

# Modicon TM5 EtherNet/IP Fieldbus Interface

## Programming Guide

EIO0000003707.04  
07/2023



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The information provided in this document contains general descriptions, technical characteristics and/or recommendations related to products/solutions.

This document is not intended as a substitute for a detailed study or operational and site-specific development or schematic plan. It is not to be used for determining suitability or reliability of the products/solutions for specific user applications. It is the duty of any such user to perform or have any professional expert of its choice (integrator, specifier or the like) perform the appropriate and comprehensive risk analysis, evaluation and testing of the products/solutions with respect to the relevant specific application or use thereof.

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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.

 <b>DANGER</b>
<b>DANGER</b> indicates a hazardous situation which, if not avoided, <b>will result in</b> death or serious injury.

 <b>WARNING</b>
<b>WARNING</b> indicates a hazardous situation which, if not avoided, <b>could result in</b> death or serious injury.

 <b>CAUTION</b>
<b>CAUTION</b> indicates a hazardous situation which, if not avoided, <b>could result in</b> minor or moderate injury.

<b>NOTICE</b>
<b>NOTICE</b> 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

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product.

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.

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## INTENDED USE

The products described or affected by this document, together with software, accessories, and options, are fieldbus interfaces, intended for industrial use according to the instructions, directions, examples, and safety information contained in the present document and other supporting documentation.

The product may only be used in compliance with all applicable safety regulations and directives, the specified requirements, and the technical data.

Prior to using the product, you must perform a risk assessment in view of the planned application. Based on the results, the appropriate safety-related measures must be implemented.

Since the product is used as a component in an overall machine or process, you must ensure the safety of persons by means of the design of this overall system.

Operate the product only with the specified cables and accessories. Use only genuine accessories and spare parts.

Any use other than the use explicitly permitted is prohibited and can result in unanticipated hazards.

# About the Book

## Document Scope

This document describes the configuration of the Modicon TM5 EtherNet/IP Fieldbus Interface for EcoStruxure Machine Expert. For further information, refer to the separate documents provided in the EcoStruxure Machine Expert Online help.

## Validity Note

This document has been updated for the release of EcoStruxure™ Machine Expert V2.2.

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/](http://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.

For product compliance and environmental information (RoHS, REACH, PEP, EOL, etc.), go to [www.se.com/ww/en/work/support/green-premium/](http://www.se.com/ww/en/work/support/green-premium/).

## Related Documents

Title of Documentation	Reference Number
Modicon TM5 EtherNet/IP Fieldbus Interface - Hardware Guide	EIO0000003715 (ENG)
	EIO0000003716 (FRE)
	EIO0000003717 (GER)
	EIO0000003718 (SPA)
	EIO0000003719 (ITA)
	EIO0000003720 (CHS)
Modicon TM5 / TM7 Flexible System - System Planning and Installation Guide	EIO0000003161 (ENG)
	EIO0000003162 (FRE)
	EIO0000003163 (GER)
	EIO0000003164 (SPA)
	EIO0000003165 (ITA)
	EIO0000003166 (CHS)
Modicon M262 Logic/Motion Controller - Hardware Guide	EIO0000003659 (ENG)
	EIO0000003660 (FRE)
	EIO0000003661 (GER)
	EIO0000003662 (SPA)
	EIO0000003663 (ITA)
	EIO0000003664 (CHS)
	EIO0000003665 (POR)
	EIO0000003666 (TUR)

Title of Documentation	Reference Number
Modicon M262 Logic/Motion Controller - Programming Guide	EIO0000003651 (ENG) EIO0000003652 (FRE) EIO0000003653 (GER) EIO0000003654 (SPA) EIO0000003655 (ITA) EIO0000003656 (CHS) EIO0000003657 (POR) EIO0000003658 (TUR)
Modicon M251 Logic Controller Hardware Guide	EIO0000003101 (ENG) EIO0000003102 (FRE) EIO0000003103 (GER) EIO0000003104 (SPA) EIO0000003105 (ITA) EIO0000003106 (CHS)
Modicon M251 Controller - Programming Guide	EIO0000003089 (ENG) EIO0000003090 (FRE) EIO0000003091 (GER) EIO0000003092 (SPA) EIO0000003093 (ITA) EIO0000003094 (CHS)
Modicon M241 Logic Controller Hardware Guide	EIO0000003083 (ENG) EIO0000003084 (FRE) EIO0000003085 (GER) EIO0000003086 (SPA) EIO0000003087 (ITA) EIO0000003088 (CHS)
Modicon M241 Controller - Programming Guide	EIO0000003059 (ENG) EIO0000003060 (FRE) EIO0000003061 (GER) EIO0000003062 (SPA) EIO0000003063 (ITA) EIO0000003064 (CHS)
Cybersecurity Guidelines for EcoStruxure Machine Expert, Modicon and PacDrive Controllers and Associated Equipment, User Guide	EIO0000004242 (ENG)

You can download these technical publications and other technical information from our website at [www.se.com/ww/en/download/](http://www.se.com/ww/en/download/) .



## Product Related Information

<b>▲ WARNING</b>
<p><b>LOSS OF CONTROL</b></p> <ul style="list-style-type: none"> <li>• Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, of your application, and apply preventive and detective controls before implementation.</li> <li>• Provide a fallback state for undesired control events or sequences.</li> <li>• Provide separate or redundant control paths wherever required.</li> <li>• Supply appropriate parameters, particularly for limits.</li> <li>• Review the implications of transmission delays and take actions to mitigate them.</li> <li>• Review the implications of communication link interruptions and take actions to mitigate them.</li> <li>• 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.</li> <li>• Apply local accident prevention and safety regulations and guidelines.<sup>1</sup></li> <li>• Test each implementation of a system for proper operation before placing it into service.</li> </ul> <p><b>Failure to follow these instructions can result in death, serious injury, or equipment damage.</b></p>

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

<b>▲ WARNING</b>
<p><b>UNINTENDED EQUIPMENT OPERATION</b></p> <ul style="list-style-type: none"> <li>• Only use software approved by Schneider Electric for use with this equipment.</li> <li>• Update your application program every time you change the physical hardware configuration.</li> </ul> <p><b>Failure to follow these instructions can result in death, serious injury, or equipment damage.</b></p>

## Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in the information contained herein, 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 13849-1:2023	Safety of machinery: Safety related parts of control systems. General principles for design.

Standard	Description
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 62061:2021	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 61784-3:2021	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.

## Information on Non-Inclusive or Insensitive Terminology

As a responsible, inclusive company, Schneider Electric is constantly updating its communications and products that contain non-inclusive or insensitive terminology. However, despite these efforts, our content may still contain terms that are deemed inappropriate by some customers.

# TM5 System Configuration General Information

## Introduction

This chapter provides general information to help you configure TM5NEIP1 in EcoStruxure Machine Expert. TM5 EtherNet/IP Fieldbus Interface is compatible with most TM5 and TM7 I/O modules.

## TM5 / TM7 System General Information

### TM5 Expansion Modules General Description

#### Introduction

The range of expansion modules includes:

- TM5 Compact I/O modules with integrated electronic modules
- TM5 Digital I/O modules
- TM5 Analog I/O modules
- TM5 Temperature Analog modules
- TM5 Analog Strain modules
- TM5 Expert modules
- TM5 Transmitter - Receiver modules
- TM5 Power distribution modules
- TM5 Common distribution modules
- TM5 Dummy modules

**NOTE:** The listed expansion modules are compatible with the TM5 Fieldbus Interfaces.

The range of TM5 Fieldbus Interfaces includes:

- TM5 EtherNet/IP Fieldbus Interface
- TM5 CANopen Interface
- TM5 Sercos III Interface

Compact, digital, and analog input modules convert measured values (voltages, currents) into numerical values that can be processed by the controller.

Compact, digital, and analog output modules convert controller-internal numerical values into voltages or currents.

Expert modules are used for counting. They use either a Synchronous Serial Interface (SSI) encoder, incremental encoder, or event counting.

The transmitter and receiver modules handle the communication between remote modules via expansion bus cables.

Power distribution modules are used to manage the power supply for the various I/O modules.

Common distribution modules provide 0 Vdc and/or 24 Vdc terminal connections for the 24 Vdc I/O power segment(s) integrated into the bus bases, which expand the wiring possibilities for sensors and actuators.

The dummy module is a non-functional module. This module is used to separate modules which have specific thermal or EMC requirements, or as a placeholder for later system expansion.

The fieldbus interfaces are used to connect TM5 I/O modules and, via the TM5 transmitter module, TM7 I/O modules in a distributed I/O system.

