

Modicon TM3 Bus Coupler (EcoStruxure Machine Expert – Basic)

Programming Guide

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Safety Information

Important Information

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



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



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

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

Please Note

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

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

About the Book

Document Scope

This document describes the configuration of the TM3 bus couplers for EcoStruxure Machine Expert - Basic. For further information, refer to the separate documents provided in the EcoStruxure Machine Expert - Basic online help.

Validity Note

This document has been updated for the release of EcoStruxure™ Machine Expert - Basic V1.3.

Available Languages of this Document

This document is available in these languages:

- English (EIO0000004091)
- French (EIO0000004092)
- German (EIO0000004093)
- Spanish (EIO0000004094)
- Italian (EIO0000004095)
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- Turkish (EIO0000004098)

Related Documents

Title of Documentation	Reference Number
TM3 Bus Coupler - Hardware Guide	EIO0000003635 (ENG)
	EIO0000003636 (FRE)
	EIO0000003637 (GER)
	EIO0000003638 (SPA)
	EIO0000003639 (ITA)
	EIO0000003640 (CHS)
	EIO0000003641 (POR)
	EIO0000003642 (TUR)
TM3 Digital I/O Modules - Hardware Guide	EIO0000003125 (ENG)
	EIO0000003126 (FRE)
	EIO0000003127 (GER)
	EIO0000003128 (SPA)
	EIO0000003129 (ITA)
	EIO0000003130 (CHS)
	EIO0000003424 (POR)
	EIO0000003425 (TUR)

Title of Documentation	Reference Number
TM3 Analog I/O Modules - Hardware Guide	EIO0000003131 (ENG) EIO0000003132 (FRE) EIO0000003133 (GER) EIO0000003134 (SPA) EIO0000003135 (ITA) EIO0000003136 (CHS) EIO0000003426 (POR) EIO0000003427 (TUR)
TM3 Expert Modules - Hardware Guide	EIO0000003137 (ENG) EIO0000003138 (FRE) EIO0000003139 (GER) EIO0000003140 (SPA) EIO0000003141 (ITA) EIO0000003142 (CHS) EIO0000003428 (POR) EIO0000003429 (TUR)
TM3 Safety Modules - Hardware Guide	EIO0000003353 (ENG) EIO0000003354 (FRE) EIO0000003355 (GER) EIO0000003356 (SPA) EIO0000003357 (ITA) EIO0000003358 (CHS) EIO0000003359 (POR) EIO0000003360 (TUR)
TM3 Transmitter and Receiver Modules - Hardware Guide	EIO0000003143 (ENG) EIO0000003144 (FRE) EIO0000003145 (GER) EIO0000003146 (SPA) EIO0000003147 (ITA) EIO0000003148 (CHS) EIO0000003430 (POR) EIO0000003431 (TUR)
Modicon M221 Logic Controller - Programming Guide	EIO0000003297 (ENG) EIO0000003298 (FRE) EIO0000003299 (GER) EIO0000003300 (SPA) EIO0000003301 (ITA) EIO0000003302 (CHS) EIO0000003303 (POR) EIO0000003304 (TUR)

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Product Related Information

⚠ WARNING

LOSS OF CONTROL

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

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

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

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

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

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.

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.
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.

TM3 Bus Coupler Configuration General Information

Introduction

The Modicon TM3 Bus Couplers are devices designed to manage EtherNet/IP, Modbus TCP, or Modbus serial line communication protocols. This chapter provides general information to help you configure TM3 bus coupler in EcoStruxure Machine Expert - Basic.

Modicon TM3 Bus Couplers

Introduction

The range of TM3 bus couplers includes:

- TM3 Ethernet bus coupler
- TM3 Modbus Serial Line bus coupler

Modicon TM3 Bus Couplers

The following table shows the TM3 bus couplers, with port, communication and terminal types:

Reference	Ports	Communication type	Terminal Type
TM3BCEIP	Isolated switched Ethernet ports: 2	Modbus TCP	RJ45
	USB mini-B ports: 1	EtherNet/IP ⁽¹⁾	USB mini-B
TM3BCSL	Isolated RS-485 ports: 2 (daisy-chained)	Modbus Serial line	RJ45
	USB mini-B ports: 1		USB mini-B
(1) Not supported by M221.			

TM2 General Description

Introduction

The range of TM2 expansion modules includes:

- Digital expansion modules
- Analog expansion modules

Digital Expansion Modules Features

The following table shows the digital expansion modules features:

Module reference	Channels	Channel type	Voltage/current	Reference page
Input Modules				
TM2DAI8DT	8	Inputs	120 Vac 7.5 mA	TM2DAI8DT
TM2DDI8DT	8	Inputs	24 Vdc 7 mA	TM2DDI8DT
TM2DDI16DT	16	Inputs	24 Vdc 7 mA	TM2DDI16DT
TM2DDI16DK	16	Inputs	24 Vdc 5 mA	TM2DDI16DK
TM2DDI32DK	32	Inputs	24 Vdc 5 mA	TM2DDI32DK
Output Modules				
TM2DRA8RT	8	Outputs Relay	30 Vdc/230 Vac 2 A max	TM2DRA8RT
TM2DRA16RT	16	Outputs Relay	30 Vdc/230 Vac 2 A max	TM2DRA16RT
TM2DDO8UT	8	Outputs Transistor sink	24 Vdc 0.3 A max per output	TM2DDO8UT
TM2DDO8TT	8	Outputs Transistor source	24 Vdc 0.5 A max per output	TM2DDO8TT
TM2DDO16UK	16	Outputs Transistor sink	24 Vdc 0.1 A max per output	TM2DDO16UK
TM2DDO16TK	16	Outputs Transistor source	24 Vdc 0.4 A max per output	TM2DDO16TK
TM2DDO32UK	32	Outputs Transistor sink	24 Vdc 0.1 A max per output	TM2DDO32UK
TM2DDO32TK	32	Outputs Transistor source	24 Vdc 0.4 A max per output	TM2DDO32TK
Mixed Modules				

Module reference	Channels	Channel type	Voltage/current	Reference page
TM2DMM8DRT	4	Inputs	24 Vdc/7 mA	TM2DMM8DRT
	4	Outputs	30 Vdc/230VAC	
		Relay	2 A max	
TM2DMM24DRF	16	Inputs	24 Vdc/7 mA	TM2DMM24DRF
	8	Outputs	30 Vdc/230VAC	
		Relay	2 A max	

Analog Expansion Modules Features

The following table shows the analog expansion modules features:

Module reference	Channels	Channel type	Voltage/current	Reference page
Input Modules				
TM2AMI2HT	2	High-level inputs	0...10 Vdc 4...20 mA	TM2AMI2HT
TM2AMI2LT	2	Low-level inputs	Thermocouple type J, K, T	TM2AMI2LT
TM2AMI4LT	4	Inputs	0...10 Vdc 0...20 mA PT100/1000 Ni100/1000	TM2AMI4LT
TM2AMI8HT	8	Inputs	0...20 mA 0...10 Vdc	TM2AMI8HT
TM2ARI8HT	8	Inputs	NTC / PTC	TM2ARI8HT
TM2ARI8LRJ	8	Inputs	PT100/1000	TM2ARI8LRJ
TM2ARI8LT	8	Inputs	PT100/1000	TM2ARI8LT
Output Modules				
TM2AMO1HT	1	Outputs	0...10 Vdc 4...20 mA	TM2AMO1HT
TM2AVO2HT	2	Outputs	+/- 10 Vdc	TM2AVO2HT
Mixed Modules				
TM2AMM3HT	2	Inputs	0...10 Vdc 4...20 mA	TM2AMM3HT
	1	Outputs	0...10 Vdc 4...20 mA	
TM2AMM6HT	4	Inputs	0...10 Vdc 4...20 mA	TM2AMM6HT
	2	Outputs	0...10 Vdc 4...20 mA	
TM2ALM3LT	2	Low-level inputs	Thermocouple J, K, T, PT100 0...10 Vdc	TM2ALM3LT
	1	Outputs	4...20 mA	

TM3 General Description

Introduction

The range of TM3 expansion modules includes:

- Digital modules, classified as follows:
 - Input modules, page 13
 - Output modules, page 14
 - Mixed input/output modules, page 15
- Analog modules, classified as follows:
 - Input modules, page 16
 - Output modules, page 17
 - Mixed input/output modules, page 18
- Expert modules, page 19
- Transmitter and receiver modules, page 19
- Safety modules, page 20

TM3 Digital Input Modules

The following table shows the TM3 digital input expansion modules, with corresponding channel type, nominal voltage/current, and terminal type. For information on configuration of these modules, refer to the TM3 Digital I/O Modules Configuration section.

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DI8A	8	Regular inputs	120 Vac 7.5 mA	Removable screw terminal block / 5.08 mm
TM3DI8	8	Regular inputs	24 Vdc 7 mA	Removable screw terminal block / 5.08 mm
TM3DI8G	8	Regular inputs	24 Vdc 7 mA	Removable spring terminal block / 5.08 mm
TM3DI16	16	Regular inputs	24 Vdc 7 mA	Removable screw terminal block / 3.81 mm
TM3DI16G	16	Regular inputs	24 Vdc 7 mA	Removable spring terminal block / 3.81 mm
TM3DI16K	16	Regular inputs	24 Vdc 5 mA	HE10 (MIL 20) connector
TM3DI32K	32	Regular inputs	24 Vdc 5 mA	HE10 (MIL 20) connector

TM3 Digital Output Modules

The following table shows the TM3 digital output modules, with corresponding channel type, nominal voltage/current, and terminal type. For information on configuration of these modules, refer to the TM3 Digital I/O Modules Configuration section.

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DQ8R	8	Relay outputs	24 Vdc / 240 Vac 7 A maximum per common line / 2 A maximum per output	Removable screw terminal block / 5.08 mm
TM3DQ8RG	8	Relay outputs	24 Vdc / 240 Vac 7 A maximum per common line / 2 A maximum per output	Removable spring terminal block / 5.08 mm
TM3DQ8T	8	Regular transistor outputs (source)	24 Vdc 4 A maximum per common line / 0.5 A maximum per output	Removable screw terminal block / 5.08 mm
TM3DQ8TG	8	Regular transistor outputs (source)	24 Vdc 4 A maximum per common line / 0.5 A maximum per output	Removable spring terminal block / 5.08 mm
TM3DQ8U	8	Regular transistor outputs (sink)	24 Vdc 4 A maximum per common line / 0.5 A maximum per output	Removable screw terminal block / 5.08 mm
TM3DQ8UG	8	Regular transistor outputs (sink)	24 Vdc 4 A maximum per common line / 0.5 A maximum per output	Removable spring terminal block / 5.08 mm
TM3DQ16R	16	Relay outputs	24 Vdc / 240 Vac 8 A maximum per common line / 2 A maximum per output	Removable screw terminal block / 3.81 mm
TM3DQ16RG	16	Relay outputs	24 Vdc / 240 Vac 8 A maximum per common line / 2 A maximum per output	Removable spring terminal block / 3.81 mm
TM3DQ16T	16	Regular transistor outputs (source)	24 Vdc 4 A maximum per common line / 0.5 A maximum per output	Removable screw terminal block / 3.81 mm
TM3DQ16TG	16	Regular transistor outputs (source)	24 Vdc 4 A maximum per common line / 0.5 A maximum per output	Removable spring terminal block / 3.81 mm
TM3DQ16U	16	Regular transistor outputs (sink)	24 Vdc 2 A maximum per common line / 0.3 A maximum per output	Removable screw terminal block / 3.81 mm
TM3DQ16UG	16	Regular transistor outputs (sink)	24 Vdc 2 A maximum per common line / 0.3 A maximum per output	Removable spring terminal block / 3.81 mm

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DQ16TK	16	Regular transistor outputs (source)	24 Vdc 2 A maximum per common line / 0.1 A maximum per output	HE10 (MIL 20) connector
TM3DQ16UK	16	Regular transistor outputs (sink)	24 Vdc 2 A maximum per common line / 0.1 A maximum per output	HE10 (MIL 20) connector
TM3DQ32TK	32	Regular transistor outputs (source)	24 Vdc 2 A maximum per common line / 0.1 A maximum per output	HE10 (MIL 20) connector
TM3DQ32UK	32	Regular transistor outputs (sink)	24 Vdc 2 A maximum per common line / 0.1 A maximum per output	HE10 (MIL 20) connector

TM3 Digital Mixed Input/Output Modules

This following table shows the TM3 mixed I/O modules, with corresponding channel type, nominal voltage/current, and terminal type. For information on configuration of these modules, refer to the TM3 Digital I/O Modules Configuration section.

Reference	Channels	Channel Type	Voltage Current	Terminal Type / Pitch
TM3DM8R	4	Regular inputs	24 Vdc 7 mA	Removable screw terminal block / 5.08 mm
	4	Relay outputs	24 Vdc / 240 Vac 7 A maximum per common line / 2 A maximum per output	
TM3DM8RG	4	Regular inputs	24 Vdc 7 mA	Removable spring terminal block / 5.08 mm
	4	Relay outputs	24 Vdc / 240 Vac 7 A maximum per common line / 2 A maximum per output	
TM3DM24R	16	Regular inputs	24 Vdc 7 mA	Removable screw terminal block / 3.81 mm
	8	Relay outputs	24 Vdc / 240 Vac 7 A maximum per common line / 2 A maximum per output	
TM3DM24RG	16	Regular inputs	24 Vdc 7 mA	Removable spring terminal block / 3.81 mm
	8	Relay outputs	24 Vdc / 240 Vac 7 A maximum per common line / 2 A maximum per output	

TM3 Analog Input Modules

The following table shows the TM3 analog input expansion modules, with corresponding channel type, nominal voltage/current, and terminal type. For information on configuration of these modules, refer to the TM3 Analog Input Modules Configuration section.

Reference	Resolution	Channels	Channel Type	Mode	Terminal Type / Pitch
TM3AI2H	16 bit, or 15 bit + sign	2	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	Removable screw terminal block / 5.08 mm
TM3AI2HG	16 bit, or 15 bit + sign	2	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	Removable spring terminal block / 5.08 mm
TM3AI4	12 bit, or 11 bit + sign	4	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	Removable screw terminal block / 3.81 mm
TM3AI4G	12 bit, or 11 bit + sign	4	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	Removable spring terminal blocks / 3.81 mm
TM3AI8	12 bit, or 11 bit + sign	8	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA 0...20 mA extended 4...20 mA extended	Removable screw terminal block / 3.81 mm
TM3AI8G	12 bit, or 11 bit + sign	8	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA 0...20 mA extended 4...20 mA extended	Removable spring terminal blocks / 3.81 mm
TM3TI4	16 bit, or 15 bit + sign	4	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA Thermocouple Pt100/1000 Ni100/1000	Removable screw terminal block / 3.81 mm

Reference	Resolution	Channels	Channel Type	Mode	Terminal Type / Pitch
TM3TI4G	16 bit, or 15 bit + sign	4	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA Thermocouple Pt100/1000 Ni100/1000	Removable spring terminal blocks / 3.81 mm
TM3TI4D	16 bit, or 15 bit + sign	4	inputs	Thermocouple	Removable screw terminal block / 3.81 mm
TM3TI4DG	16 bit, or 15 bit + sign	4	inputs	Thermocouple	Removable spring terminal blocks / 3.81 mm
TM3TI8T	16 bit, or 15 bit + sign	8	inputs	Thermocouple NTC/PTC	Removable screw terminal block / 3.81 mm
TM3TI8TG	16 bit, or 15 bit + sign	8	inputs	Thermocouple NTC/PTC	Removable spring terminal blocks / 3.81 mm

TM3 Analog Output Modules

The following table shows the TM3 analog output modules, with corresponding channel type, nominal voltage/current, and terminal type. For information on configuration of these modules, refer to the TM3 Analog Output Modules Configuration section.

