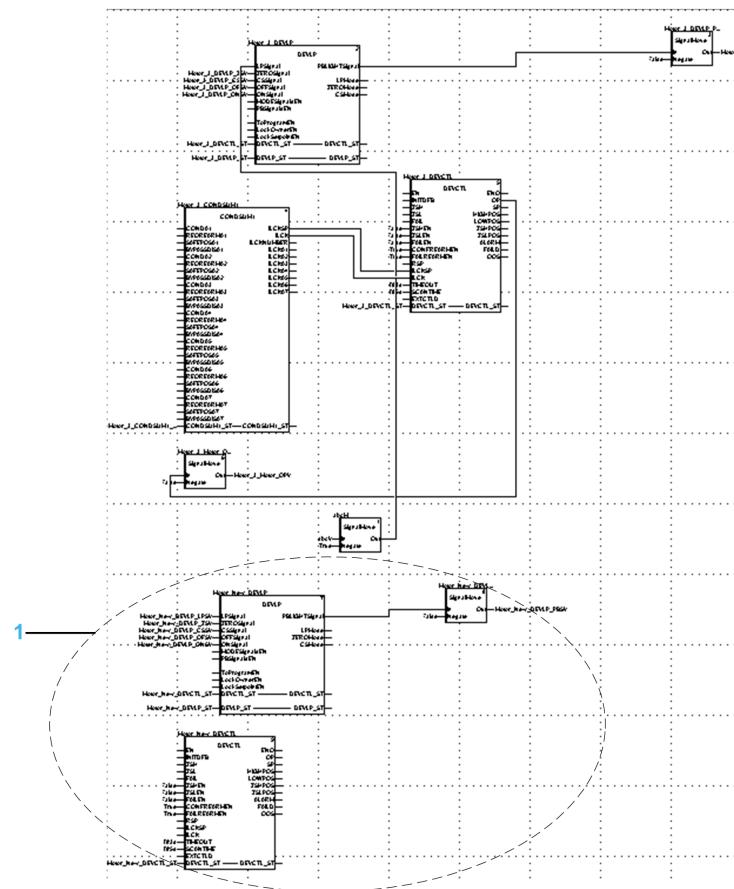
To illustrate this scenario, a new instance of the \$Motor sample template is created and its facets assigned to the FBD section containing facets of **Motor\_3**.

The figure shows the candidate Control facets of instance **Motor\_New** that have been assigned to the same FBD section.

FBD_Section - Assignments						
Facet	Facet Template	Path	Order	Assignment	Generation	
Motor_3_DEVCTL	\$DEVCTL_UL	Control\Motor	0	Assigned	Generated	
Motor_3_CONDSUM1	\$CONDSUM1_UL	Control\Interlocks	1	Assigned	Generated	
Motor_3_DEVLP_LPS	\$DISignal_UL	Control\LocalPanel	2	Assigned	Generated	
Motor_3_DEVLP_ZS	\$DISignal_UL	Control\LocalPanel	3	Assigned	Generated	
Motor_3_DEVLP_CSS	\$DISignal_UL	Control\LocalPanel	4	Assigned	Generated	
Motor_3_DEVLP_OFS	\$DISignal_UL	Control\LocalPanel	5	Assigned	Generated	
Motor_3_DEVLP_ONS	\$DISignal_UL	Control\LocalPanel	6	Assigned	Generated	
Motor_3_DEVLP_PBS	\$DOSignal_UL	Control\LocalPanel	7	Assigned	Generated	
Motor_3_DEVLP	\$DEVLP_UL	Control\LocalPanel	8	Assigned	Generated	
Motor_3_Motor_OP	\$DOSignal_UL	Control	9	Assigned	Generated	
Motor_New_DEVCTL	\$DEVCTL_UL	Control\Motor	10	Assigned	Non Generated	
Motor_New_COND SUM	\$CONDSUM1_UL	Control\Interlocks	11	Assigned	Non Generated	
Motor_New_DEVLP_LP	\$DISignal_UL	Control\LocalPanel	12	Assigned	Non Generated	
Motor_New_DEVLP_ZS	\$DISignal_UL	Control\LocalPanel	13	Assigned	Non Generated	
Motor_New_DEVLP_CS	\$DISignal_UL	Control\LocalPanel	14	Assigned	Non Generated	
Motor_New_DEVLP_OF	\$DISignal_UL	Control\LocalPanel	15	Assigned	Non Generated	
Motor_New_DEVLP_ON	\$DISignal_UL	Control\LocalPanel	16	Assigned	Non Generated	
Motor_New_DEVLP_PE	\$DOSignal_UL	Control\LocalPanel	17	Assigned	Non Generated	
Motor_New_DEVLP	\$DEVLP_UL	Control\LocalPanel	18	Assigned	Non Generated	

The section is then generated again.

The figure shows the position of the blocks encapsulated in the facets referenced by instance **Motor\_New** after generation. The software positions them at the end of the section content while respecting the layout as defined by the **\$Motor** template.



**1** *DECVCTL, DEVLP, and Signal/Move function blocks encapsulated in the facets referenced by instance **Motor\_New**. The Interlocks service has not been selected at the instance level, therefore the **CONDUM1** DFB has not been generated.*

## Refinement Stage

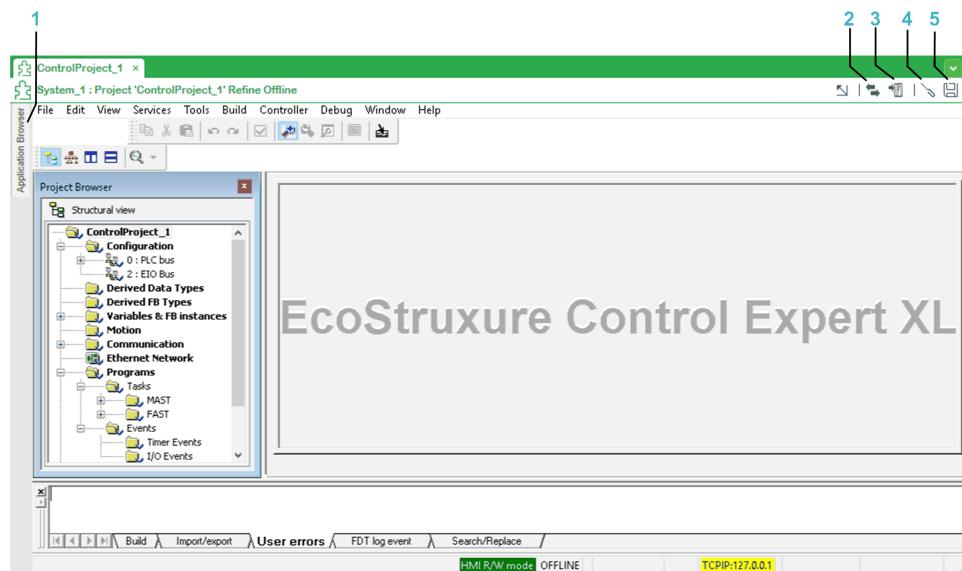
### Refining the Logical Control Control Participant Project

#### Getting Here

For information on how to get here, refer to Refining the Logical Control project (see EcoStruxure™ Process Expert, User Guide).

#### Control Expert User Interface

The following figure shows an example of the Control Expert window, which opens after selecting the **Refine** command for a Control project. The window is shown restored.



Item	Description
1	Tab of the pane in which you can see the project sections in relation to the structure of the application
2	Manage network variables button
3	Access device DDTs of unmapped hardware button
4	Check consistency button
5	Save button

**NOTE:** When you select the **Refine** command for a section, the Control Expert window shows the contents of the section but the **Project Browser** and the information window are not displayed. The **Application Browser** pane is also not available.

#### Scope of Services

You can change the following parts of the project:

- **Derived Data Types**
- **Derived FB Types**
- **Variables & FB Instances**
- **Program**
- **Animation Tables**
- **Operator Screens**
- **Documentation**

- Project settings, page 11

**NOTE:** You may need to unlock data, page 28 before you can modify it.

**NOTE:** By default, FBD sections that you create during refinement have a size of 360 rows x 240 columns.

## Refining Offline With CCOTF Enabled

Change configuration on the fly (CCOTF) (see EcoStruxure™ Process Expert, User Guide) is enabled by default for the CPU of the default configuration of the Control project. Do not use the **Build Changes** and **Rebuild All Project** commands. Doing so prevents notifications about CCOTF-incompatible modifications from being displayed or may cause CCOTF-related notifications to become inaccurate.

## Limitations

- Changes to the following parts of the Control Expert project are not applied to the built Control Participant project; data coming from the topology (configuration stage) is used instead:
  - The **Configuration**
  - The **Communication**
- Do not refine sections that contain hardware abstraction layer (HAL) DFB instances; otherwise, if you need to do an online refinement of the code in such sections later on, you will not be able to transfer these online refinements back to the logical Control Participant project, using the **Update Control Project** command.

Instead, put refinements outside of these sections.

- For more information on HAL DFB instances, refer to Managing HAL Variables and DFB Instances (see EcoStruxure™ Process Expert, User Guide).
- For more information on transferring online refinements, refer to *Updating with Changes to Sections Containing HAL DFBS* in Updating the Logical Control Participant Project (see EcoStruxure™ Process Expert, User Guide).
- Changes that you make to **Project Settings** are not applied to the built Control Participant project. Make such changes during configuration, page 43.
- You cannot unlock an FBD section that is generated by the software if facets are assigned to it and generated; therefore, you cannot delete the section. You need to delete it from the **Project Explorer**.
- When you delete a section, the following information applies depending on the type of section:

Type of section	Result after saving changes and closing the Control Participant window	Result when refining the Control Participant project again
FBD section that was created in the <b>Project Explorer</b> but not generated and without having saved refinement changes.	The section still appears in the <b>Containers</b> pane of the <b>Project Explorer</b> after other existing sections <sup>(1)</sup> .	The section is still present in last position.
Non-FBD section except LL984 segments.		
FBD section that was created during refinement but not generated.		
LL984 segment.	The section still appears in the <b>Containers</b> pane of the <b>Project Explorer</b> in last position.	The section is not present anymore.
(1) If you had deleted an LL984 segment during refinement, the section is positioned before the segment		

You need to delete the section manually in the **Project Explorer** to complete the deletion process (see EcoStruxure™ Process Expert, User Guide).

## Unlocking Locked Code

To modify code that is locked (see EcoStruxure™ Process Expert, User Guide), proceed as follows.

Step	Action
1	In the FBD editor of Control Expert, right-click the data that you want to modify and select <b>Unlock....</b> <b>Result:</b> A confirmation dialog box opens.
2	Click <b>Yes</b> . <b>Result:</b> The data is shown in black and can be edited.

**NOTE:** To modify a locked DFB pin, you need to unlock the actual parameter or the link that is connected to it first.

**NOTE:** Performing the following actions does not require unlocking data:

- Renaming sections.
- Modifying section properties.
- Changing the order of sections.

## REF\_TO Data Type

This topic describes variables that are generated by hardware abstraction layer (HAL) templates (for example, signal conditioning templates) and that you can see when you refine a Control project.

HAL is a mechanism that emulates access to hardware resources to maintain an application device-independent. By using HAL templates, you can use in the Control Expert project the elementary digital and analog variables they generate and that represent the value and/or quality of hardwired signals, independently of the configuration.

Starting with Process Expert 4.1, HAL templates generate variables, which use the Reference data type. These templates are referred to as HAL2.0 templates.

References that are declared by using the keyword REF\_TO contain the memory address of a variable and use the **Value** column for the assignment.

HAL variables have a specific identification (see EcoStruxure™ Process Expert, User Guide).

The software uses REF\_TO type variables to:

- Map different data types in a DDT.
- Overcome limitations associated to the use of BOOL and EBOOL data types by referencing the ANY\_BOOL data type. For more information, refer to *Boolean Types* in the help of Control Expert.

REF\_TO type variables generated by HAL2.0 templates have the following attribute settings:

- **Constant: True**
- **R/W Rights of Referenced Variable:** *True* for output variables. For example, variables that are used for peer to peer communication to write data to the server.

**NOTE:** Before using variables of the Reference data type during refinement, refer to *Reference Data Type Declarations* in the help of Control Expert.

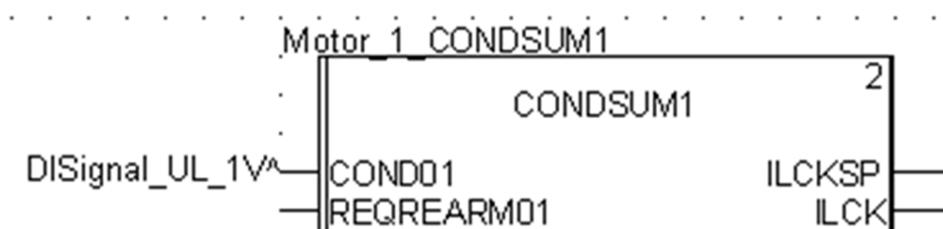
The following figure shows some examples of REF\_TO variables generated by templates where the reference is (from top to bottom):

- An IODDT structure element (M580 platform)

- A device DDT structure element (M580 platform)
- An internal word (M340 platform)
- A word extracted bit (M340 platform)

Name	Type	A.	Value
Z5_M5_DO_16_DOUTPUT_D0SV	REF_TO ANY_BOOL		REF[MOD_DIS_16_2.DIS_CH_OUT[15].VALUE]
STB_43_2_ATV31_30_ATV_InData	REF_TO ATV_STB_IN_DDT		REF[STBIsland_43_2_BMENOC030122.Inputs.Free[16]]
STB_43_2_AI_01_AINPUT_AISV	REF_TO INT		REF[%MW659]
STB_43_3_DD_16_DOUTPUT_D0...	REF_TO ANY_BOOL		REF[%MW561.15]

References are dereferenced by using the caret postfix (^).



