



Process Expert - General Purpose Library Classic

Communication Templates Reference Manual

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

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Safety Information

Important Information

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



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



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

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

Please Note

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

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

Qualification of Personnel

A qualified person is one who has the following qualifications:

- Skills and knowledge related to the construction and operation of electrical equipment and the installation.
- Knowledge and experience in industrial control programming.
- Received safety-related training to recognize and avoid the hazards involved.

The qualified person must be able to detect possible hazards that may arise from parameterization, modifying parameter values and generally from mechanical,

electrical, or electronic equipment. The qualified person must be familiar with the standards, provisions, and regulations for the prevention of industrial accidents, which they must observe when designing and implementing the system.

Proper Use

This product is a library to be used together with the automation control systems and is intended solely for the purposes described in the present documentation as applied in the industrial sector.

Always observe the applicable safety-related instructions, the specified conditions, and the technical data.

Perform a risk evaluation concerning the specific use before using the product. Take protective measures according to the result.

Since the product is used as a part of an overall system, you must ensure the safety of the personnel by means of the concept of this overall system (for example, machine concept).

Any other use is not intended and may be hazardous.

Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

WARNING

UNGUARDED EQUIPMENT

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

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

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before

placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

Start-up and Test

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check are made and that enough time is allowed to perform complete and satisfactory testing.

⚠ WARNING

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

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

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

Operation and Adjustments

The following precautions are from the NEMA Standards Publication ICS 7.1-1995:

(In case of divergence or contradiction between any translation and the English original, the original text in the English language will prevail.)

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.

- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About the Book

Document Scope

This document describes the communication templates that are included in the General Purpose library of the EcoStruxure Process Expert software as well as the Control services that they provide.

For a more detailed description of their associated Control services and configuration parameters, refer to the user guides mentioned in this document.

To use communication templates, you need to have knowledge of EcoStruxure Process Expert and of the Control Participant.

Validity Note

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

Related Documents

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.

Title of Documentation	Reference Number
EcoStruxure Process Expert User Guide	EIO0000001114
EcoStruxure™ Process Expert - General Purpose Library Classic Process Templates Reference Manual	EIO0000000987
EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual	EIO0000001312
EcoStruxure Process Expert Runtime Navigation Services User Guide	EIO0000001574 (eng)

Technical Support

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

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.

Examples described in this manual are provided 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.

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.

Standard	Description
	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.

Overview

Communication Templates

Description

The EcoStruxure Process Expert General Purpose library provides resources:

- That have been pre-configured and tested by Schneider Electric.
- That are designed for automating a large variety of processes.

Communication templates model generic functionalities of process equipment but also hardwired signals from the field, and variables. They represent the application of the system.

They are used to implement the Control services that are provided by the software Participants, streamlining the engineering of systems.

The resources providing these services are encapsulated in dedicated facet references, which are then organized in composite references.

At the highest level, the Communication template represents the control module.

You can easily customize the services that are provided by Communication templates to fulfill your specific requirements. You can also link communication templates with compatible device and process templates, using interfaces.

Communication Template Services

Facet templates referenced by communication control module templates provide the following services:

Control	Includes core services plus additional, optional services, which you can activate if needed. Function blocks and variables are the resources that are encapsulated in these facet references to provide such services.
---------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Also, for Control services, you can configure parameters during instantiation to meet the requirements of your system.

List of Families

The communication templates described in this document are grouped by family.

You can find the templates in the Global Templates Library at the following location: *Global Templates\General Purpose Library\Communications\Control Modules*.

The following table lists the communication templates that are available for each family:

Family Name	Template Id	Description
Modbus	\$MBPortM, page 16	M340/M580 Modbus Port serialized request management
	\$MBScanner, page 18	Modbus multiple requests client
	\$MBClient, page 19	Modbus single request client
	\$MBPortQx80, page 20	Modbus Port serialized request management on X80 drop for Quantum controllers.
	\$MBPortM58x80, page 22	Modbus Port serialized request management on X80 drop for M580 controllers.

Family Name	Template Id	Description
	\$MBAddM, page 23	M340/M580 Modbus Port address for managing 1 to N mapping.
Ethernet IP Communication	\$EIPMPortM, page 25	M580 Ethernet IP port serialized request management.
	\$EIPMClient, page 26	Ethernet IP single request client management.
Modbus TCP Ethernet	\$EGtwMB, page 29	Modbus Ethernet/Modbus serial gateway
	\$EMPortM, page 31	M340 Ethernet Port serialized request management
	\$EMPortQ, page 33	Quantum Ethernet Port serialized request management
	\$EMScanner, page 35	Modbus Ethernet multiple requests client management
	\$EMClient, page 36	Modbus Ethernet single request client management
	\$EthAddM, page 37	M340/M580 Ethernet Port address for managing 1 to N mapping.
	\$EthAddQ, page 38	Quantum Ethernet Port address for managing 1 to N mapping.
Profibus	\$PRMMgtM, page 43	PRM management M340/M580
	\$PRMMgtQ, page 44	PRM management Quantum

Common Services

Overview

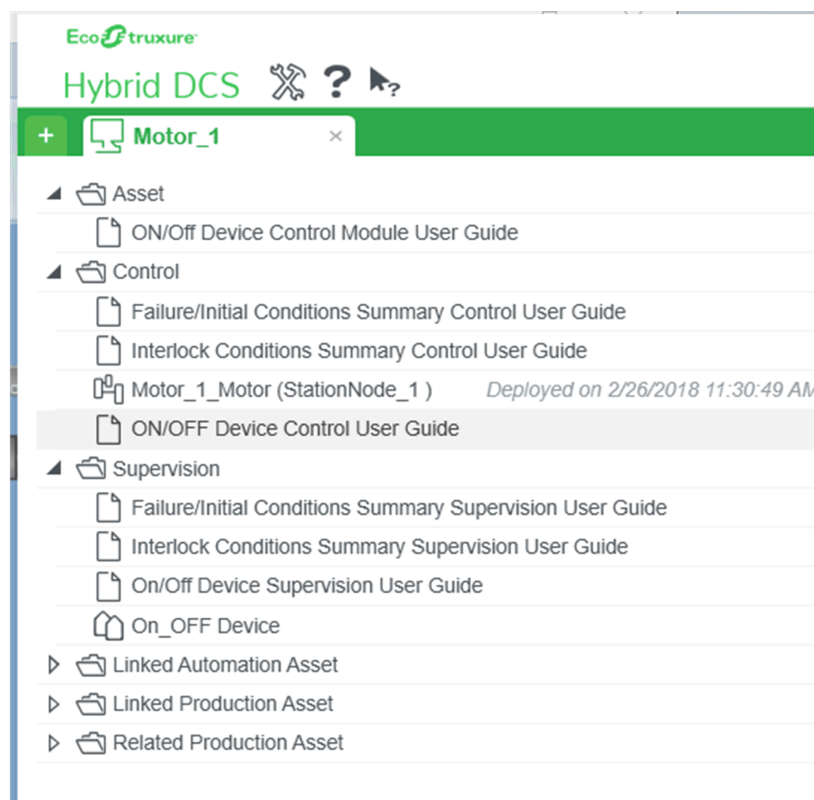
This chapter describes the different services that are common to the control modules.