Reference	Resolution	Channels	Channel Type	Mode	Terminal Type / Pitch
TM3AQ2	12 bit, or 11 bit + sign	2	outputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	Removable screw terminal block / 5.08 mm
TM3AQ2G	12 bit, or 11 bit + sign	2	outputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	Removable spring terminal block / 5.08 mm
TM3AQ4	12 bit, or 11 bit + sign	4	outputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	Removable screw terminal block / 5.08 mm
TM3AQ4G	12 bit, or 11 bit + sign	4	outputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	Removable spring terminal block / 5.08 mm

TM3 Analog Mixed Input/Output Modules

This following table shows the TM3 analog mixed I/O modules, with corresponding channel type, nominal voltage/current, and terminal type. For information on configuration of these modules, refer to the TM3 Analog Mixed I/O Modules Configuration section.

Reference	Resolution	Channels	Channel Type	Mode	Terminal Type / Pitch
TM3AM6	12 bit, or 11 bit + sign	4	inputs	0...10 Vdc	Removable screw terminal block / 3.81 mm
		2	outputs	-10...+10 Vdc 0...20 mA 4...20 mA	
TM3AM6G	12 bit, or 11 bit + sign	4	inputs	0...10 Vdc	Removable spring terminal block / 3.81 mm
		2	outputs	-10...+10 Vdc 0...20 mA 4...20 mA	
TM3TM3	16 bit, or 15 bit + sign	2	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA Thermocouple Pt100/1000 Ni100/1000	Removable screw terminal block / 5.08 mm
	12 bit, or 11 bit + sign	1	output	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	
TM3TM3G	16 bit, or 15 bit + sign	2	inputs	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA Thermocouple Pt100/1000 Ni100/1000	Removable spring terminal block / 5.08 mm
	12 bit, or 11 bit + sign	1	output	0...10 Vdc -10...+10 Vdc 0...20 mA 4...20 mA	

TM3 Expert Modules

The following table shows the TM3 expert expansion modules, with corresponding terminal type. For information on configuration of these modules, refer to the TM3 Expert I/O Modules Configuration section.

Reference	Description	Terminal Type / Pitch
TM3XTYS4	TeSys module	4 front connectors RJ-45 1 removable power supply connector / 5.08 mm

TM3 Transmitter and Receiver Modules

The following table shows the TM3 transmitter and receiver expansion modules, with corresponding terminal type. For information on configuration of these modules, refer to the TM3 Transmitter and Receiver I/O Modules Configuration section.

Reference	Description	Terminal Type / Pitch
TM3XTRA1	Data transmitter module for remote I/O	1 front connector RJ-45 1 screw for functional ground connection
TM3XREC1	Data receiver module for remote I/O	1 front connector RJ-45 1 removable power supply connector / 5.08 mm

TM3 Safety Modules

This table contains the TM3 safety modules (see Modicon TM3, Safety Modules, Hardware Guide), with the corresponding channel type, nominal voltage/current, and terminal type:

Reference	Function Category	Channels	Channel type	Voltage Current	Terminal type
TM3SAC5R	1 function, up to category 3	1 or 2 ⁽¹⁾	Safety input	24 Vdc	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable screw terminal block
		Start ⁽²⁾	Input	100 mA maximum	
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAC5RG	1 function, up to category 3	1 or 2 ⁽¹⁾	Safety input	24 Vdc	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable spring terminal block
		Start ⁽²⁾	Input	100 mA maximum	
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAF5R	1 function, up to category 4	2 ⁽¹⁾	Safety inputs	24 Vdc	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable screw terminal block
		Start	Input	100 mA maximum	
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAF5RG	1 function, up to category 4	2 ⁽¹⁾	Safety inputs	24 Vdc	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable spring terminal block
		Start	Input	100 mA maximum	
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAFL5R	2 functions, up to category 3	2 ⁽¹⁾	Safety inputs	24 Vdc	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable screw terminal block
		Start	Input	100 mA maximum	
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAFL5RG	2 functions, up to category 3	2 ⁽¹⁾	Safety inputs	24 Vdc	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable spring terminal block
		Start	Input	100 mA maximum	
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAK6R	3 functions, up to category 4	1 or 2 ⁽¹⁾	Safety inputs	24 Vdc	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable screw terminal block
		Start	Input	100 mA maximum	
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
TM3SAK6RG	3 functions, up to category 4	1 or 2 ⁽¹⁾	Safety inputs	24 Vdc	3.81 mm (0.15 in.) and 5.08 mm (0.20 in.), removable spring terminal block
		Start	Input	100 mA maximum	
		3 in parallel	Relay outputs Normally open	24 Vdc / 230 Vac 6 A maximum per output	
⁽¹⁾ Depending on external wiring					
⁽²⁾ Non-monitored start					

TM3 I/O Configuration General Description

Introduction

The I/O expansion bus of the bus coupler is formed when you assemble the TM3 I/O expansion modules to the bus coupler.

The following modules are supported:

- TM3 Digital (TM3D•) except TM3DM16R and TM3DM32R
- TM3 Analog (TM3A•/T•)
- TM3 Safety (TM3S•)
- TM3 TeSys (TM3XTYS4)
- TM3 Transmitter and Receiver (TM3XTRA1, TM3XREC1)

NOTE: You can connect a maximum of 10 TM3 Safety modules to one TM3 bus coupler.

Fallback Behavior

When encountering fieldbus timeout or releasing of bus ownership in Web server session, the TM3 bus coupler:

- applies the fallback values to the outputs of the expansion modules if they have been configured or
- sets the output values of the expansion modules to 0 if no fallback values have been configured. If 0 is outside the range according to the configuration of a particular output channel, the last values will be preserved.

The TM3 bus coupler sets the output values of the expansion modules:

- to 0 when a new configuration is received from the controller, or
- after recovering from timeout and writing of the fallback values, the following TM3 bus coupler IO region is read first before the write:
 - TM3BCEIP (Modbus TCP): Registers 1...199, 3001...3999
 - TM3BCSL: Registers 1...199, 3001...3999

The configuration request is sent by the controller after the following event is done: **Initialize controller**.

I/O Expansion Bus Error Handling

When the bus coupler detects an expansion module in bus communication error it sets the bus to a "bus off" condition whereby the expansion module outputs, the input image value and the output image value are set to 0. An expansion module is considered to be in bus communication error when an I/O exchange with the expansion module has been unsuccessful for at least 10 consecutive bus task cycles.

Normal I/O expansion bus operation can only be restored after eliminating the source of the error and performing one of the following:

- Power cycle
- New application download
- Issuing a controller **Initialize controller** command with EcoStruxure Machine Expert - Basic.

I/O Configuration General Practices

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.

 **WARNING**

UNINTENDED EQUIPMENT OPERATION

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.

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

Adding an I/O Expansion Module

To add a module in the configuration:

Step	Action
1	Drag-and-drop the I/O expansion module from the catalog to the editor.
2	The following features are available: - Optional Feature for I/O Expansion Modules, refer to Marking an I/O Expansion Module as Optional in Offline Mode, page 23 - Functional Mode feature for I/O Expansion Modules, refer to Selecting the Functional Mode of an I/O Expansion Module in Offline Mode, page 24 In the Device information area, select the Optional module check box, or the Functional Mode from the drop-down list: Device information  ☐ Optional module Functional Mode Latch, Filter, Fallback ▼ Requires module with software version SV 2.0 or greater Messages Device description

I/O Expansion Modules Device Configuration

Optional Expansion I/O Modules Presentation

I/O expansion modules can be marked as optional in the configuration. The **Optional module** feature provides a more flexible configuration by the acceptance of the definition of modules that are not physically attached to the logic controller. Therefore, a single application can support multiple physical configurations of I/O expansion modules, allowing a greater degree of scalability without the necessity of maintaining multiple application files for the same application.

Without the **Optional module** feature, when the logic controller starts up the I/O expansion bus (following a power cycle, application download or initialization command), it compares the configuration defined in the application with the physical I/O modules attached to the I/O bus. Among other diagnostics made, if the logic controller determines that there are I/O modules defined in the configuration that are not physically present on the I/O bus, an error is detected and the I/O bus does not start.

With the **Optional module** feature, the logic controller ignores the absent I/O expansion modules that you have marked as optional, which then allows the logic controller to start the I/O expansion bus.

The logic controller starts the I/O expansion bus at configuration time (following a power cycle, application download, or initialization command) even if optional expansion modules are not physically connected to the logic controller.

The following module types can be marked as optional:

- TM2 I/O expansion modules
- TM3 I/O expansion modules

NOTE: TM3 Transmitter/Receiver modules (TM3XTRA1 and the TM3XREC1) and TMC2 cartridges cannot be marked as optional.

The application must be configured with a functional level of at least **Level 3.2** for modules marked as optional to be recognized as such by the logic controller.

You must be fully aware of the implications and impacts of marking I/O modules as optional in your application, both when those modules are physically absent and present when running your machine or process. Be sure to include this feature in your risk analysis.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Include in your risk analysis each of the variations of I/O configurations that can be realized marking I/O expansion modules as optional, and in particular the establishment of TM3 Safety modules (TM3S...) as optional I/O modules, and make a determination whether it is acceptable as it relates to your application.

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

Marking an I/O Expansion Module as Optional in Offline Mode

To mark an existing I/O expansion module as optional in the configuration:

Step	Action
1	Select the I/O expansion module in the editor.
2	In the Device information area, select the Optional module check box.

Optional I/O Expansion Modules in Online Mode

Optional modules are diagnosed by register 930 of the TM3 bus coupler. When the IOscanner is operational, this register value is available in the corresponding network variable %IWN. See [TM2/TM3 Bus Status, page 33](#) for a description of the bits.

Selecting the Functional Mode of an I/O Expansion Module in Offline Mode

The **Functional Mode** is available on the digital expansion modules with SV $\geq$ 2.0, except TM3DI8A.

To select the module **Functional Mode** in the configuration:

Step	Action
1	Select the I/O expansion module in the editor.
2	In the Device information area, select the Functional Mode: • Normal (default value) • Latch, Filter, Fallback NOTE: In EcoStruxure Machine Expert - Basic online mode, the modification of the Functional Mode is disabled.

Internal ID Codes

Logic controllers identify expansion modules by a simple internal ID code. This ID code is not specific to each reference, but identifies the structure of the expansion module. Therefore, different references can share the same ID code.

If you declare two modules with the same internal ID code next to each other in the configuration and both are declared as optional, a message appears at the bottom of the **Configuration** window. There must be at least one non-optional module between two optional modules.

This table shows the internal ID codes of expansion modules:

Modules sharing the same internal ID code	ID code
TM2DDI16DT, TM2DDI16DK	0
TM2DRA16RT, TM2DDO16UK, TM2DDO16TK	1
TM2DDI8DT, TM2DAI8DT	4
TM2DRA8RT, TM2DDO8UT, TM2DDO8TT	5
TM2DDO32TK, TM2DDO32UK	3
TM2DMM24DRF, TM2DDI32DK	2
TM2DMM8DRT	6
TM2ALM3LT, TM2AMI2HT, TM2AMI2LT, TM2AMI4LT, TM2AMI8HT, TM2AMM3HT, TM2AMM6HT, TM2AMO1HT, TM2ARI8HT, TM2ARI8LRJ, TM2ARI8LT, TM2AVO2HT	96
TM3DI16, TM3DI16G, TM3DI16K	128
TM3DI8, TM3DI8G, TM3DI8A	132
TM3DQ16R, TM3DQ16RG, TM3DQ16T, TM3DQ16TG, TM3DQ16TK, TM3DQ16U, TM3DQ16UG, TM3DQ16UK	129
TM3DQ32TK, TM3DQ32UK	131
TM3DQ8R, TM3DQ8RG, TM3DQ8T, TM3DQ8TG, TM3DQ8U, TM3DQ8UG	133
TM3DM8R, TM3DM8RG	134
TM3DM24R, TM3DM24RG	135
TM3SAK6R, TM3SAK6RG	144
TM3SAF5R, TM3SAF5RG	145
TM3SAC5R, TM3SAC5RG	146
TM3SAFL5R, TM3SAFL5RG	147
TM3AI2H, TM3AI2HG	192
TM3AI4, TM3AI4G	193
TM3AI8, TM3AI8G	194
TM3AQ2, TM3AQ2G	195
TM3AQ4, TM3AQ4G	196
TM3AM6, TM3AM6G	197
TM3TM3, TM3TM3G	198
TM3TI4, TM3TI4G	199
TM3TI4D, TM3TI4DG	203
TM3TI8T, TM3TI8TG	200
TM3DI32K	130
TM3XTYS4	136

Adding a Bus Coupler

Adding a Bus Coupler in IOScanner device of Modbus TCP configuration of TM221

To configure an IOScanner in your configuration, refer to Modicon M221 Logic Controller - Programming Guide (see Modicon M221, Logic Controller, Programming Guide).

Adding a Bus Coupler on Modbus TCP

This table describes how to add a Bus Coupler on **ETH1**:

Step	Action
1	In the Configuration window, click ETH1 → Modbus TCP to display the Modbus TCP properties.
2	In the Client mode: remote device table (max 16) window, select Enable Modbus TCP IOScanner .
3	Type your module IP address in the IP address .
4	Select Predefined .
5	Choose the TM3BCEIP or TM3BCSL from the list and click Add . NOTE: TM3BCSL on Modbus TCP requires a gateway from Modbus TCP to Modbus Serial Line.

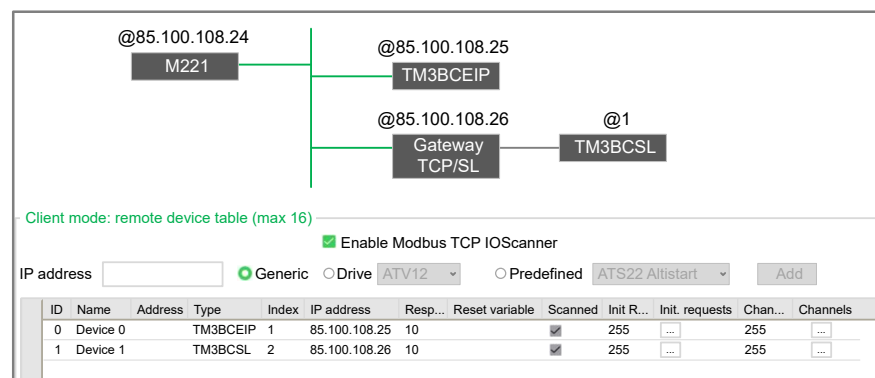
Adding a Bus Coupler on Serial Line

This table describes how to add a Bus Coupler on **SL1**:

Step	Action
1	In the Configuration window, click SL1 → Modbus Serial IOScanner to display the Modbus IOScanner properties.
2	In the Device settings window, select Others to display the list of available devices.
3	Choose the TM3BCSL from the list and click Add .