The table illustrates how topological addresses are expressed with HAL2.0 variables.

Example for HAL <sup>(1)</sup>	Example for HAL2.0
%MW100 in column <b>Address</b>	REF(%MW100) in column <b>Value</b>
MODULE.CH[x].VALUE in column <b>Alias</b>	REF(MODULE.CH[x].VALUE) in column <b>Value</b>
%MW100 in column <b>Address</b> (in case of a nested array).	REF(ATV.Inputs.Free[x]) in column <b>Value</b> (where ATV is the name of the device DDT created by the DTM).
(1) Process Expert up to V4.0 SP1.	

## PES\_CONST\_TRUE Elementary Variable

Any Control Participant project contains the *PES\_CONST\_TRUE* variable of data type BOOL with value *TRUE*.

This variable is used to be referenced by variables of data type REF\_TO, which reference variables of type ANY\_BOOL and which need to be initialized as *TRUE*. It is also used in place of variables of data type BOOL and EBOOL whose value is *TRUE*.

In the following example, *Var\_1*, which is created by the user and *PES\_CONST\_TRUE* both have the value *TRUE*.

Variables					
DDT Types					
Function Blocks					
Filter	T	Y	Name = ^		<input checked="" type="checkbox"/> EDT <input type="checkbox"/> DDT <input type="checkbox"/> IODDT <input type="checkbox"/>
Name	Type	Address	Value	Comment	
PES_CONST_TRUE	BOOL		TRUE	PES Generated Variable. Please Do Not Delete	
Var_1	REF_TO ANY_BOOL		REF(PES_CONST_TRUE)		

## Creating Network Variables

To create a network variable in the consumer project (see EcoStruxure™ Process Expert, User Guide), proceed as follows.

Step	Description
1	In the menu bar, click <b>Tools &gt; Data Editor</b> . <b>Result:</b> Control Expert displays the <b>Data Editor</b> window.
2	Enter the name of the variable that you want to create as network variable or select an existing variable. <b>NOTE:</b> Verify that the variable satisfies the network variable management rules (see EcoStruxure™ Process Expert, User Guide) and has the appropriate attribute settings (see EcoStruxure™ Process Expert, User Guide).

Step	Description
3	In the <b>Data Editor</b> , right-click the row containing the variable and select <b>Customize Columns...</b>  <b>Result:</b> Control Expert displays the <b>Column Configuration</b> window.
4	Select <b>Custom</b> .  <b>Result:</b> The <b>Custom</b> column is displayed in the <b>Data Editor</b> window.
5	Enter <i>P2P</i> in the <b>Custom</b> column.  <b>Result:</b> When you click the button to manage network variables, the software detects the variable as network variable.
6	Save your changes by clicking the  button in the toolbar of the Participant window.

**NOTE:** Verify that a variable with the same name and type exists in the owner project.

## Adding LL984 Segments

You can create and/or import LL984 segments during refinement offline.

You must enable the use of this language in Control Expert. In case of a segment creation, you must enable the setting first. If you have already deployed the Control project, applying this setting (see EcoStruxure™ Process Expert, User Guide) to the deployed project requires stopping the controller.

**NOTE:** You must also enable the use of this language in the project containing the configuration of the controller, page 46 that will be mapped to the executable of the Control project to be able to build the project.

To enable the use of the LL984 language in Control Expert, proceed as follows.

Step	Description
1	In the menu bar, click <b>Tools &gt; Project Settings....</b>  <b>Result:</b> The <b>Project Settings</b> window opens.
2	Under <b>Program</b> , click <b>Languages</b> and select <b>Ladder Logic 984 (LL984)</b> .
3	Click <b>OK</b> .  <b>Result:</b> The <b>Project Settings</b> window closes.  <b>NOTE:</b> You need to save this setting by clicking the  button in the toolbar of the Participant window.

## Viewing the Application Structure When Refining Control Projects

### Overview

When you refine a Control Participant project, the **Application Browser** pane displays FBD sections based on the location of instances whose Control facets are assigned to these sections.

It shows the relationship between the folder structure of the application and the sections of a Control Participant project. This is useful, for example, when you want to view the logic related to a specific area or subdivision of the application.

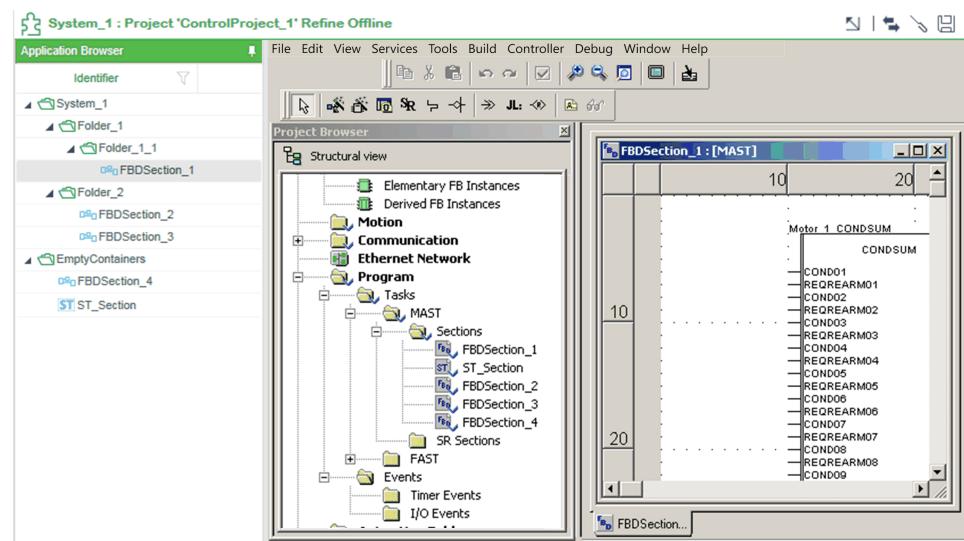
Only FBD and non-FBD sections that exist in the logical Control Participant project at the moment you select the **Refine** command are displayed. A section can appear several times depending on the facets it contains (see EcoStruxure™ Process Expert, User Guide).

The view is read-only.

**NOTE:** The pane is not available when you select the **Refine** command from a project section.

### Application Browser Pane

The following figure shows an example of the Control Participant window in which the **Application Browser** pane is pinned in open position.



### Refreshing the View

Once you have selected the **Refine** command, if you make changes (for example, renaming, adding, or deleting a section), the content of the pane is not refreshed until you close the Control Participant window and select the command again.

### Using the Pane

- To view the **Application Browser** pane, move the pointer over the tab. Click the pin button so that the pane remains open and does not overlap with the Control Participant window.
- By default, the application structure is shown collapsed. You can use the plus (+) and minus (-) keys to expand/collapse nodes of the folder structure.
- You can sort and filter sections by identifier.
- To hide the pane, click outside the pane or click the pin button so that it appears horizontal.

## Opening Program Sections from the Pane

Double-click a section in the **Application Browser** pane to open it in the Control Participant. You can also press **Enter** to open a section that is selected in the tree view.

Opening a section from the pane expands the **Program** node of the **Structural View** in the **Project Browser** of the Participant to show sections.

**NOTE:** Because the content of the pane is not refreshed during the refinement session, if you rename or delete a section, you cannot open it from the pane.

# Configuration Stage

## Overview

This section describes the automation hardware architectures that are integrated, the scope of services, and the limitations pertaining to the configuration tasks that you can perform in Control Expert when acting as a software Participant.

## Integrated Hardware Architectures

### Controller Platforms

Hardware templates for the following controller platforms are available:

- Modicon M580 and M580 Safety
- Modicon M340
- Modicon Quantum

**NOTE:** Applicable restrictions are documented in the corresponding topics.

### Modules

Hardware templates for the following types of modules are available:

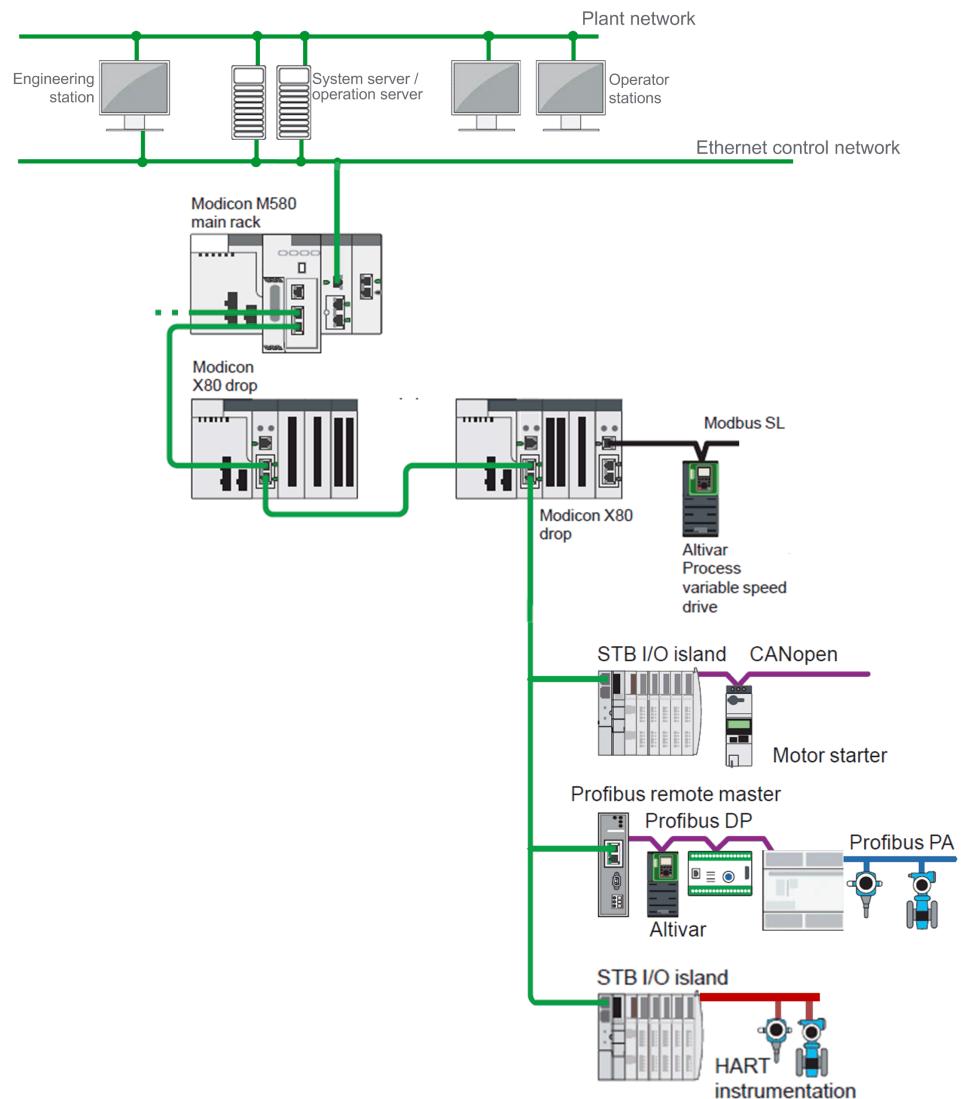
- Digital input/output modules
- Analog input/output modules
- Special modules (for example, counters (see EcoStruxure™ Process Expert , Foundation Application Templates, User Guide))
- Communication modules

**NOTE:** For certain modules that are supported by Control Expert, a corresponding hardware template may not be available in the Foundation library. For more information, refer to the topic describing not integrated hardware modules, page 40.

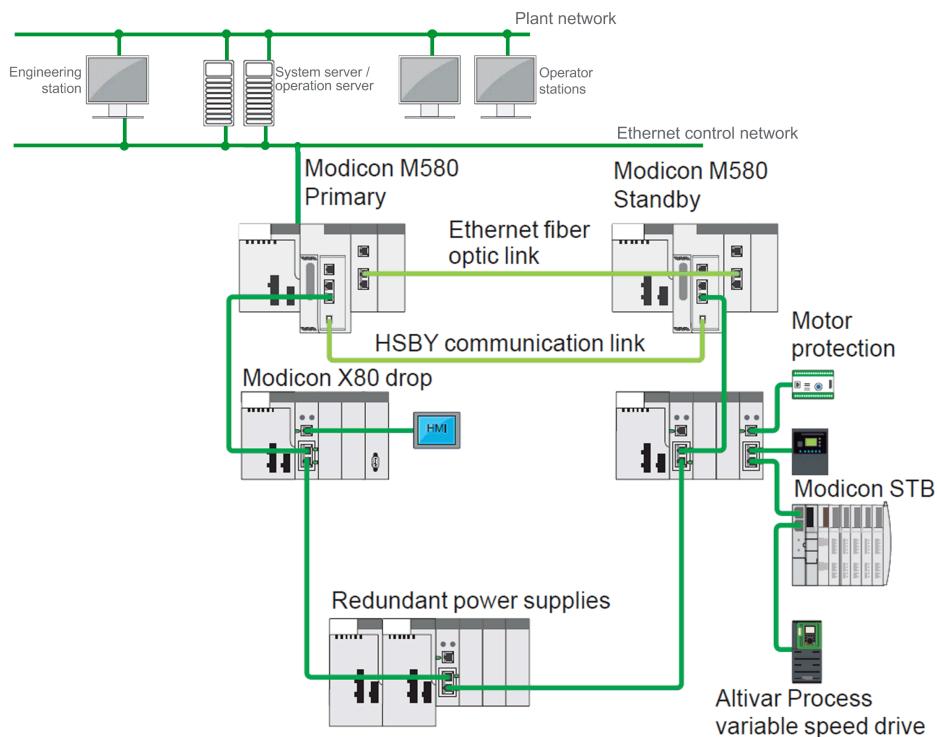
When you configure modules for which a hardware template exists, limitations may apply, page 43.

