



Process Expert

Control Participant Services

User Guide

Original instructions

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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.

<div> DANGER</div> <div>DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.</div>
<div> WARNING</div> <div>WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.</div>
<div> CAUTION</div> <div>CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.</div>
<div>NOTICE</div> <div>NOTICE is used to address practices not related to physical injury.</div>

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 how to use Control Expert Classic and Advantys Configuration Software (ACS), which are referred to collectively as the *Control Participant*, when open within EcoStruxure Process Expert for the engineering and maintenance of systems.

It is written for users who are familiar with EcoStruxure Process Expert, EcoStruxure Control Expert, and Advantys.

Validity Note

This document has been updated for the release of EcoStruxure Process Expert 2023.

The characteristics that are described in the present document, as well as those described in the documents included in the Related Documents section below, can be found online. To access the information online, go to the Schneider Electric home page www.se.com/ww/en/download/.

The characteristics that are described in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

Related Documents

Title of documentation	Reference number
EcoStruxure™ Process Expert, Security Deployment Guide	EIO0000004234 (ENG)
EcoStruxure™ Process Expert, User Guide	EIO0000001114 (ENG)
EcoStruxure™ Control Expert, Security Editor, Operation Guide	EIO0000004105 (ENG) EIO0000004106 (FRE) EIO0000004107 (GER) EIO0000004109 (SPA) EIO0000004108 (ITA) EIO0000004110 (CHS)
EcoStruxure™ EcoStruxure Control Expert, Operating Modes	33003101 (ENG) 33003102 (FRE) 33003103 (GER) 33003104 (SPA) 33003696 (ITA) 33003697 (CHS)
EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual	35006144 (ENG) 35006145 (FRE) 35006146 (GER) 35006147 (SPA) 35013361 (ITA) 35013362 (CHS)
PMEPXM0100, ProSoft, User Manual	PMEPXM0100_User_Manual (ENG)
M580 - BMENUA0100 OPC UA Embedded Module, Installation and Configuration Guide	PHA83350 (ENG) PHA83351 (FRE) PHA83352 (GER) PHA83354 (SPA) PHA83353 (ITA) PHA83355 (CHS)

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

Product Related Information

⚠ WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, 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 them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.¹
- 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.

¹ 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.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

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

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 templates contained in the supplied Schneider Electric libraries.

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in this manual, or that appear in or on the products themselves, are generally derived from the terms or definitions of international standards.

In the area of functional safety systems, drives and general automation, this may include, but is not limited to, terms such as *safety*, *safety function*, *safe state*, *fault*, *fault reset*, *malfunction*, *failure*, *error*, *error message*, *dangerous*, etc.

Among others, these standards include:

Standard	Description
IEC 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2015	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2013	Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests.
ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2015	Safety of machinery - Emergency stop - Principles for design
IEC 62061:2015	Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements.
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems.
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements.
IEC 61784-3:2016	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions.
2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive

In addition, terms used in the present document may tangentially be used as they are derived from other standards such as:

Standard	Description
IEC 60034 series	Rotating electrical machines
IEC 61800 series	Adjustable speed electrical power drive systems
IEC 61158 series	Digital data communications for measurement and control – Fieldbus for use in industrial control systems

Finally, the term zone of operation may be used in conjunction with the description of specific hazards, and is defined as it is for a hazard zone or danger zone in the Machinery Directive (2006/42/EC) and ISO 12100:2010.

NOTE: The aforementioned standards may or may not apply to the specific products cited in the present documentation. For more information concerning the individual standards applicable to the products described herein, see the characteristics tables for those product references.

Participant Language Settings

Control Expert Classic and Advantys Language Setting

When Control Expert Classic and Advantys are used as Participants of EcoStruxure Process Expert, their language must be set to the same language as EcoStruxure Process Expert.

If this language is not supported, select English.

If another language is selected when either one is opened from EcoStruxure Process Expert (herein, the software), it may prevent you from completing the system engineering life cycle.

Presentation

Using Control Expert Classic And Advantys As Control Participant

Interacting With Control Expert Classic

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

Generally, the software automatically manages interactions between the platform and Control Expert Classic/ACS. However in the following stages, Control Expert Classic and/or ACS open, allowing you to manually perform the necessary tasks to complete the system engineering life cycle:

- Refinement (offline changes)
- Configuration
- Execution (online changes)

The number of Control Expert Classic 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 during the configuration stage.

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

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 this case, verify the **Notification Panel** (see *EcoStruxure Process Expert, User Guide*) for details.

Opening the Control Expert and ACS Help

Control Expert Classic and ACS help can be accessed by selecting **Help** from the menu bar.

In addition, when Control Expert Classic and ACS are closed, you can access their help by clicking the ? icon (see *EcoStruxure Process Expert, User Guide*) in the EcoStruxure Process Expert client toolbar.

Using Control Expert and Advantys Separately

Overview

You can use Control Expert, Control Expert Classic, 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 (or Control Expert Classic) on a computer on which the EcoStruxure Process Expert system server or a client was started before, a window opens that requires that you log in by entering credentials.

The Control Expert (or Control Expert Classic) log-in requirements are dictated by the policy that is selected in Security Editor.

- Starting the EcoStruxure Process Expert system server configures Security Editor by setting **Login** to **Security on, mandatory login** with **ESX CE Engineer** as **Fixed profile** (formerly *ehdcs_admin*) in the **Policies** tab.
- The following Control Expert profiles (see *EcoStruxure Process Expert, Installation and Configuration Guide*) are created and associated to EcoStruxure Process Expert users depending on their roles:
 - *ESX CE Engineer* (formerly *ehdcs_admin*)
 - *ESX CE Operator* (formerly *ehdcs_operator*)

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

For details on how to use Security Editor, refer to *Access Security Management in EcoStruxure™ EcoStruxure Control Expert, Operating Modes*. Refer also to *EcoStruxure™ Control Expert, Security Editor, Operation Guide*

Differences in Functionality Compared to the 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 no longer available in favor of the backup mechanism used by EcoStruxure Process Expert.

Actions that you perform in Control Expert (or Control Expert Classic) opened as a standalone application have no relation with EcoStruxure Process Expert systems.

Configuration of Control Expert Classic

Control Expert Classic Settings

Project Settings Applied During the Build Process

When you build a Control Participant project by using the **Build**, **Generate and Build**, or **Build All Build** or **Build All** command (see *EcoStruxure Process Expert, User Guide*), the software sets specific values to the following Control Expert Classic properties. If you change these values by refining the Control project or when configuring, page 43 the controller that is mapped to the executable of the Control project, your changes are overridden.

The following table indicates the values that are set by the software.

Property	Value set when building the project	Comment
Overlapping of address generates (enumeration)	Nothing	To view the property, click General > Management of build messages
Create New data block on line (check box)	TRUE (selected)	To view the property, click General > Build settings
Data dictionary (check box)	TRUE (selected)	If supported by the controller selected in the configuration. To view the property, click General > PLC embedded data
Only HMI variables (check box)	TRUE (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 HMI variable . To view the property, click General > PLC embedded data
Program Viewer information (check box)	TRUE (selected)	Allows you to view the contents of a section during runtime by using navigation services (see <i>EcoStruxure Process Expert, Runtime Navigation Services, User Guide</i>). To view the property, click General > PLC diagnostics
Allow dynamic arrays [ANY_ARRAY_XXX] (check box)	TRUE (selected)	To view the property, click Variables
Allow multi-assignment [a:=b:=c] (ST/LD) (check box)	TRUE (selected)	To view the property, click Program > Languages > Common
Safe Signature management	Automatic	Applies only to Control projects of M580 safety controllers (see <i>EcoStruxure Process Expert, User Guide</i>).

Other Project Settings

You can change the values of the following project properties by using the **Project Settings** command in the **Tools** menu of Control Expert Classic when you configure the controller, page 43.

The following table indicates the default values of these properties in the project containing the controller configuration.

Property	Value	Comment
I/O Scanning mode (enumeration)	Enhanced	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 General > Build settings .
Force references initialization (check box)	<i>FALSE</i> (cleared)	Variables of data type <i>Reference</i> that are not initialized in the Data Editor are initialized by default with the NULL value. In such a case, they are assigned by the <i>REF</i> function in the logical Participant project (the application program). To access the property, click Variables .
Preload on build changes (check box)	<i>FALSE</i> (cleared)	Select it when you configure a controller that supports the property. It helps avoid displaying #Bad parameter in Supervision pages after making online changes in the deployed Control Participant project. To access the property, click General > PLC embedded data NOTE: When you select the Preload on build changes property, you must also configure the Effective Build changes time-out (sec) setting.
Upload information (check box)	<i>TRUE</i> (selected)	Unselected to reduce the memory consumption in the upload memory area. To access the property, click General > PLC embedded data .
Usage of Process Namespace (check box)	<i>FALSE</i> (cleared)	For Control projects of M580 safety controllers, the setting is not supported and the check box must be cleared to save changes that you make by refining the project. To access it, click General > PLC embedded data .
Time Stamping Mode (enumeration)	System	Use this setting to build Control Participant projects that contain mappings to Modicon X80 I/O modules. To access the property, click General > Time . NOTE: If the controller does not support this setting, change it to Applicative . 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 Types Libraries

Overview

When a Device Type Manager (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 Classic.

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

Perform the installation of the DTMs and Types Libraries on each computer of the EcoStruxure Process Expert infrastructure.

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

Installing DTMs by Using a Setup

The following table outlines the steps to install DTMs on a computer by using their setup.

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

Installing DTMs by Using EDS Files

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

Before using the wizard, ensure that engineering and operation clients are closed, the system server is stopped, and that the server console is closed.

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

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

Installing PROFIBUS DTMs by Using GSD Files

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

The following table describes the steps to install the DTMs on a computer by using GSD files.

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

Installing Types Libraries

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

Before using the installer, ensure that engineering and operation clients are closed, the system server is stopped, and that the server console is closed.

For details, refer to the topic describing the *Libset* in *EcoStruxure™ EcoStruxure Control Expert, Operating Modes*.

Control Participant Services in the System Engineering Life Cycle

General Information

Working Inside Control Expert Classic and Advantys Configuration Software

Overview

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

General Guidelines

When Control Expert Classic displays a modal dialog box (an overlay that does not allow you to use the main Participant window until you acknowledge or close the dialog box) if you put the computer into sleep mode, you may discard unsaved modifications because of an interruption of ongoing communications.

NOTICE

LOSS OF DATA

Do not put the computer in sleep mode without first saving modifications and closing open dialog boxes.

Failure to follow these instructions can result in equipment damage.

Participant Window Mode

The Control Expert Classic and ACS windows may open as floating, independent windows. In this case, you can embed (see *EcoStruxure Process Expert, User Guide*) them in the client by using the **Restore** button.

Data Type Equivalence

EcoStruxure Process Expert Data Type Equivalence

The following 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	FFFFFFFF	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.

NOTE: 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 describes the way the software manages the layout of function blocks in Function Block Diagram (FBD) sections when you generate a section again after changing the element selection and parameters of an instance.