## Compact I/O Expansion Features

Reference	Number of Channels	Voltage/Current
TM5C12D6T6L	12 digital inputs	24 Vdc / 3.75 mA
	6 digital outputs	24 Vdc / 0.5 A
	4 analog inputs	-10...+10 Vdc 0...20 mA/4...20 mA
	2 analog outputs	-10...+10 Vdc 0...20 mA
TM5C12D8T	12 digital inputs	24 Vdc / 3.75 mA
	8 digital outputs	24 Vdc / 0.5 A
TM5C24D12R	24 inputs	24 Vdc / 3.75 mA
	12 relays NO contact	24 Vdc / 230 Vac 2 A
TM5C24D18T	24 digital inputs	24 Vdc / 3.75 mA
	18 digital outputs	24 Vdc / 0.5 A
TM5CAI8O8CL	8 analog inputs	0...20 mA / 4...20 mA
	8 analog outputs	0...20 mA
TM5CAI8O8CVL	4 analog inputs	-10...+10 Vdc
	4 analog inputs	0...20 mA / 4...20 mA
	4 analog outputs	-10...+10 Vdc
	4 analog outputs	0...20 mA
TM5CAI8O8VL	8 analog inputs	-10...+10 Vdc
	8 analog outputs	-10...+10 Vdc

## Digital I/O Expansion Features

Reference	Number of Channels	Voltage/Current
TM5SDI2D	2 inputs	24 Vdc / 3.75 mA
TM5SDI2DF	2 fast inputs	24 Vdc / 10.5 mA
TM5SDI4D	4 inputs	24 Vdc / 3.75 mA
TM5SDI6D	6 inputs	24 Vdc / 3.75 mA
TM5SDI12D	12 inputs	24 Vdc / 3.75 mA
TM5SDI16D	16 inputs	24 Vdc / 2.68 mA
TM5SDI2A	2 inputs	100...240 Vac
TM5SDI4A	4 inputs	100...240 Vac
TM5SDI6U	6 inputs	100...120 Vac
TM5SDO2T	2 outputs	24 Vdc / 0.5 A
TM5SDO4T	4 outputs	24 Vdc / 0.5 A
TM5SDO6T	6 outputs	24 Vdc / 0.5 A
TM5SDO12T	12 outputs	24 Vdc / 0.5 A
TM5SDO16T	16 outputs	24 Vdc / 0.5 A
TM5SDO4TA	4 outputs	24 Vdc / 2 A
TM5SDO8TA	8 outputs	24 Vdc / 2 A

Reference	Number of Channels	Voltage/Current
TM5SDO2R	2 relays C/O contact	30 Vdc / 230 Vac 5 A
TM5SDO4R	4 relays NO contact	30 Vdc / 230 Vac 5 A
TM5SDO2S	2 outputs	230 Vac / 1 A
TM5SDM12DT	8 inputs	24 Vdc / 7 mA
	4 outputs	24 Vdc / 0.5 A
TM5SMM6D2L	4 digital inputs	24 Vdc / 3.3 mA
	2 digital outputs	24 Vdc / 0.5 A
	1 analog input	-10...+10 Vdc 0...20 mA / 4...20 mA
	1 analog output	-10...+10 Vdc 0...20 mA

## Analog I/O Expansion Features

Reference	Number of Channels	Voltage/Current
TM5SAI2L	2 inputs	-10...+10 Vdc 0...20 mA / 4...20 mA
TM5SAI4L	4 inputs	-10...+10 Vdc 0...20 mA / 4...20 mA
TM5SAI2H	2 inputs	-10...+10 Vdc 0...20 mA
TM5SAI4H	4 inputs	-10...+10 Vdc 0...20 mA
TM5SAO2L	2 outputs	-10...+10 Vdc 0...20 mA
TM5SAO2H	2 outputs	-10...+10 Vdc 0...20 mA
TM5SAO4L	4 outputs	-10...+10 Vdc 0...20 mA
TM5SAO4H	4 outputs	-10...+10 Vdc 0...20 mA

## Temperature Analog Expansion Features

Reference	Number of Channels	Sensor Type
TM5SAI2PH	2 inputs	PT100/1000
TM5SAI4PH	4 inputs	PT100/1000
TM5SAI2TH	2 inputs	Thermocouple J, K, N, S
TM5SAI6TH	6 inputs	Thermocouple J, K, N, S

## Analog Strain Gauge Input Electronic Module Features

Reference	Number of Channels	Sensor Type
TM5SEAISG	1 input	Full-bridge strain gauge

## Expert Expansion Features

Reference	Number of Channels	Encoder Inputs
TM5SE1IC02505	1	5 Vdc Symmetrical
TM5SE1IC01024	1	24 Vdc Asymmetrical
TM5SE2IC01024	2	24 Vdc Asymmetrical
TM5SE1SC10005	1	5 Vdc Symmetrical

## Transmitter-Receiver Expansion Features

Reference	Modules Description
TM5SBET1	TM5 data transmitter electronic module.
TM5SBET7	TM5 data transmitter electronic module. It also distributes power to the TM7 bus.
TM5SBER2	TM5 data receiver electronic module. It also distributes power to the TM5 bus and to the 24 Vdc I/O power segment.

## Power Distribution Expansion Features

Reference	Modules Description
TM5SPS1	24 Vdc I/O power segment supply
TM5SPS1F	24 Vdc I/O power segment supply with integrated fuse
TM5SPS2	24 Vdc I/O power segment supply and TM5 bus supply
TM5SPS2F	24 Vdc I/O power segment supply with integrated fuse and TM5 bus supply
TM5SPS3	FieldBus Interface 24 Vdc power supply

## Common Distribution Expansion Features

Reference	Number of Channels	Voltage
TM5SPDG12F	12	0 Vdc
TM5SPDD12F	12	24 Vdc
TM5SPDG5D4F	2 x 5	0 Vdc - 24 Vdc
TM5SPDG6D6F	2 x 6	0 Vdc - 24 Vdc

## Fieldbus Interface Features

Reference	Port	Communication Type	Terminal Type
TM5NEIP1	2 Ethernet switched ports	EtherNet/IP	RJ45
TM5NS31	2 Ethernet switched ports	Sercos	RJ45
TM5NCO1	-	CANopen	1 SUB-D 9, male

## Dummy Expansion Features

Reference	Number of Channels	Voltage
TM5SD000	–	–

## Match Software and Hardware Configuration

The I/O that may be embedded in your controller is independent of the I/O that you may have added in the form of I/O expansion. It is important that the logical I/O configuration within your program matches the physical I/O configuration of your installation. If you add or remove any physical I/O to or from the I/O expansion bus or, depending on the controller reference, to or from the controller (in the form of cartridges), then you must update your application configuration. This is also true for any field bus devices you may have in your installation. Otherwise, there is the potential that the expansion bus or field bus no longer function while the embedded I/O that may be present in your controller continues to operate.

<b>▲ WARNING</b>
<b>UNINTENDED EQUIPMENT OPERATION</b>
Update the configuration of your program each time you add or delete any type of I/O expansions on your I/O bus, or you add or delete any devices on your field bus.
<b>Failure to follow these instructions can result in death, serious injury, or equipment damage.</b>

## TM7 Expansion Modules General Description

### Introduction

TM5 EtherNet/IP Fieldbus Interface is compatible with TM7 Expansion modules via the TM5 data transmitter electronic module (TM5SBET7).

The range of expansion I/O includes:

- TM7 Digital I/O blocks
- TM7 Analog I/O blocks

Digital or analog input blocks convert measured values (voltages, currents) into numerical values which can be processed by the controller.

Digital or analog output blocks convert controller internal numerical values into voltages or currents.

Analog temperature blocks convert the temperature measurement values into number values which can be processed by the controller. For temperature measurements, the temperature block returns the measured value using 0.1 °C (0.18 °F) steps.

The Power Distribution Blocks PDB are used to manage the power supply for the various I/O blocks. The PDB feeds the TM7 power bus.

**NOTE:** The TM7 I/O blocks are associated with power cables, TM7 bus cables and I/O cables.

## Expansion Block Features

This table lists the digital blocks:

Reference	Number of Channels	Voltage/Current
TM7BDI8B	8 inputs	24 Vdc / 7 mA
TM7BDI16A	16 inputs	24 Vdc / 7 mA
TM7BDI16B	16 inputs	24 Vdc / 7 mA
TM7BDO8TAB	8 outputs	24 Vdc / 2 A
TM7BDM8B <sup>1</sup>	8 inputs	24 Vdc / 4.4 mA
	8 outputs	24 Vdc / 0.5 A
TM7BDM16A <sup>1</sup>	16 inputs	24 Vdc / 4.4 mA
	16 outputs	24 Vdc / 0.5 A
TM7BDM16B <sup>1</sup>	16 inputs	24 Vdc / 4.4 mA
	16 outputs	24 Vdc / 0.5 A

1. I/O is individually configurable as either input or output.

This table lists the analog blocks:

Reference	Number of Channels	Voltage/Current
TM7BAI4VLA	4 inputs	-10...+10 Vdc
TM7BAI4CLA	4 inputs	0...20 mA
TM7BAO4VLA	4 outputs	-10...+10 Vdc
TM7BAO4CLA	4 outputs	0...20 mA
TM7BAM4VLA	2 inputs	-10...+10 Vdc
	2 outputs	-10...+10 Vdc
TM7BAM4CLA	2 inputs	0...20 mA
	2 outputs	0...20 mA

This table lists the analog temperature input blocks:

Reference	Number of Channels	Sensor Type
TM7BAI4TLA	4 inputs	PT100/1000
		KTY10-6/84-130
TM7BAI4PLA	4 inputs	Thermocouple J,K,S

## Match Software and Hardware Configuration

The I/O that may be embedded in your controller is independent of the I/O that you may have added in the form of I/O expansion. It is important that the logical I/O configuration within your program matches the physical I/O configuration of your installation. If you add or remove any physical I/O to or from the I/O expansion bus or, depending on the controller reference, to or from the controller (in the form of cartridges), then you must update your application configuration. This is also true for any field bus devices you may have in your installation. Otherwise, there is the



potential that the expansion bus or field bus no longer function while the embedded I/O that may be present in your controller continues to operate.

<b>⚠ WARNING</b>
<b>UNINTENDED EQUIPMENT OPERATION</b>
Update the configuration of your program each time you add or delete any type of I/O expansions on your I/O bus, or you add or delete any devices on your field bus.
<b>Failure to follow these instructions can result in death, serious injury, or equipment damage.</b>

## Adding a TM5 EtherNet/IP Fieldbus Interface and Expansion Modules

### Adding a Fieldbus Interface

#### Adding a Fieldbus Interface

To add a TM5 EtherNet/IP Fieldbus Interface to your project, select the TM5 EtherNet/IP Fieldbus Interface in the **Hardware Catalog**, drag it to the **Devices tree**, and drop it on one of the highlighted nodes.

### Adding an Expansion Module

#### Procedure

To add an expansion module to your controller or fieldbus interface, select the expansion module in the **Hardware Catalog**, drag it to the **Devices tree**, and drop it on one of the highlighted nodes.