Accepted Network Architecture

The following graphic provides an example of architecture with a declaration of a gateway IP and a TM3 Modbus Serial Line bus coupler unit ID:



Adding TM3 Modules to a TM3 Bus Coupler

Overview

The configuration of TM3 modules is accessible in **architect editor** and in the device tree of **IOScanner** devices. Refer to the Modicon TM3 EcoStruxure Machine Expert - Basic Expansion Modules Configuration Programming Guide (see Modicon TM3 (EcoStruxure Machine Expert - Basic), Expansion Modules Configuration, Programming Guide) for detailed information on TM3 expansion modules.

Adding a TM3 I/O Module under a TM3 Serial Line Bus Coupler

This table describes how to add a TM3 I/O module to a TM3 Serial Line bus coupler:

Step	Action
1	In the Configuration window, click SL1 → Modbus > Device 0 (TM3BCSL) .
2	Choose the module from the list of references and drag and drop the chosen I/O module.
3	Click on the module in architect editor or in tree view to develop the configuration menu of the selected module.

Adding a TM3 I/O Module under a TM3 Ethernet Bus Coupler

This table describes how to add a TM3 I/O module to a TM3 Ethernet bus coupler:

Step	Action
1	In the Configuration window, click ETH1 → Modbus TCP IOScanner > Device 0 (TM3BCEIP) .
2	Choose the module from the list of references and drag and drop the chosen I/O module.
3	Click on the module in architect editor or in tree view to develop the configuration menu of the selected module.

Adding I/O objects from Modicon TM3 Bus Coupler

For each added module behind a TM3BC, the associated I/O objects are added automatically. (%Ix.y.Z,%Qx.y.Z,%QWx.y.Z,%IWx.y.Z,%IWSx.y.Z and %QWSx.y.Z).

Example where the variable of the remote I/O module connected to the TM3 bus coupler on SL1 is %Q100.1:

- 100 = device number: 0
- 1 = module number: 1
- 0 = channel number: 0

TM3 Ethernet Bus Coupler

Introduction

This chapter describes how to configure the TM3 Ethernet bus coupler and provides information about Ethernet configuration, Ethernet services and diagnostic.

TM3 Ethernet Bus Coupler Presentation

Introduction

The TM3 Ethernet bus coupler is a device designed to manage EtherNet/IP (not supported by M221) and Modbus TCP communication when using expansion modules with a controller in a distributed architecture.

The TM3 Ethernet bus coupler supports the TM2 and TM3 expansion modules.

Ethernet Services

Overview

The TM3 Ethernet bus coupler supports the following services:

- Modbus TCP/IP server, page 31
- Web Server, page 36

NOTE: The TM221 controllers are able to establish Modbus TCP/IP communication only.

Ethernet Protocols

The TM3 Ethernet bus coupler supports the following:

- IPV4 (Internet Protocol)
- UDP (User Datagram Protocol)
- TCP (Transmission Control Protocol)
- ARP (Address Resolution Protocol)
- RSTP (Rapid Spanning Tree Protocol) (not supported by M221)

NOTE: The M221 does not support Ring Topology

Connections

The maximum numbers of connections are indicated in the table below:

Connection Type	Number of Connections
Modbus TCP/IP Server	8
Web Server	10

Each connection based on TCP manages its own set of connections as follows:

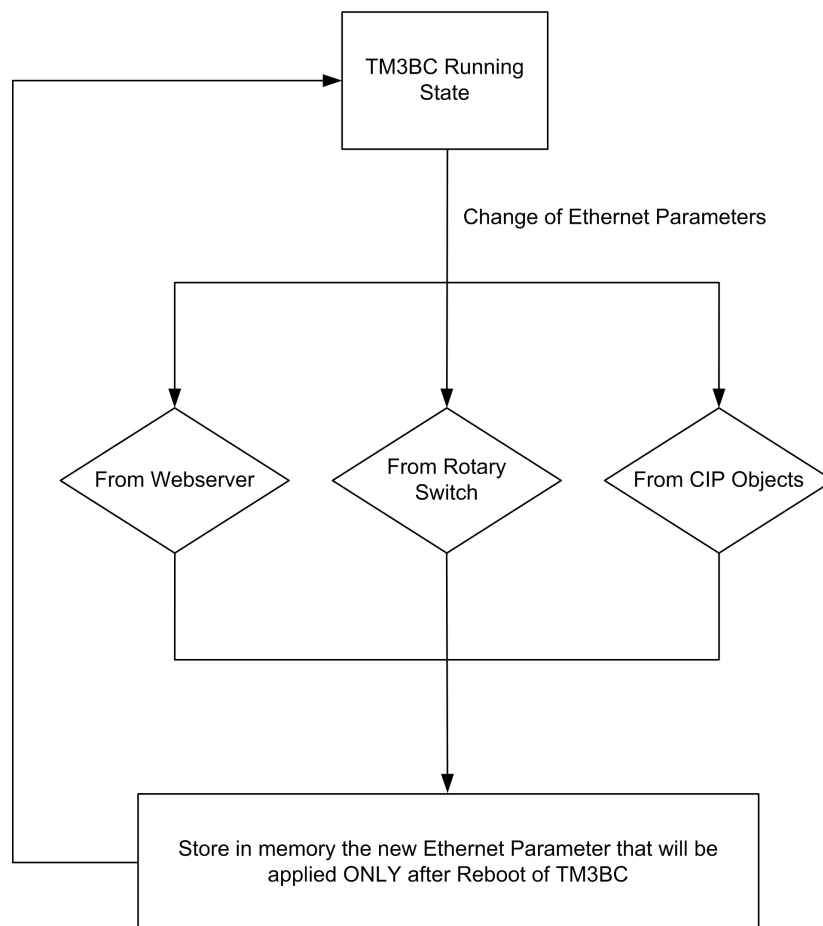
1. When a client tries to open a TCP connection that exceeds the poll size, the TM3 Ethernet bus coupler closes the oldest connection. For Class 1 and Class 3 connections, when a client tries to open a connection that exceeds the poll size, the TM3 Ethernet bus coupler denies the new connection with the message: no resource available.
2. If all connections are busy (exchange in progress) when a client tries to open a new one, the new connection is denied.

Connections can be closed when the originator of the connection requests to close the connection it had previously opened.

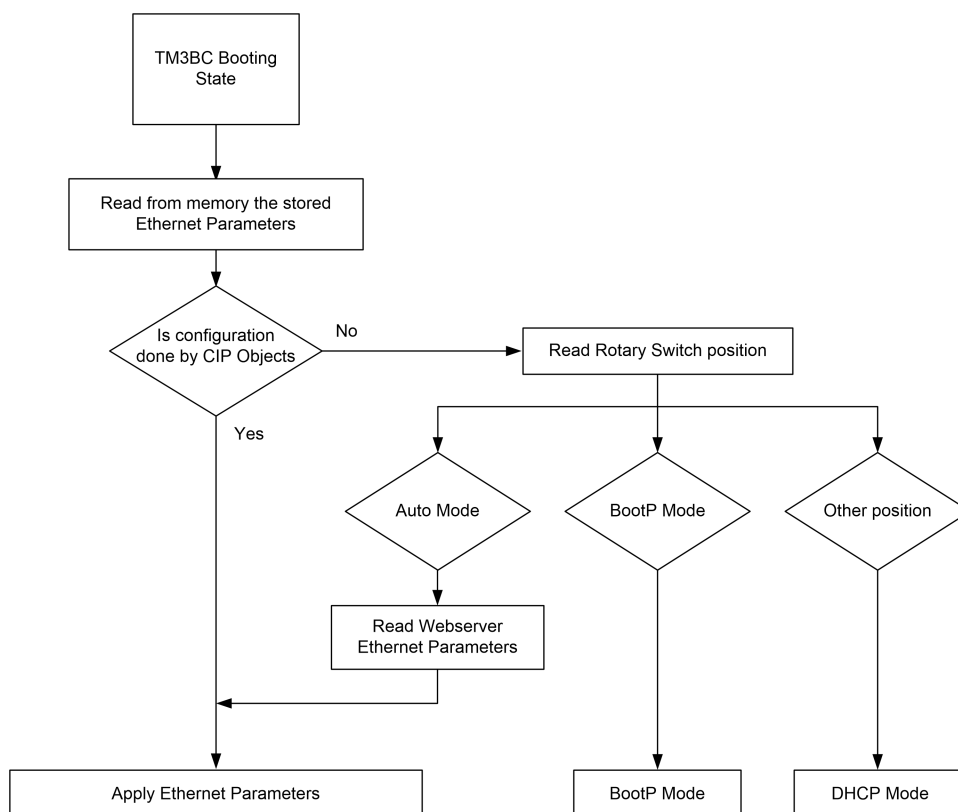
Ethernet Parameters

Ethernet Configuration During Running and Booting States

The following diagram shows the different ways to change the Ethernet parameters of the TM3 Ethernet Bus Coupler:



The following diagram shows boot process to apply the Ethernet parameters to the TM3 Ethernet Bus Coupler:



NOTE: After a reset to factory settings, TM3BCEIP has the following default values:

Mode: DHCP

Device Name: TM3BCEIP_MAC4MAC5MAC6

For example, if the MAC address of the TM3BCEIP is 00:80:f4:91:bf:b1 then its device name is: TM3BCEIP_91bf1.

NOTE: If no DHCP server is present, bus coupler uses its default IP address: 10.10.MAC5.MAC6.

NOTE: If multiple changes have been made, only the last one is taken into account after reboot of the TM3 Ethernet Bus Coupler.

Any change in rotary switch position during the running state of TM3 Ethernet Bus Coupler replaces the Ethernet configuration done with CIP object only after reboot.

Any change in the Ethernet parameters through Web server during the running state of TM3 Ethernet Bus Coupler replaces the Ethernet configuration done with CIP object only after reboot.

Any change in the Ethernet parameters with CIP objects during the running state of TM3 Ethernet Bus Coupler are applied after reboot, regardless of the position of the rotary switches.

Modbus TCP Server

Introduction

Modbus TCP is not based on a hierarchical structure, but on a client/server model.

Without any configuration, the embedded Ethernet port of the bus coupler supports Modbus server.

Modbus TCP Server

The Modbus server supports the Modbus requests:

Function Code Dec (Hex)	Subfunction Dec (Hex)	Function
3 (3)	–	Read holding register (%MW)
6 (6)	–	Write single register (%MW)
16 (10)	–	Write multiple registers (%MW)
22 (16)	-	Mask write register
23 (17)	–	Read/write multiple registers (%MW)
43 (2B)	14 (E)	Read device identification

Modbus TCP Configuration

To configure your TM3 Ethernet bus coupler as a Modbus TCP slave device, add the bus coupler and select **Modbus TCP IO Scanner > TM3BCEIP**.

TM3 Bus Coupler Modbus TCP Registers

Zone	Access	Registers	Function
Diagnostic Zone	RO	900 - 901	Bus coupler diagnostics
	RO	930 - 931	TM2/TM3 bus status
	RO	932	System state
	RO	991 - 992	Communication diagnostics
	RO	1058...1066	Ethernet communication parameters
	RO	1100...1115	TM3 bus coupler product information
	RO	2512 - 2513	TM3 bus coupler product serial number
IO Scanner Zone	RO	1...99	Subset of bus coupler module input values (first 7 modules) ⁽¹⁾
	RW	101...199	Subset of bus coupler module output values (first 7 modules) ⁽¹⁾
	RO	3001...3499	Bus coupler module input values (all modules) ⁽¹⁾
	RW	3501...3999	Bus coupler module output values (all modules) ⁽¹⁾
	RO	13001...13499	Bus coupler module input values (all modules) for use with HMI devices.
	RO	13501...13999	Bus coupler module output values (all modules) for use with HMI devices.
Direct TM3 Configuration	Refer to How to Configure: Configuration Management Registers , page 55	15000 - 16499	Allow controllers to send TM3 configuration through Modbus requests

(1) Access to those registers returns an error when **System State (register 932)** is not 5 (TM3 bus controlled by Modbus TCP). The values of registers 3001...3499, 3501...3999, 13001...13999 are valid only when the **register 931** is 0 (Bus status OK, All module status OK).

Bus Coupler Diagnostics

Registers	Function	Description
900	Bus coupler diagnostics	Bits (0...8): Not used
		Bit (9): I/O bus runtime error
		Bits (10-11): Not used
		Bit (13): I/O bus not configured or bus configuration error
		Bits (14-15): Not used
901	I/O modules status	Bit (0...13): Status of first expansion module to status of 14 th expansion module
		Bits (14-15): Not used
		0: No error detected
		1: Error detected

TM2/TM3 Bus Status

Registers	Function	Bits	Description
930	TM2/TM3 bus status	0...1 Module 1	Module status (2 bits per module): 0x0: Module OK 0x1: Module configuration error detected 0x2: Module runtime error detected 0x3: Module not present but it is optional module
		2...3 Module 2	
		4...5 Module 3	
		6...7 Module 4	
		8...9 Module 5	
		10...11 Module 6	
		12...13 Module 7	
		14...15 Module 8	
931	TM2/TM3 bus status	0...1 Module 9	Module status (2 bits per module): 0x0: Module OK 0x1: Module configuration error detected 0x2: Module runtime error detected 0x3: Module not present but it is optional module
		2...3 Module 10	
		4...5 Module 11	
		6...7 Module 12	
		8...9 Module 13	
		10...11 Module 14	
		12...13	Reserved
		14...15	Bus status: 0x0: Bus OK 0x1: Bus configuration error detected 0x2: Bus runtime error detected 0x3: Bus not configured

System State

Registers	Function	Description
932	State of the system	0x0: System is booting. 0x1: TM3 bus is not configured. 0x2: A TM3 configuration is being transferred. 0x3: A valid TM3 configuration has been applied successfully. The outputs are set to 0. 0x4: TM3 bus is controlled by EIP. 0x5: TM3 bus is controlled by ModbusTCP IO scanner. 0x6: TM3 bus is controlled by Web server. 0x7: Timeout on fieldbus refresh 0x8: Firmware update in progress 0xA: System state transition in progress.
933	TM2/TM3 bus configuration	- Bits [0]: Modbus TCP Data consistency 0x0: Disable 0x1: Enable

NOTE: The values of the status registers (900...901, 930...932) reflects the state of the TM3 Bus Coupler and connected TM3 Expansion modules. In Ecostruxure Machine Expert – Basic, these values can be read using their respective %IWN objects. Refer to the Programming Guide of the M221 Logic Controller for details on Input Registers (IOScanner) Objects (%IWN).

Communication Diagnostic

Registers	Function	Description
991	Number of received messages	Number of messages received.
992	Number of sent messages	Number of messages sent.