## Modicon M580 Platform

The following figure gives an overview of the architectures based on the Modicon M580 platform that you can configure and integrate into the topology of a system managed by the software.



Modicon M580 redundant controllers can also be configured and integrated into the topology of a system. The following figure shows an example of a typical architecture.



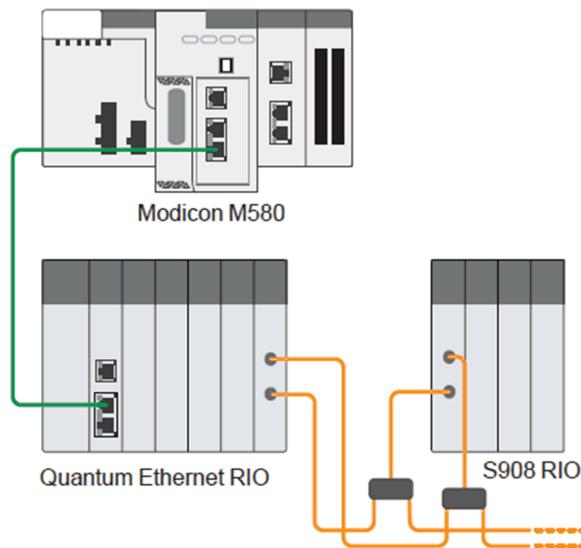
**NOTE:** The following can be configured:

- M580 CPUs up to reference BMEP586040.
- Redundant M580 CPUs up to reference BMEH586040.
- Redundant power supplies (BMXCP3522, BMXCP34002, BMXCP4022) can be configured by using dual power supply backplanes BMEXBP0602 and BMEXBP1002. The preventive maintenance functions of the power supply are not supported at the template level.
- M580 safety CPUs up to reference BMEP586040S.
- Redundant M580 safety CPUs up to reference BMEH586040S.
- M580 safety coprocessor BMEP584040SCPRO.

For information on other non-integrated architectures based on the Modicon M580 platform and communication protocols, refer to the *Modicon M580 System Planning Guide* and *Modicon M580 Safety System Planning Guide* in the help of Control Expert.

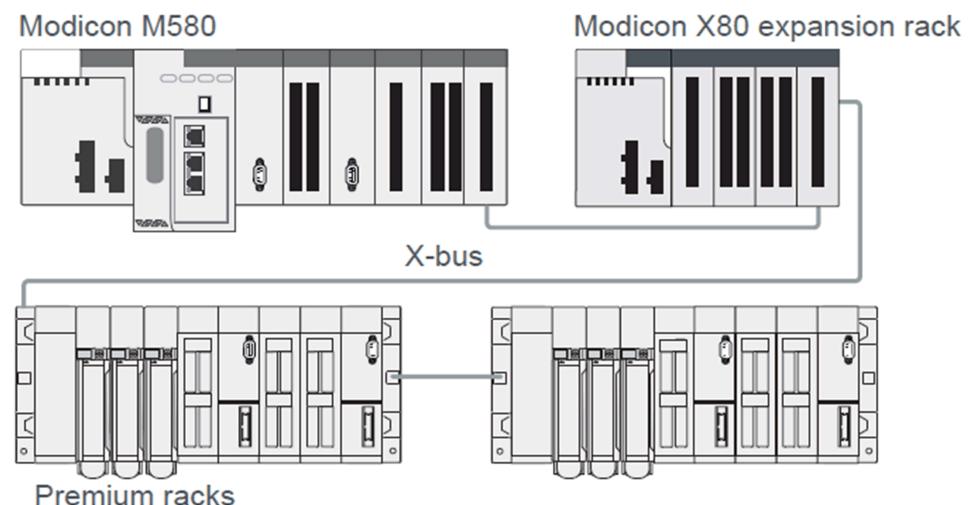
## Modernization of Modicon Quantum (S908) and Premium I/Os with Modicon M580

You can configure in the topology your existing Quantum I/Os on an S908 network so that they communicate with an M580 architecture.



For more information on the modernization of Quantum S908 architectures, refer to *Converting an S908 Architecture to M580* in the help of Control Expert.

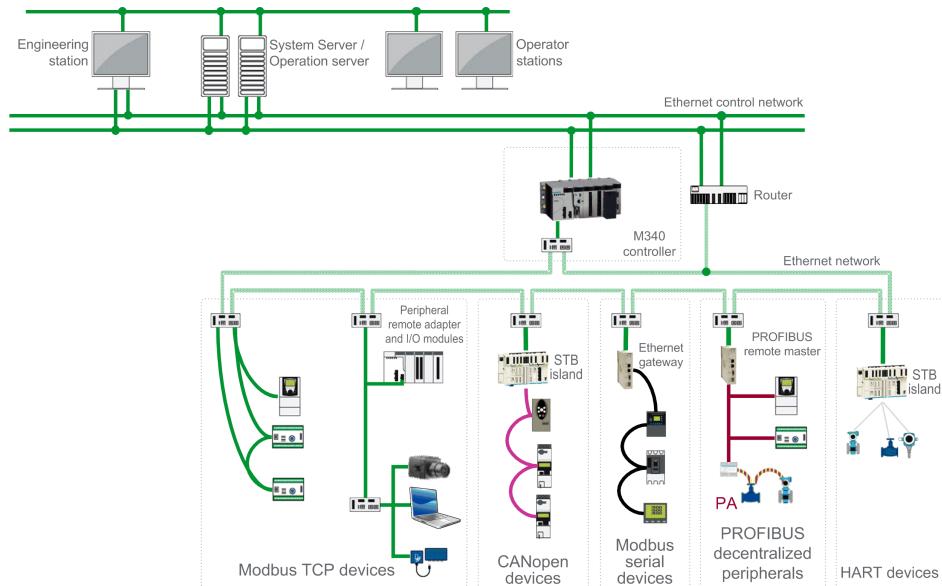
You can configure in the topology your existing Premium racks and extended racks so that they communicate with an M580 architecture.



For more information on the modernization of Premium architectures, refer to *Using Premium Racks in an M580 System* in the help of Control Expert.

## Modicon M340 Platform

The following figure gives an overview of the architectures based on the Modicon M340 platform that you can configure and integrate into the topology of a system managed by the software.

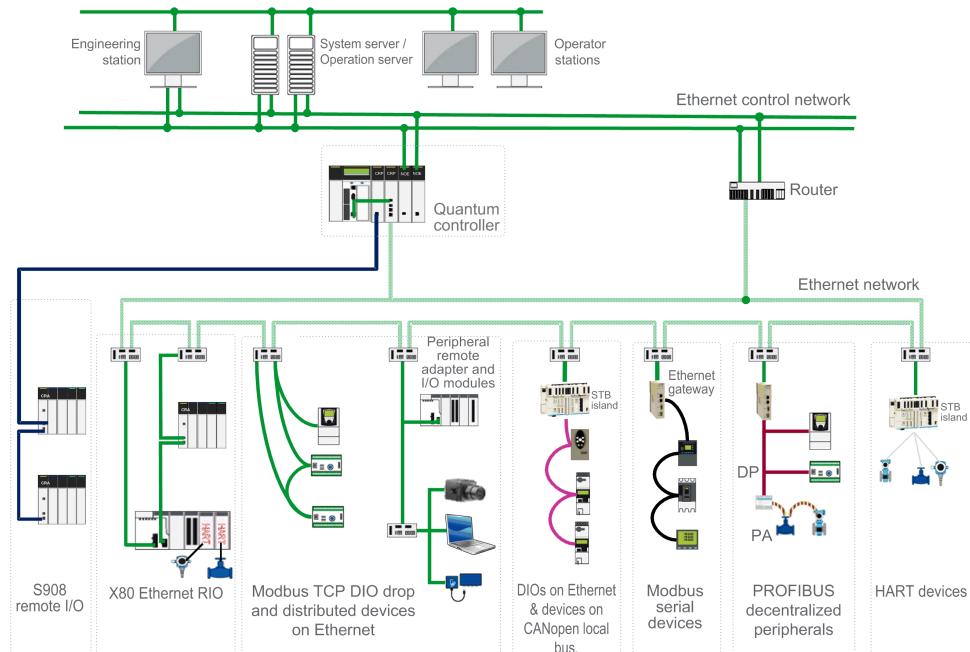


**NOTE:** Routers and network switches cannot be configured as part of the topology of a system.

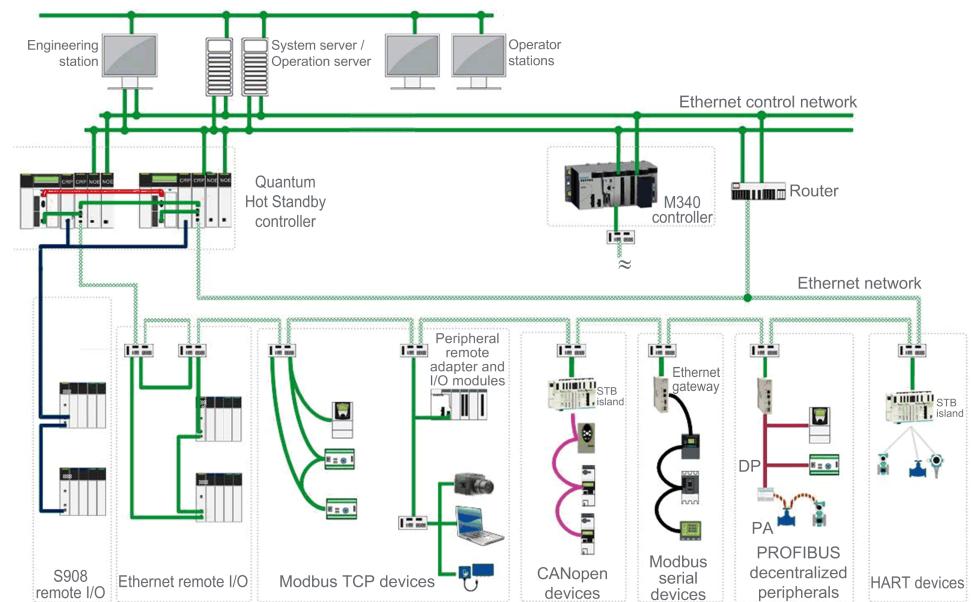
For information on other non-integrated architectures and communication types based on the Modicon M340 platform, refer to *Modicon M340 Platform* in the help of Control Expert.

## Modicon Quantum Platform

The following figure gives an overview of the architectures based on the Modicon Quantum platform that you can configure and integrate into the topology of a system managed by the software.



Modicon Quantum Hot Standby controllers can also be configured and integrated into the topology of a system. The following figure shows examples of typical architectures.



**NOTE:**

- Only Quantum and Modicon X80 (including Modicon X80 BME) Ethernet remote I/O drops can be configured.
- Routers and network switches cannot be configured as part of the topology of a system.

For information on other non-integrated architectures and communication types based on the Modicon Quantum platform, refer to the *Quantum Ethernet I/O System Planning Guide* in the help of Control Expert.

## Not Integrated Hardware Modules

### Overview

Modules for which no device-specific template is available are modeled by using the *\$UnknownModule* topological template so that you can add them to the configuration. However, for these modules, no service is provided by the software.

You cannot add to the configuration modules that are not supported.

### Replacing the *\$UnknownModule* Template

If you have already configured a module in the topology of the system and it is using the *\$UnknownModule* template, in case a template for this module is now available in the Global Templates library and you want to use it instead, you cannot replace it directly.

You need to remove the module from the configuration, save changes, and add the module again. This requires that you configure the module again.

### Modicon M580 Platform

The table lists the modules for which no device-specific template is available in the Global Templates library.

Communication modules	Special modules
BMXEIA0100	BMXEHC0800
BMXNOC0301	BMXMSP0200
BMXNOC0402	BMXEAE0300
BMECXM0100	PMXCDA0400
BMXNGD0100	
BMENOR0400H	
PMEUCM0202	
PMEGPS0100	
PMEIBS011	

The table lists the Premium I/O modules for which no device-specific template is available in the Global Templates library.

I/O modules	Counting modules	Weighing modules
TSXPAY262	TSXCTY2A	TSXISPY101
TSXPAY282	TSXCTY4A	

The table lists the S908 architecture modules for which no device-specific template is available in the Global Templates library.

Digital I/O modules	Analog I/O modules	Communication modules	Expert	Motion
GENIO	GENANAIO	140XBE10000	140ESI06210	140MSB10100
		140EIA92100	140DCF07700	140MSC10100
			140XCP90000	
			140ERT85430	

### Modicon M340 Platform

The table lists the modules for which no device-specific template is available in the Global Templates library.

Communication modules	Special modules
BMXEIA0100	BMXMSP0200
BMXNOC0401	BMXAE0300
BMXNOC0401.2	

**NOTE:** CANopen drops are not supported. The software does not create instances for CANopen devices and their bus when you add such devices on the CANopen bus.

## Modicon Quantum Platform

The table lists the modules for which no device-specific template is available in the Global Templates library.