### I/O Configuration

To configure the expansion module, double-click the expansion module you added in the **Devices tree**.

**Result:** The **TM5 Module I/O Mapping** window is displayed.

### User-Defined Parameters Tab Description

Set the parameters of the expansion module using the **User-Defined Parameters** tab:

Module configuration			
<input checked="" type="checkbox"/> Symbolic values			
Name	Value	Type	Default
InputFilter	10	Byte	10, adjustable in steps of 100 µs

The **User-Defined Parameters** tab contains these columns:

Column	Description	Editable
Name	Parameter name	No
Value	Value of the parameter	Yes. An edit frame can be opened by double-clicking.
Type	Parameter data type	No
Default	Default parameter value	No

## TM5 Module I/O Mapping Tab Description

Variables can be defined and named in the **TM5 Module I/O Mapping** tab. Additional information such as topological addressing is also provided in this tab:

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
		Outputs	%QB2				
		Status	%IB2				
2D8T_ModuleOK ...		ModuleOK	%IB2	BYTE	0		
ibTM5C12D8T_SL4...		SL4 Status digitale outputs	%IB3	BYTE	0		
ibTM5C12D8T_SL5...		SL5 Status digitale outputs	%IB4	BYTE	0		
		Inputs	%IB5				
ibTM5C12D8T_SL1...		SL1 digital Inputs	%IB5	BYTE	0		
		DigitalInput00	%IX5.0	BOOL			24 VDC, 0.1 to 25 ms switching...
		DigitalInput01	%IX5.1	BOOL			24 VDC, 0.1 to 25 ms switching...
		DigitalInput02	%IX5.2	BOOL			24 VDC, 0.1 to 25 ms switching...
		DigitalInput03	%IX5.3	BOOL			24 VDC, 0.1 to 25 ms switching...
ibTM5C12D8T_SL2...		SL2 digital Inputs	%IB6	BYTE	0		
ibTM5C12D8T_SL3...		SL3 digital Inputs	%IB7	BYTE	0		

The **TM5 Module I/O Mapping** tab contains these columns:

Column	Description
<b>Variable</b>	Lets you map the channel on a variable. Double-click the variable icon to enter the variable name. If it is a new variable, the variable is created. It is also possible to map an existing variable with the variables <b>Input Assistant</b> by clicking the input assistant button.
<b>Mapping</b>	Indicates if the channel is mapped on a new variable or an existing variable.
<b>Channel</b>	Name of the channel of the device.
<b>Address</b>	Address of the channel.
<b>Type</b>	Data type of the channel.
<b>Unit</b>	Unit of the channel value.
<b>Description</b>	Description of the channel.

The parameter **Always update variables** is set to **Enabled 1 (use bus cycle task if not used in any task)** and is not editable.

**NOTE:** %I value is updated from physical information at the beginning of each task using the %I.

Physical output level is updated from memory variable for the outputs value within the task configured by **Bus cycle task** configuration.

# TM5 EtherNet/IP Fieldbus Interface

## Introduction

This chapter describes how to configure the Modicon TM5 EtherNet/IP Fieldbus Interface, and provides information about Ethernet configuration, Ethernet services and diagnostic.

## TM5 EtherNet/IP Fieldbus Interface Presentation

### TM5 EtherNet/IP Fieldbus Presentation

#### Introduction

The TM5 EtherNet/IP Fieldbus Interface is a device designed to manage Ethernet/IP communication when using expansion modules with a controller in a distributed architecture.

The TM5 EtherNet/IP Fieldbus Interface supports the TM5 and TM7 expansion modules.

See *General Information*, page 11 for the range of TM5 / TM7 compatible expansion modules.

## Configuring the TM5 Ethernet/IP Fieldbus Interface

This section describes how to configure the Ethernet network interface of the TM5 EtherNet/IP Fieldbus Interface.

## Ethernet Services

### Overview

The Modicon TM5 EtherNet/IP Fieldbus Interface supports the following services:

- Ethernet/IP adapter
- Web server
- DHCP client

### Ethernet Protocols

The Modicon TM5 EtherNet/IP Fieldbus Interface supports IP (Internet Protocol).

### Connections

The Modicon TM5 EtherNet/IP Fieldbus Interface is equipped with 2 RJ45 connectors.

## Rotary Switches: Setting the IP Address

### Overview

The rotary switches on the TM5NEIP1 are used to configure the module Ethernet parameters.

For more information on the rotary switches, refer to the Modicon TM5 EtherNet/IP Fieldbus Interface - Hardware Guide.

## Configuring the Fieldbus Interface

### Introduction

This section describes the configuration of the Modicon TM5 EtherNet/IP Fieldbus Interface as an Ethernet/IP target device.

For further information about EtherNet/IP, refer to the [www.odva.org](http://www.odva.org) website.

### EtherNet/IP Target Configuration

To configure your TM5NEIP1 as an EtherNet/IP target device, add the fieldbus interface to your project. Refer to [Adding a Fieldbus Interface](#), page 17.

### Industrial Ethernet Port Configuration

The device can be connected via Industrial Ethernet. For information and procedures necessary to configure the device network, refer to the EcoStruxure Machine Expert EtherNet/IP User Guide.

### EtherNet/IP Parameter Configuration

To configure the Ethernet/IP parameters, double-click the TM5 EtherNet/IP Fieldbus Interface node in the **Devices tree**.

### Target Settings Tab

The screenshot shows the 'Address Settings (DHCP server configuration)' section with three radio buttons: 'IP Address by DHCP' (selected), 'IP Address by BOOTP', and 'Fixed IP Address'. The 'Fixed IP Address' field is set to '0 . 0 . 0 . 0'. Below this is the 'Electronic Keying' section with five checked checkboxes: 'Check Device Type' (12), 'Check Vendor Code' (243), 'Check Product Code' (4106), 'Check Major Revision' (1), and 'Check Minor Revision' (1). A 'Restore default values' button is present. The 'Protocol on the fieldbus' section shows 'Protocol used by the device' set to 'EtherNet/IP'.

The configured parameters are explained as below:

Configurable Parameters	Description
IP Address by DHCP	IP address is obtained via DHCP
Fixed IP Address	IP address, subnet mask and gateway address are defined by the user

**NOTE:** DHCP Device name longer than 16 characters are not supported.

## Electronic Keying

**Electronic Keying** signatures are used to identify the device. **Electronic Keying** is information contained in the firmware of the device (Vendor Code, Product Code, ...).When the controller scanner starts, it compares each selected electronic keying value with the corresponding information in the device. If the device values are not the same as the application values, the logic controller no longer communicates with the device.

You can configure any of following **Electronic Keying** attributes:

Attribute	Description
Check Device Type	The general type of the product.
Check Vendor Code	The device manufacture.
Check Product Code	The specific type of the product. The Product Code maps to a catalog number. The Product Code differentiates the product from other products of the same Device Type under the indicated Vendor.
Check Major Revision	A number that represents the functional capabilities of a device. Typically, a Major Revision is backwards compatible with a lower Major Revision.
Check Minor Revision	A number that represents behavior changes in the device, for example, anomaly corrections. This number does not represent the functional capabilities of a device.

## Connections on Ethernet/IP

To access a target device, an Originator opens a connection which can include several sessions that send requests.

One explicit connection uses one session (a session is a TCP or UDP connection).

One I/O connection uses two sessions.

The total number of connections is 32.

**NOTE:** The TM5 EtherNet/IP Fieldbus Interface supports cyclic connections. If an Originator opens a connection using a change of state as a trigger, packets are sent at the RPI rate.

## Configuration Stream Tab

The following table shows the parameters available in the **Configuration Stream** tab:

Parameter name	Type	Value	Description
TM5 Bus			
TM5CycleTime	Enumeration of BYTE	0: 40000 us 1: 35000 us 2: 30000 us 3: 25000 us 4: 20000 us 5: 15000 us 6: 10000 us* 7: 500 us	TM5 link configuration
Communication Loss			
CommunicationLossAction	Enumeration of BYTE	0: No Action 1: Set Outputs to Zero* 2: Reserved 3: Freeze Outputs 4: Disable new Class 1 Connections	Communication interruption (timeout) action
CommunicationLossFieldOfAction	Enumeration of BYTE	0: Assembly Local 1: Global*	Communication interruption (timeout) scope
CommunicationLossReset-Mode	Enumeration of BYTE	0: Exploit via Bus Controller Object, Instance service 32 hex 1: Reestablish I/O connection*	Communication interruption (timeout) reset mode
Controller Programming Mode			
ProgrammModeAction	Enumeration of BYTE	0: No Action 1: Set Outputs to Zero* 2: Reserved 3: Freeze Outputs 4: Disable new Class 1 Connections	Program mode (idle) action
ProgramModeFieldOfAction	Enumeration of BYTE	0: Assembly Local 1: Global*	Program mode (idle) scope
Miscellaneous			
Webserver	Enumeration of BYTE	0: Disabled* 1: Enabled	Enables or disables the web server.
(*) Default value.			

## Connections Tab

Each EtherNet/IP device has connections.

In the **Devices tree**, double-click an EtherNet/IP device and select the **Connections** tab.

Column	Comment
<b>Connection N°</b>	The connection number is unique. It is automatically assigned by EcoStruxure Machine Expert.
<b>Connection Name</b>	The connection name is generated automatically by EcoStruxure Machine Expert.
<b>RPI O → T (ms)</b>	Requested Packet Interval: The time period between cyclic data transmissions requested by the scanner.
<b>RPI T → O (ms)</b>	
<b>O→T size (byte)</b>	Number of bytes to exchange between the Originator (O) and the Target (T).

Column	Comment
T->O size (byte)	

To create a connection, click **Add Connection**.

To modify a connection, select a connection and click **Edit Connection**, or double-click it.

To remove a connection, select a connection and click **Delete Connection**.