Accessing General Purpose Library User Guides and Technical Documents using RTNS Feature

General Description

The General Purpose Library user guides and technical documents can be accessed using the Runtime Navigation Services (see EcoStruxure™ Process Expert, Runtime Navigation Services , User Guide) provided by the EcoStruxure Process Expert.

In the Operation Client, the user guides are segregated as shown in the image below.



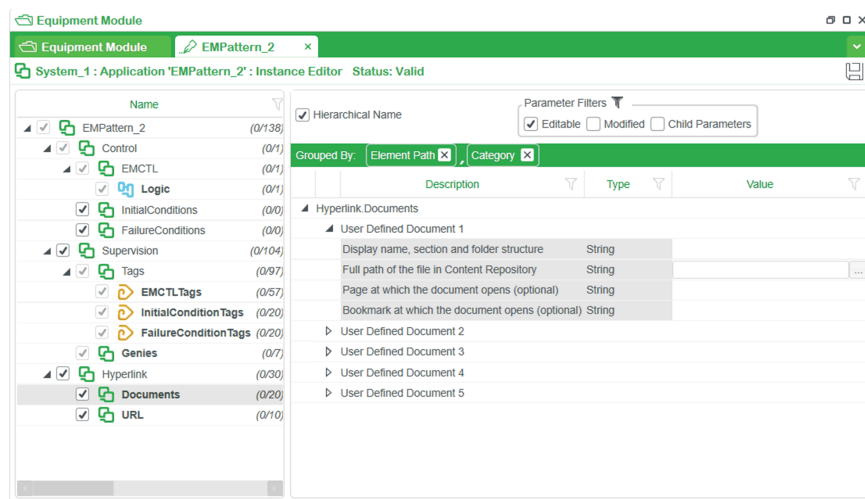
NOTE: The user guides will be available in their respective sections (**Asset**, **Control** or **Supervision**) in the EcoStruxure Process Expert application.

Hyperlink Services

General Description

The General Purpose Library control modules allows you to link the documents and URL to its instances. The hyperlink service is disabled by default, you have to enable the hyperlink service and configure the parameters as shown in the below

screen shot. For more details refer to the topic describing how to use the hyperlink service (see EcoStruxure™ Process Expert, Runtime Navigation Services , User Guide).



NOTE: A maximum of five documents and five URLs can be added to each instance.

Modbus Communication

Overview

This chapter explains the basic functionality of the templates for Modbus communication based function blocks, their content and composition.

These function blocks do not reflect any specific installation.

⚠ 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.

\$MBPortM - M340/M580 Modbus Port Serialized Request Management

Description

The \$MBPortM control module template serializes Modbus requests sent to a port of the controller.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default Value	Description
Logic	SimultaneousSends	Short	4	Total number of active sends.

Element Name	Name	Type	Default Value	Description
	Timeout	Duration	00:00:02	Response time has to be greater than hardware timeout.

Composition

The communication control module template `$MBPortM` is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the `$MBPortM` control module and the corresponding facet, which implements the service:

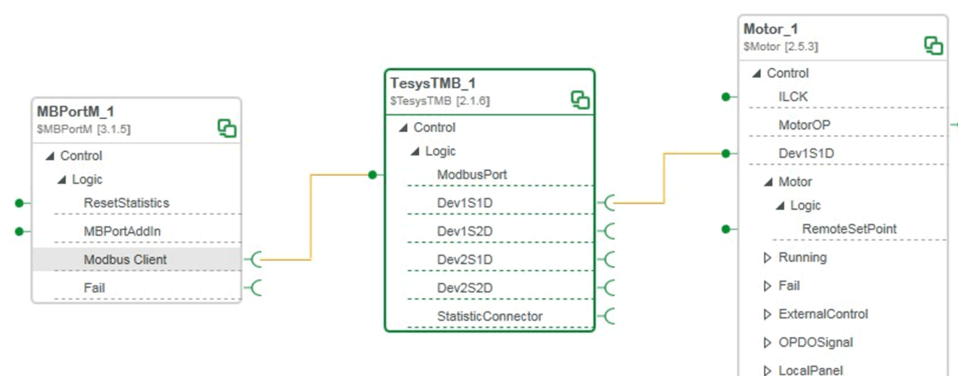
Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	<code>\$MBPortM_UC</code>	<code>\$MBPortM_UL</code>	Refer to <code>ModBusPortM DFB</code> (see <i>EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual</i>).
Mapping Interface			
<code>\$MBPortChM/CO</code>			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<code>\$Fail</code>	<code>\$Bool/Def</code>	EDT interface
<code>\$ModbusClient</code>	<code>\$MBWorkMemory/Port</code>	Links to a device object
<code>\$ResetStatistics</code>	<code>\$Bool/Ref</code>	Resets the data on the <i>Statistics</i> output variable to its default value (0)
<code>\$MBPortAddIn</code>	<code>\$MBPortAddress/</code> <code>\$MBPortAddOut</code>	Links to a port address object
For a COMM Port, PORT role identifiers link to a device object.		
For a COMM Port, CLIENT role identifiers link to a communication object.		

Using the Communication Port Template

The following figure shows the connection that you need to make, using the **Links Editor**, between a process instance, a Modbus device instance, and a Modbus communication port instance to implement communication through Modbus Explicit Messaging with a M340 controller:



Refer also to the topic describing the implementation of Modbus serial communication (see EcoStruxure™ Process Expert, User Guide).

\$MBSscanner - Modbus Multiple Requests Client

Description

The \$MBSscanner control module template periodically refreshes read or write requests for n registers issued to a single node on a Modbus communication bus.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default Value	Description
Logic	MaxReadSize	Short	125	Maximum size of the data to be read.
	MaxWriteSize	Short	125	Maximum size of the data to be written.
	ModbusAddress	Short	0	The Modbus address of the device.
	Priority	Short	3	The priority of the operation. Smaller values have higher priority than larger values.
	ReadDataLen	Short	125	Array length to hold the data to be read in each scanner line.
	WriteDataLen	Short	125	Array length to hold the data to be written in each scanner line.

Time

The table describes the **Time** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Logic	Refresh	Duration	00:00:05	Time the device takes to refresh the cyclic data.

Composition

The communication control module template \$MBSscanner is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the \$MBSscanner control module and the corresponding facet, which implements the service:

Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	\$MBSscanner_UC	\$MBSscanner_UL	Refer to ModBusScanner DFB (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual).
Mapping Interface			
\$ModbusAddress/CO			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<code>\$StaticConnector</code>	<code>\$StaticConnector_Name/Def</code>	EDT interface
<code>\$ModbusPort</code>	<code>\$MBWorkMemory/Client</code>	Links to a device object
For a COMM Port, PORT role identifiers link to a device object.		
For a COMM Port, CLIENT role identifiers link to a communication object.		