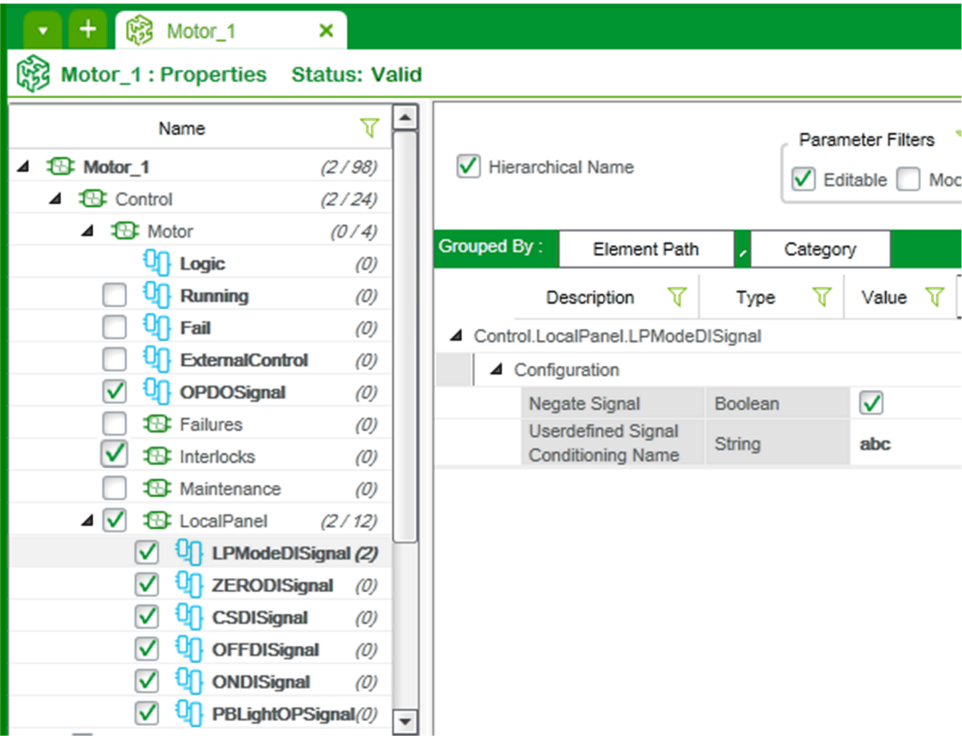
Using two instances of the *\$Motor* sample template having an identical final configuration, the example compares the position of function blocks that are generated in several steps with the position of those that are generated in one step.

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

NOTE: Figures from sections of Control Expert Classic that appear in this topic show Derived Function Blocks (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 following figure shows the configuration of instance *Motor_1* in the **Application Explorer**.



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

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 *LPMODEDSignal* element is not enabled.

The diagram illustrates the hardware architecture of the system, showing the interconnections between the DEVLN, DEVCTL, and CONDSUM1 blocks.

DEVLN Block:

- Inputs:** DEVLN_P, DEVLN, DEVLN_P.
- Outputs:** DEVLN, DEVLN_P, DEVLN_P.

DEVCTL Block:

- Inputs:** DEVLN, DEVLN_P, DEVLN_P.
- Outputs:** DEVLN, DEVLN_P, DEVLN_P.

CONDSUM1 Block:

- Inputs:** DEVLN, DEVLN_P, DEVLN_P.
- Outputs:** DEVLN, DEVLN_P, DEVLN_P.

The DEVLN block is connected to the DEVLN_P block. The DEVCTL block is connected to the DEVLN block and the CONDSUM1 block. The CONDSUM1 block is connected to the CONDSUM1_P block.

Selecting the OPDOSignal Element and Performing Second Generation

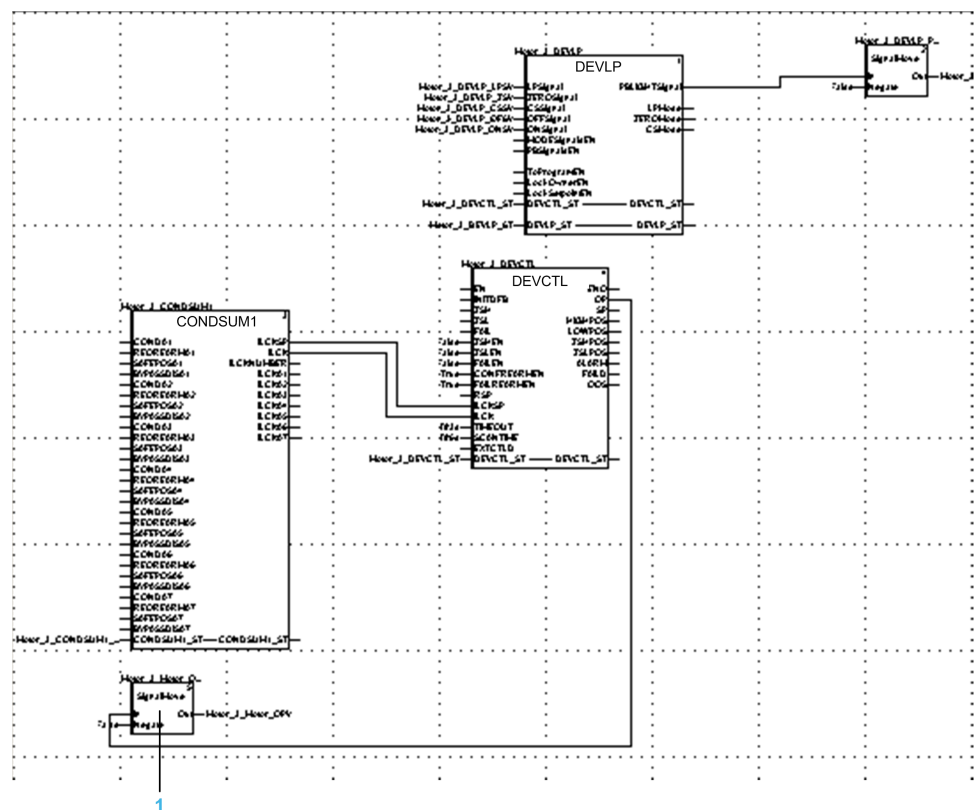
The following figure shows the *Motor_3_Motor_OP* facet that has been created by selecting the optional *OPDOSignal* element and assigning it to the FBD section.

Facet	Facet Template	Path	Order	Assignment	Generation
Motor_3_DEVCTL	\$DEVCTL_UL	ControlMotor	0	Assigned	Generated
Motor_3_CONDSUM1	\$CONDSUM1_UL	ControlInterlocks	1	Assigned	Generated
Motor_3_DEVLP_LPS	\$DSignal_UL	ControlLocalPanel	2	Assigned	Generated
Motor_3_DEVLP_ZS	\$DSignal_UL	ControlLocalPanel	3	Assigned	Generated
Motor_3_DEVLP_CSS	\$DSignal_UL	ControlLocalPanel	4	Assigned	Generated
Motor_3_DEVLP_OFS	\$DSignal_UL	ControlLocalPanel	5	Assigned	Generated
Motor_3_DEVLP_ONS	\$DSignal_UL	ControlLocalPanel	6	Assigned	Generated
Motor_3_DEVLP_PBS	\$DOSignal_UL	ControlLocalPanel	7	Assigned	Generated
Motor_3_DEVLP	\$DEVLP_UL	ControlLocalPanel	8	Assigned	Generated
Motor_3_Motor_OP	\$DOSignal_UL	Control	9	Assigned	Non Generated

The section is then generated again.

Function 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 (see callout (1), page 18).

The following figure shows the position of the function block encapsulated in the *Motor_3_Motor_OP* facet after the second generation of the section.



1 Signal/Move function block generated by selecting the *OPDOSignal* element

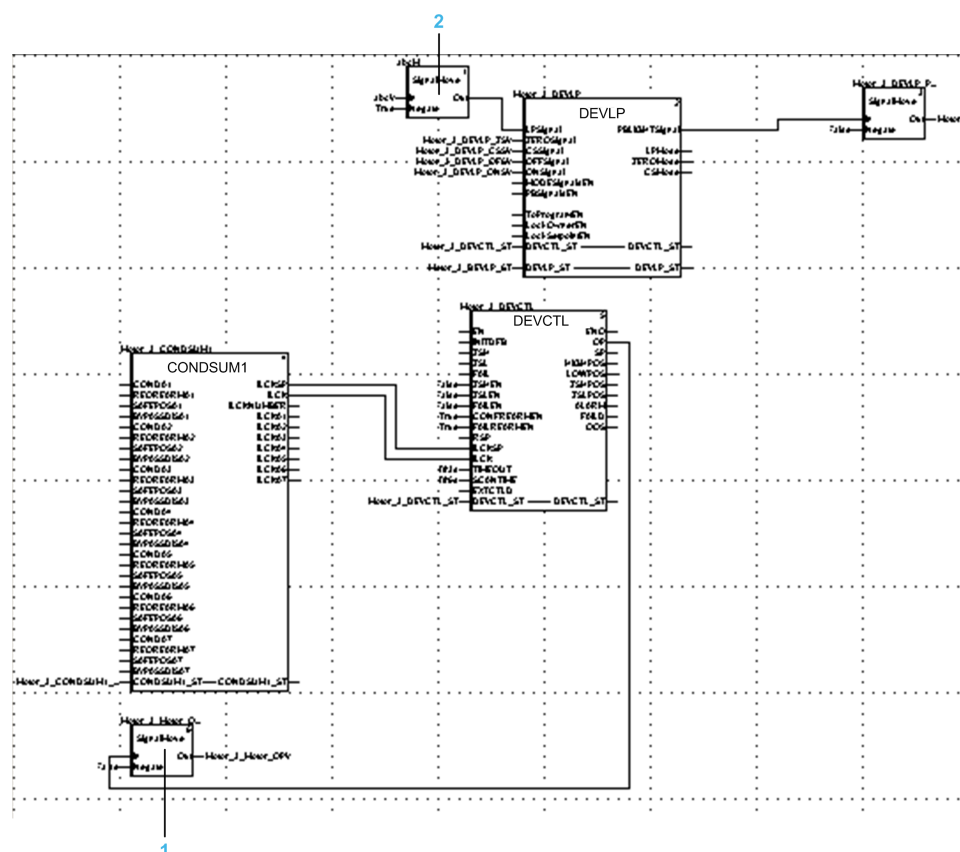
Negating the LPMODEDISignal Element Signal and Performing Third Generation

The following figure shows the status of facets *Motor_3_DEVLP* and *Motor_3_DEVLP_LPS* that has changed to **Out Of Date** after enabling the signal negate function of the *LPMODEDISignal* element. No new facets were created.

Facet	Facet Template	Path	Order	Assignment	Generation
Motor_3_DEVCTL	\$DEVCTL_UL	ControlMotor	0	Assigned	Generated
Motor_3_CONDSUM1	\$CONDSUM1_UL	ControlInterlocks	1	Assigned	Generated
Motor_3_DEVLP_LPS	\$DISignal_UL	ControlLocalPanel	2	Out Of Date	Generated
Motor_3_DEVLP_ZS	\$DISignal_UL	ControlLocalPanel	3	Assigned	Generated
Motor_3_DEVLP_CSS	\$DISignal_UL	ControlLocalPanel	4	Assigned	Generated
Motor_3_DEVLP_OFS	\$DISignal_UL	ControlLocalPanel	5	Assigned	Generated
Motor_3_DEVLP_ONS	\$DISignal_UL	ControlLocalPanel	6	Assigned	Generated
Motor_3_DEVLP_PBS	\$DOSignal_UL	ControlLocalPanel	7	Assigned	Generated
Motor_3_DEVLP	\$DEVLP_UL	ControlLocalPanel	8	Out Of Date	Generated
Motor_3_Motor_OP	\$DOSignal_UL	Control	9	Assigned	Generated

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

The following figure shows the position of the function block encapsulated in the **Out Of Date** *Motor_3_DEVLP_LPS* facet after the third generation.



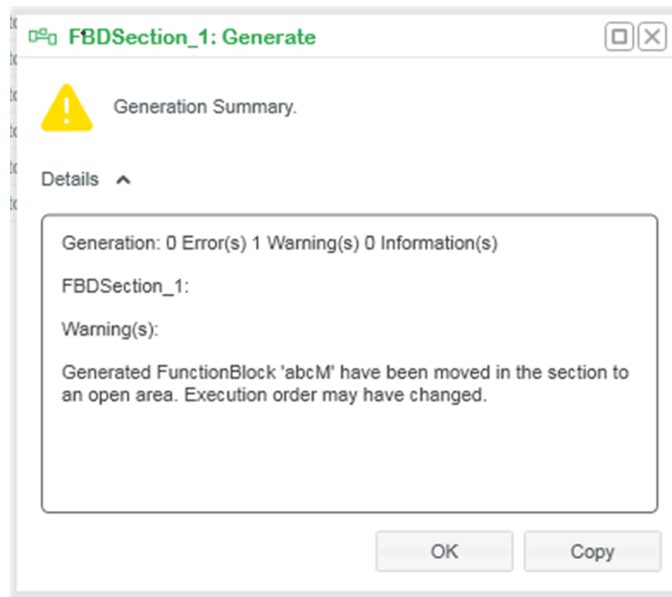
1 *SignalMove* function block generated by selecting the *OPDOSignal* element. The function block was generated by the second generation

2 *SignalMove* function block encapsulated in the *LPMODEDISignal* element, created by enabling the signal negate function and performing the third generation (*Motor_3_DEVLP_LPS* facet). The function block occupies a position as defined in the template referencing its facet.