## EtherNet/IP I/O Mapping Tab

Variables can be defined and named in the **EtherNet/IP I/O Mapping** tab. Additional information such as topological addressing is also provided in this tab. For information and procedures necessary to configure the **EtherNet/IP I/O Mapping**, refer to the EcoStruxure Machine Expert Programming Guide.

## Status

The description of the TM5 EtherNet/IP Fieldbus Interface status is as follows:

- Reads the fieldbus interface status. 32 bits of information are available.
- Bits 0 to 10 indicate error-free states; bits 11 to 31 indicate error states.
- Individual states are also indicated by the LED status indicators on the fieldbus interface.

The following table shows bits, their values and description:

Bit	Value (hex)	Description
0	00000001	The adapter was configured using configuration assemblies.
1	00000002	System start or I/O module detection is done.
2	00000004	Fieldbus interface is not ready to start I/O module configuration.
3	00000008	Fieldbus interface I/O module configuration is in process.
4	00000010	All I/O module configuration is complete.
5	00000020	Ethernet/IP stack initialization is done.
6	00000040	Ethernet/IP stack configuration is done.
7...10	00000080...00000400	Reserved
11	00000800	Memory error
12	00001000	Flash data error while reading the primary flash memory page.
13	00002000	Firmware update error detected. The fieldbus interface is booting with the default firmware.
14	00004000	Missing module detected during boot phase
15	00008000	Incorrect module detected during boot phase.
16	00010000	The adapter has not yet received an IP address assignment from DHCP.
17	00020000	2 or more identical IP addresses exist in the network.
18	00040000	General EIP stack error
19	00080000	Communication resources: Limit reached
20	00100000	Stack socket error detected

Bit	Value (hex)	Description
21	00200000	Insufficient memory
22	00400000	Error detected while reading the primary flash memory page.
23	00800000	Incorrect configuration assembly data
24	01000000	"Scanner auto-connected" error
25	02000000	Corrupted firmware detected. The fieldbus interface is booting with the default firmware.
26	04000000	Error when generating the configuration
27	08000000	Configuration resource is locked
28...31	01000000...80000000	Reserved

You can also read the status information of the remote adapter with the FB\_RemoteAdapter function block properties from the TM5BC EtherNet/IP Remote Adapter library.

Name	Type	Initial	Value name	Comment
Status	USINT	0	Initializing	Initialization of the Remote Adapter
		1	Searching	Try to get connection to the Remote Adapter
		2	Configuring	Writing the user parameters
		3	Configured	Configuration applied successfully
		4	Aborted	Writing was aborted following the flag AbortIfError
		5	Error	Error detected (see property ErrorInfo for more details)
		6	Disabled	Remote Adapter is disabled

The property ErrorInfo is a structure providing details about the error detected:

Name	Type	Initial	Value name	Comment
uiErrorNumber	USINT	0 hex...255 hex	CommunicationErrorCodes	Communication error codes
		256 hex...1000 hex	OperationErrorCodes	Operation Error Codes = uiErrorNumber – 256 hex
		1001 hex	ConfigurationError	Configuration of the Remote Adapter not successful or incorrect configuration of the user parameters
		1002 hex	EipDataExchUnexpectedOutput	Unexpected reaction of the function block EipDataExch
		1003 hex	EipDataExchTimeoutExpired	Timeout of the function block EipDataExch
		1004 hex	ReadingUserParameterFailed	Reading a user parameter from the Remote Adapter not successful
		1005 hex	TimeoutStartConnection	Timeout while waiting for the health bit after starting the connections
		1006 hex...FFFF FFFF hex	-	-
uiParameterNumber	USINT	-	-	Number of the parameter implied in the error detected

## Profile

The controller supports the following objects:



Object class	Class ID (hex)	Number of Instances	Effect on Interface Behavior
Identity Object, page 25	01	1	Provides general information about the bus coupler.
Message Router Object, page 27	02	2	Provides message connection.
Assembly Object, page 27	04	2	Defines I/O data format.
Connection Manager Object, page 28	06	1	–
Bus Controller Object, page 29	64	2	–
Connection Object, page 31	F4	1	Displays connection properties.
TCP/IP Interface Object, page 33	F5	1	Displays TCP/IP configuration.
Ethernet Link Object, page 34	F6	1	Displays counter and status information for the IEEE 802.3 interface.

## Common Class Attributes

The following table describes the class attributes of all supported object:

Attribute ID (hex)	Access	Data type	Description
1	Get	UINT	Object revision
2	Get	UINT	Largest instance number of the object generated in this class level
3	Get	UINT	Number of generated instances
4	Get	STRUCT of UINT	Number of optional attributes
		ARRAY of UINT	List of optional attribute numbers
5	Get	STRUCT of UINT	Number of optional services
		ARRAY of UINT	List of optional service codes
6	Get	UDINT	Largest possible ID number of class attributes
7	Get	UDINT	Largest possible ID number of instance attributes

## Identity Object (Class ID = 01 hex)

The identity object provides identification and status information about the device or object.

The following table provides a general overview of the identity object:

Value (hex)	Description
1, 2, 3, 6, 7	Class attributes
1, E	Class services
1, 2, 3, 4, 5, 6, 7, 8	Instance attributes
1, 5, E	Instance services

The following table describes the instance attributes:

Attribute ID (hex)	Access	Data type	Description	Function
1	Get	UINT	Vendor ID	0377 hex (887)
2	Get	UINT	Device type	Default value: F3 hex (243) = Adapter device
3	Get	UINT	Product code	Hardware ID of the fieldbus interface. This is identical to the first four characters printed on the module's housing.

Attribute ID (hex)	Access	Data type	Description	Function
				Fieldbus interface code: 100A hex (4106)
4	Get	STRUCT of USINT	Major revision	ZZ = Firmware major revision
		STRUCT of USINT	Minor revision	YY = Firmware minor revision
5	Get	WORD	Status	Refer to status code table below.
6	Get	UDINT	Serial number	Identical to the seven characters on the module's housing after the hardware ID
7	Get	STRING	Product name	1C hex (length = 28) and hexadecimal equivalent of TM5 EtherNet/IP Fieldbus Interface TM5NEIP1
8	Get	USINT	Status	0 = Does not exist 1 = Device self-test 2 = Standby 3 = Operational 4 = Major recoverable error 5 = Major unrecoverable error 6 to 254 = Reserved

The following table describes the status codes of instance attribute 5:

Bit	Definition	Function
0	Owned by master (predefined scanner/adaptor connection)	There is an owner for the device or object within the device. In the scanner/adaptor paradigm, setting this bit means that a scanner has been assigned to a predefined scanner/adaptor connection set.
1	-	Reserved, set to 0 by default.
2	Configured	The firmware is no longer set to the pre-configured default behavior. This does not include how communication is configured.
3	-	Reserved, set to 0 by default.
4...7	Extended device status (Refer to extended status codes table below)	The extended device status indicates whether the device is following the general definition for using this bit through the use of the <code>DeviceStatusAssembly</code> keyword in the [Device] section of the EDS file.
8	Minor recoverable error	The device has detected an error that appears to be recoverable. This detected error does not cause the device to enter into an error state.
9	Minor unrecoverable error	The device has detected an error that does not appear to be recoverable. This detected error does not cause the device to enter into an error state.
10	Major recoverable error	The device has detected an error that makes it to enter the "Major recoverable error".
11	Major unrecoverable error	The device has detected an error that makes it to enter the "Major unrecoverable error".
12-15	-	Reserved, set to 0 by default.

The following table describes the extended status codes of Bits 4-7 of instance attribute 5:

Bits 4...7	Definition
0000	Self-testing or unknown.
0001	Firmware update in progress.
0010	At least on unsuccessful I/O connection.
0011	No I/O connections established.
0100	Non-volatile configuration.
0101	Major error - either bit 10 or 11 is true.
0110	At least one I/O connection in run mode.

Bits 4...7	Definition
0111	At least one I/O connection established, all in idle mode.
1000...1001	Reserved, set to 0 by default.
1010...1111	Vendor or product specific.

The following table describes the identity services:

Service code (hex)	Supported by	Service name	Description
1	Class/Instance	Get_Attribute_All	Read all attributes
5	Instance	Reset	Reset factory default
E	Class/Instance	Get_Attribute_Single	Read one attribute

## Message Router Object (Class ID = 02 hex)

The message router provides a message connection that can be used by a client to execute any class or instance services within a physical device.

The following table provides a general overview of the Message Router Object:

Value (hex)	Description
1, 2, 3, 4, 5, 6, 7	Class attributes
1, E	Class services
1, 2	Instance attributes
1, E	Instance services

The following table describes the instance attributes:

Attribute ID (hex)	Access	Data type	Description
1	Get	STRUCT of UINT	List of all supported objects
			Number of supported classes in class array
		ARRAY of UINT	List of supported class codes
2	Get	UINT	Maximum number of supported connections

The following table describes the service objects:

Service code (hex)	Supported by	Service name	Description
1	Class/Instance	Get_Attribute_All	Returns a list of object attributes
E	Class/Instance	Get_Attribute_Single	Supplies the contents of the corresponding attribute

## Assembly Object (Class ID = 04 hex)

The assembly object unifies the attributes of various objects and allows data for each object to be transmitted or received using a single connection. The assembly object can be used for input and output data. The direction is considered from the network perspective.

The following table provides a general overview of the assembly object:

Value (hex)	Description
1, 2, 3, 6, 7	Class attributes
1, E	Class services

Value (hex)	Description
3	Instance attributes
E, 10	Instance services

The following table describes the instance attributes:

Attribute ID (hex)	Access	Data type	Description
3	Set	ARRAY OF BYTE	Data

The following table describes the service objects:

Service code (hex)	Supported by	Service name	Description
E	Class/Instance	Get_Attribute_Single	Supplies the contents of the corresponding attribute
10	Instance	Get_Attribute_Single	Modifies the value of an attribute

## Connection Manager Object (Class ID = 06 hex)

The connection manager object is used for connected and connectionless communication using various subnetworks.