Digital I/O modules	Analog I/O modules	Communication modules	Special modules
GENIO	GENANAIO	GENNOM	140ERT85420
		PTQPDPMV1	140ERT85430
		140NVM10000	140ESI06210
		140XBE10000	140XCP90000
		140NOG11100	140MSB10100
		140NOM2xx00	140MSC10100
		140NOC77101	140HLI34000
		140EIA92100	140DCF07700

**NOTE:** The following are not supported:

- 140NOC77100
- 140NOG11100
- Legacy 800 series I/O drops and their racks.
- SY/MAX drops.

## STB Islands

No device-specific templates are available in the Global Templates library for the following hardware components:

- STB modules:
  - STBCPS2111
  - STBEHC0320
  - STBXMP1100
  - STBXBE1100
  - STBXBE1300
  - ATV32 (CANopen)
  - TeSys U LU9RFL15 (accessories)
  - Obsolete modules
- Schneider Electric and third-party partner modules:
  - Any FTB devices
  - BTL5-H1 - V4.xx
  - CPV-CO2 (No inputs)
  - CPV-CO2 (With inputs)
  - RMV04-CO - V1.xx
  - Scaime eNod-4T - V1.00

- XCC-351xxs84CB - V1.xx

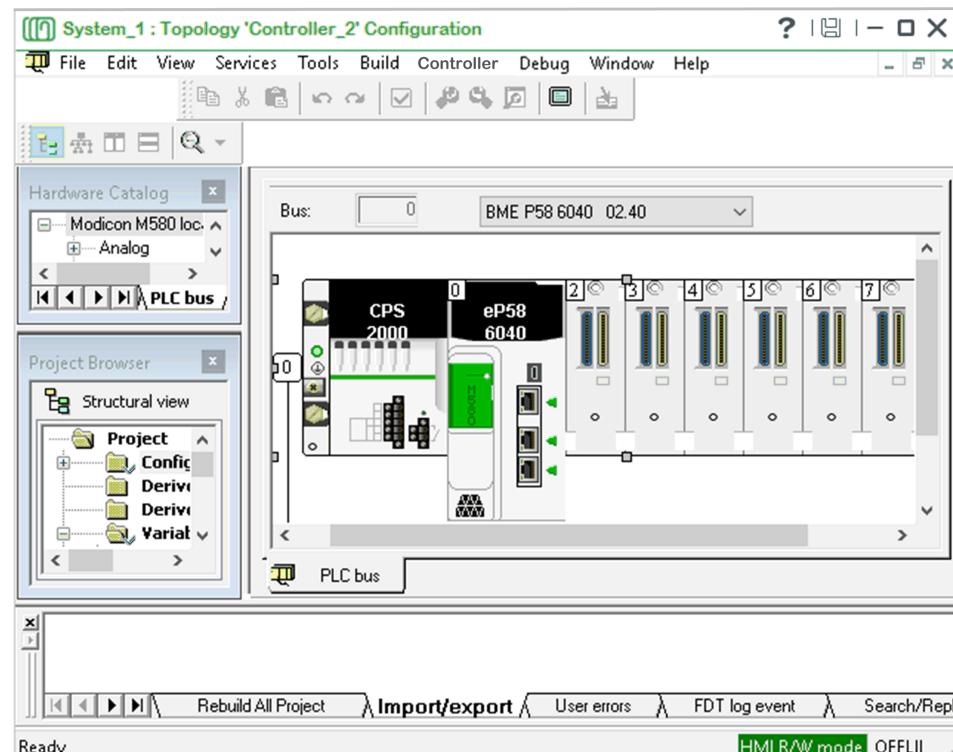
## Configuring a Controller

### Getting Here

For information on how to get here, refer to Configuring the Controller (see EcoStruxure™ Process Expert, User Guide).

### Control Expert User Interface

The following figure shows an example of the Control Expert window with the default standalone Modicon M580 configuration that opens after selecting the **Configure** command from an M580 entity and double-clicking **PLC Bus** in the **Project Browser**.



**NOTE:** The default configuration that is opened corresponds to the platform that you have chosen when selecting the **Create Controller** command in the **Topology Explorer**. It uses a CPU module with the latest firmware that is available in the version of Control Expert included with EcoStruxure Process Expert. Later versions may exist. Selecting an earlier version of the firmware may restrict the functionality. Refer to the platform release notes for details on firmware version minimum requirements.

### Scope of Services

For a controller, you can configure:

- Local racks and drops.
- Power supply modules.
- The CPU module.
- Communication modules.
- Communication networks, IP addresses, and subnet masks.
- Device type managers (DTMs) for child devices of NOC communication modules, which use the following communication protocols:
  - Modbus TCP
  - HART
- I/O modules in local and remote racks, including HART analog I/O modules.

You can change **Project Settings**, page 11 to apply them to the built Control Participant project. However, the software may override, page 11 some of these settings during the build process.

**NOTE:** Configuration change on the fly (CCOTF) is enabled by default. Before performing a CCOTF-compatible modification (see EcoStruxure™ Process Expert, User Guide), refer to the topics describing the CCOTF functionality in the help of the Control Participant for your specific controller platform and follow the recommendations that they provide.

## Limitations

During the configuration of a controller, do not create or modify items or settings other than the ones described in *Scope of Services* as they are not saved to the configuration file.

The following configuration restrictions apply:

- When CCOTF is enabled, do not use the **Build Changes** and **Rebuild All Project** commands. Doing so prevents notifications about CCOTF-incompatible modifications from being displayed or may cause CCOTF-related notifications to become inaccurate.
- The configuration of the PRA DTM is not supported.
- Child devices that you configure by using DTMs are not managed in the topology of a system (except for HART analog I/O modules that you add to the local rack or drops). However, their configuration data is preserved during build and can be deployed to a controller.
- You can connect to the CPU module or NOC communication module of M580 controllers only by using the main IP address to perform deployment or execution tasks.
- You can save the configuration of a controller of the M580 platform only if you have selected the following I/O data type when adding a module:

Module position	Supported I/O data type
Local rack or drop	<b>Device DDT</b> <sup>(1)</sup>
Quantum drop (on Ethernet or S908 network)	<b>State Ram</b> <sup>(2)</sup>
Premium rack	<b>Topological</b>

**(1)** NOC communication modules can be added even though they appear as supporting only the **Topological** I/O data type

**(2)** For these modules, the module health bit address is set to *REF(PES\_CONST\_TRUE)* (instead of, for example, *REF(DROP\_1.IO\_HEALTH\_RACK1.1)*) independently of the actual status of the module

Topological templates are available only for hardware components presented in the topic describing integrated hardware architectures, page 34.

## Firmware Version Compatibility

You need to use a firmware version that is compatible with newly supported modules and/or data types (for example, the Modicon Quantum 140CPU65260 version 03.20 does not support the ANY\_BOOL data type. Version 03.30 does). You may need to upgrade physical CPU modules to a firmware version that is later than the version available in Control Expert.

For information on minimum firmware version requirements, refer to the platform release notes.

## Configuring NOC Memory with Quantum Platform

When a controller of the Quantum platform is configured with a NOC communication module and acting as client, configure the parameters of the

**Inputs** and **Outputs** sections so that sufficient memory is allocated to generate I/O scanner lines during build.

To access the parameters, double-click the NOC module in the **Local Bus** editor and select the **Configuration** tab.

## Considerations When Updating an Existing Configuration

The table describes the impact of changes to communication functions of an existing controller configuration.

Change	Result
Changing the IP address of a module that has the I/O scanner service enabled.	Sets the build state (see EcoStruxure™ Process Expert, User Guide) of the associated Control executable to <b>Out Of Date</b> if any communication mapping exists.  Refer to Changing the Controller Configuration (see EcoStruxure™ Process Expert, User Guide).
Disabling the I/O scanner service.	Deletes the communication channels in the executable of the consumer project.  Refer to Changing the Controller Configuration (see EcoStruxure™ Process Expert, User Guide).
Replacing or deleting the module.	After you acknowledge the notification: <ul style="list-style-type: none"> <li>Removes the physical interface link (see EcoStruxure™ Process Expert, User Guide) that exists for the module.</li> <li>Deletes the communication channels in the executables of the owner and consumer projects.</li> </ul> Refer to Changing the Controller Configuration (see EcoStruxure™ Process Expert, User Guide).
Removing the Ethernet network link of the module.	Refer to Managing Conflicting Connections to Ethernet Networks (see EcoStruxure™ Process Expert, User Guide).
Entering an IP address for a communication module that conflicts with the IP address of a communication module that is already configured in the system, and connected to the Ethernet network.	Refer to Changing the Controller Configuration (see EcoStruxure™ Process Expert, User Guide).
In a configuration where communication is performed with a communication module that validates IP addresses based on the subnet mask, changing the IP address of the module so that it belongs to a different subnet or changing the subnet address or mask.	Refer to Changing the Controller Configuration (see EcoStruxure™ Process Expert, User Guide).
Changing the configuration of a standalone controller that is connected to an Ethernet network to a redundant controller or the other way around.	Refer to the topic describing how to connect to an Ethernet network (see EcoStruxure™ Process Expert, User Guide).

## Configuring HART Modules With NOC Communication Module

The table outlines some of the steps to follow to configure a HART analog I/O module with a controller containing a NOC communication module.

Step	Action
1	Configure a controller of the M580 or Quantum platform.
2	Add a NOC module. <b>NOTE:</b> With Quantum platform, use 140NOC78000.
3	Add a HART analog I/O module to the local rack or a remote EIO drop. <b>NOTE:</b> With Quantum platform, you can add a HART module only in the Modicon X80 drop (BME).
4	Open the <b>DTM Browser</b> and add the DTM that corresponds to the HART module: <ul style="list-style-type: none"> <li>With Quantum platform or for HART modules in the local rack, right-click the DTM of the NOC.</li> </ul>

Step	Action
	<ul style="list-style-type: none"> <li>For HART modules in a remote EIO drop, right-click the DTM of the M580 ECPU.</li> </ul> <p><b>NOTE:</b> You need to add one DTM for each HART module.</p>
5	Open the DTM of the NOC module and/or ECPU.
6	Select the HART module in the <b>Device List</b> .
7	In the <b>Address Setting</b> tab, configure the IP information and/or the <b>Identifier</b> of the HART module.
8	Open the DTM of the HART module.
9	In the <b>Configuration &gt; Parameter Configuration</b> section, configure the channels of the HART module.
10	In the <b>Process Data</b> section, configure each enabled channel of the HART module.  <b>NOTE:</b> The <b>Primary Variable (PV)</b> is selected by default and is the only variable that is available in the <b>Hardware Mapping Editor</b> later on. The other data that you configure is preserved during build and can be deployed to a controller but is not usable at the software system level.
11	With a Quantum platform: <ul style="list-style-type: none"> <li>Double-click the NOC module in the <b>Local Bus</b> editor and configure <b>Inputs</b> and <b>Outputs</b> in the <b>Configuration</b> window.</li> <li>Double-click the DTM of the NOC module and enable <b>FTP</b> in the <b>Security</b> section of the properties of the DTM.</li> </ul>

**NOTE:**

- For more information on the M580 platform, refer to the *Modicon eX80 BMEAHI0812 HART Analog Input Module & BMEAHO0412 HART Analog Output Module User Guide*.
- For more information on the Quantum platform, refer to the topic *Adding a BMEAHO•12 HART Module to a Remote I/O Drop* in the help of Control Expert.

## Enabling the LL984 Language

If your Control project contains sections in LL984 language, you need to enable the language in the project containing the configuration of the controller that you will map to the executable of this Control project (service mapping). This is required for the build to complete successfully.

**NOTE:** The LL984 language may not be supported by certain CPU references.

To enable the use of the LL984 language, proceed as follows.

Step	Description
1	In the menu bar, click <b>Tools &gt; Project Settings...</b>  <b>Result:</b> The <b>Project Settings...</b> window opens.
2	Under <b>Program</b> , click <b>Languages</b> and select <b>Ladder Logic (LL984)</b> .
3	<b>Result:</b> The <b>Project Settings...</b> window closes.  <b>NOTE:</b> You need to save this setting by clicking the  button in the toolbar of the Participant window.

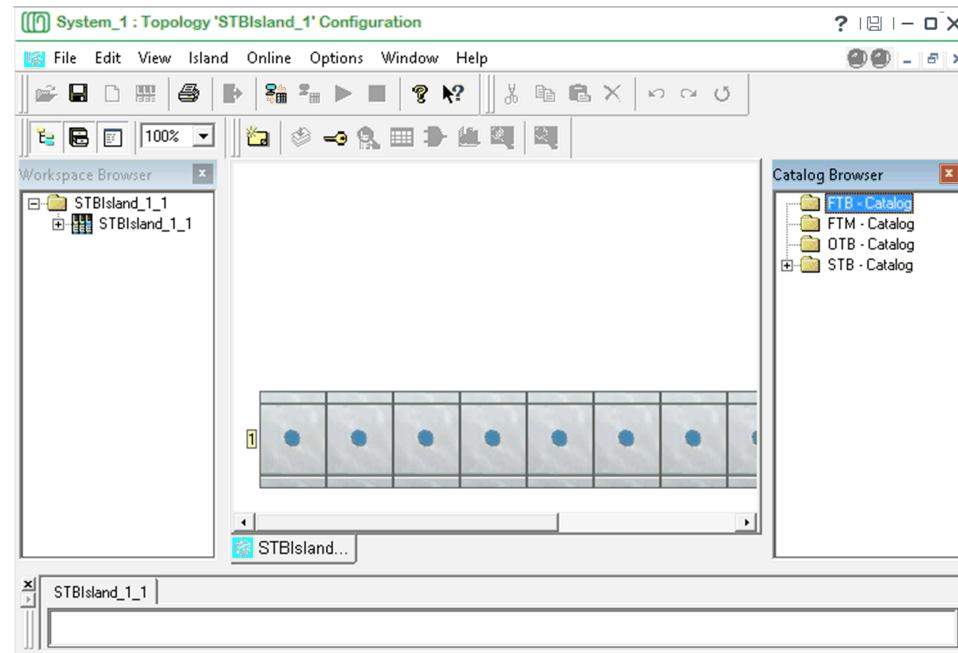
## Configuring an STB Island

### Getting Here

For information on how to get here, refer to Configuring the STB Island (see EcoStruxure™ Process Expert, User Guide).