Ethernet Communication Parameters

Registers	Function
1058	MAC address
1059	
1060	
1061	IP address
1062	
1063	Subnet mask
1064	
1065	Gateway
1066	

TM3 Bus Coupler Product Information

Registers	Function
1100	TM3 bus coupler product code
2507-2508	TM3 bus coupler product firmware version
2512-2513	TM3 bus coupler product serial number
2601	Value of Rotary switch ONES
2602	Value of Rotary switch TENS

Bus Coupler and Module Description Registers

The following table shows the registers supported by TM3 bus coupler for expansion modules:

Register	Access	Function
1100	RO	TM3 bus coupler product code
1101	RO	TM3 bus coupler software version
1102	RO	Type of expansion module 1
1103	RO	Type of expansion module 2
1104	RO	Type of expansion module 3
1105	RO	Type of expansion module 4
1106	RO	Type of expansion module 5
1107	RO	Type of expansion module 6
1108	RO	Type of expansion module 7
1109	RO	Type of expansion module 8
1110	RO	Type of expansion module 9
1111	RO	Type of expansion module 10
1112	RO	Type of expansion module 11
1113	RO	Type of expansion module 12
1114	RO	Type of expansion module 13
1115	RO	Type of expansion module 14

Bus Coupler Status and Configuration

The following table shows registers used for the Bus Coupler Status and Configuration interface:

Register	Function	Description
2502 - 2506	Reserved	Not used
2507	Firmware major revision	-
2508	Firmware minor revision	-
2512 - 2513	Serial number	-
2514 - 2515	Reserved	Not used
2518	Total number of I/O modules detected	Maximum of 14 modules
2519	Slave 0 module ID, if present	-
2520	Slave 1 module ID, if present	-
2521	Slave 2 module ID, if present	-
2522	Slave 3 module ID, if present	-
2523	Slave 4 module ID, if present	-
2524	Slave 5 module ID, if present	-
2525	Slave 6 module ID, if present	-
2526	Slave 7 module ID, if present	-
2527	Slave 8 module ID, if present	-
2528	Slave 9 module ID, if present	-
2529	Slave 10 module ID, if present	-
2530	Slave 11 module ID, if present	-
2531	Slave 12 module ID, if present	-
2532	Slave 13 module ID, if present	-
2533 - 2600	Reserved	Reserved
2601	Value of Rotary switch ONES	-
2602	Value of Rotary switch TENS	-

Web Server

Introduction

The Web server integrated in the TM3 bus coupler offers an access using a web browser to the information such as configuration of the most common settings, status, I/O data, Network statistic, and diagnostic information. The Web server allows you to monitor a bus coupler network and I/O remotely.

The Web server is accessible through the bus coupler USB port, page 102 and Ethernet port by specifying the IP address or hostname in the address bar. You can use the pages of the website for network setup and control the I/O module outputs as well as application diagnostics and monitoring. These pages are ready to use with a Web browser. No configuration or programming is required.

Use a PC providing a USB (host) port and/or an Ethernet interface to connect to the Web server by using a Web browser.

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

- Google Chrome (version ≥ 71)
- Mozilla Firefox (version ≥ 64)
- Microsoft Edge (version ≥ 42)

The Web server allows you to monitor a bus coupler remotely, to perform various maintenance activities including modifications to output modules data and network configuration parameters. 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 exercising 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. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this feature.

Web Server Access

You can manage the user accounts on the Web server on **MAINTENANCE / User Accounts**, page 45.

By default, the user name is Administrator, and the password is Administrator. You must change the password at the first login.

⚠ WARNING

UNAUTHORIZED DATA ACCESS

- Do not expose the device or device network to public networks and the Internet as much as possible.
- Immediately change the default password to a new secure password.
- Do not distribute passwords to unauthorized or otherwise unqualified personnel.
- Restrict access to unauthorized personnel.
- Use additional security layers like VPN for remote access and install firewall mechanisms.
- Validate the effectiveness of these measurements regularly and frequently.

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

NOTE: A secure password is one that has not been shared or distributed to any unauthorized personnel and does not contain any personal or otherwise obvious information. Further, a mix of upper and lower case letters and numbers offer greater security. You should choose a password length of at least ten characters.

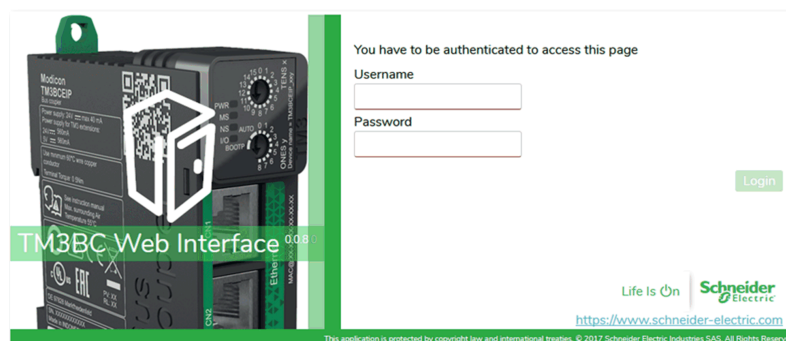
Resetting the Password

To reset the password:

Step	Action
1	Connect to the bus coupler using the USB port. Ensure the Ethernet cable is disconnected.
2	Open the browser.
3	Enter the IP address 90.0.0.1.
4	Move the position of any rotary switch to any other position. Result: MS LED is flashing red. The Restore user accounts button is displayed.
5	Click Restore user accounts .
6	Move the position of the changed rotary switch to its previous position. Result: The Restore user accounts button is no longer displayed.

Login Page

The login page is the entry point to get authenticated by the Web server. The certificate, page 103 must be validated. To access the website login page shown in the following illustration, type in your navigator the IP address of the TM3 bus coupler or IP address 90.0.0.1 if you are connected by USB. To login to the Web server, enter the user name and password and click **Login**.



The Web server contains the following pages:

- HOME, page 39
- DIAGNOSTICS, page 39
- CONFIGURATION, page 42
- MONITORING, page 42
- MAINTENANCE, page 44

NOTE: The timeout session for each login is ten minutes. When you do not perform any action after you logged in, it redirects you to the login page if you click any button. You need to log in again with user name and password to access the web pages.

HOME Page

The **HOME** page shows the product details of TM3 bus coupler.

The **identification** section of **HOME** page consists of:

Element	Description
Identification	
Vendor ID	Vendor ID of the bus coupler
Vendor Name	Vendor name of the bus coupler
Product ID	Product ID of the bus coupler
Product Name	Product name of the bus coupler
Product Reference	Product reference of the bus coupler
Serial Number	Serial number of the bus coupler
Locate Device 	Click the button to locate the bus coupler. The LEDs of the bus coupler flash red for few seconds.

DIAGNOSTICS Page

The **DIAGNOSTICS** page displays the status of the bus coupler.

The **DIAGNOSTICS** page contains the following sub-pages:

- Device, page 39
- Ethernet, page 40
- EtherNet/IP, page 41
- Modbus TCP, page 41

DIAGNOSTICS / Device

The **Device** sub-page displays the details about identification, page 39 and status of the bus coupler:

Element	Description
Status	
Last Stop Cause	Displays the cause of the last stop of the bus coupler.
USB Port	Displays whether a USB cable is connected to the bus coupler.
Operating Mode	Displays one of the following operating modes of the bus coupler: • Idle • EtherNet/IP • Modbus TCP • Web interface • Firmware update in progress • Time Out
Configuration Status	Displays one of the following configuration status of the bus coupler: • Not Configured • Configured

DIAGNOSTICS / Ethernet

The **Ethernet** sub-page displays the configuration and status of Ethernet connection:

Element	Description
Configuration	
MAC Address	MAC address of the bus coupler.
Mode	Displays the IP mode of the bus coupler: • DHCP • BOOTP • Manual • FDR
IP Address	IP address of the bus coupler
Subnet Mask	Subnet mask of the bus coupler
Gateway Address	Gateway address of the bus coupler
Reset 	Resets all the counter values to zero.
Refresh	Refreshes the values.
Statistics	
TX Bytes	Displays the number of the bytes transmitted.
TX Frames	Displays the number of frames transmitted.
ErroneousTXFrames	Displays the number of the frames transmitted in error.
RxBytes	Displays the number of the bytes received.
RX Frames	Displays the number of frames received.
ErroneousRXFrames	Displays the number of the frames received in error.
Reset 	Resets all the counter values to zero.
Refresh	Refreshes the values.
Rapid Spanning-Tree Protocol (RSTP)	
Service Status	Displays one of the following status of the bus coupler: • Running • Stopped
Bridge ID	Made from the Bridge Priority and the MAC address.
Bridge Priority	Read only. The Bridge Priority is defined in MAINTENANCE / Ethernet, page 48.
Port State (1)	Displays one of the following states of the CN1 port: • Disabled • Discarding • Learning • Forwarding
Port Role (1)	Displays one of the following roles of the CN1 port: • Root • Designated • Backup • Alternate • Disabled
Port State (2)	Displays one of the following states of the CN2 port: • Disabled • Discarding • Learning • Forwarding

Element	Description
Port Role (2)	Displays one of the following roles of the CN2 port: • Root • Designated • Backup • Alternate • Disabled
Refresh	Refreshes the values.

DIAGNOSTICS / EtherNet/IP

The **EtherNet/IP** sub-page displays the status information of EtherNet/IP:

Element	Description
Reset  Reset	Resets all the counter values to zero.
Refresh	Refreshes the values.
Statistics	
TX I/O Messages	Displays the number of I/O messages transmitted through EtherNet/IP.
RX I/O Messages	Displays the number of I/O messages received through EtherNet/IP.
Failed TX I/O Messages	Displays the number of erroneous I/O messages that were not transmitted through EtherNet/IP.
Failed RX I/O Messages	Displays the number of erroneous I/O messages that were not received through EtherNet/IP.
UCMM Requests	Displays the number of UCMM requests.

DIAGNOSTICS / Modbus TCP

The **Modbus TCP** sub-page displays the status information of Modbus TCP:

Element	Description
Reset  Reset	Resets all the counter values to zero.
Refresh	Refreshes the values.
Statistics	
TX Messages	Displays the number of Modbus messages transmitted through Modbus TCP.
RX Messages	Displays the number of Modbus messages received through Modbus TCP.
Error Messages	Displays the number of Modbus detected error messages transmitted through Modbus TCP.

CONFIGURATION

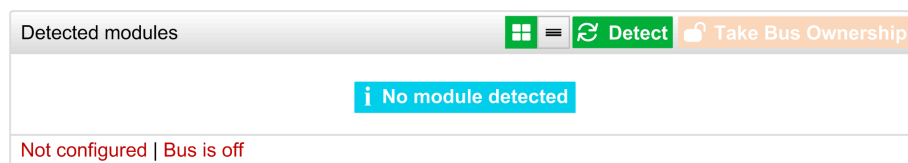
The **CONFIGURATION** page displays the I/O modules configuration imported from the TM3 Bus Coupler IO Configurator. The configuration file is an .SPF format.

Element	Description
PROJECT toolbar	
New	Read only button.
Open	Allows you to import the I/O modules configuration files generated by the TM3 Bus Coupler IO Configurator. Click Open to import the files.
Save	Read only button.
CONFIGURATION toolbar	
Apply	Allows you to apply the I/O modules configuration files on the TM3 bus coupler. If the configuration mismatch the hardware, an error message is generated.
DEVICES toolbar	Read only toolbar.

MONITORING Page

The **MONITORING** page displays the TM2 and TM3 expansion modules that are connected to the TM3 bus coupler.

The following illustration shows **MONITORING** page without detected modules:



The following illustration shows **MONITORING** page with modules and details:

1 Bus Monitoring

2 Selected module

3 Reconcile button

4 Module details

The **MONITORING** page shows and describes all the modules detected by the bus coupler and allows you to:

- See the state of a selected module (running or not running) and the protocol used.
- Read the value of an input or output.
- Force a value to an output by clicking **Force**.
- Identify a module by clicking **Reconcile**.

Element	Description
Detect	Allows you to detect the modules connected to the bus coupler.
Take Bus Ownership Release Bus Ownership	Reserves the bus to allow you to force the module outputs. You can click the button when the bus coupler is configured and not controlled by a controller (EtherNet/IP or Modbus TCP) ⁽¹⁾ . Result: You are notified that the I/O bus is controlled by the Web interface. You can edit the output values. Click Release Bus Ownership to release the control of the I/O bus.
(1) When connected on EtherNet/IP, the I/O bus is controlled, no matter the controller state. When connected on Modbus TCP, the I/O bus is not controlled when the controller is in <i>STOPPED</i> state.	

Module Details

The module details view provides the following data:

- Module name and description
- Module state
- A list of its I/Os

This list of I/Os allows you to view a real-time value of an input and to write the value of an output.

The view has **DISPLAY** buttons to modify the format of the displayed values.

Output Forcing

1. When **Take Bus Ownership** is enabled, click a module to force its outputs.
2. Set the output values you wish to force for the module in the **Prepared Values** column of the list of its I/Os.
3. Click the **Force** button.

Result: A message is displayed.

4. Click **I agree** to validate the modifications and send them to the bus coupler.
Click **I disagree** to cancel the modifications.

As the modules are not identified automatically, click the **Reconcile** button to identify the modules.

MAINTENANCE Page

The **MAINTENANCE** page allows you to view and edit the configuration of the bus coupler.

The **MAINTENANCE** page contains the following sub-pages:

- User Accounts, page 45
- Setup, page 46
- Ethernet, page 48
- Firmware, page 48
- Modules Firmware, page 49
- System Log Files, page 50
- Fast Device Replacement (FDR), page 51

MAINTENANCE / User Accounts

The sub-page allows you to enter your login password to access the Web server:

Element	Description
Account Management	
Select an account to edit it	
User Name	List of the following user accounts: • Administrator The Administrator account is configured with a predefined password (Administrator / Administrator). Modify the predefined password after the first connection. • Operator This account is disabled by default. • Viewer This account is disabled by default. NOTE: Depending on your account, you can access to some web pages. See the table below to know the accessible web pages.
Enabled	Selected if the account is enabled.
Account Management	
Provide a new password for account	
Current Password	Enter the current password of the user account.
New Password	Enter a password for the user account. NOTE: Minimum ten characters, maximum 32 characters and use a...z, A...Z, 0...9 alphanumeric characters. To reset the password, refer to <i>Resetting the Password</i>, page 38.
Confirm New Password	Enter the password again of the selected account.
Apply	Saves your new password.

This table describes the accessible pages depending on the user account:

Web pages	Sub pages	Administrator	Operator	Viewer
HOME	–	✓	✓	✓
MONITORING	–	✓	✓	–
DIAGNOSTICS	Device	✓	✓	✓
	Ethernet	✓	✓	✓
	EtherNet/IP	✓	✓	✓
	Modbus TCP	✓	✓	✓
CONFIGURATION	–	✓	–	–
MAINTENANCE	Setup	✓	–	–
	Ethernet	✓	–	–
	User Accounts	✓	✓ ⁽¹⁾	✓ ⁽¹⁾
	Firmware	✓	–	–
	System Log Files	✓	✓	–
	- Syslog Server		–	
	FDR	✓	–	–
(1) You can only modify your user account.				

System Use Notification

The sub-page allows you to define a **System Use Notification** message which is displayed to users at log-in:

Element	Description
System Use Notification	
Enabled	When selected, you can define a message that is displayed at log-in.
Message	Displays the message defined.
Reset	Reset to default message.
Apply	Applies your changes.