The following table provides a general overview of the connection manager object:

Value (hex)	Description
1, 2, 3, 4, 6, 7	Class attributes
1, E	Class services
1, 2, 3, 4, 5, 6, 7, 8	Instance attributes
1, E, 4E, 52, 54	Instance services

The following table describes the instance attributes:

Attribute ID (hex)	Access	Data type	Description
1	Set <sup>(1)</sup>	UINT	Number of forward open service requests received.
2	Set <sup>(1)</sup>	UINT	Number of forward open service requests which were rejected due to incorrect format.
3	Set <sup>(1)</sup>	UINT	Number of forward open service requests which were rejected due to lack of resources.
4	Set <sup>(1)</sup>	UINT	Number of forward open service requests that were not rejected due to an invalid format or insufficient resources.
5	Set <sup>(1)</sup>	UINT	Number of received forward close service requests.
6	Set <sup>(1)</sup>	UINT	Number of forward close service requests which were rejected due to incorrect format.
7	Set <sup>(1)</sup>	UINT	Number of forward close service requests which were rejected for reasons other than incorrect format.
8	Set	UINT	Total number of connection timeouts that have occurred in connections controlled by this connection manager.

(1) A device can refuse the Set request to this attribute if the transmitted attribute value is not zero. In this case, it transmits the general status code 09 hex (invalid attribute value).

The following table describes the service objects:

Service code (hex)	Supported by	Service name	Description
1	Class/Instance	Get_Attribute_All	Returns a predefined list of object attributes
E	Class/Instance	Get_Attribute_Single	Returns the contents of the corresponding attributes

Service code (hex)	Supported by	Service name	Description
4E	Instance	Forward_Close	Closes a connection
52	Instance	Unconnected_Send	Unconnected transmit service
54	Instance	Forward_Open	Opens a connection, maximum data size is 511 bytes

## Bus Controller Object (Class ID = 64 hex)

The bus controller object is used to configure all global bus controller parameters. All I/O module parameters are managed individually using the I/O module object, page 45.

The following table provides a general overview of the bus controller object:

Value (hex)	Description
1, 2	Class attributes
E	Class services
1, 2, 3, 5, 6, 7, 8, 9, A, B, 20, 21, 22, 23, 24, 25, 26, 27, 40, 41, 42, 43, 44, 45, 46, 60, 61, 62, 63, 64, 65, 66, 67, 68, 80, 81, E0, E1, E2, E3, E4, E5, E6	Instance attributes
10, 32, 33, 34, 34, 35, 36, 37, 38, 40, 41, 42, E	Instance services

The following table describes the instance attributes:

Attribute ID (hex)	Access	Data type	Description
1	Get	UDINT	Adapter status
2	Get	UINT	Hardware major revision
3	Get	UINT	Hardware minor revision
4	Get	UINT	FPGA hardware revision
5	Get	UINT	Active boot block
6	Get	UINT	Default firmware major revision
7	Get	UINT	Default firmware minor revision
8	Get	UINT	Update firmware major revision
9	Get	UINT	Update firmware minor revision
A	Get	UINT	Default FPGA software revision
B	Get	UINT	Update FPGA software revision
20	Get	UINT	Number of modules
21	Get	UINT	Length of the analog input data in bytes
22	Get	UINT	Length of the analog output data in bytes
23	Get	UINT	Length of the digital input data in bytes
24	Get	UINT	Length of the digital output data in bytes
25	Get	UINT	Length of the X2X network status information in bytes
26	Get	UINT	Length of the output status information in bytes
27	Get	UINT	Highest X2X station number currently in use
40	Set/Get	UINT	Size of the analog input assembly in bytes (AI)
41	Set/Get	UINT	Size of the analog output assembly in bytes (AO)
42	Set/Get	UINT	Size of the digital input assembly in bytes (DI)
43	Set/Get	UINT	Size of the digital output assembly in bytes (DO)
44	Set/Get	UINT	Size of the X2X network status assembly in bytes (NS)

Attribute ID (hex)	Access	Data type	Description
45	Set/Get	UINT	Size of the output status assembly in bytes (OS)
46	Set/Get	UINT	Composition of the combination input assembly
60	Set/Get	UINT	Global action delay time (ms)
61	Set/Get	UINT	Communication loss (timeout) action
62	Set/Get	UINT	Communication loss (timeout) scope
63	Set/Get	UINT	Communication loss (timeout) reset mode
64	Set/Get	UINT	Program mode (idle) action
65	Set/Get	UINT	Program mode (idle) scope
66	Set/Get	UINT	Action for an inoperable module or a missing module in state "Operational"
67	Set/Get	UINT	Action for missing module(s) during the boot phase
68	Set/Get	UINT	Action for incorrect module type(s) during the boot phase
80	Set/Get	UINT	X2X Link configuration
81	Set/Get	UINT	X2X cable length (m)
E0	Get	UINT	Reading network address switches
E1	Set/Get	UINT	Module initialization delay (ms)
E2	Set/Get	UINT	Enable/disable the Telnet password
E3	Set/Get	UINT	IP maximum transmission unit (bytes)
E4	Get	UINT	Current boot configuration assembly ID
E5	Get	UINT	Read the number of configured I/O modules

The following table describes the service objects:

Service code (hex)	Supported by	Service name	Description
E	Class/Instance	Get_Attribute_Single	Supplies the contents of the corresponding attribute.
10	Instance	Get_Attribute_Single	Modifies the value of an attribute.
32	Class/Instance	–	Resets any pending timeout.
33	Instance	–	Saves all system data to flash memory. This permanently stores changes to volatile flash memory that have not been stored there automatically by other services.
34	Instance	–	Reads any system data from flash memory. This overwrites any changes in RAM with the permanently saved settings.
35	Instance	–	Deletes the entire flash memory. This restores the default settings.
36	Instance	–	Reinitializes all assemblies.
37	Instance	–	Enables one or more extended configuration assemblies. The specified parameter makes it possible to generate several independent configurations in the 10 assemblies. This can be used to enable the desired configuration with the corresponding start assembly ID. All 10 assemblies for a single configuration can also be used.
38	Instance	–	Clears I/O modules configuration data from RAM. Flash memory is not cleared.
40	Instance	–	Generates a new configuration based on an existing configuration or the non-connected I/O modules. This includes both configured and non configured I/O modules. <ul style="list-style-type: none"> <li>• Bit 0: the configuration is compressed in ZIP format</li> <li>• Bit 1: The EtherNet/IP stack configuration assemblies are written</li> <li>• Bit 2: All data generated is stored in flash memory</li> <li>• Bit 3: The configuration is applied to the I/O module register</li> </ul>
41	Instance	–	Clears the parameter list for I/O modules.
42	Instance	–	Applies the parameter list to existing configurations. This changes all existing configurations. The result is stored in the volatile memory of the RAM.

## Connection Object (Class ID = F4 hex)

The connection object describes the CIP connections present on the device.

The following table provides a general overview of the connection object:

Value (hex)	Description
1, 2, 3, 6, 7	Class attributes
8, 9	Extended class attributes
1, E	Class services
1, 2, 3, 4, 7	Instance attributes
1, E	Instance services

The following table describes the extended class attributes:

Attribute ID (hex)	Access	Data type	Description	Default Value
8	Get	UINT	Instance of the connection object that describes the connection object and was used to send this request to the device.	-
9	Get	ARRAY OF STRUCT	Array of structures that contain the instances attributes 1 and 2 for each instance.	(1)
		UINT	Enumerates the connection types.	Refer to instance attributes below.
		UINT	CIP connection number that is linked to this connection.	Refer to instance attributes below.
(1) The index of the array is determined by the instance number, from 1 to the maximum number of instances. The value at index 1 (offset 0) and non-instanced instances set to 0.				

The following table describes the instance attributes:

Attribute ID (hex)	Access	Data type	Description	Function
1	Get	UINT	Enumerates the possible connection types. All connection types with the exception of 0 indicate routing-capable connections of the corresponding type.	<ul style="list-style-type: none"> <li>0: Connection does not support CIP routing. Attribute 2 is ignored</li> <li>1 Reserved to preserve compatibility with existing protocols</li> <li>2: ControlNet</li> <li>3: ControlNet redundant</li> <li>4: EtherNet/IP</li> <li>5: DeviceNet</li> <li>6 - 99: Reserved</li> <li>100 - 199: Manufacturer-specific</li> <li>200: CompoNet</li> <li>201: Modbus TCP</li> <li>202: Modbus SL</li> <li>203: SERCOS III</li> <li>204: -</li> <li>65534: Reserved</li> <li>65535: Not configured</li> </ul>
2	Get	UINT	CIP connection number that is linked to this connection. This attribute is ignored if the connection type = 0.	Manufacturer assigns a unique value to identify each communication port. Value 1 is defined for internal product use (i.e. backplane). Value 0 is reserved and cannot be used.
3	Get	STRUCT		
		UINT	Number of 16-bit words in the following path.	Range = 2 to 6
		Padded EPATH	Logical path segment that identifies the object for this port.	The path consists of one logical class segment and one logical instance segment. The maximum size is 12 bytes.
4	Get	SHORT_STRING	Name of the physical network port.	"Port A", for example. The maximum number of characters is 64. This name must be different for each physical port. If several CIP ports use the same physical port, the same physical name must be used.
7	Get	Padded EPATH	Rotary switch value	The switch value identical to attribute 2.

The following table describes the service objects:

Service code (hex)	Supported by	Service name	Description
1	Class/Instance	Get_Attributes_All	Returns a predefined list of object attributes.
E	Class/Instance	Get_Attribute_Single	Returns the contents of the corresponding attributes.