The following figure shows the position of the *SignalMove* function block encapsulated in the **Out Of Date Motor_3_DEVLP_LPS** facet after the third generation if you move the *DEVLP* function block left before generating.



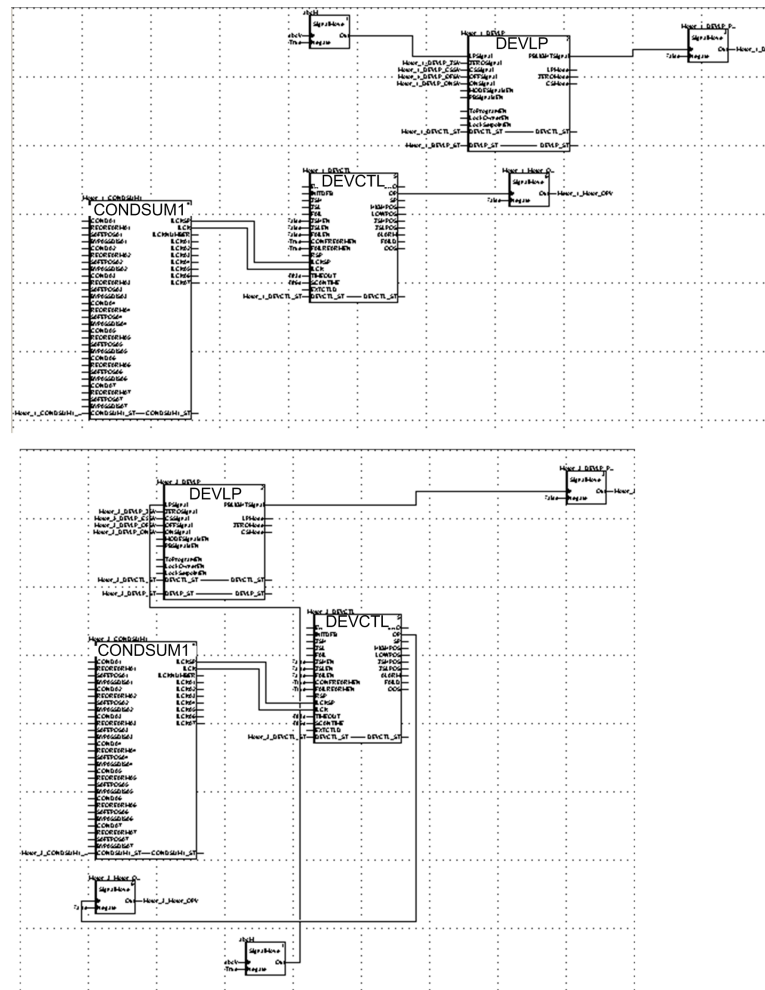
After generating this type of **Out Of Date** facets, if the software moved a function block to the end of the section content, it displays a summary message. The message indicates the name of the function blocks that were moved. It also informs you that the execution order of these function blocks may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

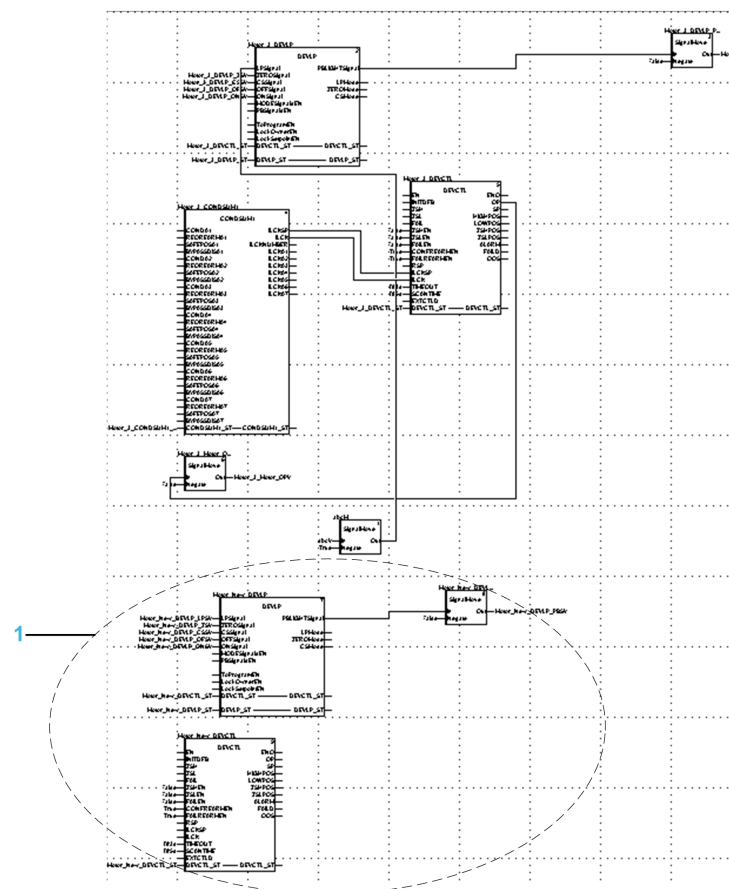
To illustrate this scenario, a new instance of the *\$Motor* sample template is created and its facets assigned to the FBD section containing facets of *Motor_3*.

The following figure shows the candidate Control facets of instance *Motor_New* that were assigned to the same FBD section.

Facet	Facet Template	Path	Order	Assignment	Generation
Motor_3_DEVCTL	\$DEVCTL_UL	ControlMotor	0	Assigned	Generated
Motor_3_CONDSUM1	\$CONDSUM1_UL	ControlInterlocks	1	Assigned	Generated
Motor_3_DEVLP_LPS	\$DSISignal_UL	ControlLocalPanel	2	Assigned	Generated
Motor_3_DEVLP_ZS	\$DSISignal_UL	ControlLocalPanel	3	Assigned	Generated
Motor_3_DEVLP_CSS	\$DSISignal_UL	ControlLocalPanel	4	Assigned	Generated
Motor_3_DEVLP_OFS	\$DSISignal_UL	ControlLocalPanel	5	Assigned	Generated
Motor_3_DEVLP_ONS	\$DSISignal_UL	ControlLocalPanel	6	Assigned	Generated
Motor_3_DEVLP_PBS	\$DOSignal_UL	ControlLocalPanel	7	Assigned	Generated
Motor_3_DEVLP	\$DEVLP_UL	ControlLocalPanel	8	Assigned	Generated
Motor_3_Motor_OP	\$DOSignal_UL	Control	9	Assigned	Generated
Motor_New_DEVCTL	\$DEVCTL_UL	ControlMotor	10	Assigned	Non Generated
Motor_New_CONDSUM1	\$CONDSUM1_UL	ControlInterlocks	11	Assigned	Non Generated
Motor_New_DEVLP_LP	\$DSISignal_UL	ControlLocalPanel	12	Assigned	Non Generated
Motor_New_DEVLP_ZS	\$DSISignal_UL	ControlLocalPanel	13	Assigned	Non Generated
Motor_New_DEVLP_CS	\$DSISignal_UL	ControlLocalPanel	14	Assigned	Non Generated
Motor_New_DEVLP_OF	\$DSISignal_UL	ControlLocalPanel	15	Assigned	Non Generated
Motor_New_DEVLP_OF	\$DSISignal_UL	ControlLocalPanel	16	Assigned	Non Generated
Motor_New_DEVLP_PE	\$DOSignal_UL	ControlLocalPanel	17	Assigned	Non Generated
Motor_New_DEVLP	\$DEVLP_UL	ControlLocalPanel	18	Assigned	Non Generated

The section is then generated again.

The following figure shows the position of the function 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 *DEVCTL*, *DEVLP*, and *SignalMove* function blocks encapsulated in the facets referenced by instance *Motor_New*. The **Interlocks** service was selected at the instance level, therefore the *CONDSUM1* DFB was not generated.

Refinement Stage

Refining the Logical Control Participant Project

Overview

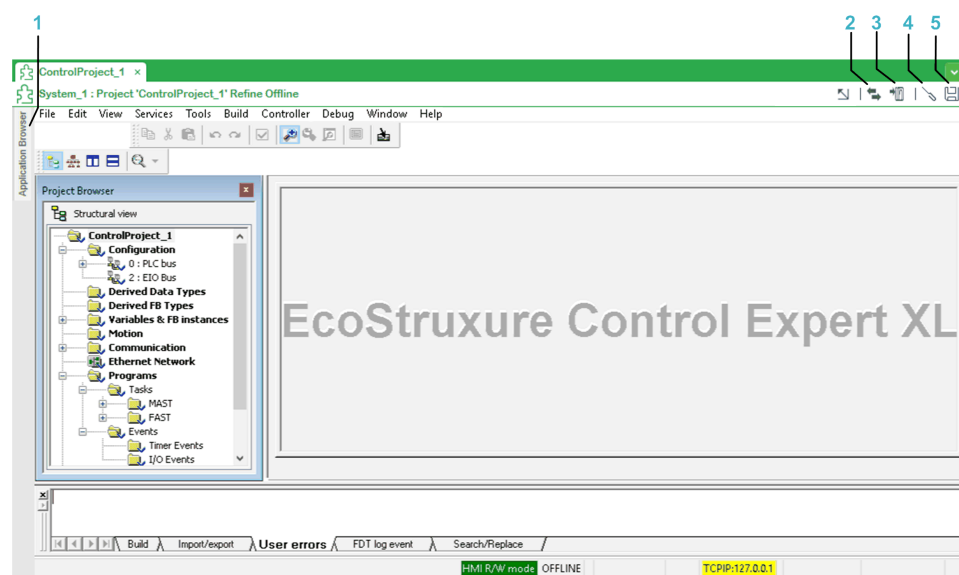
The **Refine** command allows you to modify offline the following components of the project in Control Expert Classic:

- **Derived Data Types**
- **Derived FB Types**
- **Variables & FB Instances**
- **Program**
- **Animation Tables**
- **Operator Screens**
- **Documentation**
- Project settings, page 12

For information on the refinement stage, refer to *Refining the Logical Control project* (see *EcoStruxure Process Expert, User Guide*).

Control Expert Classic User Interface

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



Item	Description
1	Tab of the pane in which you can see the project sections in relation to the structure of the application.
2	Button to manage network variables.
3	Button to access device DDTs of unmapped hardware.
4	Button to perform a consistency check.
5	Button to save changes.

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

Refining Offline With Configuration Change On The Fly Enabled

Configuration Change On The Fly (CCOTF) (see *EcoStruxure Process Expert, User Guide*) is enabled by default for the controller module 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 components of the Control Expert project are not applied to the built Control Participant project; data coming from the topology (configuration stage) is used instead:
 - Configuration**
 - Communication**
- Do not make changes in sections that contain Hardware Abstraction Layer (HAL) DFB instances; otherwise, if you make online changes in these sections later, you cannot transfer the changes back to the logical Control Participant project by using the **Update Control Project** command.

Make changes in other sections of the program.

- 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 changes, 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 the configuration.
- 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 Project Explorer but not generated and without having saved refinement changes.	The section appears in the Containers pane of the Project Explorer below other existing sections ⁽¹⁾ .	The section is present in last position.
Non-FBD section except LL984 segments.		
FBD section that was created during refinement but not generated.		
LL984 segment.	The section appears in the Containers pane of the Project Explorer in last position.	The section is not present anymore.
(1) If you deleted an LL984 segment during refinement, the section is positioned before the segment		

You must 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 Classic, right-click the data that you want to modify and select Unlock... Result: A confirmation dialog box opens.
2	Click Yes . Result: The data is shown in black and can be edited.

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

NOTE: The following actions do 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 make changes to a Control project (offline and online).

HAL is a mechanism that emulates access to hardware resources to keep 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.

As of 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 to 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 *EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual*.

Variables of data type REF_TO 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.