### Advantys Configuration Software User Interface

The following figure shows an example of the Advantys Configuration Software (ACS) window embedded inside the Control Participant window, which opens after selecting the **Configure** command on an STB island entity.



### Scope of Services

For an STB island, you can configure the following:

- Its segments
- The network interface module (NIM)
- The power supply
- STB I/O modules
- HART modules
- Devices connected through the CANopen bus of the island

### Limitations

The IP address of the network interface module (NIM) is configured in the **Properties** (see EcoStruxure™ Process Expert, User Guide) window of the STB island in the **Topology Explorer**.

### Considerations When Updating an Existing STB Island Configuration

The table describes the impact of changes to communication functions of an existing STB island configuration.

Change	Result
Replacing the NIM of an STB island.	Any existing physical connection (see EcoStruxure™ Process Expert, User Guide) to an Ethernet network is maintained.
When the STB island communicates with a communication module that validates IP addresses based on the subnet mask, changing the IP address of the STB island so that it belongs to a different subnet.	Refer to Changing STB Island Properties (see EcoStruxure™ Process Expert, User Guide).

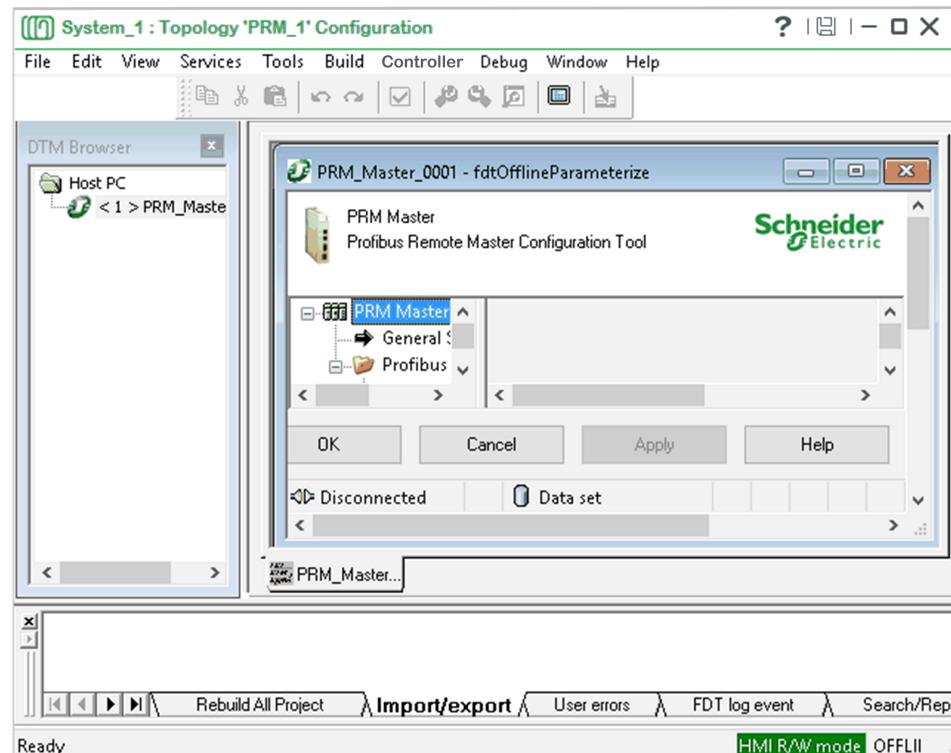
## Configuring a PROFIBUS Remote Master and Decentralized Peripherals

### Getting Here

For information on how to get here, refer to Configuring a PROFIBUS Remote Master and Decentralized Peripherals (see EcoStruxure™ Process Expert, User Guide).

### Control Expert User Interface

The following figure shows an example of the Control Expert window with the default PROFIBUS remote master (PRM) that opens after selecting the **Configure** command and double-clicking **PRM\_Master\_0001** in the DTM Browser.



**NOTE:** The base configuration that is loaded corresponds to the platform that you have selected in the **Properties** window of the RPM in the **Topology Explorer**.

### Scope of Services

Perform the following actions:

- Configure the PRM (IP address, and so on).
- Add and configure decentralized peripherals (DPs) by using either:
  - A DTM
  - A GSD file
- Adjust the **RD length** and **WR length** values in the **IO scanning** tab of the communication network in the **Project Browser** in case the total read/write length of the configured DPs exceeds 100 (default setting).

**NOTE:** The devices that are displayed in the **Add** dialog box are those for which a DTM is installed in the **Hardware Catalog** of Control Expert. You can add additional DTMs (see EcoStruxure™ Process Expert, Installation and Configuration Guide).

## Limitations

- Do not delete the PRM by using the **Delete** command in the context menu of the PRM inside Control Expert.
- Do not change the **Alias name** property of the PRM.
- The software only supports module profile **Periodic(10-10) Aperiodic(4-4)** (selectable in the **Modules Configuration** section of the GSD) when you add the **ATV71-Profibus-DPV1-Modular** GSD to the DTM of the PRM. This is because only this profile creates I/O variables that are compatible with the **PBATV7161 DFB** (see EcoStruxure™ Process Expert, Device Control Services User Guide).

## Downloading the PRM Configuration

After you have completed the PRM entity configuration, and successfully built the Control Participant project to which the controller that communicates with the PRM is mapped, you need to download the PRM configuration to the physical device on the network.

For more information, refer to *Introduction to Configuring the PRM Master DTM* in the help of Control Expert.

The table outlines the steps that allow you to access the **Store data to device** command of the contextual menu of the PRM Master.

Step	Action
1	Verify that the computer on which the engineering client is running is connected to the control network.
2	Verify that the PRM Master is connected to the same control network.
3	In the <b>Topology Explorer</b> , right-click the PRM entity and select <b>Configure</b> .
4	In the <b>DTM Browser</b> pane of Control Expert, right-click the PRM Master and select <b>Connect</b> .
5	Verify that Control Expert switched to online mode.
6	Right-click the PRM Master again and select <b>Store data to device</b> .

## Considerations When Updating an Existing PRM Configuration

The table describes the impact of changes to communication functions of an existing PRM configuration.

Change	Result
Changing the IP address of a PRM.	Sets the build state (see EcoStruxure™ Process Expert, User Guide) of the associated executable to <b>Out Of Date</b> if any communication mapping exists. Refer to Changing the PRM Configuration (see EcoStruxure™ Process Expert, User Guide).
When the PRM communicates with a communication module that validates IP addresses based on the subnet mask, changing the IP address of the PRM so that it belongs to a different subnet.	Refer to Changing the PRM Configuration (see EcoStruxure™ Process Expert, User Guide).

Change	Result
Entering an IP address for a communication module that conflicts with the IP address of a communication module that is already configured in the system, and connected to the Ethernet network.	<p>After you acknowledge the notification:</p> <ul style="list-style-type: none"><li>• Removes the physical interface link (see EcoStruxure™ Process Expert, User Guide) that exists for the module.</li><li>• Deletes the communication channels in the executables of the owner and consumer projects.</li></ul> <p>Refer to Managing Conflicting Connections to Ethernet Networks (see EcoStruxure™ Process Expert, User Guide).</p>
Adding DPs which causes the total read and/or write size to exceed 100.	<p>You cannot save the PRM configuration.</p> <p>Refer to Scope of Services, page 49.</p>

## Configuring IEC 61850 Communication Modules

### Getting Here

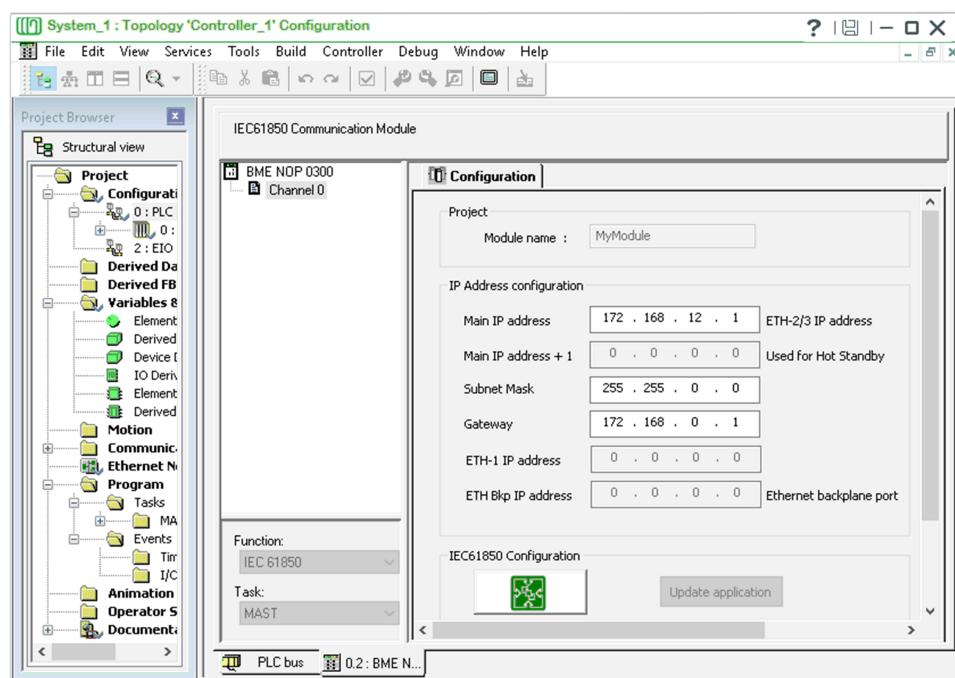
For information on how to get here, refer to Configuring the Controller (see EcoStruxure™ Process Expert, User Guide).

### Prerequisites

- You have a knowledge of IEC 61850 standards, content of services, data model, engineering process, and other necessary IEC 61850-related information.
- You have added a BMENOP0300 module to an M580 controller by using the **Configure** command.

### Control Expert User Interface

The following figure shows an example of the Control Expert window that opens after selecting the **Configure** command, opening the BMENOP0300 module, and setting the module name.



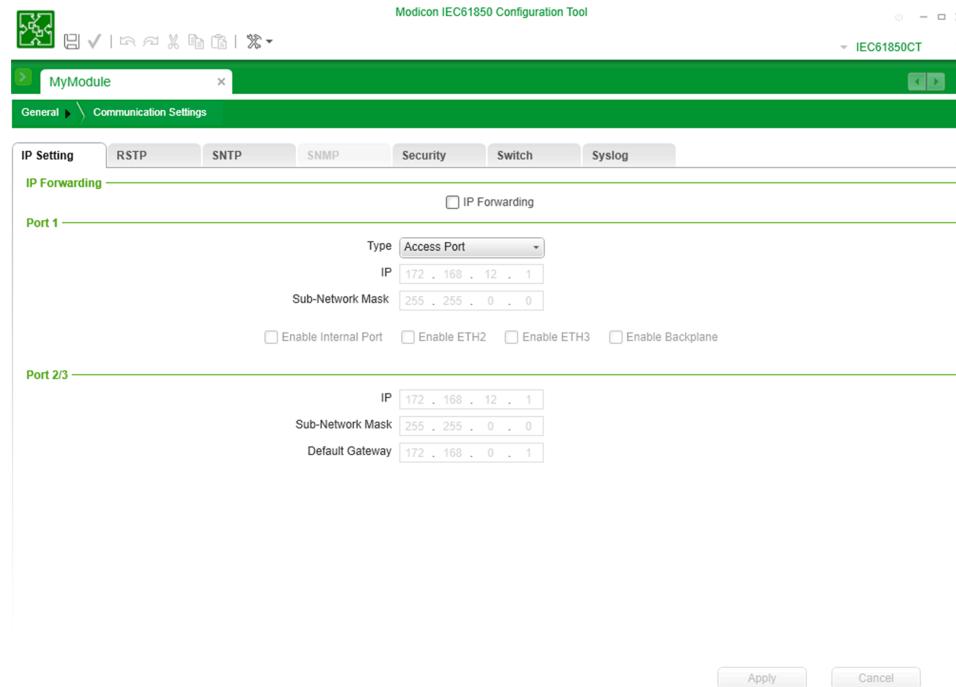
### Scope of Services

Open the **Modicon IEC 61850 Configuration Tool** to perform the following tasks:

- Configure the BMENOP0300 communication module as an IEC 61850 server or client.
- Configure the IP address settings for the module.
- Configure Ethernet services for the module such as RSTP, Security, switch settings.

**NOTE:** You can use the device DDT variables that are created when you configure the module in the Control Participant project by refining it (see EcoStruxure™ Process Expert, User Guide).

The following figure shows an example of a configuration window for communication settings that you can access after opening the configuration tool.



## Recommendations

Changes to the configuration of an IEC 61850 module that you make online require stopping the controller and cannot be applied to the logical Control Participant project by using the **Update Project** command.

Therefore, Schneider Electric recommends that you perform modifications offline in the **Topology Explorer** by using the **Configure** command, build the Control Participant project, and deploy it again.

You can apply modifications that you have made to device DDT variables to the logical Control Participant project. To do so, take advantage of the **Update** action for already created device DDTs.