MAINTENANCE / Setup

The following illustration shows the **Setup** sub-page:

Device Configuration

Device Name

TM3BCEIP_91925a

Enabled Fieldbuses

☒ EtherNet/IP
☒ Modbus TCP

Cancel

Apply

Access Control List

Enabled

☒

+ Add

IP Address Range

10.10.0.0

/

1

Mask 128.0.0.0

End Address 127.255.255.255

×

192.168.0.0

/

24

Mask 255.255.255.0

End Address 192.168.0.255

×

Cancel

Apply

SNMP

Enabled

☐

Read-Only Community String

Public_925a

Cancel

Apply

Modbus TCP Data Consistency

Enabled

☒

Cancel

Apply

TM3 Module and IP Configuration via Modbus Commands

Enabled

☐

Cancel

Apply

Device Services

Discovery (DPWS)

☒

Cancel

Apply

The **Setup** sub-page allows you to change the configuration settings of the bus coupler:

Page	Description
Device Configuration	
Device Name	Name of the bus coupler used in DCHP mode. If you modified the Device Name , do a power cycle of the bus coupler to take it into account.
Enabled Fieldbuses	Allows you to select the communication types: • EtherNet/IP (not used with M221) • Modbus TCP
Cancel	Cancels the configuration settings.
Apply ⁽¹⁾	Saves the configuration settings.
Access Control List (ACL)	
Enabled	Enables or disables the ACL management. Enable it to configure the IP address ranges allowed to communicate with the bus coupler.
Add	Adds a line of IP address range.
IP Address Range	Shows the ranges of IP addresses. Each line corresponds to an IP address range allowed to communicate with the bus coupler. The first field represents the starting IP address. The second one is the number of free bits. The maximum number of ranges is 10.
Cancel	Cancels the configuration settings.
Apply ⁽¹⁾	Saves the configuration settings.
SNMP	
Enabled	Enables or disables the SNMP management. Disabled by default.
Read-Only Community String	Shows the community name. Allows you to change the community name. The maximum number of characters is 16.
Cancel	Cancels the configuration settings.
Apply ⁽¹⁾	Saves the configuration settings.
Modbus TCP Data Consistency	
Enabled	Allows an internal copy of the input data registers (3000-3499 or 13000-13499) to be kept since the first read request is received until the second read request is received OR until the monitoring timeout is elapsed. Is enabled by default when the I/O modules configuration need more than 124 words to read the data of the input.
Cancel	Cancels the configuration settings.
Apply ⁽¹⁾	Saves the configuration settings.
TM3 Module and IP Configuration via Modbus Commands	
Enabled	Allows controller to send TM3 configuration through Modbus requests.
Cancel	Cancels the configuration settings.
Apply ⁽¹⁾	Saves the configuration settings.
Device Services	
Discovery (DPWS)	Allows the bus coupler to be located in the LAN using IPv6 or IPv4. Enabled by default.
Cancel	Cancels the configuration settings.
Apply ⁽¹⁾	Saves the configuration settings.
(1) Modifying the <i>Setup</i> configuration requires a power cycle of the bus coupler to apply the configuration settings.	

MAINTENANCE / Ethernet

The **Ethernet** sub-page allows you to change the network settings:

Element	Description
Network Configuration	
Mode	Allows you to select the following operating modes of the bus coupler: • Manual • DHCP • BOOTP
IP Address	IP address of the bus coupler. For more information, refer to TM3 Bus Coupler - Hardware Guide.
Subnet Mask	Subnet mask of the bus coupler.
Gateway Address	Gateway address of the bus coupler.
Apply⁽¹⁾	Saves the configuration settings.
Reset	Resets the configuration settings.
Ping Test	
Target IP Address	Allows you to enter the target IP address to check if the bus coupler can reach the device on the network.
Ping	Sends a message to the IP address.
RSTP Configuration	
Enabled	Enables or disables the RSTP configuration.
Bridge Priority	Configure the switch priority to be chosen as the root switch. A low number represents a high priority.
Hello Time (milliseconds)	Read only tab. Interval between the generation of spanning-tree configuration messages by the root switch. These messages mean that the switch is operational.
Maximum Age (milliseconds)	Read only tab. The number of seconds a switch waits without receiving spanning-tree configuration messages before attempting a configuration.
Forward Delay (milliseconds)	Read only tab. The number of seconds the port waits before changing from its spanning-tree learning and listening states to the forwarding state.
(1) Modifying the Ethernet configuration requires to do a power cycle of the bus coupler to apply the configuration settings.	

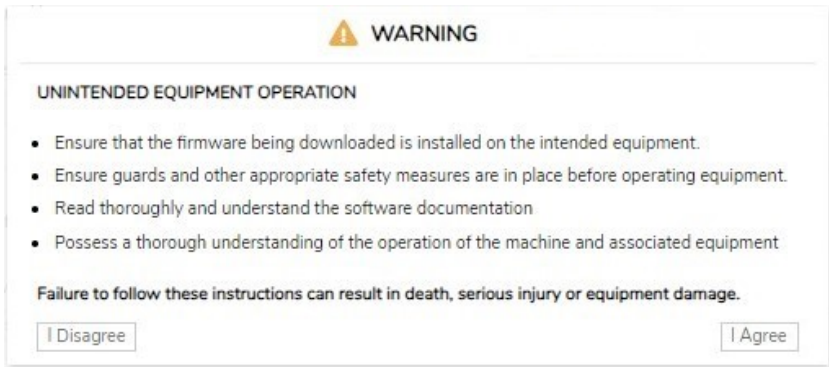
MAINTENANCE / Firmware

The **Firmware** sub-page shows the firmware version of the TM3 bus coupler and allows you to update its firmware:

Element	Description
Current Firmware	
Firmware	Firmware version
Web interface	Web server version
Firmware Update	
Select a new firmware version	
Select	Allows you to select the new firmware file of the bus coupler.
Apply	Allows you to apply the new firmware.

NOTE: You cannot update the firmware when the TM3 bus coupler cyclically exchanges data with the logic/motion controller. To make sure the bus coupler is not exchanging data, see **MONITORING**, page 42.

To update the bus coupler firmware:

Step	Action
1	Log into the Web server. Refer to the instructions provided by the Web server Login Page, page 38.
2	Verify in the MONITORING page that the bus coupler is not exchanging data with the controller.
3	Click MAINTENANCE > Firmware .
4	Click Select , then select the firmware file. Result: The following information is displayed: 
5	Read the information carefully and, if you agree, click I Agree . Result: At the end of the download and verification of the file, a confirmation window is displayed.
6	Click Yes to close the confirmation window, then click Apply . Result: At the end of the firmware update, a message is displayed to inform you whether the firmware update is completed successfully.

NOTE: Do not remove power from the bus coupler while performing the firmware update. If the power is lost while installing the new firmware, you may need to wait a few minutes for the installation process to finalize during the next power-up. Until then the Web server may not be accessible.

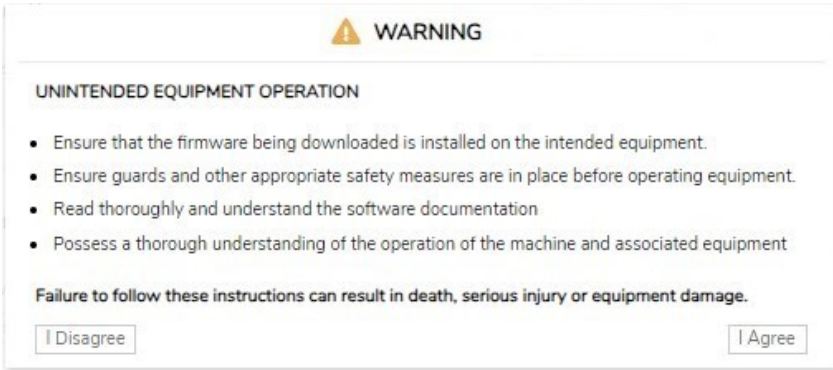
MAINTENANCE / Modules Firmware

The **Modules Firmware** sub-page shows the firmware version of the modules configured and allows you to update its firmware:

Element	Description
Modules Firmware Overview	
Slot	Slot number of the module
Reference	Reference of the module
Current Firmware	Firmware version of the module
Modules Firmware Management	
Select a new firmware version	
Select	Allows you to select the new firmware file for the module. NOTE: You can select only a single firmware file. All modules on the bus corresponding to the selected firmware are updated.
Apply	Allows you to apply the new firmware.

NOTE: You cannot update the firmware when the TM3 bus coupler cyclically exchanges data with the logic/motion controller. To make sure the bus coupler is not exchanging data, see **MONITORING**, page 42.

To update the module firmware:

Step	Action
1	Log into the Web server. Refer to the instructions provided by the Web server Login Page , page 38.
2	Verify in the MONITORING page that the bus coupler is not exchanging data with the controller.
3	Click MAINTENANCE > Modules Firmware .
4	Click Select , then select the firmware file. Result: The firmware file is selected.
5	Click Apply . Result: The following information is displayed: 
6	Read the information carefully and, if you agree, click I Agree . Result: A restart window is displayed.
7	Click Yes to proceed. Result: The file is verified and downloaded. The TM3 bus coupler reboots and a confirmation message is displayed.
8	After the confirmation message is displayed, remove power from the bus coupler (and TM3XREC1 receiver module, if any).
9	Restore power to the bus coupler (and TM3XREC1 receiver module, if any). Result: The module firmware is updated.

MAINTENANCE / System Log Files

The **System Log Files** sub-page lists the log files. Some of the information in the log files comes from internal interactions of the firmware and is intended to be used by Schneider Electric Technical Support:

Element	Description
Log Files	
Select one or more log files to download	
Select	Allows you to select one or more log files.
Name	Shows the list of the log files.
Size	Displays the size of the log files.
Download	Allows you to download the log files.

MAINTENANCE / Fast Device Replacement (FDR)

FDR mode activation:

The **Fast Device Replacement (FDR)** service allows you to replace an inoperable device by a new one without the need to configure it.

Mode	Rotary switches position	
FDR mode enabled	TENS: 09 to 15	ONES: 0 to 9

Element	Description
Device Configuration	
Device Name	Name of the bus coupler. Syntax is TM3BCEIP_+XXY (XX represents TENS switch position and Y represents ONES rotary switch position). NOTE: If the bus coupler is in AUTO mode, the name might not respect this syntax.
Ethernet Mode	- Manual DHCP BOOTP FDR
FDR Configuration	
Status	Enabled Disabled
Auto backup	Allows you to enable or disable the automatic backup. When the TM3BCEIP is selected, it sends the .prm file to the FDR server, respecting the timing configured in the automatic backup period.
Auto backup period (seconds)	Allows you to set the backup period (600-90000 seconds). Default value for the backup period is 1800 seconds.
ControlConfiguration	When FDR is enabled and Auto backup is unchecked Server: at boot, the TM3BCEIP requests for the prm.file and applies the configuration. Stored: at boot, the TM3BCEIP does not request for the prm.file and applies the existing configuration. When FDR is enabled and Auto backup is checked with a Backup period of 600 seconds: Server: at boot, the TM3BCEIP requests for the prm.file and applies the configuration. The TM3BCEIP generates and pushes the prm.file to the server each 600 seconds. Stored: at boot, the TM3BCEIP does not request for the prm.file and applies the existing configuration. The TM3BCEIP generates and pushes the prm.file to the server each 600 seconds.
Cancel	Cancels any changes made to the values.
Apply	Saves the values to the Flash memory.
FDR Restore	
Current State	Idle RestoreInProgress Error
LastError	No Error EmptyFile NoFile ServerNotFound GenericError
Restore Config	Allows you to manually restore (by downloading) the device parameters file from the FDR server to the bus coupler and to apply the configuration received without restarting. This button cannot be clicked when the bus coupler is controlled by the controller or by the Web.
FDR Push	
Current State	Idle ConfigurationPushCompleted Error
LastError	No Error EmptyFile NoFile ServerNotFound GenericError
Push Config	Allows you to manually backup (by uploading) the device parameters file from the bus coupler to the FDR server.

TM3 Configuration through Modbus Command

Introduction

This section describes how to send TM3 configuration through Modbus command from a controller. The tables used for this configuration mode are in the appendices. Refer to *Direct TM3 Configuration through Modbus Commands: Registers and Default Values for Supported Modules*, page 105.

TM3 Module Support

The following modules are supported:

- TM3 Digital (TM3D•) except TM3DM16R and TM3DM32R
- TM3 Analog (TM3A•/T•)
- TM3 Safety (TM3S•)
- TM3 TeSys (TM3XTYS4)
- TM3 Transmitter and Receiver (TM3XTRA1, TM3XREC1)

Limitations and specific notes:

- TM3 optional configuration are not supported by this feature
- Fallback configuration for TM3 analog output is also supported by bus coupler through this feature. Fallback values, if configured, is applied by the bus coupler to the output of analog expansion modules in the following scenarios:
 - fieldbus communication timeout
 - after releasing bus ownership in Web server
- The transmitter and receiver modules are transparent to the bus couplers. Therefore, you must define which is the first module after the TM3XREC1 module in a remote configuration by defining the value in *First module after expander* register.

⚠ WARNING

UNINTENDED MACHINE OPERATION

- Set the value in “First module after expander” register to match the physical configuration.
- Refer to appropriate section on how to configure the transmitter and receiver modules.

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

NOTE: Refer to *How to Configure: Module Parameters Registers*, page 57 for detailed description of the registers.

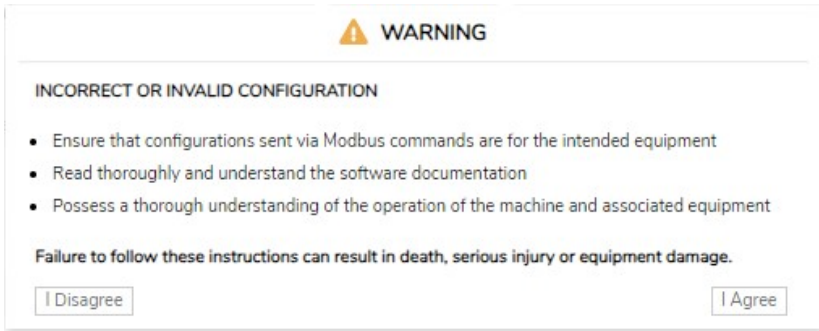
Enabling TM3 Configuration through Modbus Command

The Modbus command is disabled by default. You can enable the Modbus command by using the rotary switches or through the Web server.

To enable the Modbus command by using the rotary switches:

Step	Action
1	Remove power from the bus coupler and disconnect all fieldbus communication cables.
2	Set both rotary switches ONES and TENS to the position 3 .
3	Apply power to the bus coupler.
4	Wait until the MS LED flashes green.
5	Within 60 seconds, set the rotary switch ONES to the position BOOTP/AUTO and the rotary switch TENS to the position 12 . Result: The LED MS , NS and IO flash green five times.
6	Wait until the LED MS , NS and IO flash green five times, then hold solid. Result: The feature is enabled successfully. The bus coupler is in <i>STANDBY</i> state and no operation is allowed.
7	Remove power from the bus coupler.
8	Connect the fieldbus communication cables.
9	Apply power to the bus coupler.

To enable the Modbus command through the Web server:

Step	Action
1	Log into the Web server as Administrator.
2	Click on MAINTENANCE > Setup .
3	Select the Modbus TCP checkbox in the Device Configuration view.
4	Select the Enabled checkbox in the TM3 Module and IP Configuration via Modbus Commands view.
5	Click Apply . Result: The following information is displayed: 
6	Read the information carefully and, if you agree, click I Agree . Result: A message is displayed to inform you that the configuration will apply after the next boot-up.

See also **MAINTENANCE / Setup**, page 46.

How to Configure

Proceed as follows to configure the TM3 bus coupler:

Step	Action
1	Write 1 to Register 15000 as a single Modbus write command. NOTE: Using multiple register write commands will not affect the operation.
2	Write the required configurations to the appropriate Modbus registers. Refer to How to Configure: Module Parameters Registers , page 57 for detailed description of the registers. Refer to Direct TM3 Configuration through Modbus Commands: Registers and Default Values for Supported Modules , page 105 for the default values for each TM3 module.
3	Write 0 to Register 15000 as a single Modbus write command. NOTE: Using multiple register write commands will not affect the operation.
4	The bus coupler applies the configuration. Result: If valid, the configuration is applied and saved in non-volatile memory. Any pre-existing configuration stored in non-volatile memory is overwritten. Result: If an invalid configuration is detected, the configuration is not applied. Consult the Error Diagnostics Modbus registers and the TM3/TM2 Bus and Modules Status, page 33 registers for error information. Error description is also saved in log file, which can be retrieved through the Web server. Delete configuration saved in non-volatile memory and send again the correct configuration. Refer to Deleting Permanent Configuration, page 62 on how to delete configuration.