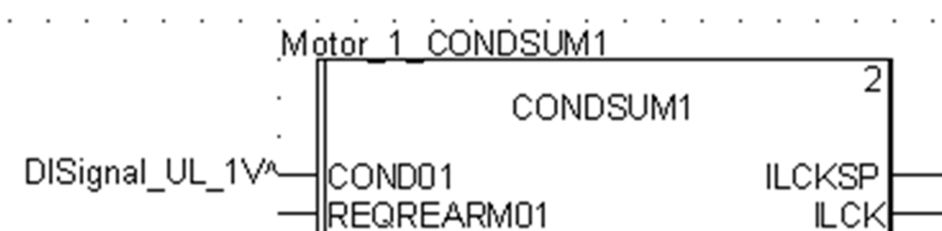
NOTE: Before using variables of the Reference data type during refinement, refer to *Reference Data Type Declarations* in *EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual*.

The following figure shows some examples of REF_TO variables generated by templates where the reference is the following (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_DOSV	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_DO_16_DOUTPUT_DO...	REF_TO ANY_BOOL		REF(%Mw561.15)

References are de-referenced by using the caret postfix (^).



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

Example for HAL ⁽¹⁾	Example for HAL2.0
%MW100 in column Address	REF(%MW100) in column Value
MODULE.CH[x].VALUE in column Alias	REF(MODULE.CH[x].VALUE) in column Value
%MW100 in column Address (for a nested array).	REF(ATV.Inputs.Free[x]) in column Value (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

Control Participant projects contain the *PES_CONST_TRUE* variable of data type BOOL with value *TRUE*.

This variable is used with 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* have the value *TRUE*.

Variables DDT Types Function Blocks DFB Types					
Filter		Name		<input checked="" type="checkbox"/> EDT <input type="checkbox"/> DDT <input type="checkbox"/> IODDT	
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 Tools > Data Editor . Result: The Data Editor window opens.
2	Enter the name of the variable that you want to create as network variable or select an existing variable. NOTE: Ensure that the variable follows the network variable management rules (see <i>EcoStruxure Process Expert, User Guide</i>) and has the appropriate attribute settings (see <i>EcoStruxure Process Expert, User Guide</i>).
3	In the Data Editor , right-click the row containing the variable and select Customize Columns... Result: The Column Configuration window opens.
4	Select Custom . Result: The Custom column is displayed in the Data Editor window.
5	Enter <i>P2P</i> in the Custom column. Result: When you click the button to manage network variables, the software detects the variable as network variable.
6	Save your changes by clicking the Save button in the toolbar of the Participant window.

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

Adding LL984 Segments

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

You must enable the use of this language in Control Expert Classic. Enable the setting before creating a segment. If you 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 build the project.

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

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

FBD Section Size

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

Viewing the Application Structure When Refining Control Projects Offline

Overview

When you make changes to a Control Participant project offline, 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, to view the logic related to a specific area or subdivision of the application.

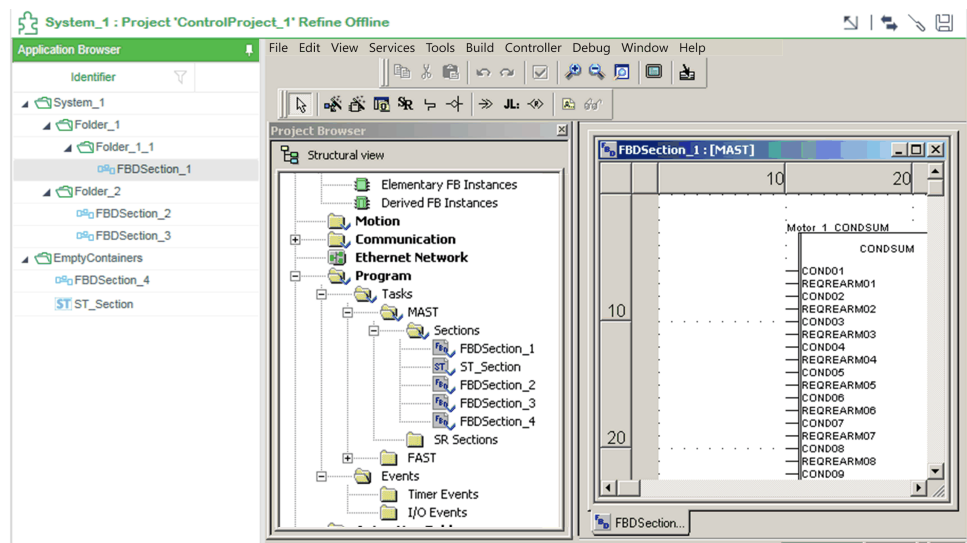
Only FBD and non-FBD sections that exist in the logical Control Participant project at the moment you select the **Refine** command are displayed. A section can appear several times depending on the facets it contains (see *EcoStruxure Process Expert, User Guide*).

The view is read-only.

NOTE: The pane is unavailable 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

After you select 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 Application Browser Pane

When you use the **Application Browser** pane, follow these guidelines:

- To view the 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 in 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 Application Browser 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: If you rename or delete a section, you cannot open it from the pane because the content of the pane is not refreshed during the online refinement session.

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 Classic when acting as a software Participant.

Integrated Hardware Architectures

Controller Platforms

Hardware templates for the following controller platforms are available:

- Modicon M580
- Modicon M340
- Modicon Quantum

NOTE: Applicable restrictions are documented in the corresponding topics.

Modules

Hardware templates for the following types of modules are available:

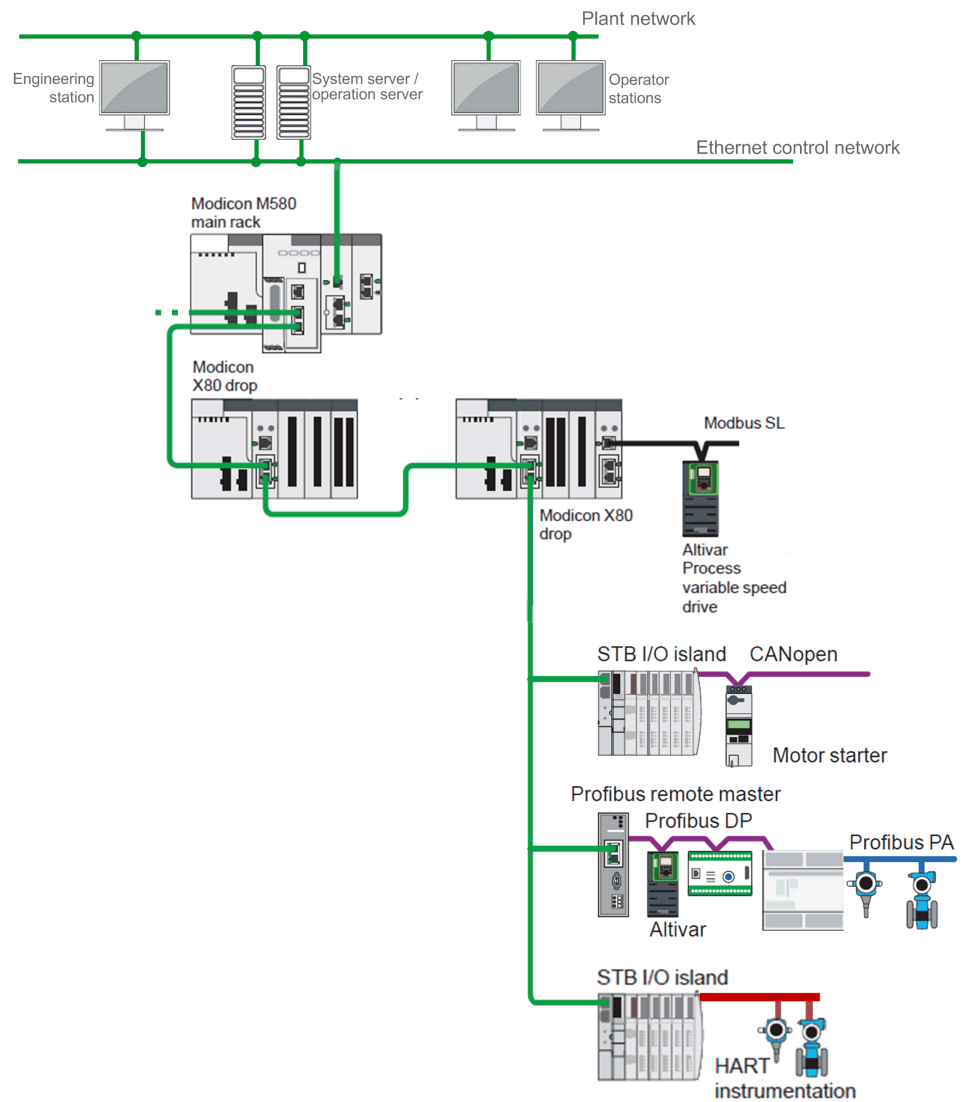
- Digital input/output modules
- Analog input/output modules
- Special modules (for example, counters (see *EcoStruxure Process Expert*, *Foundation Application Templates, User Guide*))
- Communication modules

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.

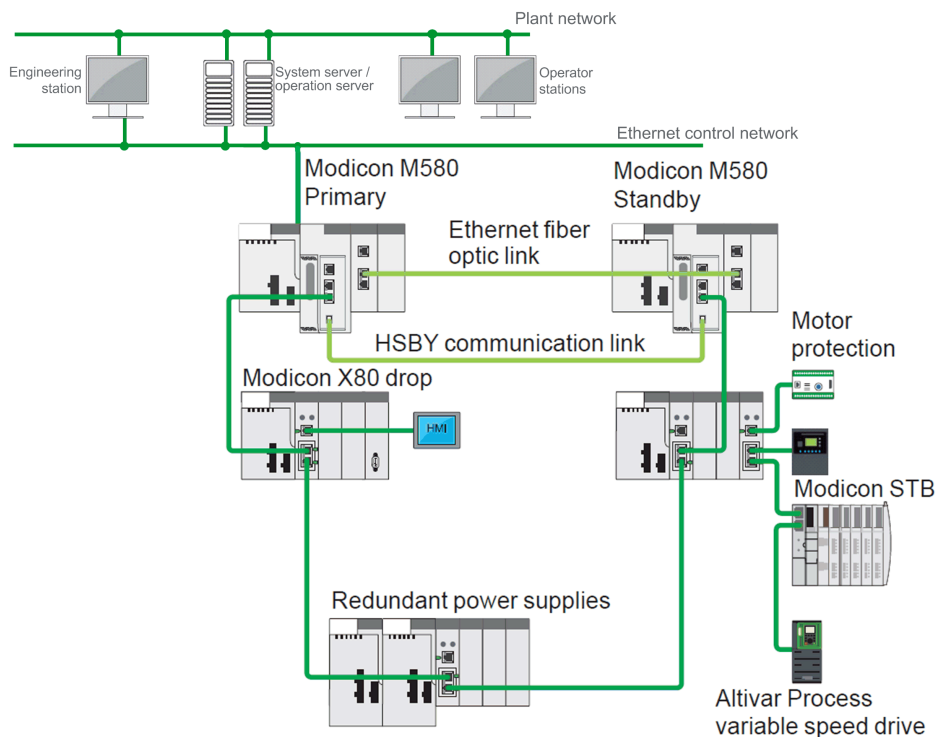
When you configure modules for which a hardware template exists, limitations may apply, page 43.

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.



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.

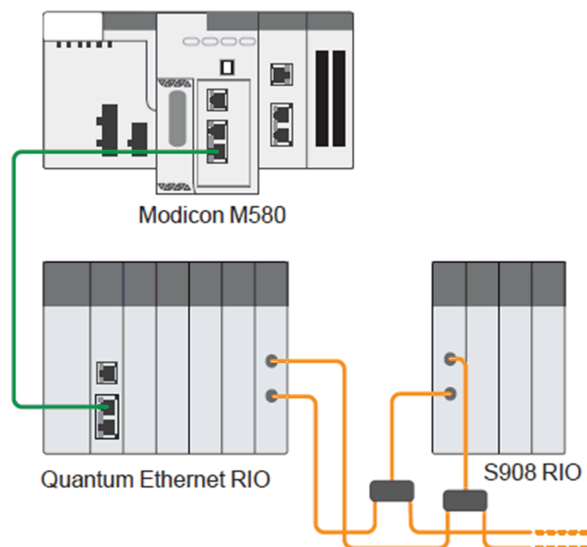


The following can be configured:

- M580 controller modules up to reference BMEP586040.
- Redundant M580 controller modules up to reference BMEH586040.
- Redundant power supplies (BMXCPS3522, BMXCPS4002, BMXCPS4022) 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 controller modules up to reference BMEP586040S.
- Redundant M580 safety controller modules up to reference BMEH586040S.
- M580 safety coprocessor modules BMEP584040SCPRO.