\$MBClient - Modbus Single Request Client

Description

The `$MBClient` control module template sends read or write requests for n registers on a Modbus communication bus.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Logic	MaxReadSize	Short	125	Maximum size of the data to be read.
	MaxWriteSize	Short	125	Maximum size of the data to be written. NOTE: The default value of the <code>MaxWriteSize</code> must be from 1 to 125 in the instance level of template configuration.
	ModbusAddress	Short	0	The Modbus address of the device.
	Priority	Short	0	The priority of the operation. Smaller values have higher priority than larger values (0 has the highest priority).
	LengthInput	Short	0	The length of the operation to be performed.
	ReadWriteSelection	Boolean	False	Type of operation. <ul style="list-style-type: none"> False = Read True = Write
	MemoryInputSelection	Boolean	False	Type of register. <ul style="list-style-type: none"> False = Memory True = Input
	MemoryAddressInput	Integer	0	The memory address to perform the selected operation.
	BitWordSelection	Boolean	True	The selection of Bit/Word. <ul style="list-style-type: none"> False = Bit True = Word
NOTE: Values of boolean parameters are set by using check boxes: <ul style="list-style-type: none"> Selected = True Cleared = False 				

Composition

The communication control module template `$MBClient` is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the `$MBClient` control module and the corresponding facet, which implements the service:

Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	<code>\$MBClient_UC</code>	<code>\$MBClient_UL</code>	Refer to <code>ModBusClientBasic</code> DFB (see <i>EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual</i>).
Mapping Interface			
<code>\$ModbusAddress/CO</code>			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<code>\$ModbusPort</code>	<code>\$MBWorkMemory/Client</code>	Links to a device object
<code>\$Busy</code>	<code>\$Bool/Def</code>	EDT interface
<code>\$End</code>	<code>\$Bool/Def</code>	EDT interface
<code>\$Fail</code>	<code>\$Bool/Def</code>	EDT interface
<code>\$StaticConnector</code>	<code>\$StaticConnector_Name/Def</code>	EDT interface
For a COMM Port, PORT role identifiers link to a device object.		
For a COMM Port, CLIENT role identifiers link to a communication object.		

`$MBPortQx80` - Modbus Port Serialized Request Management on X80 Drop for Quantum Controllers

Description

The `$MBPortQx80` control module template serializes Modbus requests sent to a port of the controller.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Logic	SimultaneousSends	Short	4	Total number of active sends.
	Timeout	Duration	00:00:02	Time to wait for a response, after this port will send a timeout error to the requesting device.
	MaxRetryAfterSwitch	Integer	3	Maximum number of retry for the first request to be successful after the controller switchover.

Composition

The communication control module template `$MBPortMx80` is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the `$MBPortMx80` control module and the corresponding facet, which implements the service:

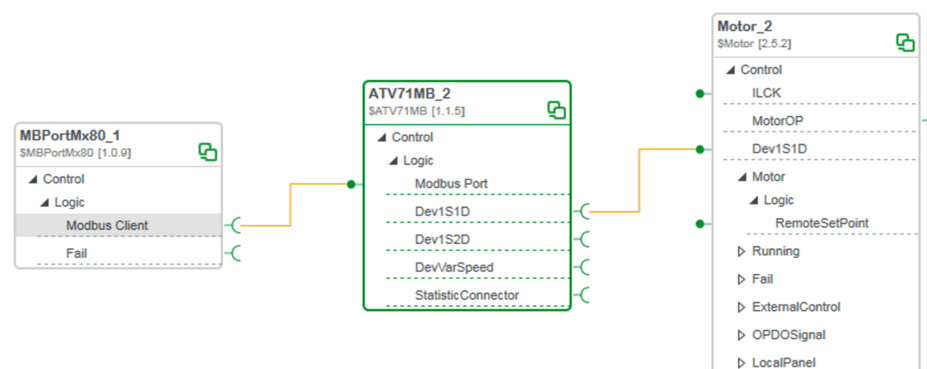
Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	<code>\$MBPortQx80_UC</code>	<code>\$MBPortQx80_UL</code>	Refer to <code>ModBusPortQx80 DFB</code> (see <i>EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual</i>).
Mapping Interface			
	<code>\$MBPortChM/CO</code>		
	<code>\$CRAIPAddress/CO</code>		
	<code>\$EMPortChM/CO</code>		

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<code>\$Fail</code>	<code>\$Bool/Def</code>	EDT interface
<code>\$ModbusClient</code>	<code>\$MBWorkMemory/Port</code>	Links to a device object
<code>\$ResetStatisticsI</code>	<code>\$Bool/Ref</code>	Resets the data on the <i>Statistics</i> output variable to its default value (0)
<code>\$MBPortAddIn</code>	<code>\$MBPortAddress/MBPortAddOut</code>	Links to a Modbus port address object
<code>\$EthPortAddIn</code>	<code>\$EthPortAddress/EthPortAddOut</code>	Links to an Ethernet port address object
For a COMM Port, PORT role identifiers link to a device object.		
For a COMM Port, CLIENT role identifiers link to a communication object.		

Using the Communication Port Template

The following figure shows the connection that you need to make, using the **Links Editor**, between a process instance, a Modbus device instance, and a Modbus communication port instance to implement communication through Modbus Explicit Messaging with a M340 controller:



Refer also to the topic describing the implementation of Modbus serial communication (see EcoStruxure™ Process Expert, User Guide).

\$MBPortM58x80 - Modbus Port Serialized Request Management on X80 Drop for M580 Controllers.

Description

The \$MBPortM58x80 control module template serializes Modbus requests sent to a port of the controller.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Logic	SimultaneousSends	Short	4	Total number of active sends.
	Timeout	Duration	00:00:02	Time to wait for a response, after this port will send a timeout error to the requesting device.
	MaxRetryAfterSwitch	Integer	3	Maximum number of retry for the first request to be successful after the controller switchover.

Composition

The communication control module template \$MBPortM58x80 is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the \$MBPortM58x80 control module and the corresponding facet, which implements the service:

Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	\$MBPortM58x80_UC	\$MBPortM58x80_UL	Refer to ModBusPortM58x80 DFB (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual).
Mapping Interface			
\$MBPortChM/CO			
\$CRAIPAddress/CO			
\$EMPortChM/CO			

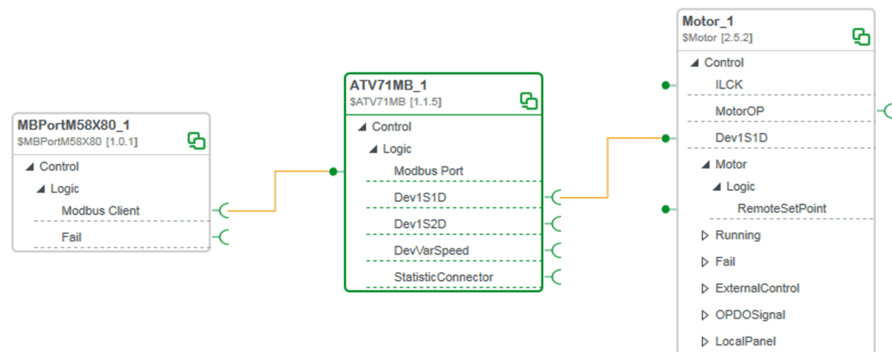
The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
\$Fail	\$Bool/Def	EDT interface
\$ModbusClient	\$MBWorkMemory/Port	Links to a device object

Interface Identifier	Interface model/Role identifier	Description
<i>\$ResetStatistics</i>	<i>\$Bool/Ref</i>	Resets the data on the <i>Statistics</i> output variable to its default values (0)
<i>\$MBPortAddIn</i>	<i>\$MBPortAddress/MBPortAddOut</i>	Links to a modbus port address object
<i>\$EthPortAddIn</i>	<i>\$EthPortAddress/EthPortAddOut</i>	Links to an ethernet port address object
For a COMM Port, PORT role identifiers link to a device object. For a COMM Port, CLIENT role identifiers link to a communication object.		