NOTE:

- Step 1 to 3 must be completed within 10 minutes. After 10 minutes, a configuration timeout occurs and the bus coupler interrupts the configuration process.
- Once a configuration is started, no further configuration initialization is allowed until the completion of the configuration, or a configuration timeout has occurred.
- For Analog channels, you must set the minimum and maximum values suitable for this application. The bus coupler firmware does not automatically adjust the minimum and maximum values according to type chosen. The analog values from module are scaled according to the range between the minimum and maximum configuration.

For example, if channel type is 0 – 10 V, and minimum/maximum is set to 0 V and 10000 V respectively, this means the unit of measure would be $10\text{ V} / 10000 = 1\text{ mV}$.
- For the following types of configuration, it is required to configure the specific minimum and maximum value as defined in the respective compatibility table. Configuring another value results in a configuration error.
 - TM3AI8 -> 0 – 20 mA extended range and 4 – 20 mA extended range.
 - A temperature input with scope set to either in Celsius or Fahrenheit, except for Type B and Type C thermocouple in Fahrenheit. For these two specific use cases, refer to the compatibility table for the configuration (see [Direct TM3 Configuration through Modbus Commands: Registers and Default Values for Supported Modules](#), page 105).
 - Input is set to Ohmmeter

Using Rotary Switch to Define the First Module after Expander Value

You can define this value through Modbus command or by using the **TENS** rotary switch.

To define the First Module After Expander Value by using the **TENS** rotary switch:

Step	Action
1	Ensure that the TENS rotary switch is set to a position between 0 and 7 . NOTE: The MS LED flashes red if the rotary switch position is changed after boot-up. You can return the rotary switch to its original position after the configuration process is complete.
2	Start the configuration.
3	During configuration process, write the value 254 to the Register 15001.
4	When the required configuration values have been written, apply the configuration. Result: The bus coupler replaces the value in the Register 15001 with the value defined by the TENS rotary switch after configuration is applied successfully.

How to Configure: Module Parameters Registers

This table describes registers dedicated to the overall management of the feature:

Register Address	Description	Access	Comments
15000	Control Start/Stop Configuration	RW	Write: 1 = Start configuration (start to accept modules configuration commands). 0 = Apply configuration. Other values result in "Illegal Data Value" exception. Read: 1 = In configuration state 0 = Not in configuration state
15001	First module after expander	RW	Index of the first module after the expander module 255 (default) = No modules after the expander 0 = 1st physical module 1 = 2nd physical module 2 = 3rd physical module 3 = 4th physical module 4 = 5th physical module 5 = 6th physical module 6 = 7th physical module 7 = 8th physical module 254 = Use TENS rotary switch value. See Using Rotary Switch to Define the First Module after Expander Value, page 56. No other values allowed.
15002	Remove Permanent Configuration	RW	Allows you to remove saved configuration from non-volatile memory. See Deleting Permanent Configuration, page 62 .
15003	Monitoring Timeout	RW	Timeout value of the bus in millisecond. Range value: 0 – 65535. Default value: 10000.
15004-15049	Reserved	RO	The registers are reserved and the value is 0.
15050	Configurable	RO	0 = The connected expansion modules are not configurable by using the Modbus command. 1 = The connected expansion modules are configurable by using the Modbus command.
15051	Number of modules	RO	Indicates the number of connected expansion modules.
15052	Enabling feature	RO	0 = TM3 configuration through Modbus command is disabled. 1 = TM3 configuration through Modbus command is enabled.
15053-15059	Reserved	RO	The registers are reserved and the value is 0.
15060	Number of errors	RO	Number of errors detected. NOTE: A maximum of 10 errors can be detected; subsequent errors are ignored.

Register Address	Description	Access	Comments
15061	1 st Error - Error Code	RO	Error codes: - Register value 0: <i>RESERVED</i> - Register value 1: Invalid Analog channel type - Register value 2: Invalid Analog minimum value - Register value 3: Invalid Analog maximum value - Register value 4: Configured Analog minimum value is greater than configured maximum value - Register value 5: <i>RESERVED</i> - Register value 6: Invalid filter value (TM3 Analog modules) - Register value 7: Invalid sampling value - Register value 8: Invalid fallback value (TM3 Analog modules) - Register value 9: Invalid Analog scope - Register value 10: Invalid resistance reference value R_{ref} (used with NTC thermistor only) - Register value 11: Invalid temperature reference value T_{ref} (used with NTC thermistor only) - Register value 12: Invalid sensitivity value Beta (used with NTC thermistor only) - Register value 13: Invalid value used to configure Functional Mode (TM3 Digital modules) - Register value 14: Invalid filter value (TM3 Digital modules) - Register value 15: Invalid fallback mode selected (TM3 Digital modules) - Register value 16: Invalid fallback value (TM3 Digital modules) - Register value 17: Invalid value used to enable or disable module diagnostics - Register value 18: Configured Functional mode value is not supported by TM3D* modules with SV < 2.0 - Register value 19: Invalid low threshold value (used with Threshold mode only in TM3 Analog modules) - Register value 20: Invalid high threshold value (used with Threshold mode only in TM3 Analog modules) - Register value 21: Configured low threshold value is greater than configured high threshold value (used with Threshold mode only in TM3 Analog modules) - Register value 22 – 99: <i>RESERVED</i> - Register value 100: Invalid "First module after expander" value - Register value 101: Connected module does not support direct configuration through Modbus commands - Register value 102: More than 10 TM3S* Safety modules are connected - Register value 103 – 65534: <i>RESERVED</i> - Register value 65535: Default value (No error)
15062	1 st Error - Module and channel	RO	[Bits 0 – 4] Channel index (Value range: 0 – 31) [Bits 5 – 7] Reserved [Bit 8] 0 = Output, 1 = Input [Bit 9] 0 = Channel error, 1 = Module error [Bits 10 – 11] Reserved [Bits 12 – 15] Module index (Value range: 0 – 13) Module error is applicable to error code 13, 17, 18, 101 and 102. Examples: 1st physical module, 3rd physical output channel = 0x0002 4th physical module, 3rd physical input channel = 0x3102 5th physical module, 4th physical output channel = 0x4003 14th physical module, 32nd physical input channel = 0xD11F 8th physical module, Module error = 0x7200
15063-15080	2 nd to 10 th Error - Code, and Error - Module and channel	RO	See registers values Error Code and Error - Module and channel, above.
15081-15099	Reserved	RO	The registers are reserved and the value is 0.

This table describes the configuration registers division:

Address	Description
15100 - 15199	Configuration parameters of TM3 module at slot number 0
15200 - 15299	Configuration parameters of TM3 module at slot number 1
15300 - 15399	Configuration parameters of TM3 module at slot number 2
15400 - 15499	Configuration parameters of TM3 module at slot number 3
15500 - 15599	Configuration parameters of TM3 module at slot number 4
15600 - 15699	Configuration parameters of TM3 module at slot number 5
15700 - 15799	Configuration parameters of TM3 module at slot number 6
15800 - 15899	Configuration parameters of TM3 module at slot number 7
15900 - 15999	Configuration parameters of TM3 module at slot number 8
16000 - 16099	Configuration parameters of TM3 module at slot number 9
16100 - 16199	Configuration parameters of TM3 module at slot number 10
16200 - 16299	Configuration parameters of TM3 module at slot number 11
16300 - 16399	Configuration parameters of TM3 module at slot number 12
16400 - 16499	Configuration parameters of TM3 module at slot number 13

For each section:

Address Offset	Description	Access	Comments
1XY00	Module Type	RO	Module ID of TM3 module.
1XY01	Number of Configuration Parameters	RO	Depends on the module type. For example, "6" means addresses from [1XY08 - 1XY13] are available for configuration.
1XY02 - 1XY07	Reserved	RO	The registers are reserved and the value is 0.
1XY08 - 1XY99	Specific Configuration Parameters	RW	For specific parameter configuration 0xFFFF = the register is not available or invalid for modification.

NOTE: XY indicates the slot to which module is connected. $51 \leq XY \leq 64$.

Example: For the first module, "Module Type" is at address 15100 and the 14th module is at address 16400.

How to Configure: TM3 Module Specific Registers

Module Type	Module ID (Read only 1XY00)	Configuration Size (Read only 1XY01) (Read/Write Memory starts from 1XY08)
TM3DI8 / TM3DI8G, page 106	132	9
TM3DI8A	132	0
TM3DI16 / TM3DI16G, TM3DI16K, page 106	128	17
TM3DI32K, page 107	130	33
TM3DQ8R / TM3DQ8RG, TM3DQ8T / TM3DQ8TG, TM3DQ8U / TM3DQ8UG, page 108	133	17
TM3DQ16R / TM3DQ16RG, TM3DQ16T / TM3DQ16TG, TM3DQ16TK, TM3DQ16U / TM3DQ16UG, TM3DQ16UK, page 109	129	33
TM3DQ32TK, TM3DQ32UK, page 111	131	65
TM3DM8R / TM3DM8RG, page 114	134	13
TM3DM24R / TM3DM24RG, page 115	135	33
TM3AI2H / TM3AI2HG, page 116	192	11
TM3AI4 / TM3AI4G, page 117	193	21
TM3AI8 / TM3AI8G, page 119	194	41
TM3TI4 / TM3TI4G, page 122	199	25
TM3TI4D / TM3TI4DG, page 124	203	25
TM3TI8T / TM3TI8TG, page 126	200	89
TM3AQ2 / TM3AQ2G, page 131	195	9
TM3AQ4 / TM3AQ4G, page 132	196	17
TM3AM6 / TM3AM6G, page 134	197	29
TM3TM3 / TM3TM3G, page 136	198	17
TM3SAC5R / TM3SAC5RG	146	0
TM3SAF5R / TM3SAF5RG	145	0
TM3SAFL5R / TM3SAFL5RG	147	0
TM3SAK6R / TM3SAK6RG	144	0
TM3XTYS4	136	0

How to Configure: Example

This graphic shows the configuration for a TM3 bus coupler and a TM3TI4G:

Edition of Module_3 (TM3TI4/G)

Configuration Mapping Information

Name	Value	Unit	
Optional module	No		
Inputs			
IW0			
Type	0 - 10 V		Range mode
Scope	Normal		Unit
Minimum	DEC 0 [-32768;7999]		Minimum value
Maximum	DEC 8000 [1;32767]		Maximum value
Input Filter	DEC 5 [0;1000]	x 10 ms	Input Filter
Sampling	100	ms/Channel	Input sampling selection
IW1			
Type	K thermocouple		Range mode
Scope	Celsius (0.1 °C)		Unit
Minimum	DEC -2000 [-32768;32766]		Minimum value
Maximum	DEC 13000 [-32767;32767]		Maximum value
Input Filter	DEC 1 [0;1000]	x 10 ms	Input Filter
Sampling	100	ms/Channel	Input sampling selection
IW2			
Type	Not used		Range mode
Scope	Not used		Unit
Minimum	DEC -32768 [-32768;32766]		Minimum value

This table shows the Modbus registers to write:

TM3TI4/G	Address	Value	Description
Ch 0 - type	15109	1	0 – 10 V
Ch 0 - Scope	15110	1	Unit in Normal
Ch 0 - Minimum	15111	0	Minimum
Ch 0 - Maximum	15112	8000	Maximum
Ch 0 - Input filter	15113	5	50 ms filter time
Ch 0 - Sampling	15114	0	100 ms sampling time
Ch 1 - type	15115	7	K Thermocouple
Ch 1 - Scope	15116	2	Unit in Celsius
Ch 1 - Minimum	15117	63536	Minimum (63536 equal to -2000 in signed value)
Ch 1 - Maximum	15118	13000	Maximum
Ch 1 - Input filter	15119	1	10 ms filter time
Ch 1 - Sampling	15120	0	100 ms sampling time

Modbus Command done using “Write Single Register”

- Address: 15000
- Data bytes: [1]

Modbus Command done using “Write Multiple Registers”

- Address: 15108
- Number of registers: 12
- Data bytes: [1, 1, 0, 8000, 5, 0, 7, 2, 63536, 13000, 1, 0]

Modbus Command done using “Write Single Register”

- Address: 15000
- Data bytes: [0]

Deleting Permanent Configuration

The configuration stored in the non-volatile memory can be deleted by using Modbus command. The following conditions are required:

- The configuration through Modbus command is enabled
- The connected modules are configurable through this command
- The bus coupler is not in *configuring* state (see **System State (register 932)**), controlled by the Web server or updating the firmware.

To delete the configuration by using Modbus command:

Step	Action
1	Write 0xFF to Register 15002.
2	Within 30 seconds, write 0 to Register 15002. Result: The bus coupler attempts to delete the stored configuration. NOTE: If 0 is not written in the register within 30 seconds, a timeout occurs and the stored configuration is not deleted. Register 15002 is reset to 0 by the bus coupler.
3	Verify the System State (register 932): Result: When the bus coupler state is in <i>not configured state</i> this indicates that the stored configuration has been deleted successfully. The default values are filled in and the error registers are cleared.

Configure Network Settings through Modbus Command

You can update:

- The IP address configuration alone (IP address: 1051 - 1052)
- The IP address configuration and the subnet mask configuration (IP address: 1051 - 1052 and subnet mask: 1053 - 1054)
- The IP address configuration, the subnet mask configuration and the Gateway (IP address: 1051 - 1052, subnet mask: 1053 - 1054 and Gateway: 1055 - 1056)

To update the network parameters through Modbus command:

Step	Action
1	Set the rotary switch ONES to the position AUTO .
2	Within 60 seconds: • 2a: Write 1 to Register 1050 as a single write Modbus request • 2b: Write the required network configuration to Registers 1051 – 1056 • 2c: Write 0 to Register 1050 as a single write Modbus request. Result: If the parameters set are valid, the bus coupler saves these parameters. NOTE: If the parameters are not valid, the bus coupler updates the error register 1057 and indicates the detected error. NOTE: A timeout occurs and the configuration is not set if the process described within this step is not completed within 60 seconds. When a timeout occurs, register 1050 is reset to 0 by the bus coupler.
3	Wait for 10 seconds.
4	Remove power from the bus coupler.
5	Apply power to the bus coupler. Result: The new network parameters are applied.

NOTE: Refer to the Ethernet Communication Parameters, page 34 table for more details on registers.

Example of a network settings for IP address of 10.10.0.136 (0x0A0A 0088) with mask 255.0.0.0 (0xFF00 0000) and Gateway 10.10.0.6 (0x0A0A 0006):

Step	Register	Value to write
2a	1050	1
2b	1051	0A0A
	1052	0088
	1053	FF00
	1054	0000
	1055	0A0A
	1056	0006
2c	1050	0

Error Management

If the physical setup is not compatible, the register 15050 is set to 0. The configuration using Modbus commands cannot apply and the error is written in the log file. Incompatible physical setup includes the following scenarios:

- One or more TM2 modules are present in the bus
- One or more TM3X•HSC202• modules are present in the bus
- More than 10 safety modules are present in the bus

When the module configuration registers are written, the values are not validated until the configuration is applied. If an error is detected during the validation, the details about the first 10 errors (error code, module index and channel) are indicated in the registers 15061...15080. Validation stops after the first 10 errors. These 10 errors are logged in the log file. The default values for error registers 15061...15080 are 0xFFFF.