## Limitations

- The topology of a system contains only the IEC 61850 communication modules. The management of the IEC 61850 intelligent electronic devices (IEDs) and the connection to supervision software is not managed.
- The embedded Control Expert does not limit the number of NOP communication modules that you can configure in a local rack. This number is related to your choice of CPU module. Refer to the help of the IEC 61850 communication module for details.
- Update the **Modicon IEC 61850 Configuration Tool** that is installed by EcoStruxure Process Expert only with versions that are available on the mySchneider support portal, page 6 and explicitly recommended for use with EcoStruxure Process Expert.

## Using the Modicon IEC 61850 Configuration Tool

To table outlines the steps to use the **Modicon IEC 61850 Configuration Tool**.

Step	Action
1	Name the module.  For information on how to name a module and use the <b>Modicon IEC 61850 Configuration Tool</b> , refer to the help of the tool (see EcoStruxure™ Process Expert, User Guide).
2	In the <b>Configuration</b> tab of the module, click <b>IEC61850 Configuration</b> .  <b>Result:</b> The configuration tool opens.
3	Proceed with the configuration of the module, save changes in the client/server configuration, and close the configuration tool.
4	Updating the application by clicking <b>Update application</b> in the <b>Configuration</b> tab of the module.  <b>Result:</b> The client/server device DDT variables are created.  <b>NOTE:</b> If you modify the configuration of the module after this step, you need to update the application again.
5	Revert to the procedure describing how to configure the controller (see EcoStruxure™ Process Expert, User Guide).

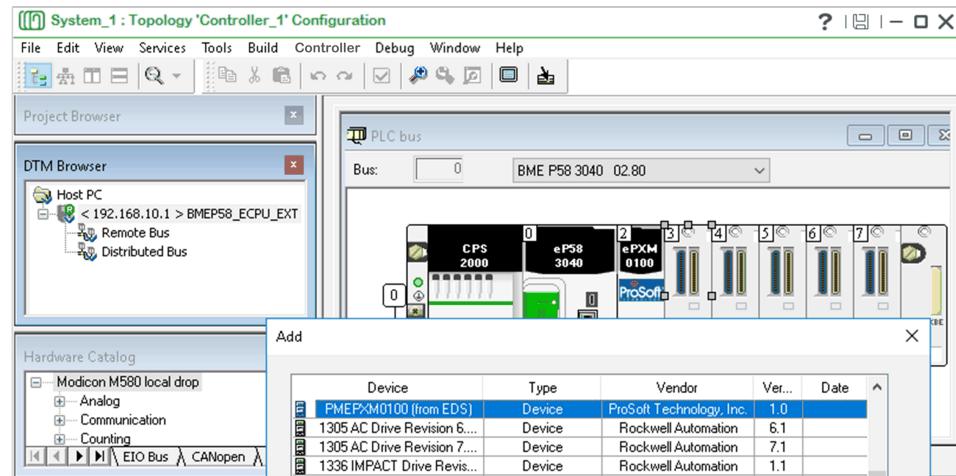
## Configuring PMEPXM0100 PROFIBUS Modules

### Getting Here

For information on how to get here, refer to Configuring the Controller (see EcoStruxure™ Process Expert, User Guide).

### Control Expert User Interface

The following figure shows an example of the Control Expert window that opens after selecting the **Configure** command, adding the PMEPXM0100 module, and opening the **DTM Browser**.



### Scope of Services

In Control Expert, you need to add a PMEPXM0100 module to an M580 standalone or redundant controller and configure it by following the steps described in the *PMEPM0100 ProSoft User Manual*. To download the manual, visit [www.se.com/en/download/document](http://www.se.com/en/download/document).

**NOTE:** For an overview of the entire procedure, refer to the description of the workflow (see EcoStruxure™ Process Expert, User Guide) to integrate the PMEPXM0100 PROFIBUS primary module and secondary devices into a system.

### Limitations

You need to perform certain steps of the configuration outside EcoStruxure Process Expert by using ProSoft Configurator for Modicon and following the steps described in the *PMEPM0100 ProSoft User Manual*.

**NOTE:** For an overview of the entire procedure, refer to the description of the workflow (see EcoStruxure™ Process Expert, User Guide) to integrate the PMEPXM0100 PROFIBUS primary module and secondary devices into a system.

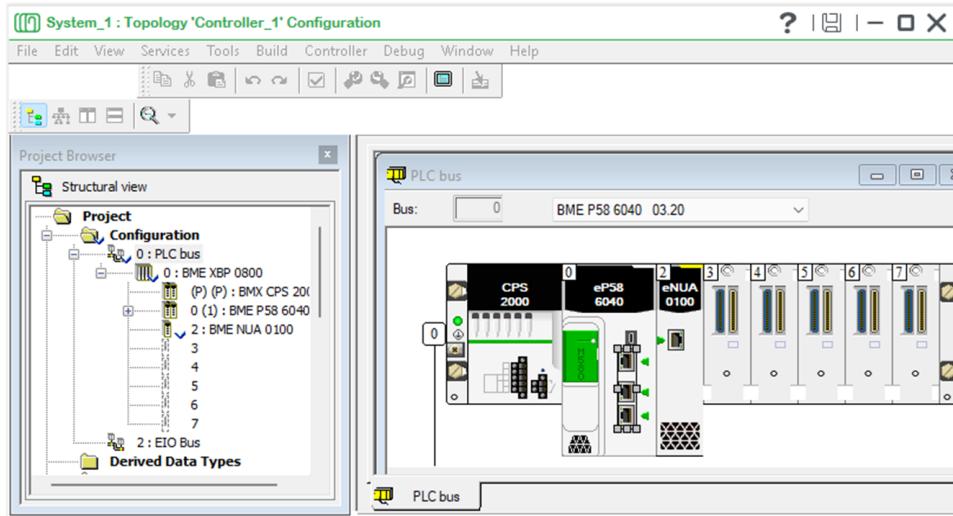
## Configuring BMENUA0100 OPC UA Embedded Modules

### Getting Here

For information on how to get here, refer to Configuring the Controller (see EcoStruxure™ Process Expert, User Guide).

### Control Expert User Interface

The following figure shows an example of the Control Expert window that opens after selecting the **Configure** command and adding the BMENUA0100 module.



### Scope of Services

In Control Expert, you need to add a BMENUA0100 or BMENUA0100.2 module to an M580 standalone or redundant controller and configure it. For details, refer to the *M580 BMENUA0100 OPC UA Embedded Module Installation and Configuration Guide*.

When you close the Control Expert window and save changes, the values that appear for the module in the **Device Editor** of the **Topology Explorer** are the following:

- IP address:
  - If the control port is disabled, the IPv4 address of the backplane port.
  - If the control port is enabled, the IPv4 address of the control port.
- TCP listening port: The value of **OPCUA TCP Listening Port**.

**NOTE:** Verify that in the Supervision project, **Protocol** of the tag container that is associated to the I/O device is set to *OPCUA Embedded*.

### Limitations

The following limitations apply:

- The use of IPv6 addresses is not supported and you cannot save the configuration if you select it for the control port of the module.
- Time stamping is not supported by OPC UA Server Expert. This includes BMENUA0100 modules, which embed OPC UA Server. As a result, when a BMENUA0100 module is configured in a rack along with modules with time stamping capability, such as BMXERT1604T, CRA adapter, or M580 CPU modules, time stamping variables can only provide the BMENUA0100 module time reference (for example, for alarms and events monitored from Supervision) instead of the at-source time stamping information that they normally provide.

## Build Stage

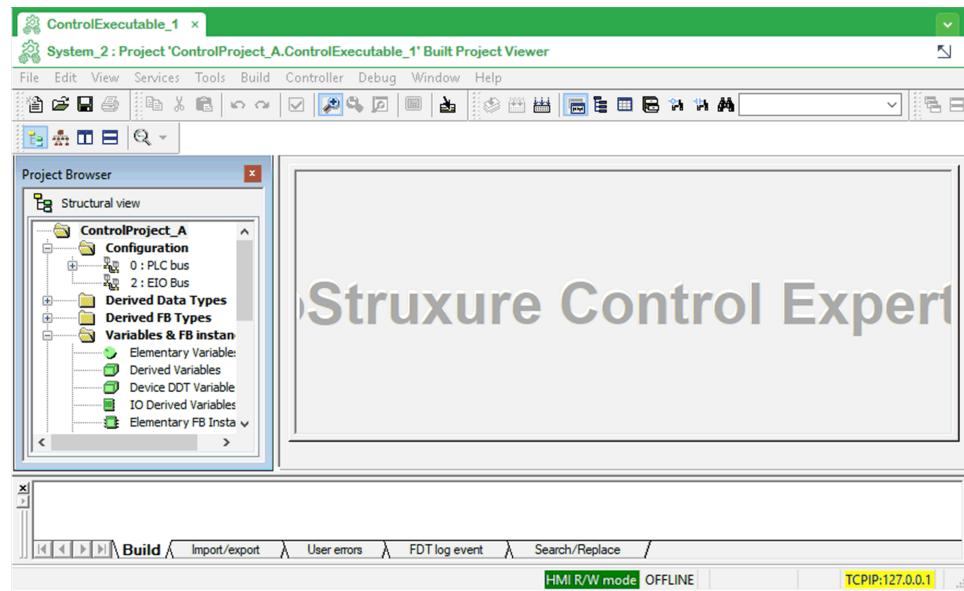
### Viewing the Built Control Participant Project

#### Getting Here

For information on how to get here, refer to the topic describing how to view the built Participant project (see EcoStruxure™ Process Expert, User Guide).

#### Control Expert User Interface

The following figure shows an example of the Control Expert window, which opens after selecting the **Open Built Project** command for a built Control executable. The window is shown restored.



#### Scope of Services

The command allows you to view the contents of the following parts of the project:

- **Configuration**
- **Derived Data Types**
- **Derived FB Types**
- **Variables & FB Instances**
- **Communication**
- **Program**
- **Animation Tables**
- **Operator Screens**
- **Documentation**

#### Limitations

Do not make any changes to the built Control Participant project in this Control Expert window as the software discards any changes upon closing the Participant window.

## Execution Stage

### Refining the Deployed Control Participant Project Online

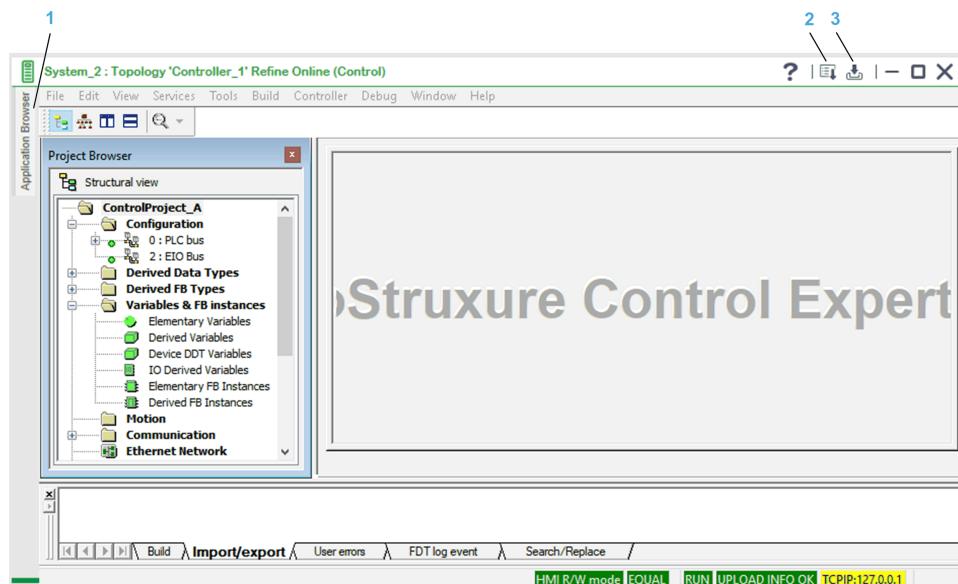
#### Getting Here

For information on how to get here, refer to Making Changes Online (see EcoStruxure™ Process Expert, User Guide).

For information on changes that require stopping the controller, refer to Changes Requiring to Stop the Controller (see EcoStruxure™ Process Expert, User Guide).

#### Control Expert User Interface

The following figure shows an example of the Control Expert window, which opens after selecting the **Refine Online** command. The window is shown restored.



Item	Description
1	Tab of the pane, page 64 in which you can see the project sections in relation to the structure of the application
2	Button to import modified and generated sections, page 66 from the corresponding logical Control Participant project
3	Button to build and deploy changes

#### Scope of Services

You can make changes pertaining to the following categories:

- Animation tables
- Operator screens
- Sections (includes importing sections directly from the corresponding logical Control Participant project)
- Types
- Variables

The software informs you if the deployment of these changes requires stopping the controller before proceeding with the actual deployment.

In case the deployment requires stopping the controller, the software gives you the option to either:

- Stop the controller and deploy changes.

- Discard any changes and not stop the controller.

For information on changes that require stopping the controller, refer to Changes Requiring to Stop the Controller (see EcoStruxure™ Process Expert, User Guide).