## TCP/IP Interface Object (Class Code = F5 hex)

The TCP/IP interface object provides a mechanism for configuring the TCP/IP network of the fieldbus interface.

The following table provides a general description of the TCP/IP interface object:

Value (hex)	Description
1, 2, 3, 6, 7	Class attributes
1, E	Class services
1, 2, 3, 4, 5, 6	Instance attributes
1, 2, E, 10	Instance services

The following table describes the instance attributes:

Attribute ID (hex)	Access	Data type	Description	Function
1	Get	DWORD	Interface status	Refer to interface status table below
2	Get	DWORD	Interface configuration properties	<ul style="list-style-type: none"> <li>0: BOOTP Client</li> <li>1: DNS Client</li> <li>2: DHCP Client</li> <li>3: DHCP DNS update</li> <li>4: Configured in EcoStruxure Machine Expert</li> <li>5-31: Reserved</li> </ul>
3	Set	DWORD	Interface control flags	<ul style="list-style-type: none"> <li>0: The software configuration is obtained by reading the internal flash memory</li> <li>1: The software configuration is obtained with BOOTP</li> <li>2: The software configuration is obtained with DHCP</li> <li>3-15: reserved</li> </ul>
4	Get	STRUCT	Path to the physically linked object	The path identifies the object that is connected to the underlying physical communication object.
		UINT	Length of the path	Number of 16 bits word in the element path.
		EPATH	Logical segments that identify the physical link	The path addresses to the internal port of the built-in 3-port switch.
5	Get	STRUCT	TCP/IP network interface configuration	Contains TCP/IP configuration parameters. In order to avoid incomplete or incompatible configurations, parameters cannot be set individually.
		UDINT	IP address	This value is 0 if an IP address has not been configured. Otherwise, a valid class A, B or C address is given. <b>Example:</b> 0164A8C0 hex (corresponds to 192.168.100.1)
		UDINT	Network mask	This value is 0 if a network mask has not been configured. <b>Example:</b> 00FFFFFF hex (corresponds to 255.255.255.0)
		UDINT	Gateway address	This value is 0 if a gateway address has not been configured. Otherwise, a valid class A, B or C address is given. <b>Example:</b> FE64A8C0 hex (corresponds to 192.168.100.254)
		UDINT	Primary name server	The value 0 indicates that a primary name server has not been configured. Otherwise, a valid class A, B or C address is given.
		UDINT	Secondary server	The value 0 indicates that a secondary name server has not been configured. Otherwise, a valid class A, B or C address is given.

Attribute ID (hex)	Access	Data type	Description	Function
		STRING	Domain name	ASCII characters.  The maximum length is 48 characters. They are filled to an even number (filler byte not included in the length).  The length is 0 if a domain name has not been configured.
6	Get	STRING	Hostname	ASCII characters.  The maximum length is 64 characters. They are filled to an even number (filler byte not included in the length).  The length is 0 if a domain name has not been configured.

The following table provides the interface status of attribute 1:

Bit	Name	Description
0...3	Interface configuration status	<ul style="list-style-type: none"> <li>0: The software configuration attribute has not been configured.</li> <li>1: The software configuration contains a valid configuration for BOOTP, DHCP or non volatile memory.</li> <li>2: The software configuration contains a valid configuration for hardware settings such as a thumbwheel switch, handwheel, etc.</li> <li>3-15: Reserved</li> </ul>
4	Mcast pending	Indicates a pending configuration change in the TTL value and/or Mcast configuration attribute. This bit is set if either the TTL value or Mcast configuration attribute is set and deleted the next time the device is started.
5...31	Reserved	Reserved

The following table describes the service objects:

Service code (hex)	Supported by	Service name	Description
1	Class/Instance	Get_Attribute_All	Returns a predefined list of object attributes.
2	Instance	Set_Attribute_All	Modifies all modifiable attributes.
E	Class/Instance	Get_Attribute_Single	Returns the content of the corresponding attributes.
10	Instance	Set_Attribute_Single	Modifies an individual attribute value.

## Ethernet Link Object (Class ID = F6 hex)

The Ethernet link object manages connection-specific counters and status information.

The following table provides a general overview of the Ethernet link object:

Value (hex)	Description
1, 2, 3, 6, 7	Class attributes
1, E	Class services
1, 2, 3	Instance attributes
1, E	Instance services

The following table describes the instance attributes:

Attribute ID (hex)	Access	Data type	Description	Function
1	Get	UDINT	Transfer rate in use	Speed in Mbps (for instance 0, 10, 100, 1000, etc.)
2	Get	DWORD	Interface status flag	Refer to interface status table below
3	Get	ARRAY [0...5] of USINT	Physical address	Device-specific MAC address

The following table describes the status codes of the interface status flag:

Bit	Name	Description
0	Connection status	Indicates whether the communication interface is connected to an active network. <ul style="list-style-type: none"> <li>0: Indicates an inactive link.</li> <li>1: Indicates an active link.</li> </ul>
1	Full-/Half-duplex	Indicates the duplex mode in use. <ul style="list-style-type: none"> <li>0: Indicates that the interface is running half duplex.</li> <li>1: Indicates full duplex.</li> </ul> This flag is undefined if the connection status flag is 0.
2...4	Auto-negotiation Status	Indicates the status of auto-negotiation. <ul style="list-style-type: none"> <li>0: Auto-negotiation in progress</li> <li>1-2: Auto-negotiation and speed detection not successful.</li> <li>3: Successfully negotiated speed and duplex.</li> <li>4: Auto-negotiation not attempted. Forced speed and duplex.</li> </ul>
5	Manual Setting Require Reset	Indicates the change mode required. <ul style="list-style-type: none"> <li>0: The interface can activate changes to link parameters (auto-negotiate, duplex mode, interface speed) automatically.</li> <li>1: The device requires a reset service be issued to its identity object in order for the changes to take effect.</li> </ul>
6	Local Hardware Error	Indicates whether a local error is detected. <ul style="list-style-type: none"> <li>0: Indicates that the interface detects no local hardware error</li> <li>1: Indicates that a local hardware error is detected. The meaning of this is product-specific.</li> </ul>
7...31	Reserved	Reserved. Set to 0 by default.

The following table describes the instance service objects:

Service code (hex)	Supported by	Service name	Description
1	Class/Instance	Get_Attribute_All	Returns a predefined list of object attributes.
E	Class/Instance	Get_Attribute_Single	Provides the contents of the corresponding attribute.

## Web Server

### Introduction

The TM5 EtherNet/IP Fieldbus Interface provides as a standard equipment an embedded Web server with a predefined factory built-in website. You can use the pages of the website for module setup and as well as application diagnostics and monitoring. These pages are ready for use with a Web browser. No configuration or programming is required.

The Web server can be accessed by the web browsers listed below:

- Google Chrome (version 65.0 or greater)
- Mozilla Firefox (version 54 or greater)
- Microsoft Internet Explorer (version 11 or greater)

The Web server is limited to 32 concurrent connections.

The Web server is a tool for reading data, writing data and controlling the state of the TM5 EtherNet/IP Fieldbus Interface with full access to all data in your application. In case of security concerns over these functions you must, at least, assign a secure password to the Web server to prevent unauthorized access to the application.

The Web server allows you to monitor a TM5 EtherNet/IP Fieldbus Interface remotely to perform various maintenance activities including modifications to data, configuration parameters and modifications of the TM5 EtherNet/IP Fieldbus Interface state. Care must be taken to ensure that the immediate physical environment of the machine and process is in a state that will not present safety risks to people or property before executing control remotely.

## ▲ WARNING

### UNINTENDED EQUIPMENT OPERATION

- Define a secure password for the Web server, and do not allow unauthorized or otherwise unqualified personnel to use this feature.
- Ensure that there is a local, competent, and qualified observer present when operating on the controller from a remote location.
- You must have a complete understanding of the application and the machine/process it is controlling before attempting to adjust data, stopping an application that is operating, or starting the controller remotely.
- Take the precautions necessary to assure that you are operating on the intended controller by having clear, identifying documentation within the controller application and its remote connection.

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

**NOTE:** The Web server must only be used by authorized and qualified personnel. A qualified person is one who has the skills and knowledge related to the construction and operation of the machine and the process controlled by the application and its installation, and has received safety training to recognize and avoid the hazards involved.

## Web Server Access

The Web server is a service that allows you to remotely monitor the device and its configuration parameters.

**NOTE:** The Web server is disabled by default. The Web server can be enabled or disabled through the EcoStruxure Machine Expert software. For more details, refer to [Configuration Stream Tab, page 22](#).

When logging in to Web server for the first time, the default username (admin) and the default password (TM5NEIP1) must be used, and then the user is requested to change the password.

All other Web server menus remain unavailable until the password has been changed.

## ▲ WARNING

### UNAUTHORIZED DATA ACCESS

Disable the Web server to prevent any unwanted or unauthorized access to data in your application.

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

The username and the password can be changed at any time by opening the Web server and going to **Maintenance > Users account**. For more information, refer to [User Account, page 43](#).

**NOTE:** The only way to gain access to a TM5 EtherNet/IP Fieldbus Interface and for which you do not have the password is by performing a Fieldbus interface clear flash memory operation (rotary switch position F0). Refer to the Modicon TM5 EtherNet/IP Fieldbus Interface - Hardware Guide.

## Home Page Access: Equipment Overview

To access the website home page (**Equipment Overview**), enter in your navigator the IP address of the TM5 EtherNet/IP Fieldbus Interface.

You can access the **Equipment Overview** without login. All other web pages requires a login.

Click **Login**, then enter the user name and the password.

This figure shows the home page of the Web Server site when you have logged in:

Identification	
Vendor ID	243
Vendor Name	Schneider Electric
Product ID	4106
Product Name	TM5 Bus Coupler EtherNet/IP
Product Reference	TM5NEIP1
Serial Number	41060168506

**NOTE:** Schneider Electric adheres to industry best practices in the development and implementation of control systems. This includes a "Defense-in-Depth" approach to secure an Industrial Control System. This approach places the controllers behind one or more firewalls to restrict access to authorized personnel and protocols only.