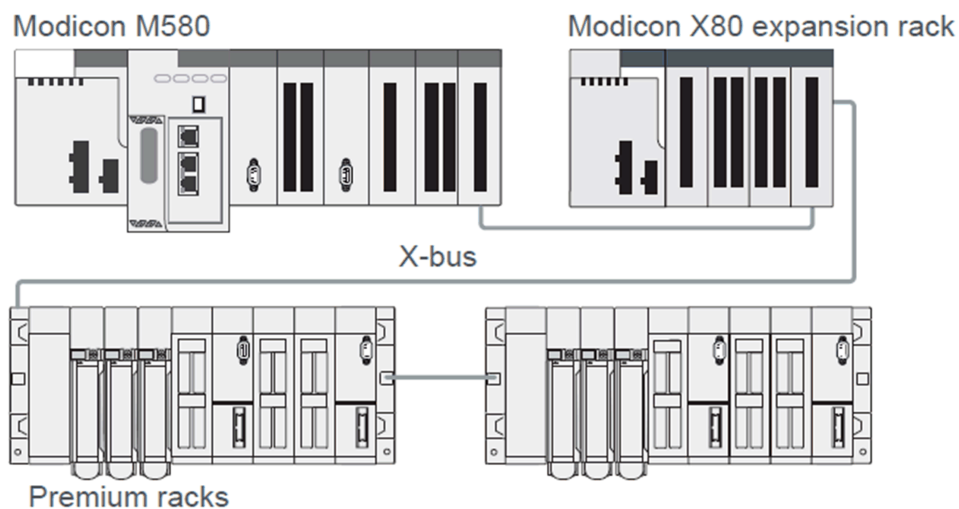
Modernization of Modicon Quantum (S908) and Premium I/Os with Modicon M580

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.

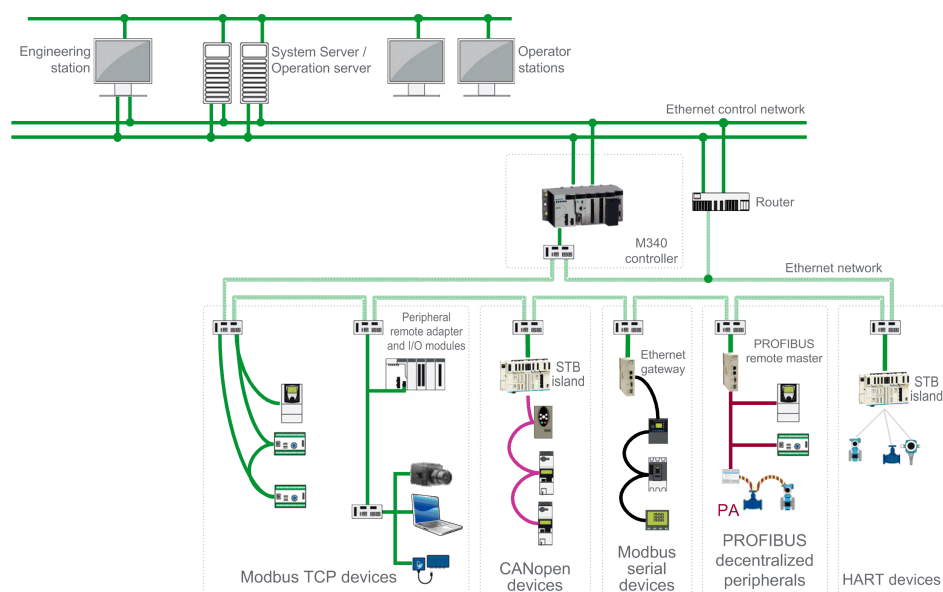
You can configure in the topology your existing Premium racks and extended racks so that they communicate with an M580 architecture.



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

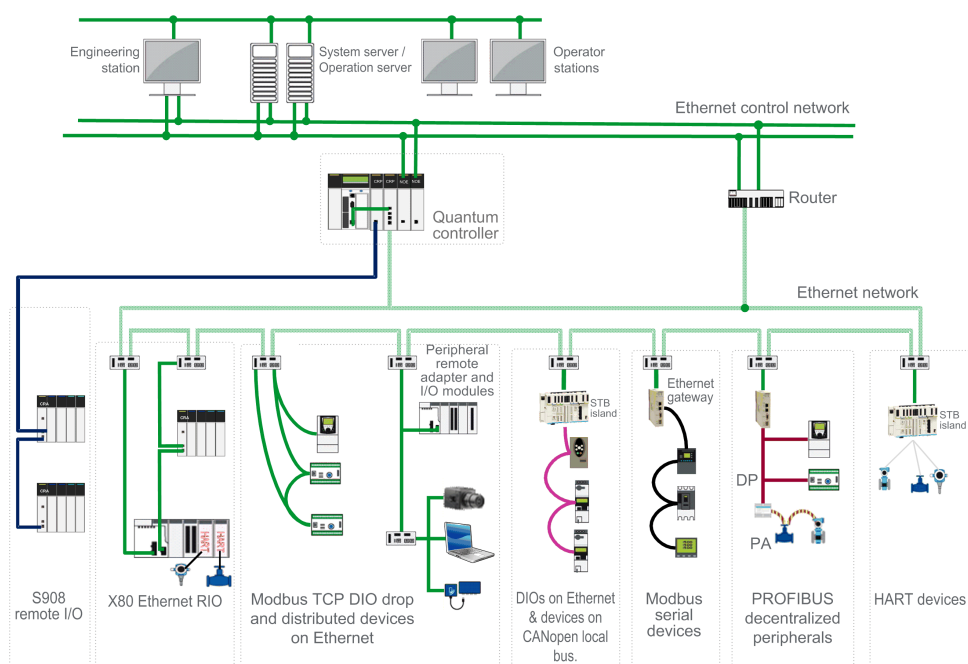
Modicon M340 Platform

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.

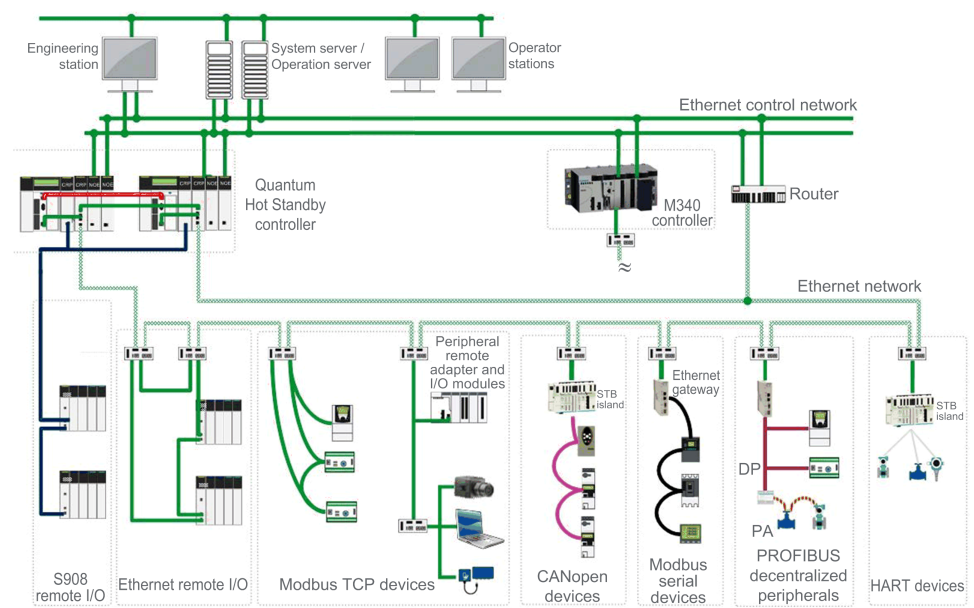


Modicon Quantum Platform

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.



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.

Not Integrated Hardware Modules

Overview

Modules for which no device-specific template is available are modeled by using the *\$UnknownModule* topological template, which allows you to add the modules 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 already configured a module in the topology of the system and it is using the *\$UnknownModule* template, if a template for this module becomes available in the Global Templates library and you want to use it, you cannot replace the template.

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

Communication modules	Special modules
BMXEIA0100	BMXMSP0200
BMXNOC0401	BMXEAE0300
BMXNOC0401.2	

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

Modicon Quantum Platform

The following 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:
 - 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

Overview

The configuration of a controller by using Control Expert Classic encompasses the following:

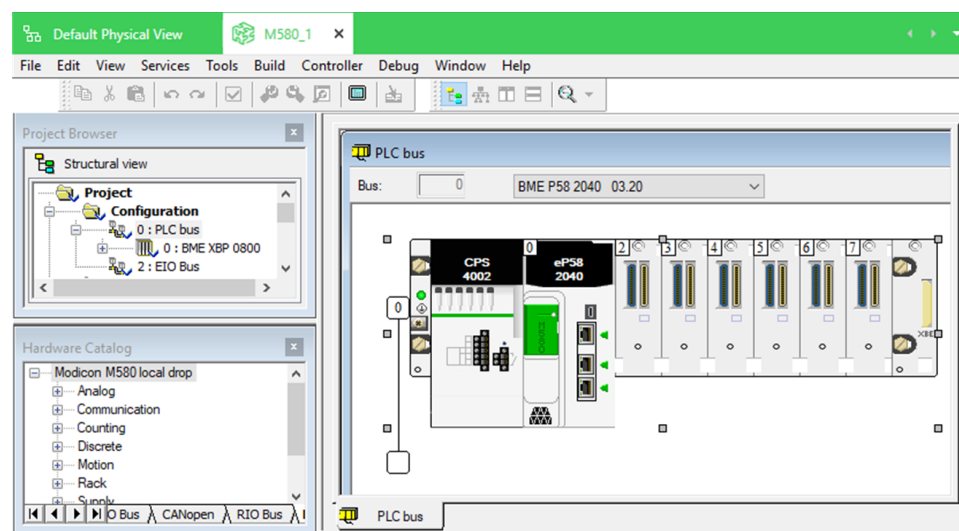
- Local racks and drops.
- Power supply modules.
- The controller module.
- Communication modules.
- I/O modules in local and remote racks, including HART analog I/O modules.
- Communication networks, IP addresses, and subnet masks (M340 and Quantum only).
- Device Type Managers (DTMs) for child devices of NOC communication modules, which use the following communication protocols (M340 and Quantum platforms only):
 - Modbus TCP
 - HART

You can change **Project Settings**, page 12 to apply them to the built Control Participant project. However, the software may override, page 12 some of these settings during the build process.

For information on the configuration stage, refer to *Configuring the Controller* (see *EcoStruxure Process Expert, User Guide*).

Control Expert Classic User Interface

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



NOTE: The configuration corresponds to the controller platform and reference that you select when you create the controller in the **Topology Explorer**.

Limitations

During the configuration of a controller, do not create or modify items or settings other than those described under *Overview* in this topic because they are not saved to the configuration file.

The following configuration restrictions apply:

- For controllers of the M580 platform, the configuration is performed mainly in the **Topology Explorer** except for adding/removing modules.
- 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.
- You can connect to the controller 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 select the following I/O data type when you add a module:

Module position	Supported I/O data type
Local rack or drop	Device DDT ⁽¹⁾
Quantum drop (on Ethernet or S908 network)	State Ram ⁽²⁾
Premium rack	Topological
<p>(1) NOC communication modules can be added even though they appear as supporting only the Topological I/O data type</p> <p>(2) For these modules, the module health bit address is set to <i>REF(PES_CONST_TRUE)</i> (instead of, for example, <i>REF(DROP_1.IO_HEALTH_RACK1.1)</i>) independently of the status of the module</p>	

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

Using Configuration Change On The Fly

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 for your specific controller platform in the Control Expert help and follow the indications.