For information on starting and stopping redundant controllers, refer to the topics describing:

- Execution with redundant controllers (see EcoStruxure™ Process Expert, User Guide).
- Redundant controller reservation and connection scenarios (see EcoStruxure™ Process Expert, User Guide)

**NOTE:** You may need to unlock data, page 28 before you can modify it.

## Limitations

- Because you cannot transfer to the logical Control Participant project certain changes by using the **Update Control Project** command:
  - Do not change any attributes of HAL variables. For more information, refer to *Updating with Changes to Variables* in Updating the Logical Control Participant Project (see EcoStruxure™ Process Expert, User Guide).
  - Do not refine sections containing HAL DFB instances. Instead, put refinements outside of these sections. For more information, refer to *Updating with Changes to Sections Containing HAL DFBs* in Updating the Logical Control Participant Project (see EcoStruxure™ Process Expert, User Guide).
- You can perform changes to data of other categories than those listed in *Scope of Services*, using the **Refine Online** command; however, you cannot update the logical Control Participant project (see EcoStruxure™ Process Expert, User Guide) with such changes.

Refer to *Synthesis of Authorized and Unauthorized Modifications* in the Control Participant help (*Operating Modes*) for information on other changes that you can perform.

- You cannot unlock an FBD section that is generated by the software if facets are assigned to it and generated; therefore, you cannot delete the section. You need to delete it from the **Project Explorer**.

**NOTE:** Do not remove the **HAL** and **HALFB** attributes that appear in the **Custom** property of variables or DFB instances.

## Unlocking Locked Code

Proceed as it is described in the topic documenting the unlocking of code during refinement offline, page 28.

## Detecting Disconnections

When you perform changes online, the **Refine Online** dialog box opens when the software detects that Control Expert is not connected to the controller anymore.

In such case, clicking **OK**:

- Closes the **Refine Online** dialog box.
- Closes the Control Expert window.
- Discards the changes that you made without deploying them to the engine.
- If some changes that you had made online have not yet been applied to the associated logical Control Participant project, the **Refine Online** dialog box opens asking you if you want to apply the changes. Until you do so, an icon in the associated topological entity folder indicates that the deployed and the logical Control Participant are different.

**NOTE:** Select the **Refine Online** command again from the **Topology Explorer** to continue the refinement process inside the Control Expert window. If you had already deployed changes to a controller by using the **Build and Deploy** button before the disconnection occurred, these changes are preserved when the Control Expert window opens again.

## Adding LL984 Segments

You can create and/or import LL984 segments during online refinement.

You must enable the use of this language in Control Expert. In case of a segment creation, you must enable the setting first. Building and deploying this setting requires stopping the controller. Thereafter, adding, modifying, or deleting LL984 segments does not require stopping the controller.

**NOTE:** If you want to update the logical Control Participant project with changes in LL984 language by using the **Update Control Project** command (see EcoStruxure™ Process Expert, User Guide) and build it, you need to enable the use of this language in the project containing the configuration of the controller, page 46 that is mapped to the executable of the Control project.

To enable the use of the LL984 language in Control Expert, proceed as follows.

Step	Description
1	In the menu bar, click <b>Tools &gt; Project Settings....</b> <b>Result:</b> The <b>Project Settings</b> window opens.
2	Under <b>Program</b> , click <b>Languages</b> and select <b>Ladder Logic 984 (LL984)</b> .
3	Click <b>OK</b> . <b>Result:</b> The <b>Online Modification Authorization</b> dialog box opens.
4	Click <b>Yes</b> . <b>Result:</b> The <b>Project Settings</b> window closes.

## Making Changes to the Control Project Online That Do Not Require Stopping the Controller

### **WARNING**

#### **UNINTENDED EQUIPMENT OPERATION**

Before deploying to an engine, verify that you have selected the correct project files.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

When you deploy changes made online to a redundant controller, although deployment to the primary controller succeeded, it is possible that synchronization of the standby controller does not complete. In such case, the software displays a message in the notification panel to inform you. If an interruption of the connection to the system server or an unexpected stop of the system server is the cause, the notification panel also contains additional information about steps that you must complete when the connection to the system server is re-established.

**⚠ WARNING****UNINTENDED EQUIPMENT OPERATION**

- Verify that deployment to the standby controller completed successfully.
- Do not operate the primary controller if deployment to the standby controller does not complete successfully.
- Synchronize the standby controller manually, using the **Sync (Primary→Standby)** command and verify that the synchronization completed successfully.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

When you make changes by online refinement, the associated logical and built Control Participant projects do not contain these changes. To preserve these changes during a next deployment, you need to integrate them into the built Control Participant project first by updating the logical Control Participant project (see EcoStruxure™ Process Expert, User Guide) and building it; otherwise, the changes are discarded.

**⚠ WARNING****LOSS OF DATA**

After building and deploying changes made during online refinement, update the associated logical Control Participant project.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

To make changes to the deployed Control Participant project that do not require stopping the controller, and deploy these changes online, proceed as follows.

Step	Action	Result
1	Proceed with the changes of the deployed Control project in Control Expert.	-
2	When done, click the <b>Build and Deploy</b> button.	The software displays the <b>List of modified sections</b> dialog box if the option is enabled.
3	Click <b>Yes</b> . <b>NOTE:</b> Click <b>No</b> to keep the Control Expert window open without building and deploying the changes.	The software: <ul style="list-style-type: none"> <li>Builds the changes.</li> <li>Deploys the changes to the controller or simulation software without stopping it.</li> <li>Displays the <b>Refine Online</b> dialog box, which provides information about the result of the build and deployment process.</li> <li>Displays <b>Completed</b> in the notification panel.               <ul style="list-style-type: none"> <li>For a redundant controller, the information pane displays separate messages for the primary and the standby controllers. If deployment to the primary controller, or synchronization of the standby controller does not complete successfully, the software displays a corresponding message in the notification panel.</li> </ul> </li> </ul>
4	Revert to the procedure describing how to make changes online (see EcoStruxure™ Process Expert, User Guide).	-

## Making Changes to the Control Project Online That Require Stopping the Controller

When you make changes that require stopping the controller and applying these changes requires building these changes in offline mode (full build), the Control Expert window is closed. This disconnects the controller so that the changes can be deployed.

If applying the changes can be performed online (incremental build), the controller is not disconnected to deploy changes.

## ⚠ WARNING

### UNINTENDED EQUIPMENT OPERATION

Before deploying to an engine, verify that you have selected the correct project files.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## ⚠ WARNING

### UNINTENDED EQUIPMENT OPERATION

Before starting or stopping a controller, verify that:

- You have assigned a valid IP address to the controller.
- The IP address corresponds to the physical address printed on the hardware.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

For more information, refer to Identifying Engines (see EcoStruxure™ Process Expert, User Guide).

Unintended situations can occur if the operations that are in progress are not known when acting on a controller.

## ⚠ WARNING

### UNKNOWN OPERATIONAL STATE OF EQUIPMENT

Before starting or stopping a controller, always positively confirm that there is no critical operation in progress.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

When deploying changes to a redundant controller, using the **Refine Online** command, deployment to the standby controller may not complete successfully. In such case, the software displays a message in the notification panel to inform you.

## ⚠ WARNING

### UNINTENDED EQUIPMENT OPERATION

- Verify that deployment to the standby controller completed successfully.
- Do not operate the primary controller if deployment to the standby controller does not complete successfully.
- Synchronize the standby controller manually, using the **Sync (Primary→Standby)** command and verify that the synchronization completed successfully.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

When you make changes by online refinement, the associated logical and built Control Participant projects do not contain these changes. To preserve these changes during a next deployment, you need to integrate them into the built Control Participant project first by updating the logical Control Participant project (see EcoStruxure™ Process Expert, User Guide) and building it; otherwise, the changes are discarded.

## ⚠ WARNING

### LOSS OF DATA

After building and deploying changes made during online refinement, update the associated logical Control Participant project.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

To make changes to the deployed Control Participant Project that require stopping the controller, and deploy these changes, proceed as follows.

Step	Action	Result
1	Proceed with the changes of the deployed Control project inside the Control Expert UI.	The software displays the <b>Online Modification Authorization</b> dialog box.
2	Click <b>Yes</b> .  <b>NOTE:</b> Click <b>No</b> to close the <b>Online Modification Authorization</b> dialog box, cancel the changes and keep the Control Expert window open.	The software applies the change.
3	When you are done with the changes, click the <b>Build and Deploy</b> button.	The software displays the <b>Refine Online</b> dialog box, which gives you the following options: <ul style="list-style-type: none"> <li>• <b>Deploy:</b> Stops the controller and proceeds with the deployment of changes.</li> <li>• <b>Discard:</b> <ul style="list-style-type: none"> <li>◦ Discards any changes that you have made until you clicked the <b>Build and Deploy</b> button.</li> <li>◦ Closes the Control Expert window.</li> <li>◦ Displays <b>Completed</b> in the notification panel.</li> <li>◦ Opens the <b>Refine Online</b> online dialog box if you had made changes online that you have not yet applied to the associated logical Control Participant project.</li> </ul> </li> <li>• <b>Cancel:</b> Closes the <b>Refine Online</b> dialog box. Changes are not discarded. Allows you to continue with the online editing and to click <b>Build and Deploy</b> again.</li> </ul>
4	If you want to continue with the deployment, select the check box if you want to start the controller or the emulated simulator after deployment is complete.	-
5	Click <b>Deploy</b> .	The software: <ul style="list-style-type: none"> <li>• Closes the Control Expert window.</li> <li>• Stops the controller.</li> <li>• Builds the changes and deploys the updated Control Participant project to the controller or simulation software.</li> <li>• Starts the controller if you had selected the option.</li> <li>• Displays <b>Completed</b> in the notification panel.               <ul style="list-style-type: none"> <li>◦ For a redundant controller, the information pane displays separate messages for the primary and the standby controllers. If deployment to either controller does not complete successfully, the software displays a corresponding message in the notification panel.</li> </ul> </li> <li>• Updates the related date/time field.</li> </ul>
6	Revert to the procedure describing how to make changes online (see EcoStruxure™ Process Expert, User Guide).	-

## Viewing the Application Structure When Making Changes Online

### Overview

When you refine a Control Participant project online, the **Application Browser** pane displays FBD sections based on the location of instances whose Control facets are assigned to these sections.

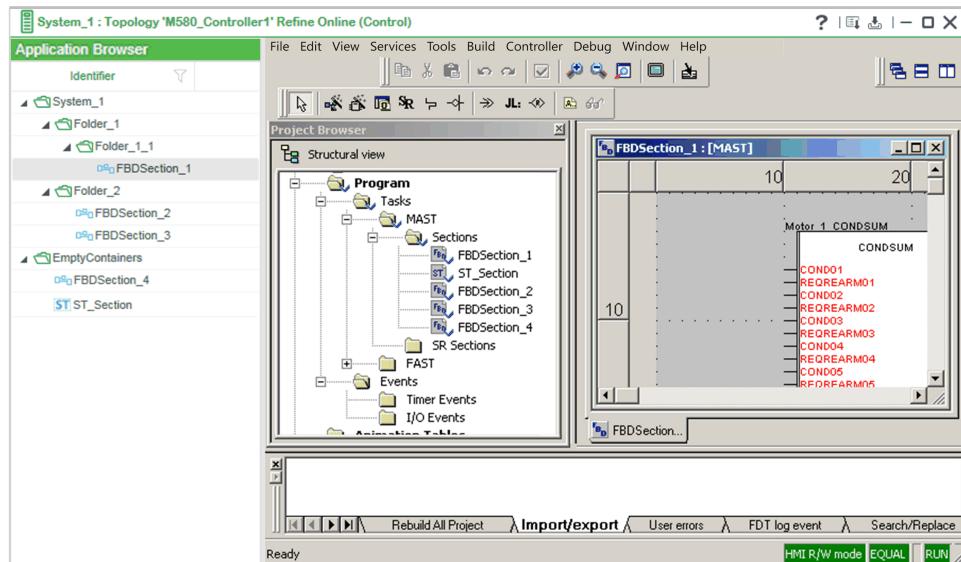
It shows the relationship between the folder structure of the application and the sections of a Control Participant project. This is useful, for example, when you want to modify the logic related to a specific area or subdivision of the application.

Only FBD and non-FBD sections of the Control Participant project that have been deployed at the moment you select the **Refine Online** command are displayed. Sections that you create or whose name you modify during online refinement are not displayed. A section can appear several times depending on the facets it contains (see EcoStruxure™ Process Expert, User Guide).

The view is read-only.

### Application Tree View Pane

The following figure shows an example of the Control Participant window in which the **Application Browser** pane is pinned in open position.



### Refreshing the View

Once you have selected the **Refine Online** command, if you make changes (for example, renaming, adding, or deleting a section), the content of the pane is not refreshed until you close the Control Participant window and select the command again.

### Using the Pane

- To view the **Application Browser** pane, move the pointer over the tab. Click the pin button so that the pane remains open and does not overlap the Control Participant window.
- By default, the application structure is shown collapsed. You can use the plus (+) and minus (-) keys to expand/collapse nodes of the folder structure.
- You can sort and filter sections by identifier.
- To hide the pane, click outside the pane or click the pin button so that it appears horizontal.

## Opening Program Sections From the Pane

Double-click a section in the **Application Browser** pane to open it in the Control Participant. You can also press **Enter** to open a section that is selected in the tree view.

Opening a section from the pane expands the **Program** node of the **Structural View** in the **Project Browser** of the Participant to show sections.

**NOTE:** Because the content of the pane is not refreshed during the online refinement session, if you rename or delete a section, you cannot open it from the pane.

## Importing Sections from the Logical Control Participant Project

### Overview

It is possible to import sections directly from the logical Control project to help speed up the implementation of changes during commissioning. This is achieved by skipping the build and deployment stages of the system engineering life cycle.

The import functionality allows you to import into the deployed Control project, sections of the corresponding logical Control project, which you have modified since they were deployed last. The modifications need to be generated to be imported.

For details, refer to the topic describing the import of sections from the logical Control project (see EcoStruxure™ Process Expert, User Guide).