## ⚠ WARNING

### UNAUTHENTICATED ACCESS AND SUBSEQUENT UNAUTHORIZED MACHINE OPERATION

- Evaluate whether your environment or your machines are connected to your critical infrastructure and, if so, take appropriate steps in terms of prevention, based on Defense-in-Depth, before connecting the automation system to any network.
- Limit the number of devices connected to a network to the minimum necessary.
- Isolate your industrial network from other networks inside your company.
- Protect any network against unintended access by using firewalls, VPN, or other, proven security measures.
- Monitor activities within your systems.
- Prevent subject devices from direct access or direct link by unauthorized parties or unauthenticated actions.
- Prepare a recovery plan including backup of your system and process information.

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

For more information on organizational measures and rules covering access to infrastructures, refer to ISO/IEC 27000 series, Common Criteria for Information Technology Security Evaluation, ISO/IEC 15408, IEC 62351, ISA/IEC 62443, NIST Cybersecurity Framework, Information Security Forum - Standard of Good Practice for Information Security and refer to Cybersecurity Guidelines for EcoStruxure Machine Expert, Modicon and PacDrive Controllers and Associated Equipment, page 7.

The **Equipment Overview** page lets you access the main Web server pages.

Home page menu descriptions:

Menu	Page	Description
<b>Equipment Overview</b>	-	Displays the TM5 EtherNet/IP Fieldbus Interface status.
<b>Configuration</b>	I/O Assembly Settings, page 39	Displays the I/O assembly.
	I/O Assembly Mapping, page 40	Displays the I/O mapping values.
<b>Monitoring</b>	Adapter Status , page 42	Allows you to access the post configuration file saved on the TM5 EtherNet/IP Fieldbus Interface.
<b>Diagnostic</b>	Module Diagnostics , page 42	Displays TM5 EtherNet/IP Fieldbus Interface diagnostic.
<b>Maintenance</b>	Ethernet , page 42	Allows you to configure the IP parameters of the TM5 EtherNet/IP Fieldbus Interface
	User Account , page 43	Allows you to change actual user password and customize login message.
	Bus Coupler Firmware Update , page 44	Allows new firmware to be downloaded to the fieldbus interface.
	I/O Module Firmware Update , page 45	Allows new firmware to be downloaded to I/O modules.
	Class Instance Editor , page 45	Allows you to directly query and change the attributes of the CIP object dictionary
	Expert Features , page 46	Is used to read or write X2X registers. It also makes it possible to load, save and delete the TM5 EtherNet/IP Fieldbus Interface configuration.

The Web server allows you to remotely monitor a TM5 EtherNet/IP Fieldbus Interface, to perform various maintenance activities, including modifications to data and configuration parameters, and change the state of the TM5 EtherNet/IP Fieldbus Interface. Ensure that the immediate physical environment of the machine and process is in a state that will not present safety risks to people or property before exercising control remotely.

<b>▲ WARNING</b>
<p><b>UNINTENDED EQUIPMENT OPERATION</b></p> <ul style="list-style-type: none"> <li>• Define a secure password for the Web server, and do not allow unauthorized or otherwise unqualified personnel to use this feature.</li> <li>• Ensure that there is a local, competent, and qualified observer present when operating on the controller from a remote location.</li> <li>• You must have a complete understanding of the application and the machine/process it is controlling before attempting to adjust data, stopping an application that is operating, or starting the controller remotely.</li> <li>• Take the precautions necessary to assure that you are operating on the intended controller by having clear, identifying documentation within the controller application and its remote connection.</li> </ul> <p><b>Failure to follow these instructions can result in death, serious injury, or equipment damage.</b></p>

**NOTE:** The Web server must only be used by authorized and qualified personnel. A qualified person is one who has the skills and knowledge related to the construction and operation of the machine and the process controlled by the application and its installation, and has received safety training to recognize and avoid the hazards involved.

## Configuration: I/O Assembly Settings

This page is used for configuring the I/O assemblies. The page is divided into four columns:

Parameter	Function
<b>Description</b>	Contains the name of the corresponding assembly and indicates on which instance this assembly is located.
<b>Used</b>	Displays the number of bytes used by I/O data in the corresponding assembly, or how many bytes would be used if the length of the assembly is reconfigured to a smaller size.
<b>Configured</b>	Displays the configured length of the corresponding assembly in bytes.
<b>Set</b>	Specifies a new value for the configured length of the corresponding assembly in bytes. Changes are applied after clicking <b>Apply</b> .

The combination output assembly (instance 112) consists of the analog output and digital output assembly. The maximum size is 502 bytes.

By default, the combination input assembly (instance 124) consists of the analog input (AI), digital input (DI), network status (NS) and output status (OS) assemblies. This composition can be changed using the check boxes in the **Set** column. The maximum size of the combination input assembly is 502 bytes.

The Web server allows you to remotely monitor a TM5 EtherNet/IP Fieldbus Interface, to perform various maintenance activities, including modifications to data and configuration parameters, and change the state of the TM5 EtherNet/IP Fieldbus Interface. Ensure that the immediate physical environment of the machine and process is in a state that will not present safety risks to people or property before exercising control remotely.

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## Configuration: I/O Assembly Mapping

The page consists of an upper and a lower section. The upper section contains a table with a similar structure as in **Diagnostics**, that lists the relationship between the six base assemblies and each I/O module. In the lower section, the I/O data of the two combination assemblies is displayed in two text boxes.

Under **(Offset / Length)**, the table lists the byte offset for each module and the index of the respective I/O data in the output and input data (**Offset**), as well as the number of bytes (**Length**). If a module does not provide corresponding data, then this is indicated with the entry "-". Clicking an **Offset / Length** pair highlights the respective bytes in the combination assembly (text boxes in the lower section of the page). Any change to the data in the respective text box causes the selection to disappear automatically.





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## Monitoring: Adapter Status

The **Adapter Status** page allows you to analyze the Operational State, Network Settings, Error State, Version Info, and General adapter statuses on the TM5 EtherNet/IP Fieldbus Interface.

## Diagnostic: Module Diagnostics

This page provides an overview of all connected and configured I/O modules on the TM5 EtherNet/IP Fieldbus Interface.

Moving the mouse cursor over the **Status** column displays a tool tip that explains the different states:

Equipment Overview		DIAGNOSTIC > Module Diagnostics						
CONFIGURATION	Slot	Name	Status	Configured ID	Current ID	Serial No	HW Variant	Firmware
MONITORING	1	TM5SPS3	OK (0x52)	0	8076	0193018	6	816
DIAGNOSTIC	2	TM5SDI12D	OK (0x52)	0	7061	0584581	5	800
Module Diagnostics	3	TM5SDO12T	OK (0x52)	0	7066	0586052	5	801
MAINTENANCE								

## Maintenance: Ethernet

This page allows you to read or set the adapter IP parameters

You can change the IP parameters if the adapter node switch is set to 00 hex(Boot with Flash parameters).

IP parameter changes are performed directly without an adapter reboot. A manual browser reconnect is required if the IP address is changed.

The Web server allows you to remotely monitor a TM5 EtherNet/IP Fieldbus Interface, to perform various maintenance activities, including modifications to data and configuration parameters, and change the state of the TM5 EtherNet/IP Fieldbus Interface. Ensure that the immediate physical environment of the machine and process is in a state that will not present safety risks to people or property before exercising control remotely.

**▲ WARNING**

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**Maintenance: User Account**

This page allows you to change the Web authentication data. The following characters are allowed: a...z, A...Z, 0...9. The password must contain between 8 and 32 characters and it must be different from the current one.

The Web server allows you to remotely monitor a TM5 EtherNet/IP Fieldbus Interface, to perform various maintenance activities, including modifications to data and configuration parameters, and change the state of the TM5 EtherNet/IP Fieldbus Interface. Ensure that the immediate physical environment of the machine and process is in a state that will not present safety risks to people or property before exercising control remotely.

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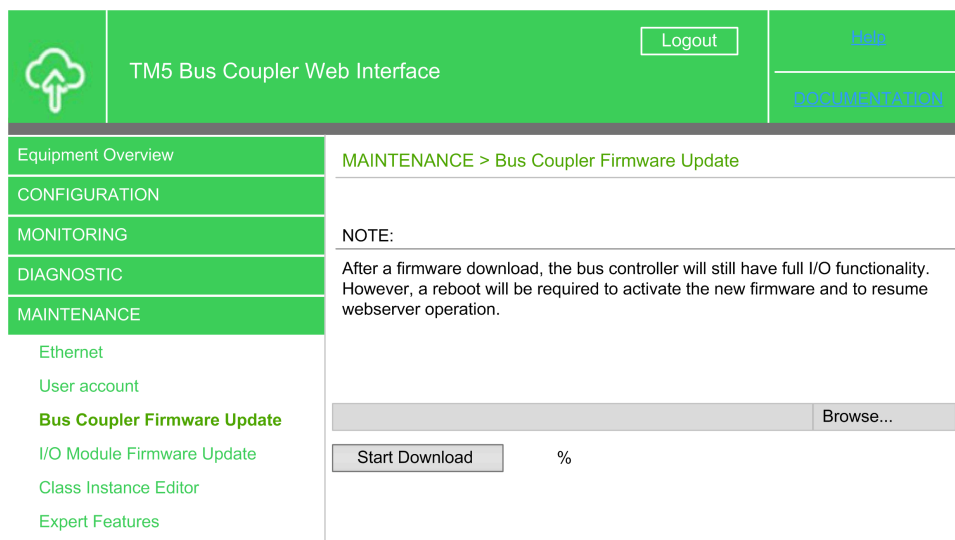
**NOTE:** The Web server must only be used by authorized and qualified personnel. A qualified person is one who has the skills and knowledge related to the construction and operation of the machine and the process controlled by the application and its installation, and has received safety training to recognize and avoid the hazards involved.