Using the Communication Port Template

The following figure shows the connection that you need to make, using the **Links Editor**, between a process instance, a Modbus device instance, and a Modbus communication port instance to implement communication through Modbus Explicit Messaging with a M580 controller:



Refer also to the topic describing the implementation of Modbus serial communication (see EcoStruxure™ Process Expert, User Guide).

\$MBAddM – M340/M580 Modbus Port Address for Managing 1 to N Mapping

Description

The *\$MBAddM* control module template allows mapping of one Modbus port (physical) to multiple ports (logical).

Composition

The communication control module template *\$MBAddM* is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the *\$MBAddM* control module and the corresponding facet, which implements the service:

Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	<i>\$MBAddM_UC</i>	<i>\$MBAddM_UL</i>	Not applicable

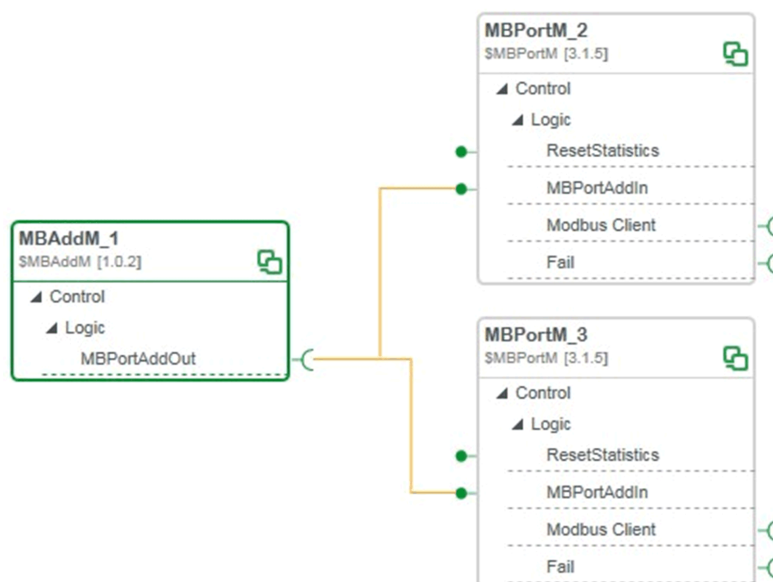
Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Mapping Interface			
<i>\$MBPortChM</i>			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<i>\$ModbusPortAddOut</i>	<i>\$MBPortAddress/MBPortAddOut</i>	Links to a communication object

Using the Communication Port Template

The following figure shows the connection that you need to make, using the **Links Editor**, between a communication instance, a Modbus device instance, and a Modbus communication port instance to implement communication through Modbus Explicit Messaging with a M340 controller:



Ethernet IP Communication

Overview

This chapter explains the basic functionality of the templates for Ethernet IP communication and their composition.

These function blocks do not reflect any specific installation.

\$EIPMPortM - M580 Ethernet IP Port Serialized Request Management

Description

The \$EIPMPortM control module template prioritizes Ethernet IP requests sent to a port of M580 controller.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Control	PortSelection	Enum	4	Selection of port function enables user to decide number of SimultaneousSends .
Logic	SimultaneousSends	Integer	Depends on the Control Expert DFB variant	Total number of active sends.
	Timeout	Duration	00:00:03	Time to wait for a response, after this port will send a detected timeout error to the requesting device.

Composition

The communication control module template \$EIPMPortM is composed of composite and facet templates, which provide the Control services.

The following table describes the services that are available from the \$EIPMPortM control module and the corresponding facet, which implements the service:

Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Logic	\$EIPMPortM_UC	\$EIPMPortM4_UL	Refer to EthernetIPPortMxx DFB* .
		\$EIPMPortM16_UL	Refer to EthernetIPPortMxx DFB* .
		\$EIPMPortM32_UL	Refer to EthernetIPPortMxx DFB* .
		\$EIPMPortM64_UL	Refer to EthernetIPPortMxx DFB* .

Control Services	Composite Template	Corresponding Facet Template	Control Service Description
		\$EIPMPortM80_UL	Refer to EthernetIPPortMxx DFB* .
		\$EIPMPortM96_UL	Refer to EthernetIPPortMxx DFB* .
Mapping Interface			
\$EMPortChM/CO			
* See EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<i>Fail</i>	<i>\$Bool/Def</i>	EDT Interface.
<i>EthernetIPClient</i>	<i>\$EIPMWorkmemory/port</i>	Links to a device object
<i>ResetStatistics</i>	<i>\$Bool/Def</i>	Resets the data on the Statistics output variable to its, default values (0)
<i>EthPortAddIn</i>	<i>\$EthPortAddress</i>	Links to a port address object

\$EIPMClient - Ethernet IP Single Request Client Management

Description

The \$EIPMClient control module template sends read or write requests on an Ethernet IP communication network issued to a single node.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Logic	Priority	Integer	1	Priority of request. Small values have higher priority.
	Request Length	Integer	0	Length of request data in bytes.
	Number of retries	Integer	3	Number of retries in case request interrupts.
	Timeout	Duration	00:00:10	Queue timeout.
	InactivityTime	Duration	00:00:10	The period for which the client will not initiate a request after the retries are expired.
	Request data length	Integer	2	Array length of request data.
	Response data length	Integer	2	Array length of response data.

Composition

The communication control module template `$EIPMClient` is composed of composite and facet templates, which provide the Control services.

The following table describes the services that are available from the `$EIPMClient` control module and the corresponding facet, which implements the service:

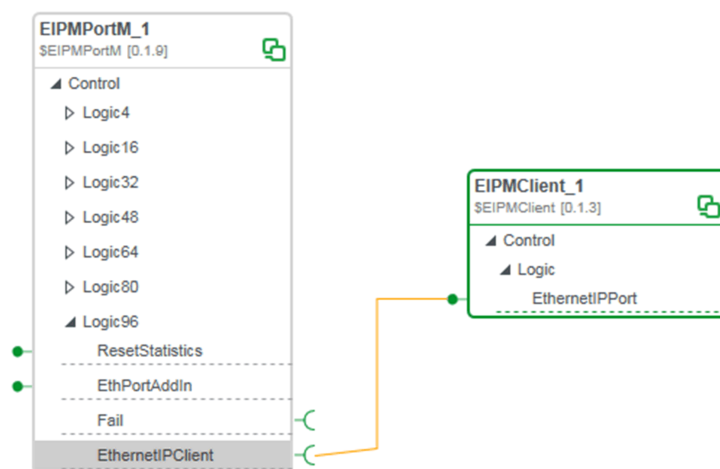
Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Logic	<code>\$EIPMClient_UC</code>	<code>\$EIPMClient_UL</code>	Refer to EthernetIPClient DFB (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual)
Optional Services			
-	-	<code>\$StatisticCounter1_UL</code>	Refer to StatisticCounter1 DFB (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual)
Mapping Interface			
<code>\$GenericEthernetIpAddress/CO</code>			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<i>EthernetIPPort</i>	<i>\$EIPMWorkmemory/client</i>	Links to a port.