**NOTE:** If the section that you import has the same name as a section in the deployed Control project, it replaces the existing section. As a result, changes you had made in the section during online refinement are overwritten.

### Importing Sections from the Logical Control Participant Project

You can use the section import functionality, page 58 several times and at any time during the same online refinement session, given that previous import operations are completed and no build and deploy operation is in progress. Sections that you have not imported the first time continue appearing as candidate until you import them or until they cannot be imported anymore.

To import sections from the logical Control Participant project into the deployed Control project, proceed as follows.

Step	Action
1	<p>While the Control Participant online refinement window is open, click the button to import sections.</p> <p><b>Result:</b> If the software detects section containing supported changes, the <b>Import Sections from Logical Project</b> window opens, showing the list of sections you can import; otherwise, a notification about no detected modifications is displayed.</p>
2	<p>Select the sections that you want to import by using the check boxes and click <b>OK</b>.</p> <p><b>NOTE:</b> Click <b>Cancel</b> to close the window without importing the selected sections.</p>
3	<p>Confirm the modification if prompted to do so.</p> <p><b>Result:</b> The sections and their contents, variables, and the corresponding types are added to the deployed Control project.</p>
4	<p>Refer to the procedure describing how to refine the deployed Control project online, page 58 for instructions on how to build and deploy changes.</p> <p><b>NOTE:</b> Close the Control Participant window and click <b>No</b> when prompted to build and deploy the changes in the <b>Refine Online</b> dialog box to quit the online refinement session and discard any non-built/non-deployed changes.</p>

# Glossary

## A

**application interface:**

Mechanism that allows sharing data and manage dependencies between 2 instances/references.

The *application interface* allows you to link:

- applications instances/references to each other
- topological instances/references to each other

**application link:**

Links describing connections between instances of the application that are made by using application interfaces. The **Asset Workspace Editor** or **Links Editor** lets you create and edit such links.

**application template:**

Global Template contained in the Global Templates library that models an object of the application of a system and its associated functions. The template encapsulates the necessary Participant capabilities.

*Application templates* are instantiated and can be configured to create the application of a system.

**application:**

The *application* models the complete functionality provided by the system through an application folder structure and instances of application templates.

**area:**

The *area*, when referring to access control, defines a topological, functional, or another user-based rule to restrict access in the scope of an automation system.

## B

**binding:**

The *binding* is the key mechanism that establishes relations between the following items of the facet and composite templates:

- Parameters
- Interfaces
- Elements

**built Participant project:**

The *built Participant project* is a generated, optionally refined, and built project, which is created by the corresponding Participant and that exists at the platform level in the form of an executable.

For example, files with *.stu* and *.ctz* extensions that are represented by Control and Supervision executables respectively are built Participant projects.

## C

**cardinality:**

The *cardinality*, in the context of the interface model, is the number of connections that are supported by the objects playing the other role of the interface model.

**communication channel:**

A *communication channel* is the logical representation, at the platform level, of communication between controllers or between a controller and devices.

For example, a controller I/O scanner row is modeled by a *communication channel* for Modbus TCP communication in the executable of the Control project.

**communication interface:**

Mechanism that allows sharing data and manage dependencies between 2 instances or references.

*Communication interfaces* allow the platform to link topological instances/ references at the logical level (for example, I/O scanner, OPC Factory Server, Supervision I/O devices).

**communication link:**

Links describing logical connections between topological instances that are made by using communication interfaces.

For example, the communication link between 2 controllers exchanging data.

**communication mapping:**

The *communication mapping* process defines the communication aspects of a logical Participant project after being mapped to the topology.

**composite template:**

The *composite template* combines the capabilities of 1 or more facet templates, each encapsulating functionalities provided by one software Participant, and/or of other *composite templates*.

**composite:**

The *composite* is an instance of a composite template.

**constituent encapsulation:**

Process that is performed by using the **Facet Editor** and that allows you to:

- Select constituents that are created with a software Participant.
- Optionally, modify constituents inside the corresponding Participant.
- Include the selected constituents inside a facet template.

**constituent:**

Set of data provided by a software Participant, which can be global or local.

**contents repository:**

The *contents repository* is a global storage provided by the platform to manage global constituents and other files, such as Participant projects, used by the libraries and the systems.

## D

**deferring mechanism:**

Mechanism that allows you to make available in the composite template that is at the highest level optional element selections, parameters, and/or interfaces of its references.

**deployed Participant project:**

A *deployed Participant project* is a built project that has been transferred to a controller or other entity of the topology acting as an engine, and that you can execute.

**DFB type:**

The *derived function block type* is a programming language element that consists of:

- A data structure definition partitioned into input, output, public, and internal variables.
- A set of operations written in IEC 61131 programming languages to be performed upon the elements of the data structure when an instance of the function block type is started.

**E****EcoStruxure Process Expert:**

Third generation name of the software platform. Formerly, StruxureWare Process Expert then, EcoStruxure Hybrid DCS.

**element:**

*Element* is the term that is used to describe the contents of templates at the next lowest level as well as the contents of interface models:

- For facet templates, elements are the constituents that the facet encapsulates.
- For composite templates, elements are:
  - Facet references
  - Composite references
- For interface models, elements are the data that is shared. See *interface elements*.

You can define properties and rules for elements during the Global Templates definition stage.

**engine:**

An *engine* is the projection of the hardware and software defined in the topology that is able to execute the deployed Participant project.

**engineering client:**

EcoStruxure Process Expert client connecting to the system server that you use to engineer and maintain systems. It can run on the system server and/or an engineering station.

**engineering station:**

The *engineering station* is a computer running an EcoStruxure Process Expert engineering client to design, and maintain systems that exist on the server to which the engineering client connects.

**executable:**

The *executable* is a project component that represents the built Participant project. It contains the mapping information.

**execution domain:**

Property of the executable of a Participant project, which serves as a filter for selecting the scope of applicable services.

For example, it is used to define the boundaries for runtime navigation services or to restrict the exchange of data through peer to peer communication between projects that have executables with the same execution domain.

**F****faceplate:**

The *faceplate* is a component of a Supervision genie that provides a user interface to interact with the object that it represents.

**facet element:**

The *facet element* is the contents that can be accessed at the system level. Depending on the type of facet template, such elements can be either:

- The visible part of the constituents stored in the facet templates.
- A set of data defined by the facet template.

**facet template:**

The *facet template* is the smallest available template that encapsulates a specific capability provided by 1 software Participant only.

**facet:**

The *facet* is an instance of a facet template.

## G

**genie:**

Animated graphic that is assigned to Supervision pages and that represents functionalities of instances of the application during operation.

*Genies* are encapsulated in Supervision facets.

**global constituent:**

Set of data provided by a software Participant that is a common resource referenced by several Global Templates. Global constituents are stored in the contents repository.

**Global Templates:**

*Global Templates* encapsulate one or more functions that can be customized and reused in any system created with EcoStruxure Process Expert. They are stored in the Global Templates library.

## H

**hardware mapping:**

The *hardware mapping* process links the logical projection of the hardware that is defined in the application and assigned to projects to the hardware defined in the topology of the system.

For example, linking Control variables representing I/O signals to I/O channels of an I/O module.

**HMI:**

Abbreviation for *human machine interface*. It is a graphical operator interface for industrial equipment.

## I

**IEC:**

The *International Electrotechnical Commission* is a non-profit and non-governmental international standard organization that prepares and publishes international standards for electrical, electronic, and related technologies.

**instance element selection:**

The *instance element selection* is a mechanism of the instantiation stage that allows you to customize an instance by selecting services that are provided by the template that the instance uses.

**instance parameter:**

*Instance parameters* are properties of the elements of an instance that you may be able to customize.

**instance:**

Abbreviation for object instance. It is the result of the instantiation of a template.

**instantiation naming convention:**

The *instantiation naming convention* defines the naming strategy that the platform applies when you create instances.

**interface element:**

Represents the data that will be shared through an interface. Interface elements are defined during the interface definition. Interface elements can be transformed by the interface by using expressions.

**interface link:**

Links describing logical connections between instances that are made by using interfaces.

The following types of links exist:

- Physical links
- Communication links
- Application links

Each type of link is made by using the corresponding interface (physical, communication, or application interface).

**interface model:**

The *interface Model* is a type of template that is available in the Global Templates library and that you can configure.

**interface:**

The *interface* is a reference, inside a composite or facet template, of an interface model. Interfaces are exposed by the facets of an instance, allowing you to make different types of links with other instances to share data.

In the context of the template definition, interfaces are a mechanism to define the links between references by declaring compatibility and/or requirement rules.

**L****local constituent:**

Set of data that is provided by a software Participant, encapsulated inside a facet template but not used at the system level. The local constituent is used to generate the contents of the logical Participant project. An example is Control Participant code that is encapsulated in a Control facet template.

**logical Participant project:**

The *logical Participant project* is a generated and refined project, which is created by the Participant but, which is not associated to the topology.

**NOTE:** The refinement of the project is optional.

**M****mapping interface:**

Mechanism that allows sharing data between two facets.

*Mapping interfaces* allow you to perform the hardware mapping. It is the process whereby you link facets assigned to projects to facets representing the hardware defined in the topology through matching mapping interfaces that these facets expose.

**MES:**

The *Manufacturing Execution Systems* is a control system for managing and monitoring work-in-process in a factory plant.

**N****network variable:**

The *network variable* is a peer to peer communication mechanism allowing you to share data between 2 or more Control projects.

**O****object template:**

An *object template* is a generic term that covers several reusable templates such as facet or composite templates.

**OFS:**

Abbreviation for OPC Factory Server.

**operation client:**

An EcoStruxure Process Expert client connecting to the system server that you can use during runtime to monitor and troubleshoot a system.

**operator station:**

The *operator station* is a computer running a Supervision client software.

**P****Participant services:**

*Participant services* are the functions provided by a software Participant when interacting with EcoStruxure Process Expert.

**peer to peer communication:**

*Peer to peer communication* is a data exchange mechanism between 2 or more Control projects, which uses the I/O scanner function of the controller acting as client.

**physical (interface) link:**

Links describing logical connections between topological instances that are made by using physical interfaces.

For example, the connection of a controller to an Ethernet network.

**physical connection:**

Link between topological entities representing the physical connections between controllers, station nodes, devices, and communication networks.

**physical interface:**

*Physical interfaces* allow the platform to link, at a physical level, topological instances to model the topology of the system.

**platform:**

Abbreviation for system platform. Represents the services that are provided by EcoStruxure Process Expert apart from the software Participants.

**privilege:**

Defines groups of functions that are provided by an application and granted to users through access control.

**project container:**

The *project container* is an organizational structure of a project to organize the facets that are assigned to it. Such a structure models the ones managed by the corresponding software Participant, and that are visible at the system level.

**project facet:**

Facet that is assigned to a project.

**project:**

Component of a system associated to a software Participant. Its structure contains elements that are managed by the software participant.

**R****redundant controller:**

Generic term that is used to refer a Quantum Hot Standby controller and/or an M580 redundant controller.

**reference:**

Defines facet and composite templates, which are contained inside other facet or composite templates in order to distinguish templates, which are used in the composition of other templates from the highest level templates, such as control modules.

**role:**

The *role* can have 2 different meanings,

- For access control:  
The *role* groups functionalities to grant different levels of user rights, which combine areas and privileges to fulfill a set of services.
- For interface models:  
The *role* defines the 2 sides of an interface, role A and role B.

**runtime navigation services:**

Describes the complete set of functionalities that are provided by EcoStruxure Process Expert operation client in runtime, such as process monitoring, viewing of instance information, diagnostics.

**S****service mapping:**

The *service mapping* links the execution capabilities of a project represented by the executable to an engine of the topology.

For example, it can link:

- The I/O server of a Supervision project to a station node representing the operation server.
- The executable of a Control project to a controller.

**service:**

In the context of projects, the *project service* is an organizational structure of a project to organize the execution capabilities. It models the structures that are managed by the corresponding software Participant, and that are visible and configured at the system level.

In the context of templates, a *service* represents a functionality provided by a Participant under the form of a facet referenced by the template.

**software Participant:**

An external tool that is running on the computer on which a client is installed and that the platform calls upon to perform certain operations. For example, the Control Participant.

**software:**

Refers to EcoStruxure Process Expert.

**station node:**

A *station node* represents a computer that can act as an engine to execute a Control project by using software emulating a simulator, or a Supervision project by using Supervision software.

**subnet mask:**

A 32-bit value that indicates the number of available host addresses on a subnet, which uses TCP/IP knowing that the first and last addresses are reserved (for example, subnet mask 255.255.192.0 allows 317 addresses for classless devices). It also indicates whether addressing is classful or classless. For classful addressing, it indicates the class of the network (for example, 255.255.255.0 is the subnet mask for class C networks).

**Supervision client:**

Client connecting to the Supervision server that provides runtime services to operate and monitor automation systems. The client runs on an operator station and/or operation server.

**Supervision server:**

Server running on the operation server or on the system server, and that provides runtime data to Supervision clients.

**system engineering life cycle:**

The *system engineering life cycle* represents the stages to engineer a system in EcoStruxure Process Expert.

**system server:**

EcoStruxure Process Expert server that hosts the Control Participant and the database containing template libraries and system data.

The system server manages requests from EcoStruxure Process Expert clients.

**system:**

Models a physical automation system.

The system consists of the following components:

- Topology
- Application
- Participant projects

## T

**topological entity:**

A *topological entity* is the representation of piece of hardware infrastructure.

For example, a controller.

**topology:**

Models the hardware and software infrastructure of a system through topological folders and entities.

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As standards, specifications, and design change from time to time,  
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