Firmware Version Compatibility

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 supports it).

For information on minimum firmware version requirements, refer to the platform *Release Notes*.

Configuring NOC Module 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 Modifying an Existing Configuration

The following table describes the impact of changes that you can perform in Control Expert Classic on communication functions of an existing configuration depending on the controller platform.

Change	Controller platform	Result
Changing the IP address of a module that has the I/O scanner service enabled.	M340, Quantum	Sets the build state (see <i>EcoStruxure Process Expert, User Guide</i>) of the associated Control executable to Out Of Date if a communication mapping exists. Refer to <i>Changing the Controller Configuration</i> (see <i>EcoStruxure Process Expert, User Guide</i>).
Disabling the I/O scanner service.		Deletes the communication channels in the executable of the consumer project. Refer to <i>Changing the Controller Configuration</i> (see <i>EcoStruxure Process Expert, User Guide</i>).
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 <i>Managing Conflicting Connections to Ethernet Networks</i> (see <i>EcoStruxure Process Expert, User Guide</i>).
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 <i>Changing the Controller Configuration</i> (see <i>EcoStruxure Process Expert, User Guide</i>).
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 <i>EcoStruxure Process Expert, User Guide</i>).
Removing the Ethernet network link of the module.	M340, Quantum	After you acknowledge the notification: <ul style="list-style-type: none"> Removes the physical interface link (see <i>EcoStruxure Process Expert, User Guide</i>) that exists for the module. Deletes the communication channels in the executables of the owner and consumer projects. Refer to <i>Changing the Controller Configuration</i> (see <i>EcoStruxure Process Expert, User Guide</i>).
Replacing or deleting the module.	M580, M340, Quantum	

Configuring HART Modules With Quantum Controller Platform

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

NOTE: For controllers of the M580 platform, the configuration is performed in the **Topology Explorer** except for adding the communication module.

Step	Action
1	Configure a controller of the Quantum platform and add a 140NOC78000 communication module.
2	Add a HART analog I/O module in the Modicon X80 drop (BME)
3	Open the DTM Browser and add the DTM that corresponds to the HART module by right-clicking the DTM of the 140NOC78000. NOTE: You need to add one DTM for each HART module.
4	Open the DTM of the NOC module.
5	Select the HART module in the Device List .
6	In the Address Setting tab, configure the IP information and/or the Identifier of the HART module.
7	Open the DTM of the HART module.
8	In the Configuration > Parameter Configuration section, configure the channels of the HART module.
9	In the Process Data section, configure each enabled channel of the HART module. NOTE: The Primary Variable (PV) is selected by default and is the only variable that is available in the Hardware Mapping Editor . The other data that you configure is retained during build and can be deployed to a controller but is not usable at the software system level.
10	Double-click the NOC module in the Local Bus editor and configure Inputs and Outputs in the Configuration window.
11	Double-click the DTM of the NOC module and enable FTP in the Security section of the properties of the DTM.

NOTE: For more information on the Quantum platform, refer to the topic *Adding a BMEAH•0•12 HART Module to a Remote I/O Drop* in the help of Control Expert.

NOTE: For more information on the M580 platform, refer to the *Modicon eX80 BMEAH10812 HART Analog Input Module & BMEAH00412 HART Analog Output Module, User Guide*.

Enabling the LL984 Language

If your Control project contains sections in LL984 language, 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 is not supported by some controller module references.

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

Step	Description
1	In the menu bar of Control Expert Classic, click Tools > Project Settings.... Result: The Project Settings... window opens.
2	Under Program , click Languages and select Ladder Logic (LL984) . Result: The Project Settings... window closes.
3	Save the change.

Configuring an STB Island

Overview

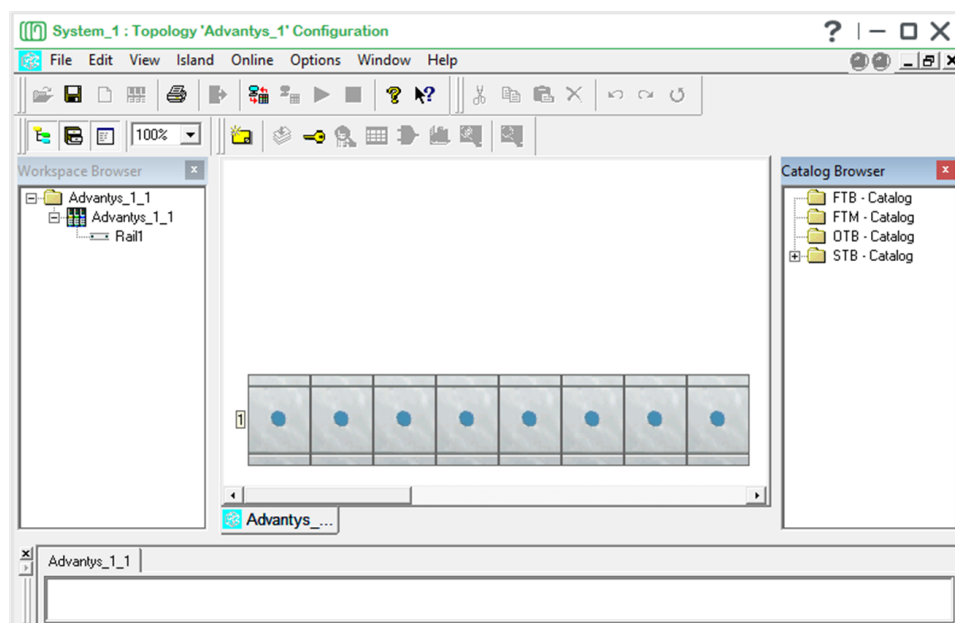
The configuration of an STB island by using ACS encompasses the following:

- 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

For information on the configuration stage, 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.



Limitations

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

Considerations When Updating an STB Island Configuration

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

Change	Result
Replacing the NIM of an STB island.	Existing physical connections (see <i>EcoStruxure Process Expert, User Guide</i>) to an Ethernet network are retained.
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 <i>Changing STB Island Properties</i> (see <i>EcoStruxure Process Expert, User Guide</i>).

Configuring a PROFIBUS Remote Master and Decentralized Peripherals

Overview

The configuration of a PROFIBUS Remote Master module by using Control Expert Classic encompasses the following:

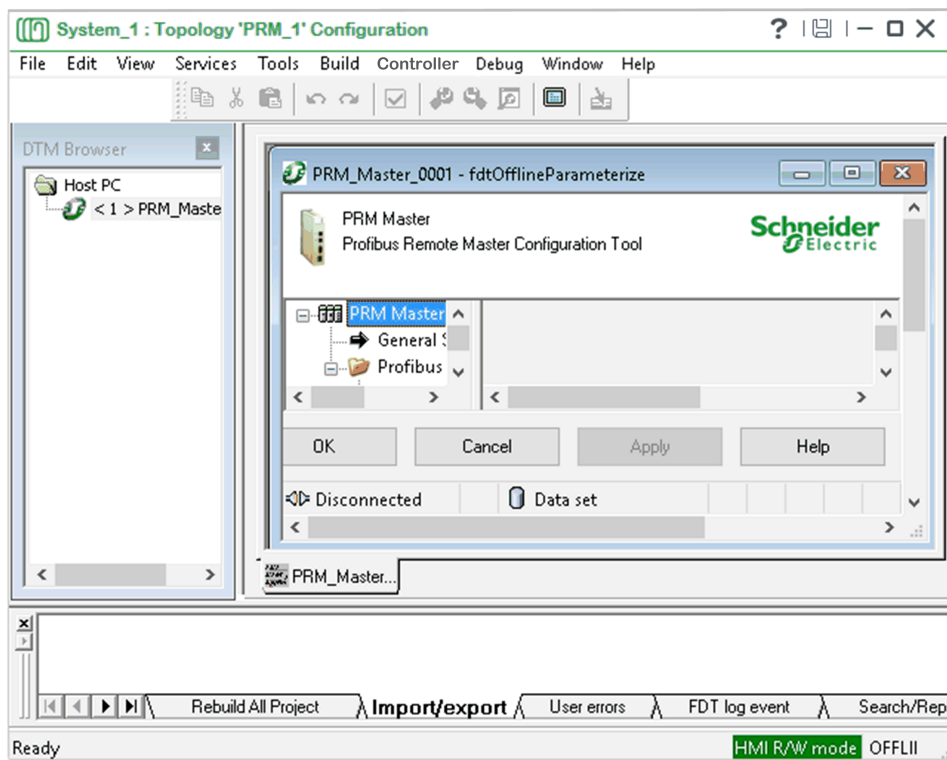
- Configuring the PRM.
- Adding and configuring Decentralized Peripherals (DPs) by using either:
 - A Device Type Manager (DTM)
 - A General Station Description (GSD) file
- Adjusting the **RD length** and **WR length** values in the **IO scanning** tab of the communication network in the **Project Browser** if 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 other DTMs and GSD files, page 14.

For information on the configuration stage, refer to *Configuring a PROFIBUS Remote Master and Decentralized Peripherals* (see *EcoStruxure Process Expert, User Guide*).

Control Expert Classic User Interface

The following figure shows an example of the Control Expert Classic 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 select in the **PROPERTIES** of the PRM in the **Topology Explorer**.

Limitations

- Do not delete the PRM by using the **Delete** command in the context menu of the PRM inside Control Expert Classic.
- 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 complete the PRM configuration and successfully build the Control Participant project to which the controller that communicates with the PRM is mapped, 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 following table outlines the steps that enable access to the **Store data to device** command of the contextual menu of the PRM Master.

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

Considerations When Updating an Existing PRM Configuration

The following table describes the impact of changes that you can perform in Control Expert Classic on communication functions of an existing PRM configuration depending on the platform of the controller that communicates with the PRM.

Change	Controller platform	Result
Changing the IP address of a PRM.	M340, Quantum	Sets the build state (see <i>EcoStruxure Process Expert, User Guide</i>) of the associated executable to Out Of Date if a communication mapping exists. Refer to Changing the PRM Configuration (see <i>EcoStruxure Process Expert, User Guide</i>).
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 <i>EcoStruxure Process Expert, User Guide</i>).
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.		After you acknowledge the notification: <ul style="list-style-type: none"> Removes the physical interface link (see <i>EcoStruxure Process Expert, User Guide</i>) that exists for the module. Deletes the communication channels in the executables of the owner and consumer projects. Refer to <i>Managing Conflicting Connections to Ethernet Networks</i> (see <i>EcoStruxure Process Expert, User Guide</i>).
Adding DPs which causes the total read and/or write size to exceed 100.	M580, M340, Quantum	You cannot save the PRM configuration. Refer to the Overview , page 50.

Configuring IEC 61850 Communication Modules

Overview

The configuration of IEC 61850 communication modules by using the **Modicon IEC 61850 Configuration Tool** encompasses the following:

- Configuring the BMENOP0300 communication module as an IEC 61850 server or client.
- Configuring Ethernet services for the module, such as, RSTP, security, and 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*).

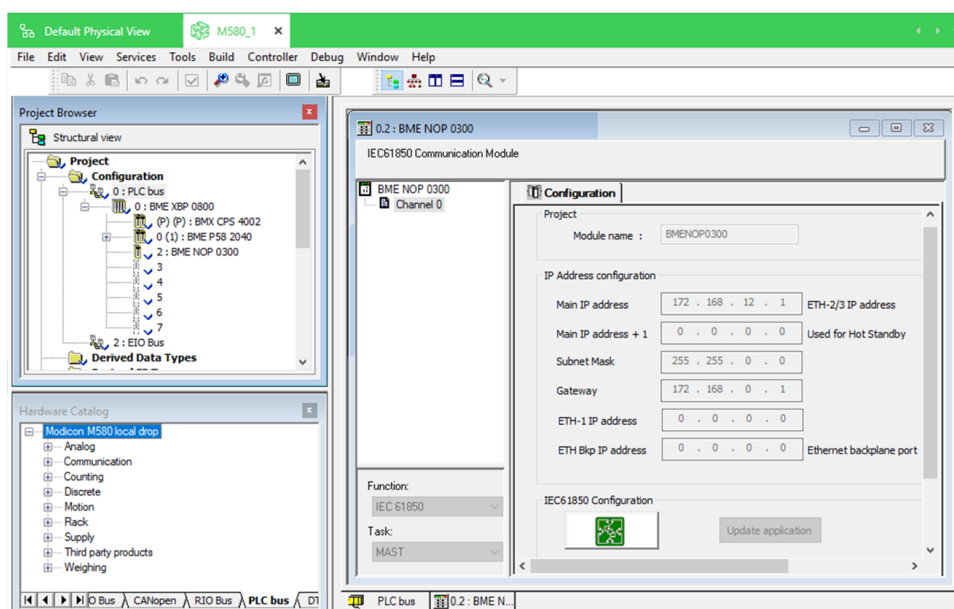
For information on the configuration stage, refer to *Configuring the Controller* (see *EcoStruxure Process Expert, User Guide*).