During validation, if an analog channel type is set as “Not Used”, the subsequent register values associated with this channel are automatically set to default values. Any values configured are ignored, and no errors are detected.

During validation, if the digital module functional level is set to 1, subsequent configurations associated with functional level 2 (Fallback, Filter) are set to default values. Any values configured are ignored, and no errors are detected.

SNMP

Introduction

The Simple Network Management Protocol (SNMP) is used to provide the data and services required for managing a network.

The data is stored in a Management Information Base (MIB). The SNMP protocol is used to read or write MIB data. Implementation of the Ethernet SNMP services is minimal, as only the compulsory objects are handled.

SNMP Server

This table presents the supported standard MIB-2 server objects:

Object	Description	Access	Value
sysDescr	Text description of the device	Read	SCHNEIDER Ethernet TM3 Bus Coupler
sysName	Node administrative name	Read/Write	TM3BCEIP

The size of these character strings is limited to 50 characters.

The values written are saved to the controller through SNMP client tool software. The Schneider Electric software for this is ConneXview. ConneXview is not supplied with the controller or bus coupler. For more details, refer to www.se.com.

Diagnostic

Overview

In online mode, the **Status** tab of the bus coupler provides monitoring and diagnostics information for the bus coupler and connected modules.

Displaying Diagnostic Information

Step	Action
1	In the Devices Tree , double-click the bus coupler node.
2	Select the Status tab: • Running: The bus coupler is running. • Configuration error: At least one configured expansion module is not in the physical configuration. • ?: At least one expansion module did not respond to the bus coupler three times successively.

TM3 Modbus Serial Line Bus Coupler

Introduction

This chapter describes how to configure the serial line communication of the TM3 Modbus Serial Line Bus Coupler.

TM3 Modbus Serial Line Bus Coupler Presentation

Introduction

The TM3 Modbus Serial Line bus coupler is a device designed to manage Serial Line communication when using TM2/TM3 expansion modules in a distributed architecture.

Serial Line Profile

Overview

The TM3 Modbus Serial Line bus coupler is a device designed to manage serial line communication when using TM2/TM3 expansion modules in a distributed architecture. The TM3 Modbus Serial Line bus coupler can be physically connected to the serial port of a master device and it must be declared under a logical node representing the Modbus Serial IOScanner of a device inside EcoStruxure Machine Expert – Basic.

Modbus Slave Profile

The TM3 Modbus Serial Line Bus Coupler conforms as a Modbus slave.

The Modbus packet structure is as follows:

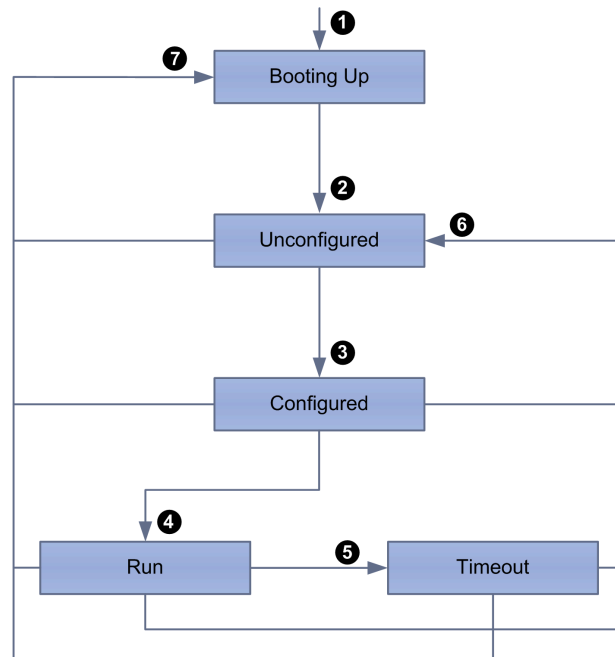
	Modbus Messages		
Address	Function Code	Data	CRC
1 byte	1 byte	n-byte field	2 bytes

The Modbus RTU message frame is as follows:

Slave Address	Function Code	Data	CRC
1 byte	1 byte	0-252 bytes	2 bytes CRC Low, CRC Hi

Serial Line Boot-Up and Operating Mode

The following diagram shows the operating modes of the TM3 Modbus Serial Line Bus Coupler:



The following table describes the transitions during the boot-up process:

Item	Description
1	Device boot-up
2	After boot-up, the device automatically enters the Unconfigured state.
3	The device begins configuration process.
4	The controller has taken control of the device.
5	A timeout error occurred.
6	A reconfiguration process is initialized.
7	An unrecoverable error caused a system reboot.

Serial Line Communication Configuration

The TM3 Modbus Serial Line bus coupler network interface configuration parameters are defined in the following table:

Parameter	Value
Mode	RTU
Parity	EVEN
Stop bit	1
Data bit	8

Serial Line Command List

The list of supported commands is described in the following table:

Modbus Function Code: Dec Index (Hex)	Sub-Function: Sub- Index	Command
3 (0003H)	-	Read n registers
6 (0006H)	-	Write a single register
16 (0010H)	-	Write n registers
22 (0016H)	-	Mask write register
23 (0017H)	-	Read/Write n registers
43 (002BH)	14	Read slave identification registers

Serial Line Identification Objects

The Device Identification Modbus command returns the following objects:

Object ID	Description	Value	Type
0x00	VendorName	Schneider Electric	ASCII String
0x01	ProductCode	0x1109	
0x02	MajorMinorRevision	XYxy (MAJORminor)	

Serial Line Operating Limits

The TM3 Modbus Serial Line bus coupler supports slave address from 1 to 127, corresponding to rotary switch address settings. Using addresses outside of the slave address range may disrupt communications between other devices on that serial line.

⚠ CAUTION
UNINTENDED EQUIPMENT OPERATION Do not use an address outside of the specified range (from 1 to 127). Failure to follow these instructions can result in injury or equipment damage.

Modicon TM3 Bus Coupler Serial Line Configuration

Introduction

This section describes the options available to setup up a simple operation with the TM3 Modbus Serial Line bus coupler.

Serial Line Configuration

The following table shows the default configuration of the TM3 Modbus Serial Line bus coupler:

Item	Default State	Empty Application State
TM3 Bus	Inactive if not configured. Outputs values = 0	No module on TM3 Bus.
Modbus	-	No manager is configured.
Rotary Switch	TENS switch in position 0, ONES switch in position 0 (default speed).	-

To configure the Serial Line using the Web Server, click **Maintenance** on the **Modbus Serial Line**.

The **Configuration** window is displayed as below:

Configuration

Speed (baud)	19200 ▼	Current speed 19200 (bauds/s)
Slave Address	1	
Parity	Even	
Data bits	8	
Stop bits	1	

TM3BCSL SL

The following parameters must be identical for each serial device connected to the port.

Element	Description	Configuration supported by the device
Speed (baud)	Transmission speed in baud	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Refer to TM3 Bus Coupler Hardware Guide.
Slave Address	Displays the Slave Address value for your device	Refer to <i>Modbus Slave Profile</i> , page 65.
Parity	Used for error detection	Even. Refer to <i>Serial Line communication configuration table</i> , page 66.
Data bits	Number of bits for transmitting data	8 Refer to <i>Serial Line communication configuration table</i> , page 66.
Stop bits	Number of stop bits	1 Refer to <i>Serial Line communication configuration table</i> , page 66.

The serial line port must be defined in a way consistent with the existing Modbus network if one already exists.

NOTICE

INTERRUPTION OF SERIAL LINE COMMUNICATIONS

Be sure that your application has the serial line ports properly configured for Modbus before physically connecting the controller to an operational Modbus Serial Line network.

Failure to follow these instructions can result in equipment damage.

Web Server

Introduction

The Web server integrated in the TM3 Modbus Serial Line bus coupler offers an access using a web browser to information such as configuration data, module status, I/O data, network statistics, and diagnostic information.

In addition the Web server allows you to monitor this information, the bus coupler network and I/O remotely.

You can access the Web server with HTTPS (secure connections). HTTP (non secured connections) is not supported.

The Web server is accessible through the bus coupler USB port, page 102. You can use the pages of the website for setup of the network speed and control the I/O modules outputs as well as diagnostics and monitoring. These pages are ready to use with a Web browser. No configuration or programming is required.

Use a PC providing a USB (host) port to connect to the Web server by using a Web browser.

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

- Google Chrome (version ≥ 71)
- Mozilla Firefox (version ≥ 64)
- Microsoft Edge (version ≥ 42)

The Web server allows you to monitor a bus coupler to perform various maintenance activities including modifications to outputs modules data and network speed configuration. 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 exercising 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. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this feature.

Web Server Access

You can manage the user accounts on the **Web server** on MAINTENANCE / User Accounts, page 76.

To access Web server, ensure that the rotary switch are in address setting location. For more information regarding address setting, refer to the Modicon TM3 Bus Coupler - Hardware Guide, Setting the Serial Line Address.

By default, the user name is Administrator, and the password is Administrator. You must change the password at the first login.

⚠ WARNING

UNAUTHORIZED DATA ACCESS

- Do not expose the device or device network to public networks and the Internet as much as possible.
- Immediately change the default password to a new secure password.
- Do not distribute passwords to unauthorized or otherwise unqualified personnel.
- Restrict access to unauthorized personnel.
- Use additional security layers like VPN for remote access and install firewall mechanisms.
- Validate the effectiveness of these measurements regularly and frequently.

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

NOTE: A secure password is one that has not been shared or distributed to any unauthorized personnel and does not contain any personal or otherwise obvious information. Further, a mix of upper and lower case letters and numbers offer greater security. You should choose a password length of at least ten characters.

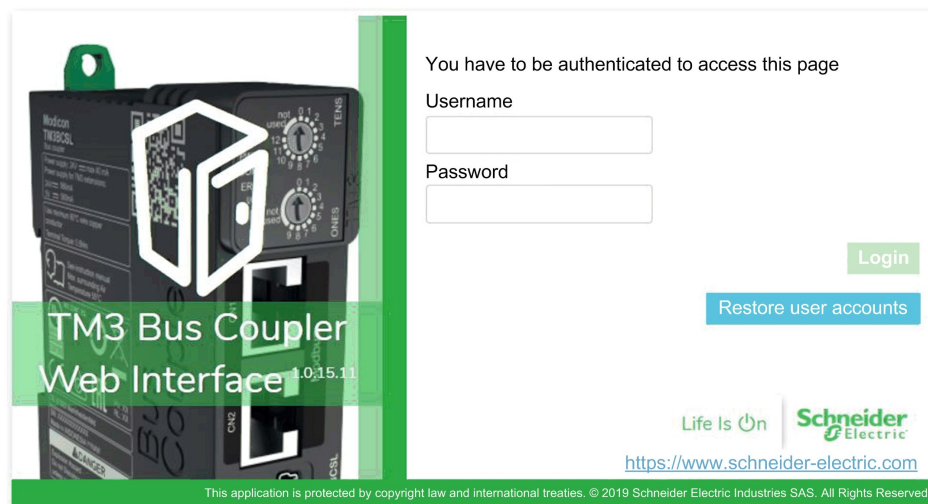
Resetting the Password

To reset the password:

Step	Action
1	Connect to the bus coupler using the USB port.
2	Open the browser.
3	Enter the IP address 90.0.0.1.
4	Move the position of any rotary switch to any other position. Result: ERR LED is flashing red. The Restore user accounts button is displayed.
5	Click Restore user accounts .
6	Move the position of the changed rotary switch to its previous position. Result: The Restore user accounts button is no longer displayed.

Login Page

The login page is the entry point to get authenticated by the Web server. The certificate, page 103 must be validated. To access the website login page shown in the following illustration, type in your navigator the IP address 90.0.0.1. To login to the Web server, enter the user name and password and click **Login**.



The Web server contains the following pages:

- HOME, page 71
- DIAGNOSTICS, page 71
- CONFIGURATION, page 73
- MONITORING, page 73
- MAINTENANCE, page 75

NOTE: The timeout session for each login is ten minutes. When you do not perform any action after you logged in, it redirects you to the login page if you click any button. You need to log in again with user name and password to access the web pages.

HOME / Equipment Overview

The **HOME** page displays the product details of TM3 bus coupler.

The **Identification** section of **HOME** page consists of:

Element	Description
Vendor Name	Vendor name of the bus coupler
Product ID	Product ID of the bus coupler
Product Name	Product name of the bus coupler
Product Reference	Product reference of the bus coupler
Serial Number	Serial number of the bus coupler
Locate Device  Locate Device	Click the button to locate the bus coupler. The LEDs of the bus coupler flash red for few seconds.

DIAGNOSTICS Page

The **DIAGNOSTICS** page shows the status of the bus coupler.

The **DIAGNOSTICS** page contains the following sub-pages:

- Device, page 72
- Modbus Serial Line or Modbus TCP, page 72

DIAGNOSTICS / Device

The **Identification** section shows details about identification, page 71 of the bus coupler:

Element	Description
Vendor Name	Vendor name of the bus coupler
Product ID	Product ID of the bus coupler
Product Name	Product name of the bus coupler
Product Reference	Product reference of the bus coupler
Serial Number	Serial number of the bus coupler

The **Status** section shows details about the status of the bus coupler:

Element	Description
Last Stop Cause	Displays the cause of the last stop of the bus coupler.
USB Port	Displays whether a USB cable is connected to the bus coupler.
Operating Mode	Displays one of the following operating modes of the bus coupler: • Idle • Modbus Serial • Web interface • Firmware update in progress • Time Out
Configuration Status	Displays one of the following configuration status of the bus coupler: • Not Configured • Configured

DIAGNOSTICS / Modbus Serial Line

The **Configuration** section displays the status of Serial Line connection:

Element	Description
Current Speed	Transmission speed in bits/s.
Slave Address	Slave address of the bus coupler.

The **Statistics** section shows the current configuration of Serial Line connection:

Element	Description
TX Messages	Displays the number of Modbus messages transmitted through the Serial Line.
RX Messages	Displays the number of Modbus messages received through the Serial Line.
Error Messages	Displays the number of Modbus messages with frame errors received through the Serial Line.
Reset	Resets the Statistics values to zero.
Refresh	Refreshes the Statistics values.

CONFIGURATION

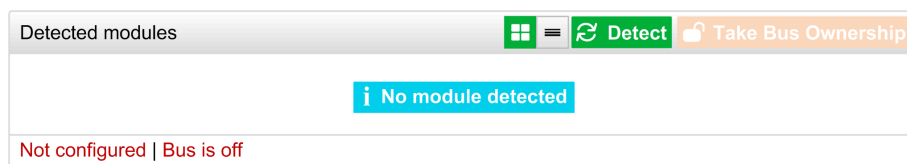
The **CONFIGURATION** page displays the I/O modules configuration imported from the TM3 Bus Coupler IO Configurator. The configuration file is an .SPF format.

Element	Description
PROJECT toolbar	
New	Read only button.
Open	Allows you to import the I/O modules configuration files generated by the TM3 Bus Coupler IO Configurator. Click Open to import the files.
Save	Read only button.
CONFIGURATION toolbar	
Apply	Allows you to apply the I/O modules configuration files on the TM3 bus coupler. If the configuration mismatch the hardware, an error message is generated.
DEVICES toolbar	Read only toolbar.

MONITORING Page

The **MONITORING** page displays the expansion modules that are connected to the TM3 bus coupler.