## Maintenance: Bus Coupler Firmware Update

This page allows you to update the firmware on the fieldbus interface.

A firmware file (\*.fw file) can be specified using the **Browse** button. Click the **Start Download** button to display the progress of the firmware update in a new window. The update must be complete (indicator at 100%) before you restart the fieldbus interface, using the **Restart Bus Controller** button, and access the Web interface. The fieldbus interface remains fully functional as EtherNet/IP adapter without restarting as the previous firmware stays active until a restart is performed.

This figure shows the **Bus Coupler Firmware Update** page:



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<b>⚠ WARNING</b>
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## Maintenance: I/O Module Firmware Update

This page allows you to update the I/O module firmware. The update is performed on all I/O modules whose hardware variant and module ID match the firmware.

A firmware file (\*.fw file) can be specified using the **Browse** button. Click the **Start Download** button to display the progress of the firmware update in a new window.

The Web server allows you to remotely monitor a TM5 EtherNet/IP Fieldbus Interface, to perform various maintenance activities, including modifications to data and configuration parameters, and change the state of the TM5 EtherNet/IP Fieldbus Interface. Ensure that the immediate physical environment of the machine and process is in a state that will not present safety risks to people or property before exercising control remotely.

<b>⚠ WARNING</b>
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## Maintenance: Class Instance Editor

The **Class Instance Editor** is used to read and write attributes and to start services:

Step	Action	Comment
1	Select a generic or a custom service.	–
2	Specify a class, an instance and an attribute (optional).	<p>Choose as decimal or hexadecimal by selecting the respective radio button.</p> <p>Any attributes that must be written or parameters requested by a service must be entered in the Request text field, as hexadecimal values in Little Endian format. Spaces can be entered between the individual bytes.</p>
3	<p>Click the <b>Process Service</b> button or the <b>Cyclic</b> button.</p> <p><b>Result:</b> Any corresponding data displays in the <b>Response</b> text field (hexadecimal, Little Endian format).</p>	–

The Web server allows you to remotely monitor a TM5 EtherNet/IP Fieldbus Interface, to perform various maintenance activities, including modifications to data and configuration parameters, and change the state of the TM5 EtherNet/IP Fieldbus Interface. Ensure that the immediate physical environment of the machine and process is in a state that will not present safety risks to people or property before exercising control remotely.

**▲ WARNING****UNINTENDED EQUIPMENT OPERATION**

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## Maintenance: Expert Features

This page lists some useful functions for advanced users. The functions on this page include reading and writing I/O module registers, starting the reset service and three vendor specific services for deleting, saving and reading the flash memory on the adapter.

Use the first three lines at the top of the page to read and write I/O module registers via the I/O module object (class 65 hex). Enter the instance of the I/O module as a decimal value in the text field of the first line. The instance corresponds to the module's slot. The first I/O module corresponds to instance 1.

Specify the register address as a hexadecimal integer value in Little Endian format (INT, 2-byte) to read an I/O register. Click the **Process** button to read the register. Click the **Cyclic** button to cause the register value to be re-scanned every 200 ms and displayed in the **Value (hex)** field as DINT value in Little Endian format.

Specify the register address and the register value (which must be written) as INT and DINT in hexadecimal Little Endian format to write an I/O register. Select the **Process** button in the Write I/O register line to write the register.

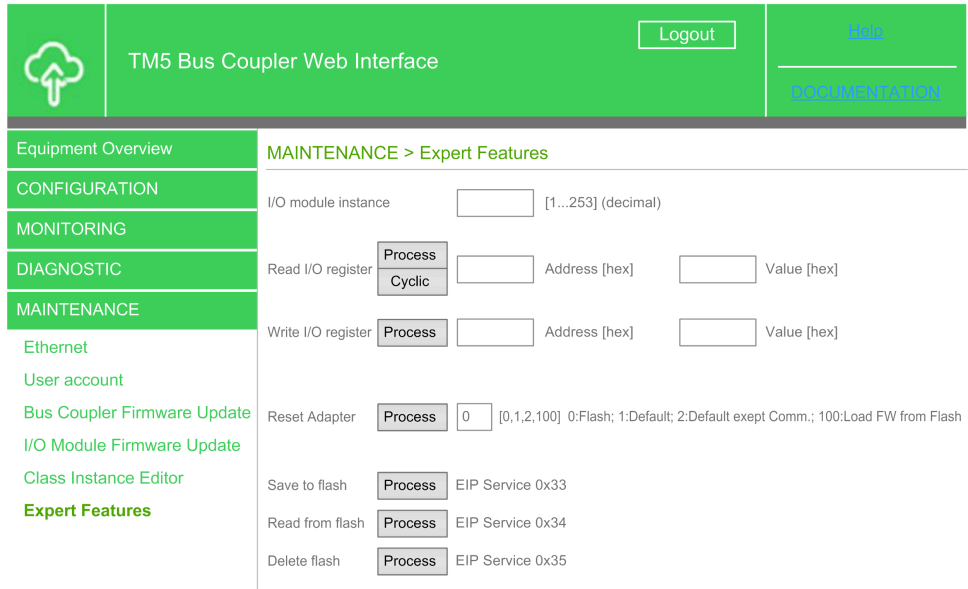
### Reset-Service

- 0: The adapter reboots and uses only flash parameters.
- 1: The adapter performs a reboot with default parameters.
- 2: The adapter performs a reboot with default parameters, except the communication parameters. These are not initialized with default values, but read from the flash.
- 100: The adapter reboots and uses only flash parameters. The FPGA is reloaded

This table describes the Adapter Flash Management:

Parameter	Function
Save to flash	Starts service 33 hex from the class 64 hex, which writes all the settings (parameters) from RAM to the non-volatile flash memory of the fieldbus interface.
Read from flash	Starts service 34 hex from the class 64hex, which overwrites all the settings (parameters) in the RAM with the corresponding parameters from the flash memory.
Delete flash	Starts service 35 hex from the class 64 hex, which overwrites all the parameters on the flash memory of the fieldbus interface with factory settings.

This figure shows the **Expert Features**:



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# Updating the Fieldbus Interface and Expansion Module Firmware

## Introduction

This chapter provides general information to help you update the firmware of the module and fieldbus interface.

## Updating the Firmware

### Overview

You can update the firmware for the following using the Web Server:

- TM5 Fieldbus EtherNet/IP Interface, page 44
- Expansion Modules, page 45



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# Glossary

## A

### **analog input:**

Converts received voltage or current levels into numerical values. You can store and process these values within the logic controller.

### **analog output:**

Converts numerical values within the logic controller and sends out proportional voltage or current levels.

## C

### **compact I/O module:**

An inseparable group of 5 analog and/or digital I/O electronic modules in a single reference.

### **configuration:**

The arrangement and interconnection of hardware components within a system and the hardware and software parameters that determine the operating characteristics of the system.

### **control network:**

A network containing logic controllers, SCADA systems, PCs, HMI, switches, ...

Two kinds of topologies are supported:

- flat: all modules and devices in this network belong to same subnet.
- 2 levels: the network is split into an operation network and an inter-controller network.

These two networks can be physically independent, but are generally linked by a routing device.

## D

### **DHCP:**

*(dynamic host configuration protocol)* An advanced extension of BOOTP. DHCP is more advanced, but both DHCP and BOOTP are common. (DHCP can handle BOOTP client requests.)

### **digital I/O:**

*(digital input/output)* An individual circuit connection at the electronic module that corresponds directly to a data table bit. The data table bit holds the value of the signal at the I/O circuit. It gives the control logic digital access to I/O values.

### **DNS:**

*(domain name system)* The naming system for computers and devices connected to a LAN or the Internet.

## E

### **EtherNet/IP Adapter:**

An EtherNet/IP Adapter, sometimes also called a server, is an end-device in an EtherNet/IP network. I/O blocks and drives can be EtherNet/IP Adapter devices.

### **expansion bus:**

An electronic communication bus between expansion I/O modules and a controller or bus coupler.

---

## G

### **GVL:**

*(global variable list)* Manages global variables within an EcoStruxure Machine Expert project.

## I

### **I/O:**

*(input/output)*

### **IP:**

*(Internet protocol)* Part of the TCP/IP protocol family that tracks the Internet addresses of devices, routes outgoing messages, and recognizes incoming messages.

## O

### **originator:**

In EtherNet/IP explicit messaging, the device, usually the logic controller, that initiates data exchanges with target network devices.

See also *target*

### **Originator:**

In EtherNet/IP, the device that initiates a CIP connection for implicit or explicit messaging communications or that initiates a message request for un-connected explicit messaging.

See also *target*

#### **NOTE:**

## R

### **RPI:**

*(requested packet interval)* The time period between cyclic data exchanges requested by the scanner. EtherNet/IP devices publish data at the rate specified by the RPI assigned to them by the scanner, and they receive message requests from the scanner with a period equal to RPI.

## T

### **Target:**

In EtherNet/IP, a device is considered to be the target when it is the recipient of a connection request for implicit or explicit messaging communications.

See also *Originator*

#### **NOTE:**

### **TCP:**

*(transmission control protocol)* A connection-based transport layer protocol that provides a simultaneous bi-directional transmission of data. TCP is part of the TCP/IP protocol suite.

---

## U

### UDP:

*(user datagram protocol)* A connectionless mode protocol (defined by IETF RFC 768) in which messages are delivered in a datagram (data telegram) to a destination computer on an IP network. The UDP protocol is typically bundled with the Internet protocol. UDP/IP messages do not expect a response, and are therefore ideal for applications in which dropped packets do not require retransmission (such as streaming video and networks that demand real-time performance).

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