Using the Communication Port Template

The following figure shows the connection that you need to make using the **Links Editor** between an Ethernet IP device instance and an Ethernet IP communication port instance to implement communication through Ethernet IP explicit messaging with a M580 controller.



NOTE: For hardware mapping you need to select `$EIPGenericDeviceHW` as hardware template in topology explorer.

Hardware Templates

Modbus TCP devices have a corresponding hardware template with the HW suffix in their identifier. Hardware templates are used to configure Modbus TCP communication, which is explained in Managing Communication (see EcoStruxure™ Process Expert, User Guide).

Hardware templates are not described in this document.

Modbus TCP Ethernet Communication

Overview

This chapter explains the basic functionality of the templates for Modbus TCP Ethernet communication and their composition.

These function blocks do not reflect any specific installation.

⚠ 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.

\$EGtwMB - Modbus Ethernet /Modbus Serial Gateway

Description

The \$EGtwMB control module template functions as a bridge between serial devices and Ethernet buses.

By using a gateway (for example, TSXETG100), you can establish communication between a CPU with Ethernet ports and devices that implement only an RS485 interface.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Logic	SimultaneousSends	Short	4	Indicates how many requests are in the gateway queue. User can configure this input. The input value ranges from 1 to 4. The more requests in the gateway queue, the better the general performance of the system. For more information, refer to MosBusGateway DFB (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual).
	GatewayAdd	String	'{0.0.0.0}'	IP address of the gateway.

Composition

The communication control module template \$EGtwMB is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the \$EGtwMB control module and the corresponding facet, which implements the service:

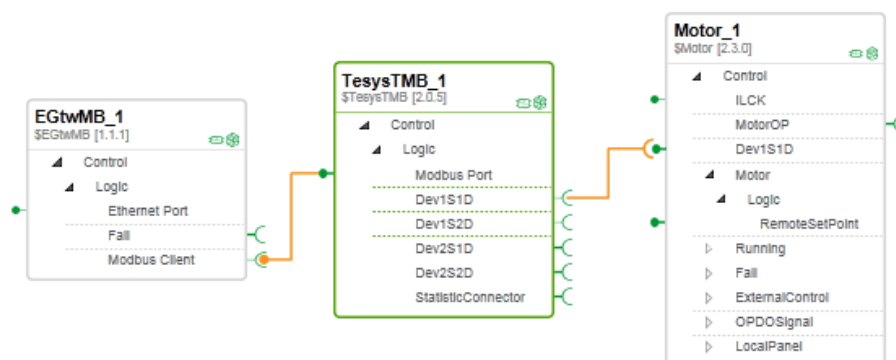
Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	\$EGtwMB_UC	\$EGtwMB_UL	Refer to MosBusGateway DFB (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual).
Mapping Interface			
\$GatewayAddress/CO			

The control module template exposes the following interfaces:

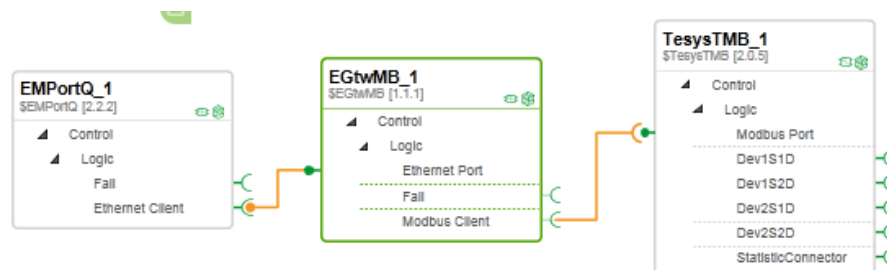
Interface Identifier	Interface model/Role identifier	Description
\$Ethernet Port	\$EMWorkMemory/Client	Links to a device object
\$Fail	\$Bool/Def	EDT interface
\$ModbusClient	\$MBWorkMemory/Port	Links to a device object
For a COMM Port, PORT role identifiers link to a device object.		
For a COMM Port, CLIENT role identifiers link to a communication object.		

Using the Communication Port Template

The following figure shows step 1 of the connection that you need to make, using the **Links Editor**, between a process instance, a Modbus device instance, and the gateway instance to implement communication through Modbus Explicit Messaging with a Quantum controller and its Ethernet port:



The following figure shows step 2 of the connection that you need to make, using the **Links Editor**, between the gateway instance, and the Modbus TCP communication port instance:



NOTE: To implement communication with an M340 controller and its Ethernet port, instantiate the \$EMPortM template instead.

Refer also to the topic describing the implementation of Modbus serial communication (see EcoStruxure™ Process Expert, User Guide).

\$EMPortM - M340 and M580 Ethernet Port Serialized Request Management

Description

The \$EMPortM control module template serializes the Ethernet requests sent to a physical port of the controller or to the communication modules.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Control	PortSelection	Enum	EMPortM	Selection of port function, enabling user to decide number of simultaneous sends
Logic	SimultaneousSends	Short	4	Total number of active sends

Element Name	Name	Type	Default value	Description
	Timeout	Duration	00:00:02	Time to wait for a response, after this port will send a timeout error to the requesting device.
	MaxRetryAfterSwitch	Integer	3	Maximum number of retry for first request to be successful after the controller switchover.
Logic16	SimultaneousSends	Short	16	Total number of active sends
	Timeout	Duration	00:00:02	Time to wait for a response, after this port will send a timeout error to the requesting device.
	MaxRetryAfterSwitch	Integer	3	Maximum number of retry for first request to be successful after the controller switchover.
Logic32	SimultaneousSends	Short	32	Total number of active sends
	Timeout	Duration	00:00:02	Time to wait for a response, after this port will send a timeout error to the requesting device.
	MaxRetryAfterSwitch	Integer	3	Maximum number of retry for first request to be successful after the controller switchover.
Logic48	SimultaneousSends	Short	48	Total number of active sends
	Timeout	Duration	00:00:02	Time to wait for a response, after this port will send a timeout error to the requesting device.
	MaxRetryAfterSwitch	Integer	3	Maximum number of retry for first request to be successful after the controller switchover.
Logic64	SimultaneousSends	Short	64	Total number of active sends
	Timeout	Duration	00:00:02	Time to wait for a response, after this port will send a timeout error to the requesting device.
	MaxRetryAfterSwitch	Integer	3	Maximum number of retry for first request to be successful after the controller switchover.
Logic80	SimultaneousSends	Short	80	Total number of active sends
	Timeout	Duration	00:00:02	Time to wait for a response, after this port will send a timeout error to the requesting device.
	MaxRetryAfterSwitch	Integer	3	Maximum number of retry for first request to be successful after the controller switchover.

Composition

The communication control module template `$EMPortM` is composed of composite and facet templates, which provide the core Control services.