Prerequisites

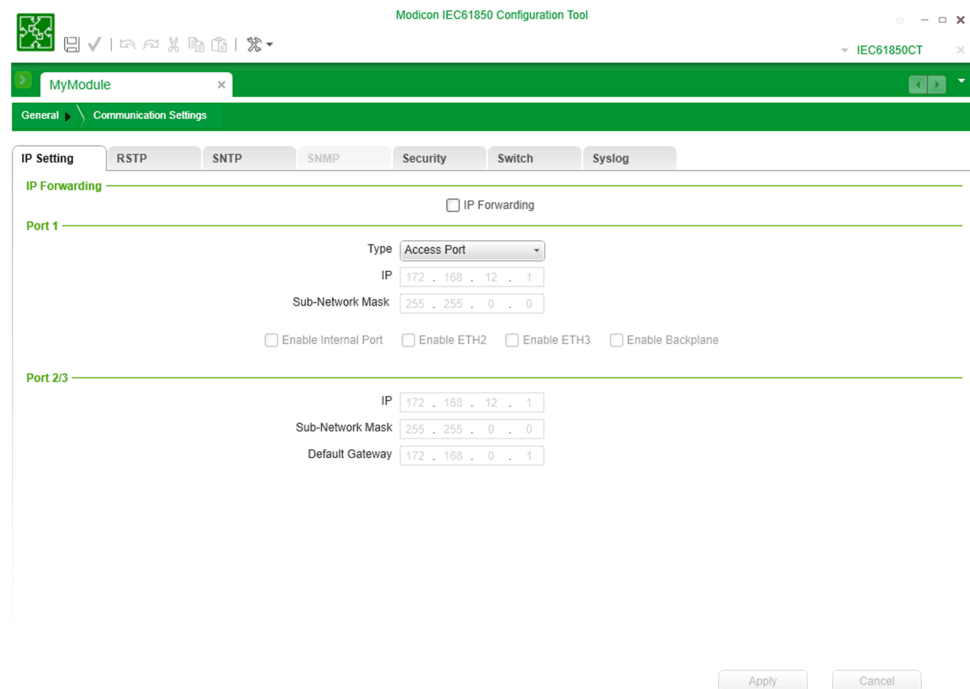
- You have a knowledge of IEC 61850 standards, content of services, data model, engineering process, and other necessary IEC 61850-related information.
- You have added a BMENOP0300 module to an M580 controller by using the **Configure** command.

Control Expert Classic User Interface

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



The following figure shows an example of a communication setting configuration window in the **Modicon IEC 61850 Configuration Tool**, which opens by clicking the **IEC61850 Configuration** button in the module **Configuration** tab in Control Expert Classic.



Changing the Configuration of IEC 61850 Communication Modules

Modifications 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, make 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 made to device DDT variables to the logical Control Participant project. Use the **Update** action for already created device DDT variables in the wizard of the **Project Explorer**, which allows you to manage them.

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 Classic does not limit the number of NOP communication modules that you can configure in a local rack. This number is related to the controller module reference. 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 a version that is available on the mySchneider support portal, page 6 and that is compatible with EcoStruxure Process Expert.

Using the Modicon IEC 61850 Configuration Tool

The following table presents the steps to use the **Modicon IEC 61850 Configuration Tool**.

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

Configuring PMPXM0100 PROFIBUS Modules

Overview

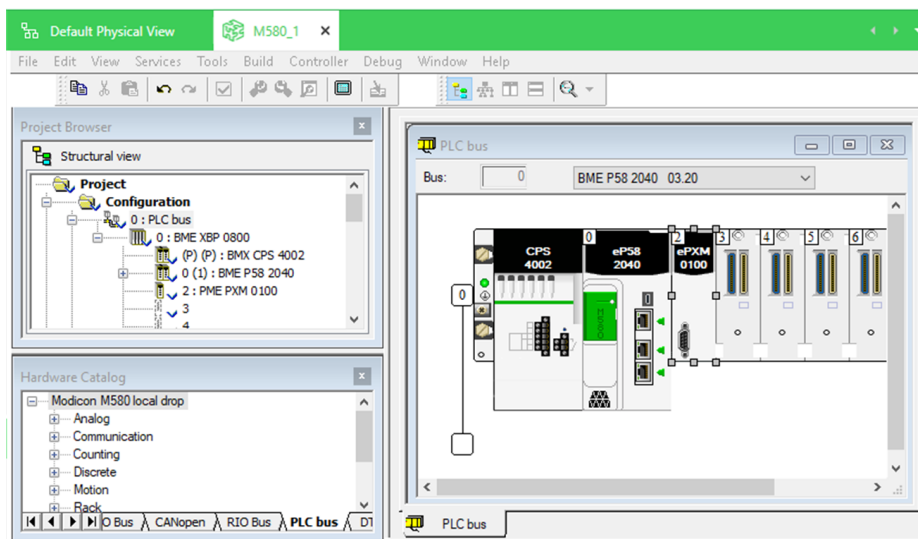
By using Control Expert Classic, you can add a PMPXM0100 module to an M580 standalone or redundant controller and configure it by following the steps described in the *PMPXM0100 ProSoft User Manual*.

For an overview of the entire procedure, refer to the description of the workflow (see *EcoStruxure Process Expert, User Guide*) to integrate the PMPXM0100 PROFIBUS primary module and secondary devices into a system.

For information on the configuration stage, refer to *Configuring the Controller* (see *EcoStruxure Process Expert, User Guide*).

Control Expert Classic User Interface

The following figure shows an example of the Control Expert Classic window that opens after selecting the **Configure** command and adding the PMPXM0100 module.



Limitations

You need to perform certain steps of the module configuration outside EcoStruxure Process Expert by using ProSoft Configurator for Modicon and following the steps described in the *PMPXM0100 ProSoft User Manual*.

Configuring BMENUA0100 OPC UA Embedded Modules

Overview

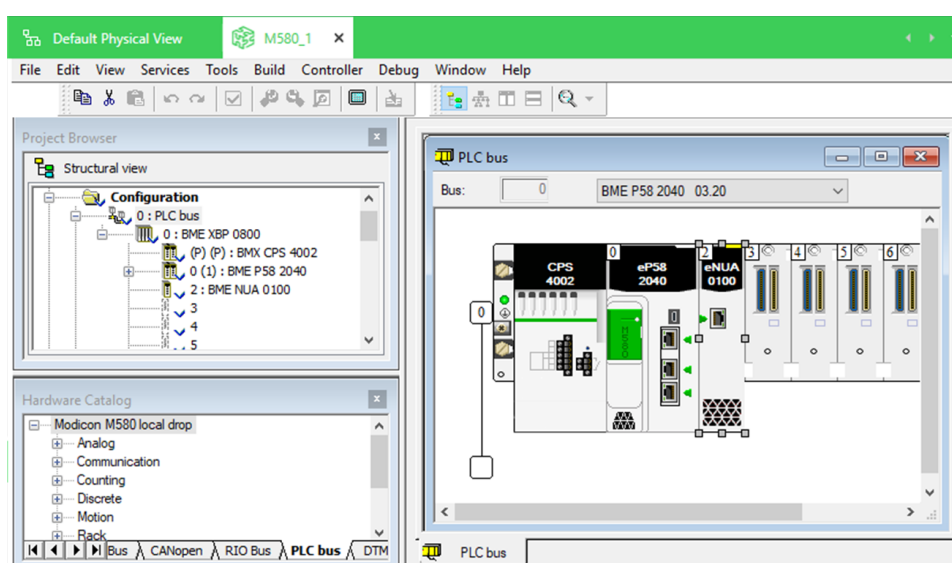
By using Control Expert Classic, you can add a BMENUA0100 or BMENUA0100.2 module to an M580 standalone or redundant controller.

Then, to configure the module, use the **PROPERTIES** pane of the **Topology Explorer**.

For information on the configuration stage, refer to *Configuring the Controller* (see *EcoStruxure Process Expert, User Guide*).

Control Expert Classic User Interface

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



Supervision Tag Container Configuration

When you use an OPC UA embedded module, ensure that in the Supervision project, **Protocol** of the tag container that is associated to the I/O device is set to *OPCUA Embedded*.

Limitations

Time stamping is not supported by OPC UA Server Expert. This includes the BMENUA0100 module, which embeds OPC UA Server. As a result, when a BMENUA0100 module is added to a rack that contains modules with time stamping capability, such as BMXERT1604T, 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.

NOTE: For time stamping support, use the BMENUA0100.2 module.

Build Stage

Viewing the Built Control Participant Project

Overview

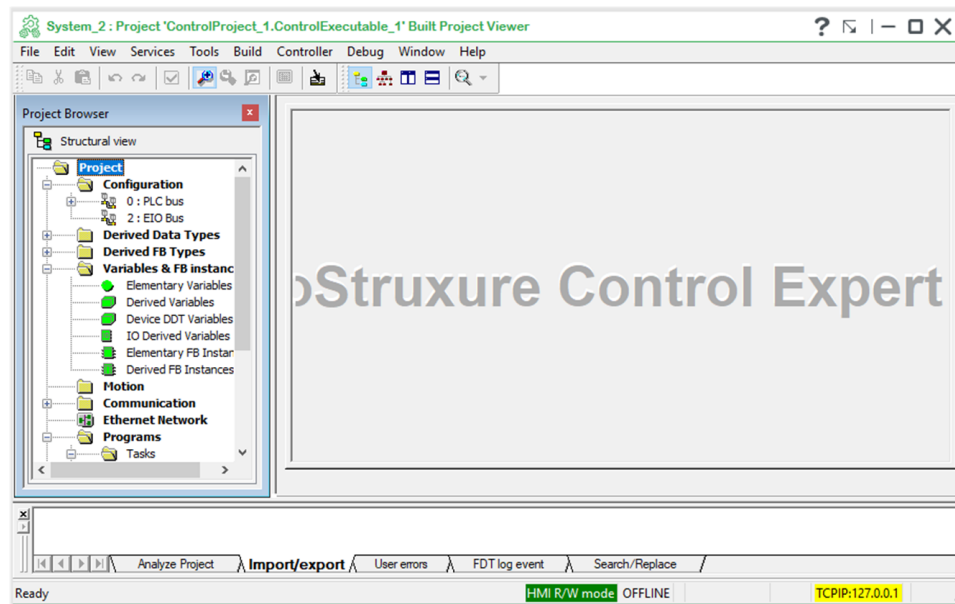
The **Open Built Project** command allows you to view the contents of the following components of the Control project in Control Expert Classic:

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

For information on the build stage, refer to the topic describing how to view the built Participant project (see *EcoStruxure Process Expert, User Guide*).

Control Expert Classic User Interface

The following figure shows an example of the Control Expert Classic window, which opens after selecting the **Open Built Project** command in the context menu of a built Control executable.



Limitations

Changes that you make to the built Control project in the Control Expert Classic window are discarded when you close the window.

NOTICE

MODIFICATIONS ARE DISCARDED

Use EcoStruxure Process Expert to make modifications to the Control project.

Failure to follow these instructions can result in equipment damage.

You may make temporary modifications to ascertain their affect on your application. To make such modifications permanent, use the **Project Explorer** in EcoStruxure Process Expert.

Execution Stage

Refining the Deployed Control Participant Project Online

Overview

The **Refine Online** command allows you to make changes to the following components of the Control project in Control Expert Classic:

- **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 deploying them.

If the deployment requires stopping the controller, you can do either of the following:

- Stop the controller and deploy changes.
- Discard 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*).

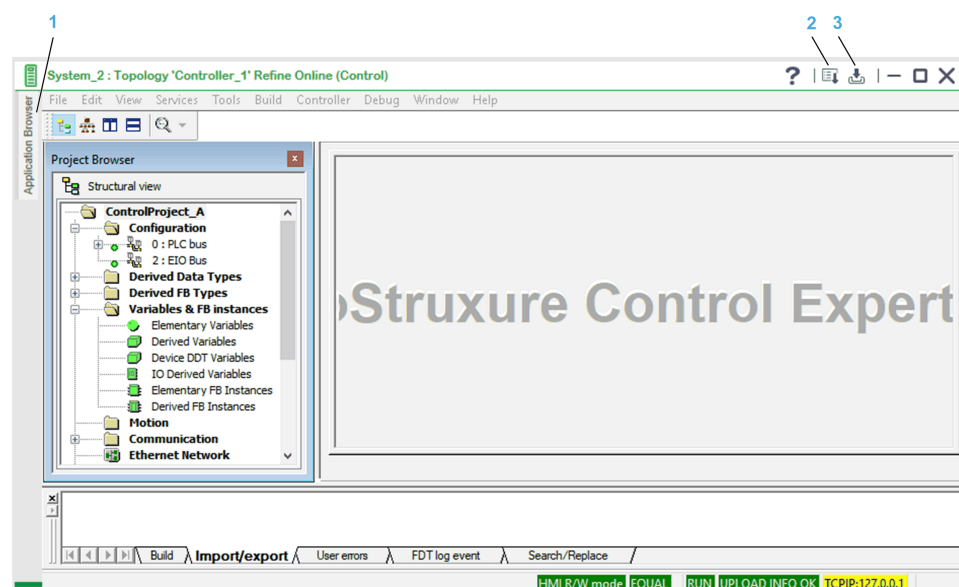
For information on starting and stopping redundant controllers, refer to the topics describing:

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

For information on the execution stage, refer to *Making Changes Online* (see *EcoStruxure Process Expert, User Guide*).

Control Expert Classic User Interface

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



Item	Description
1	Tab of the pane, page 67 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 69 from the corresponding logical Control Participant project
3	Button to build and deploy changes

Limitations

- You cannot transfer to the logical Control project the following changes by using the **Update Project** command:
 - Changes to 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*).
 - Changes in sections containing HAL DFB instances. Make changes in other sections of the program. 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 make changes to other project components than those listed in the Overview of this topic by using the **Refine Online** command; however, you cannot update the logical Control Participant project (see *EcoStruxure Process Expert, User Guide*) with these changes.
Refer to *Synthesis of Authorized and Unauthorized Modifications in EcoStruxure™ EcoStruxure Control Expert, Operating Modes* for information on other changes that you can make.
- 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**.
- Do not remove the **HAL** and **HALFB** attributes that appear in the **Custom** property of variables or DFB instances.

Unlocking Locked Code

You may need to unlock code, page 29 before you can modify it.

Detecting Disconnections

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

Clicking **OK** in the dialog box does the following:

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

NOTE: Select the **Refine Online** command again from the **Topology Explorer** to continue making online changes in the Control Expert Classic window. If you already deployed changes to a controller by using the **Build and Deploy** button before the disconnection occurred, these changes are retained when the Control Expert Classic 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 Classic. For 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: 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, 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 Classic, proceed as follows.

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

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Ensure that you have selected the correct project file before deploying it to a controller.

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

When you deploy changes made online to a redundant controller and deployment to the primary controller succeeds, the synchronization of the standby controller may not complete. In this case, the software displays a message in the notification panel to inform you. If an interruption of the connection to 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

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

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

When you make changes online, the associated logical and built Control Participant projects do not contain these changes. To retain these changes for the next deployment, integrate them into the Control Participant projects 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

Update the associated logical Control Participant project after building and deploying changes made by online refinement.

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	Make the changes in the deployed Control project in Control Expert Classic.	–
2	Click the Build and Deploy button.	The List of modified sections dialog box opens if the option is enabled.
3	Click Yes . NOTE: Click No to keep the Control Expert Classic window open without building and deploying the changes.	The software: <ul style="list-style-type: none"> • Builds the changes. • Deploys the changes to the controller or controller simulator without stopping it. • Displays the Refine Online dialog box, which provides information about the result of the build and deployment process. • Displays Completed in the notification panel. <ul style="list-style-type: none"> ◦ 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, a message is shown in the notification panel.
4	Close the Control Participant window and refer to the procedure describing how to continue this process (see <i>EcoStruxure Process Expert, User Guide</i>).	–

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

When you make changes that require stopping the controller, the Control Expert Classic window is closed. This disconnects the controller so that the changes can be built offline (full build).

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

WARNING

UNINTENDED EQUIPMENT OPERATION

Ensure that you have selected the correct project file before deploying it to a controller.

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

WARNING

UNINTENDED EQUIPMENT OPERATION

Ensure that you are connected to the controller you intend to start or stop.

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

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

⚠ WARNING**UNKNOWN OPERATIONAL STATE OF EQUIPMENT**

Always positively confirm that there is no mission-critical operation in progress before starting or stopping a controller, or any other command or action incompatible with the ongoing operation.

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

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

⚠ WARNING**UNINTENDED EQUIPMENT OPERATION**

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

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

When you make changes online, the associated logical and built Control Participant projects do not contain these changes. To retain these changes for the next deployment, integrate them into the Control Participant projects 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**

Update the associated logical Control Participant project after building and deploying changes made by online refinement.

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	Make the changes in the deployed Control project inside the Control Expert Classic window.	The Online Modification Authorization dialog box opens.
2	Click Yes . NOTE: Click No to close the Online Modification Authorization dialog box, cancel the changes, and keep the Control Expert Classic window open.	The software applies the change.
3	Click the Build and Deploy button.	The Refine Online dialog box opens, which gives you the following options: <ul style="list-style-type: none"> • Deploy: Stops the controller and deploy the changes. • Discard: <ul style="list-style-type: none"> ◦ Discards changes that you made up until you clicked the Build and Deploy button. ◦ Closes the Control Expert Classic window. ◦ Displays Completed in the notification panel. ◦ Opens the Refine Online online dialog box if you made changes online that you have not yet applied to the associated logical Control Participant project. • Cancel: Closes the Refine Online dialog box. Changes are not discarded. It allows you to continue with the online editing and to click Build and Deploy again.
4	Select whether to start the controller or the controller simulator after deployment completes.	—
5	Click Deploy .	The software: <ul style="list-style-type: none"> • Closes the Control Expert Classic window. • Stops the controller. • Builds the changes and deploys the updated Control Participant project to the controller or controller simulator. • Starts the controller if you selected the check box. • Displays Completed in the notification panel. <ul style="list-style-type: none"> ◦ 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, a message is shown in the notification panel. • Updates the related date/time field.
6	Close the Control Participant window and refer to the procedure describing how to continue this process (see <i>EcoStruxure Process Expert, User Guide</i>).	-

Viewing the Application Structure When Making Changes Online

Overview

When you make changes to 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.

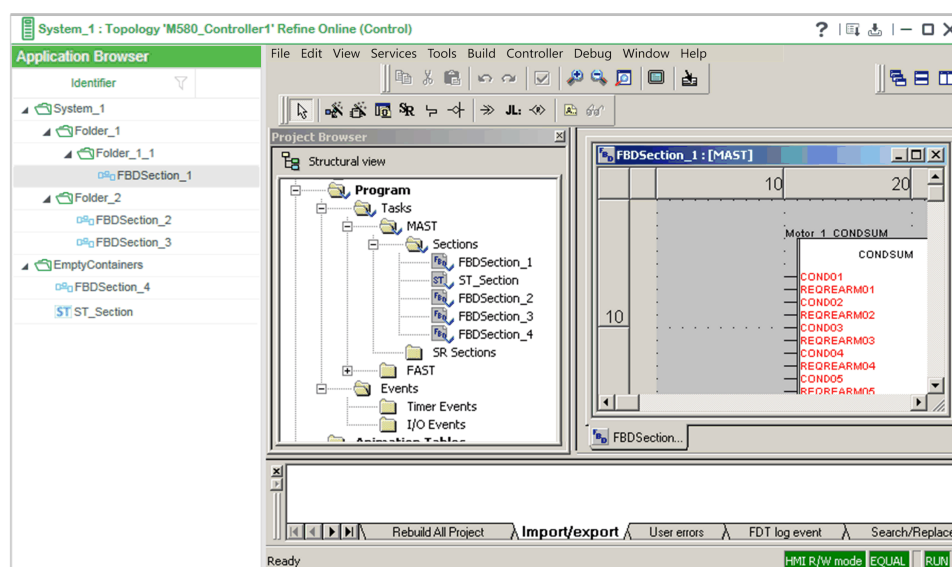
It shows the relationship between the folder structure of the application and the sections of a Control Participant project. This is useful, for example, to modify the logic related to a specific area or subdivision of the application.

Only FBD and non-FBD sections of the Control Participant project that were deployed at the moment you select the **Refine Online** command are displayed. Sections that you create or rename while making changes online 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 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

After you select the **Refine Online** command, if you make changes (for example, renaming, adding, or deleting a section), the content of the pane is refreshed when you close the Control Participant window and select the command again.

Using the Application Browser Pane

When you use the **Application Browser** pane, follow these guidelines:

- To view the 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 horizontally.

Opening Program Sections from the Application Browser 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: If you rename or delete a section, you cannot open it from the pane because the content of the pane is not refreshed during the online refinement session.

Importing Sections from the Logical Control Participant Project

Overview

You can import sections directly from the logical Control project to facilitate 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 modified since they were last deployed. 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 made in the section during online refinement are overwritten.

NOTICE

LOSS OF DATA

- Verify that the section that you import does not have the same name as a section in the deployed Control project.
- Modify the section name if you want to preserve the section of the same name in the controller.

Failure to follow these instructions can result in equipment damage.

Importing Sections from the Logical Control Participant Project

You can use the [section import functionality](#), [page 61](#) several times 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 did not import the first time continue to appear as candidate for import.

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

Step	Action
1	In the Refine Online window, click the button to import sections. Result: If the software detects section containing supported changes, the Import Sections from Logical Project window opens and shows the list of sections you can import; otherwise, a notification about no detected modifications is displayed.
2	Select the check boxes of sections to import and click OK .
3	Confirm the modification if prompted to do so. Result: The sections and their contents, variables, and the corresponding types are added to the deployed Control project.
4	Refer to the procedure describing how to refine the deployed Control project online , page 60 for instructions to build and deploy changes. NOTE: Close the Control Participant window and click No when prompted in the Refine Online dialog box to quit the online refinement session and discard non-built/non-deployed changes.

Glossary

A

application interface:

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

The *application interface* allows you to link:

- Application 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.

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:

Models the process to be controlled and monitored. It consists of instances of application templates and a application folder structure. A system can contain several applications.

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 clients use software Participants.

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 and can be deployed a topological entity.

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 in 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.

I/O:

Abbreviation for *Inputs/Outputs*.

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.

Participant:

An external tool that is embedded in EcoStruxure Process Expert and installed on the system server and client computers. It allows refining projects and/or configuring topological entities. For example, the Control Participant.

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 Participant. It contains elements that are managed at the platform level and executables that you can deploy to topological entities.

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 workstation modeling 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:

Refers to EcoStruxure Process Expert.

station node:

A *station node (workstation)* models a computer that can act as an engine to execute a Control project by using the Controller 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:

Represents the stages that must be completed to create and commission a system with EcoStruxure Process Expert.

system server:

EcoStruxure Process Expert server that hosts:

- Software Participants
- The database containing template libraries and system data

The system server manages requests from the EcoStruxure Process Expert clients.

system:

Models a physical automation system. It consists of the following components:

- Applications
- Control and Supervision projects
- The topology

T

topological entity:

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

For example, a controller.

topology:

Models the hardware, software, and communication network infrastructure of a system by using topological folders and entities.

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