This templates is composition of multiple facets, user can select facet based on the number of simultaneous operation they want to execute in one request. For more details, refer to Port (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual).

The following table describes the services that are available from the `$EMPortM` control module and the corresponding facet, which implements the service:

Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Logic	<code>\$EMPortM_UC</code>	<code>\$EMPortM_UL</code>	Refer to <code>ModBusEthernetPortM DFB</code> (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual).
		<code>\$EMPortM16_UL</code>	
		<code>\$EMPortM32_UL</code>	
		<code>\$EMPortM48_UL</code>	
		<code>\$EMPortM64_UL</code>	
		<code>\$EMPortM80_UL</code>	

Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Mapping interface			
\$EMPortChM/CO			

\$EMPortQ - Quantum Ethernet Port Serialized Request Management

Description

The \$EMPortQ control module template serializes Ethernet requests sent to a physical port of the controller or the communication modules.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Control	PortSelection	Enum	EM-PortQ	Selection of port function, enabling user to decide number of simultaneous sends
Logic	SimultaneousSends	Short	4	Total number of active sends
	Timeout	Duration	00:00:02	Time to wait for a response, after this port will send a timeout error to the requesting device.
	MaxRetryAfterSwitch	Integer	3	Maximum number of retry for first request to be successful after the controller switchover.
Logic16	SimultaneousSends	Short	16	Total number of active sends
	Timeout	Duration	00:00:02	Time to wait for a response, after this port will send a timeout error to the requesting device.
	MaxRetryAfterSwitch	Integer	3	Maximum number of retry for first request to be successful after the controller switchover.

Communication

The table describes the **Communication** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Logic	StartMemory-Heap	String		Time the device takes to refresh the cyclic data.

Composition

The communication control module template \$EMPortQ is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the \$EMPortQ control module and the corresponding facet, which implements the service:

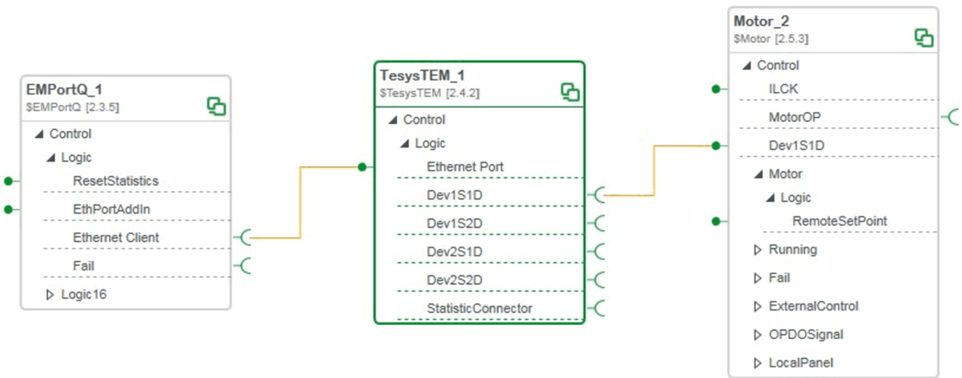
Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	\$EMPortQ_UC	\$EMPortQ_UL	Refer to ModBusEthernetPortQ DFB (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual).
		EMPORTQ16_UL	
Mapping interface			
\$EMPortChQ/CO			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<i>\$Fail</i>	<i>\$Bool/Def</i>	EDT interface
<i>\$EthernetClient</i>	<i>\$EMWorkMemory/Port</i>	Links to a device object
<i>\$ResetStatistics</i>	<i>\$Bool/Ref</i>	Resets the data on the <i>Statistics</i> output variable to its default values (0)
<i>\$EthPortAddIn</i>	<i>\$EthPortAddress/\$EthPortAddOut</i>	Links to a port address object
For a COMM Port, PORT role identifiers link to a device object.		
For a COMM Port, CLIENT role identifiers link to a communication object.		

Using the Communication Port Template

The following figure shows the connection that you need to make, using the **Links Editor**, between a process instance, a Modbus TCP device instance, and a Modbus TCP communication port instance to implement communication through Modbus TCP Explicit Messaging with a Quantum controller:



NOTE: To implement communication with an M340 controller and its Ethernet port, instantiate the \$EMPortM template instead.

Refer also to the topic describing the implementation of communication through Modbus TCP Ethernet explicit messaging.

\$EMScanner - Modbus Ethernet Multiple Requests Client Management

Description

The \$EMScanner control module template periodically refreshes read or write requests for n registers issued to a single node on an Ethernet communication network.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Logic	UnitID	Short	0	Unit ID of the Device.
	ReadDataLen	Short	125	Array length to hold the data to be read in each scanner line.
	WriteDataLen	Short	125	Array length to hold the data to be written in each scanner line.
	MaxReadSize	Short	125	Maximum size of the data to be read.
	MaxWriteSize	Short	125	Maximum size of the data to be written.
	Priority	Short	3	Priority of the operation. Small values have more priority than bigger values.

Time

The table describes the **Time** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Logic	Refresh	Duration	00:00:05	Time the device takes to refresh the cyclic data.

Composition

The communication control module template \$EMScanner is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the \$EMScanner control module and the corresponding facet, which implements the service:

Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	\$EMScanner_UC	\$EMScanner_UL	Refer to ModBusEthernetScanner DFB (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual).
Mapping Interface			
\$EthernetAddress/CO			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<i>\$WorkMemory</i>	<i>\$EMWorkMemory/Client</i>	Links to a device object
<i>\$ResetFail</i>	<i>\$Bool/Def</i>	EDT interface
For a COMM Port, PORT role identifiers link to a device object.		
For a COMM Port, CLIENT role identifiers link to a communication object.		

\$EMClient - Modbus Ethernet Single Request Client Management

Description

The `$EMClient` control module template sends read or write requests for *n* registers on an Ethernet communication network issued to a single node.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Logic	MaxReadSize	Short	0	Maximum size of the data to be read.
	MaxWriteSize	Short	0	Maximum size of the data to be written. NOTE: The default value of the <code>MaxWriteSize</code> must be from 1 to 125 in the instance level of template configuration.
	LengthInput	Short	0	The length of the operation to be performed.
	ReadWriteSelection	Boolean	False	Type of operation. <ul style="list-style-type: none"> False = Read True = Write
	MemoryInputSelection	Boolean	False	Type of register. <ul style="list-style-type: none"> False = Memory True = Input
	MemoryAddressInput	Integer	0	The memory address to perform the selected operation.
	BitWordSelection	Boolean	True	The selection of Bit/Word. <ul style="list-style-type: none"> False = Bit True = Word

Composition

The communication control module template `$EMClient` is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the `$EMClient` control module and the corresponding facet, which implements the service:

Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	\$EMClient_UC	\$EMClient_UL	Refer to ModBusEthernetClient DFB (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual).
Mapping Interface			
\$EthernetAddress/CO			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
\$WorkMemory	\$EMWorkMemory/Client	Links to a device object
For a COMM Port, PORT role identifiers link to a device object.		
For a COMM Port, CLIENT role identifiers link to a communication object.		

Hardware Templates

Modbus TCP devices have a corresponding hardware template with the HW suffix in their identifier. Hardware templates are used to configure Modbus TCP communication, which is explained in Managing Communication (see EcoStruxure™ Process Expert, User Guide).

Hardware templates are not described in this document.

\$EthAddM - M340/M580 Ethernet Port Address for Managing 1 to N Mapping

Description

The \$EthAddM control module template allows mapping of one Ethernet port (physical) to multiple ports (logical).

Composition

The communication control module template \$EthAddM is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the \$EthAddM control module and the corresponding facet, which implements the service:

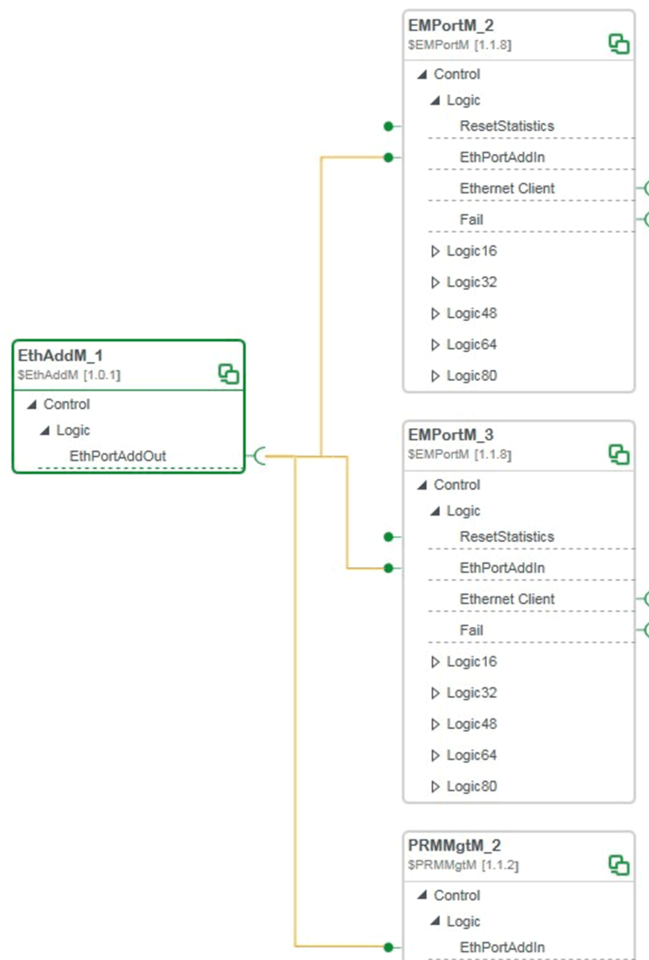
Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	\$EthAddM_UC	\$EthAddM_UL	Not applicable
Mapping Interface			
\$EMPortChM			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<i>\$EthPortAddOut</i>	<i>\$EthPortAddress/EthPortAddOut</i>	Links to a communication object

Using the Communication Port Template

The following figure shows the connection that you need to make, using the **Links Editor**, between a communication instance, a Modbus TCP device instance, and a Modbus TCP communication port instance to implement communication through Modbus TCP Explicit Messaging with a Quantum controller:



\$EthAddQ - Quantum Ethernet Port Address for Managing 1 to N Mapping

Description

The **\$EthAddQ** control module template allows mapping of one Ethernet port (physical) to multiple ports (logical).

Composition

The communication control module template **\$EthAddQ** is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the `$EthAddQ` control module and the corresponding facet, which implements the service:

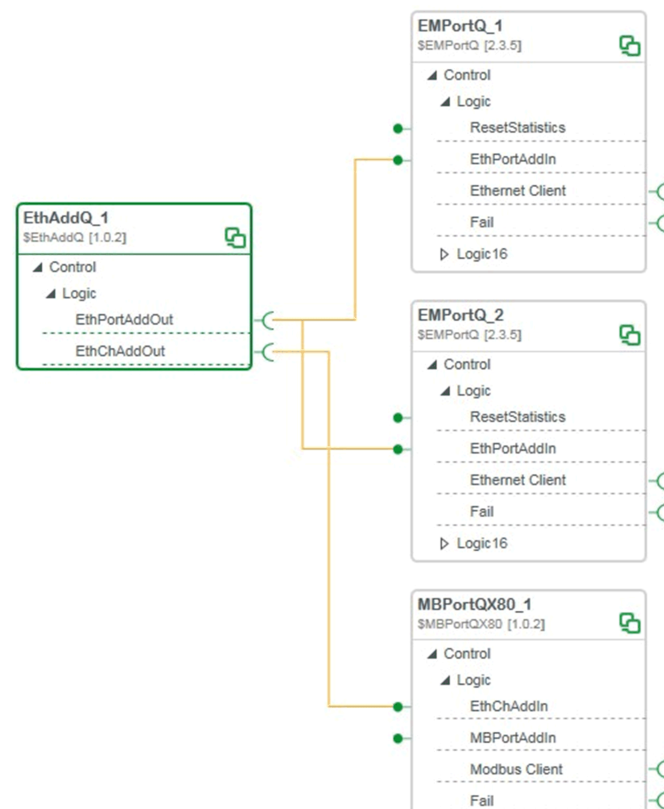
Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	<code>\$EthAddQ_UC</code>	<code>\$EthAddQ_UL</code>	Not applicable
Mapping Interface			
<code>\$EMPortChQ</code>			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<code>\$EthPortAddOut</code>	<code>\$EthPortAddress/EthPortAddOut</code>	Links to a port communication object
<code>\$EthChAddOut</code>	<code>\$EthChAddress/EthChAddOut</code>	Links to x80 port communication object

Using the Communication Port Template

The following figure shows the connection that you need to make, using the **Links Editor**, between a communication instance, a Modbus TCP device instance, and a Modbus TCP communication port instance to implement communication through Modbus TCP Explicit Messaging with a Quantum controller:



\$EMPortM1 – M340 and M580 Ethernet Port Serialized Request Management

Description

The \$EMPort1M control module template serializes Ethernet Modbus requests sent to a port of the controller.

Parameters

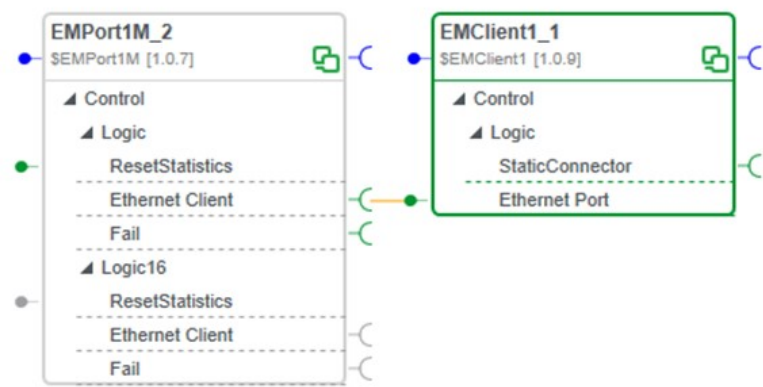
Configuration

The table describes the **Configuration** parameters that you can configure:

Element Name	Name	Type	Default Value	Description
Logic	SimultaneousSends	Short	4	Number of active sends.
	Timeout	Duration	00:00:02	Time to wait a response before timeout error.

Using the EMPort1M Template

The following figure shows the connection that you need to make, using the **Links Editor**, between a process instance, a Modbus device instance, and a Modbus communication port instance to implement communication through Modbus Explicit Messaging with a M340 controller:



The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<i>\$Fail</i>	<i>\$Bool/Def</i>	EDT interface
<i>\$ModbusClient</i>	<i>\$MBWorkMemory/Port</i>	Links to a device object
<i>\$ResetStatistics</i>	<i>\$Bool/Ref</i>	Resets the data on the <i>Statistics</i> output variable to its default value (0)
<i>\$MBPortAddIn</i>	<i>\$MBPortAddress/ \$MBPortAddOut</i>	Links to a port address object
For a COMM Port, 1 PORT1 role identifiers link to a device object.		
For a COMM Port1, CLIENT1 role identifiers link to a communication object.		

\$EMClient1 – Modbus Ethernet Single Request Client Management

Description

The \$EMClient1 control module template sends read or write requests for n registers on a Modbus communication bus.

Parameters

Configuration

The table describes the **Configuration** parameters that you can configure:

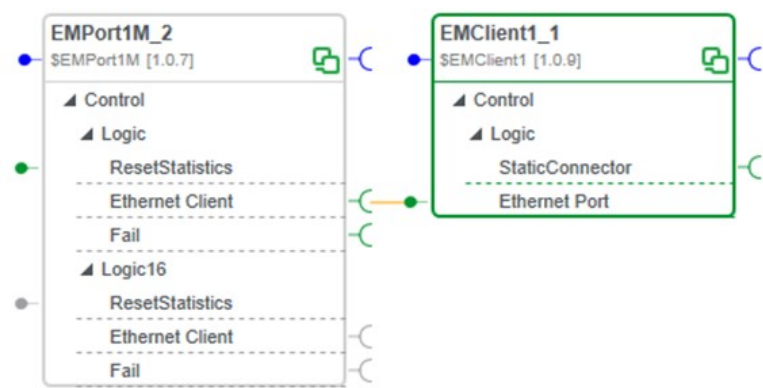
Element Name	Name	Type	Default value	Description
Logic	BitWordSelection	Boolean	True	The selection of Bit or Word. <ul style="list-style-type: none"> False = Bit True = Word
	DeviceIP	String	Null	IP address of device.
	RWReadLength	UnsignedShort	0	Length during simultaneous read.
	LengthInput	UnsignedShort	0	Length of operation to be performed.
	RWWriteLength	UnsignedShort	0	Length during simultaneous written.
	MaxReadSize	UnsignedShort	2	Maximum size of the data to be read.
	MaxWriteSize	UnsignedShort	2	Maximum size of the data to be written. NOTE: The default value of the <code>MaxWriteSize</code> must be from 1 to 125 in the instance level of template configuration.
	MemoryAddressInput	UnsignedShort	0	The Modbus address of the device.
	RWReadRegisterValue	UnsignedShort	0	Memory address of read.
	RWWriteRegisterValue	UnsignedShort	0	Memory address of write.
	MemoryInputSelection	Boolean	False	Type of register. <ul style="list-style-type: none"> False = Memory True = Input
	ModBusIdentity	String	Null	Modbus identification.
	PriorityNumber	UnsignedShort	10	The priority of the operation. Smaller values have higher priority than larger values (0 has the highest priority).
	ReadWriteSelection	Boolean	False	Read or Write.
	CommFailRetries	UnsignedShort	0	Retries when client communication detected fail.
	RWSimultaneousType	Boolean	False	Set to perform read and write in a single request.
	ResetDataOnFail	Boolean	False	Set to reset data on detected fail.
	Timeout	Duration	00:00:05	Time after which detected fail is declared.
	InactivityTime	Duration	00:00:01	Time for which client does not issue request.

NOTE: Values of boolean parameters are set by using check boxes:

- Selected = True
- Cleared = False

Using the EMPort1M Template

The following figure shows the connection that you need to make, using the **Links Editor**, between a process instance, a Modbus device instance, and a Modbus communication port instance to implement communication through Modbus Explicit Messaging with a M340 controller:



The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<i>\$Fail</i>	<i>\$Bool/Def</i>	EDT interface
<i>\$ModbusClient</i>	<i>\$MBWorkMemory/Port</i>	Links to a device object
<i>\$ResetStatistics</i>	<i>\$Bool/Ref</i>	Resets the data on the <i>Statistics</i> output variable to its default value (0)
<i>\$MBPortAddIn</i>	<i>\$MBPortAddress/ \$MBPortAddOut</i>	Links to a port address object
For a COMM Port, PORT role identifiers link to a device object.		
For a COMM Port, CLIENT role identifiers link to a communication object.		

Profibus

Overview

This chapter explains the basic functionality of the templates for Profibus and their composition.

These function blocks do not reflect any specific installation.

⚠ 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.

\$PRMMgtM - PRM Management M340/M580

Description

The \$PRMMgtM control module template manages the PRM master for M340/M580 controller platform. The PRM hardware requires this block to enter Run state. \$PRMMgtM automatically starts the PRM using the information given by the Master_Info structure.

Parameters

The \$PRMMgtM control module features no configurable parameters other than the general \$System parameters (\$Name, \$Description, and \$Area).

Composition

The communication control module template `$PRMMgtM` is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the `$PRMMgtM` control module and the corresponding facet, which implements the service:

Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	<code>\$PRMMgtM_UC</code>	<code>\$PRMMgtM_UL</code>	Refer to <code>PRMMgtM</code> DFB (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual).
Mapping interface			
<code>\$EMPortChM/CO</code>			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<code>\$EthPortAddIn</code>	<code>\$EthPortAddress/</code> <code>\$EthPortAddOut</code>	Links to a port address object.

`$PRMMgtQ` - PRM Management Quantum

Description

The `$PRMMgtQ` control module template manages the PRM master for Quantum controller platform. The PRM hardware requires this block to enter Run state. `$PRMMgtQ` automatically starts the PRM using the information given by the `Master_Info` structure.

Parameters

Communication

The table describes the **Communication** parameters that you can configure:

Element Name	Name	Type	Default value	Description
Logic	StartMemoryHeap	String	%MW	Holds the register starting address to be used with PRM communication.

Composition

The communication control module template `$PRMMgtQ` is composed of composite and facet templates, which provide the core Control services.

The following table describes the services that are available from the `$PRMMgtQ` control module and the corresponding facet, which implements the service:

Control Services	Composite Template	Corresponding Facet Template	Control Service Description
Core Services			
Logic	\$PRMMgtQ_UC	\$PRMMgtQ_UL	Refer to PRMMgtQ DFB (see EcoStruxure™ Process Expert - General Purpose Library Classic Communication Control Services Reference Manual).
Mapping interface			
\$EMPortChQ/CO			

The control module template exposes the following interfaces:

Interface Identifier	Interface model/Role identifier	Description
<i>\$EthPortAddIn</i>	<i>\$EthPortAddress/ \$EthPortAddOut</i>	Links to a port address object.

Glossary

P

PRM:

Profibus Remote Master

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