The following illustration shows the **MONITORING** page without detected modules:



The following illustration shows **MONITORING** page with modules and details:

Detected modules

Slot 0 Slot 1 Slot 2 Slot 3

TM3DQ16 TM3DQ16 TM3DQ16 TM3DQ16

Configured | Controlled by Web interface

Details of slot 2 (TM3DQ16T/G)

Name	Value	Prepared Value	Unit	Description
QW0	0	DEC16383 [0:65535]		
Q0	False	True False		
Q1	False	True False		
Q2	False	True False		
Q3	False	True False		
Q4	False	True False		
Q5	False	True False		
Q6	False	True False		
Q7	False	True False		
Q8	False	True False		
Q9	False	True False		
Q10	False	True False		
Q11	False	True False		
Q12	False	True False		
Q13	False	True False		
Q14	False	True False		
Q15	False	True False		

TM3DQ16T (screw), TM3DQ16TG (spring) 16-channel, 0.5A source transistor outputs expansion module with 1 common line and removable terminal block.

1 Bus Monitoring

2 Selected module

3 Reconcile button

4 Module details

The **MONITORING** page shows and describes all the modules detected by the bus coupler and allows you to:

- See the state of a selected module (running or not running) and the protocol used.
- Read the value of an input or output.
- Force a value to an output by clicking **Force**.
- Identify a module by clicking **Reconcile**.

Element	Description
Detect	Allows you to detect the modules connected to the bus coupler.
Take Bus Ownership Release Bus Ownership	Reserves the bus to allow you to force the module outputs. You can click the button when the bus coupler is configured and not controlled by a controller. Result: You are notified that the I/O bus is controlled by the Web interface. You can edit the output values. Click Release Bus Ownership to release the control of the I/O bus.

Module Details

The module details view provides the following data:

- Module name and description
- Module state
- Filter option to filter I/Os
- A list of its I/Os

This list of I/Os allows you to view a real-time value of an input and to write the value of an output.

The view has **DISPLAY** buttons to modify the format of the displayed values.

Output Forcing

1. When **Take Bus Ownership** is enabled, click a module to force its outputs.
2. Set the output values you wish to force for the module in the **Prepared Values** column of the list of its I/Os.
3. Click the **Force** button.

Result: A message is displayed.

4. Click **I agree** to validate the modifications and send them to the bus coupler.
Click **I disagree** to cancel the modifications.

As the modules are not identified automatically, click the **Reconcile** button to identify the modules.

MAINTENANCE Page

The **MAINTENANCE** page allows you to view and edit the configuration of the bus coupler.

The **MAINTENANCE** page contains the following sub-pages:

- User Accounts, page 76
- Firmware, page 77
- Modules Firmware, page 78
- System Log Files, page 80
- Modbus Serial Line, page 80

MAINTENANCE / User Accounts

Account Management

The sub-page allows you to define your login password to access the Web server:

Element	Description
Account Management	
Select an account to edit it	
User Name	List of the following user accounts: • Administrator The Administrator account is configured with a predefined password (Administrator / Administrator). Modify the predefined password after the first connection. • Operator This account is disabled by default. • Viewer This account is disabled by default. NOTE: Depending on your account, you have access to some web pages. See the table below for the accessible web pages.
Enabled	Selected if the account is enabled.
Account Management	
Provide a new password for account	
Current Password	Enter the current password of the user account.
New Password	Enter a password for the user account. NOTE: Minimum ten characters, maximum 32 characters and use a...z, A...Z, 0...9 alphanumeric characters. To reset the password, refer to Resetting the Password, page 70.
Confirm New Password	Enter the password again of the selected account.
Apply	Saves your new password.

This table describes the accessible pages depending on the user account:

Web pages	Sub pages	Administrator	Operator	Viewer
HOME	–	✓	✓	✓
MONITORING	–	✓	✓	–
DIAGNOSTICS	Device	✓	✓	✓
	Modbus Serial Line	✓	✓	✓
CONFIGURATION	–	✓	–	–
MAINTENANCE	User Accounts	✓	✓ ¹	✓ ¹
	Firmware	✓	–	–
	System Log Files	✓	✓	–
	Modbus Serial Line	✓	–	–
(1) You can only modify your user account.				

System Use Notification

The sub-page allows you to define a **System Use Notification** message which is displayed to users at log-in:

Element	Description
System Use Notification	
Enabled	When selected, you can define a message that is displayed at log-in.
Message	Displays the message defined.
Reset	Reset to default message.
Apply	Applies your changes.

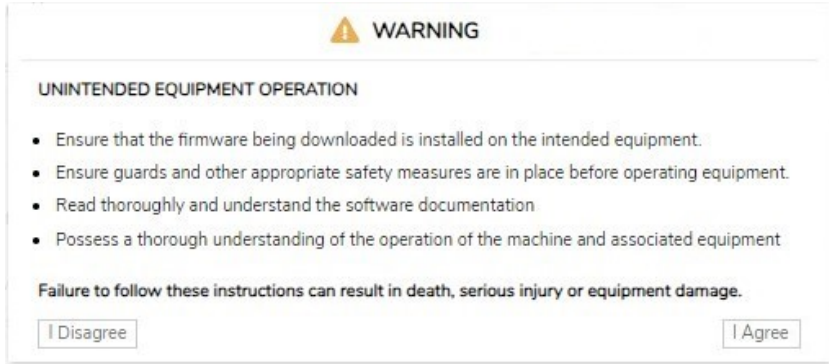
MAINTENANCE / Firmware

The **Firmware** sub-page shows the firmware version of the TM3 bus coupler and allows you to update its firmware:

Element	Description
Current Firmware	
Firmware	Firmware version
Web interface	Web server version
Firmware Update	
Select a new firmware version	
Select	Allows you to select the new firmware file for the bus coupler.
Apply	Applies the new firmware.
Cancel	Cancels firmware modifications.

NOTE: You cannot update the firmware when the TM3 bus coupler cyclically exchanges data with the logic/motion controller. To make sure the bus coupler is not exchanging data, see **MONITORING**, page 73.

To update the bus coupler firmware:

Step	Action
1	Remove power to the bus coupler.
2	Ensure rotary switches are in address setting position, TENS to 0, ONES to 1.
3	Connect USB cable to PC then to bus coupler.
4	Apply power to the bus coupler.
5	Log into the Web server as Administrator.
6	Verify in the MONITORING page that the bus coupler is not exchanging data with the controller.
7	Click MAINTENANCE > Firmware .
8	Click Select, then select the firmware file. Result: The following information is displayed: 
9	Read the information carefully and, if you agree, click I Agree. Result: At the end of the download and verification of the file, a confirmation window is displayed.
10	Click Yes to close the confirmation window, then click Apply. Result: At the end of the firmware update, a message is displayed to inform you whether the firmware update is completed successfully.

NOTE: Do not remove power from the bus coupler while performing the firmware update. If the power is lost while installing the new firmware, you may need to wait a few minutes for the installation process to finalize during the next power-up. Until then the Web server may not be accessible.

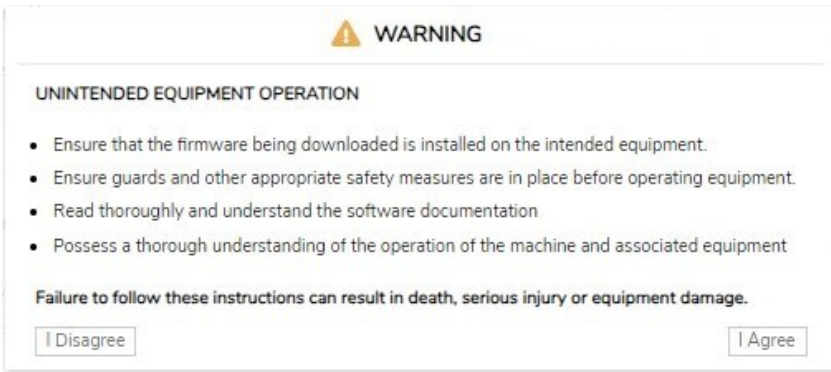
MAINTENANCE / Modules Firmware

The **Modules Firmware** sub-page shows the firmware version of the modules configured and allows you to update its firmware:

Element	Description
Modules Firmware Overview	
Slot	Slot number of the module
Reference	Reference of the module
Current Firmware	Firmware version of the module
Modules Firmware Management	
Select a new firmware version	
Select	Allows you to select the new firmware file for the module. NOTE: You can select only a single firmware file. All modules on the bus corresponding to the selected firmware are updated.
Apply	Allows you to apply the new firmware.

NOTE: You cannot update the firmware when the TM3 bus coupler cyclically exchanges data with the logic/motion controller. To make sure the bus coupler is not exchanging data, see **MONITORING**, page 73.

To update the module firmware:

Step	Action
1	Remove power from the bus coupler.
2	Connect the USB cable.
3	Apply power to the bus coupler.
4	Log into the Web server.
5	Verify in the MONITORING page that the bus coupler is not exchanging data with the controller.
6	Click MAINTENANCE > Modules Firmware .
7	Click Select , then select the firmware file. Result: The firmware file is selected.
8	Click Apply . Result: The following information is displayed: 
9	Read the information carefully and, if you agree, click I Agree . Result: A restart window is displayed.
10	Click Yes to proceed. Result: The file is verified and downloaded. The TM3 bus coupler reboots and a confirmation message is displayed.
11	After the confirmation message is displayed, remove power from the bus coupler (and TM3XREC1 receiver module, if any).
12	Restore power to the bus coupler (and TM3XREC1 receiver module, if any). Result: The module firmware is updated.

MAINTENANCE / System Log Files

The **System Log Files** sub-page lists the log files. Some of the information in the log files comes from internal interactions of the firmware and is intended to be used by Schneider Electric Technical Support.

Element	Description
Log Files	
Select one or more log files to download	
Select	Allows you to select one or more log files.
Name	Shows the list of the log files.
Size	Displays the size of the log files.
Download	Allows you to download the log files.

MAINTENANCE / Modbus Serial Line

The **Modbus Serial Line** sub-page allows you to change the network settings:

Element	Description
Configuration	
Speed (baud)	Allows you to set the transmission speed in bits/s. You can also set the baud rate using the rotary switch. Refer to Modicon TM3 Bus Coupler Hardware Guide.
Slave Address	Displays the Slave Address value for your device.
Parity	Used for error detection.
Data bits	Displays the number of bits for transmitting data.
Stop bits	Displays the number of stop bits.
Apply	Saves the configuration settings. NOTE: Upon confirmation, the bus coupler is automatically reset and the new speed is applied.
Cancel	Cancels configuration modifications.
Modbus Serial Data Consistency	
Enabled	Allows an internal copy of the input data registers (3000-3499 or 13000-13499) to be kept since the first read request is received until the second read request is received OR until the monitoring timeout is elapsed. Is enabled by default when the I/O modules configuration need more than 124 words to read the data of the input.
Cancel	Cancels the configuration settings.
Apply ⁽¹⁾	Saves the configuration settings.
TM3 Module Configuration via Modbus Commands	
Enabled	Allows controller to send TM3 configuration through Modbus command.
Cancel	Cancels the configuration settings.
Apply ⁽¹⁾	Saves the configuration settings.
(1) Modifying the <i>Setup</i> configuration requires a power cycle of the bus coupler to apply the configuration settings.	

TM3 Configuration through Modbus Command

Introduction

This section describes how to send TM3 configuration through Modbus command from a controller. The tables used for this configuration mode are in the appendices. Refer to *Direct TM3 Configuration through Modbus Commands: Registers and Default Values for Supported Modules*, page 105.

TM3 Module Support

The following modules are supported:

- TM3 Digital (TM3D•) except TM3DM16R and TM3DM32R
- TM3 Analog (TM3A•/T•)
- TM3 Safety (TM3S•)
- TM3 TeSys (TM3XTYS4)
- TM3 Transmitter and Receiver (TM3XTRA1, TM3XREC1)

Limitations and specific notes:

- TM3 optional configuration are not supported by this feature
- Fallback configuration for TM3 analog output is also supported by bus coupler through this feature. Fallback values, if configured, is applied by the bus coupler to the output of analog expansion modules in the following scenarios:
 - fieldbus communication timeout
 - after releasing bus ownership in Web server
- The transmitter and receiver modules are transparent to the bus couplers. Therefore, you must define which is the first module after the TM3XREC1 module in a remote configuration by defining the value in *First module after expander* register.

⚠ WARNING

UNINTENDED MACHINE OPERATION

- Set the value in “First module after expander” register to match the physical configuration.
- Refer to appropriate section on how to configure the transmitter and receiver modules.

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

NOTE: Refer to *How to Configure: Module Parameters Registers*, page 85 for detailed description of the registers.

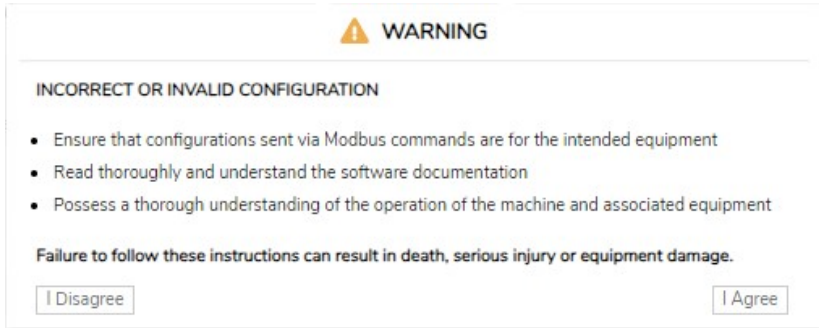
Enabling TM3 Configuration through Modbus Command

The Modbus command is disabled by default. You can enable the Modbus command by using the rotary switches or through the Web server.

To enable the Modbus command by using the rotary switches:

Step	Action
1	Remove power from the bus coupler and disconnect all fieldbus communication cables.
2	Set both rotary switches ONES and TENS to the position 3 .
3	Apply power to the bus coupler.
4	Wait until the COM LED is off.
5	Within 60 seconds, set the rotary switch ONES to the position NOT USED and the rotary switch TENS to the position 12 . Result: The LED COM , ERR and IO flash green five times.
6	Wait until the LED COM , ERR and IO flash green five times, then hold solid. Result: The feature is enabled successfully. The bus coupler is in <i>STANDBY</i> state and no operation is allowed.
7	Remove power from the bus coupler.
8	Connect the fieldbus communication cables.
9	Apply power to the bus coupler.

To enable the Modbus command through the Web server:

Step	Action
1	Log into the Web server as Administrator.
2	Click on MAINTENANCE > Setup .
3	Select the Enabled checkbox in the TM3 Module via Modbus Commands view.
4	Click Apply . Result: The following information is displayed: 
5	Read the information carefully and, if you agree, click I Agree . Result: A message is displayed to inform you that the configuration will apply after the next boot-up.

See also **MAINTENANCE / Modbus Serial Line**, page 80.

How to Configure

Proceed as follows to configure the TM3 bus coupler:

Step	Action
1	Write 1 to Register 15000 as a single Modbus write command. NOTE: Using multiple register write commands will not affect the operation.
2	Write the required configurations to the appropriate Modbus registers. Refer to How to Configure: Module Parameters Registers , page 85 for detailed description of the registers. Refer to Direct TM3 Configuration through Modbus Commands: Registers and Default Values for Supported Modules , page 105 for the default values for each TM3 module.
3	Write 0 to Register 15000 as a single Modbus write command. NOTE: Using multiple register write commands will not affect the operation.
4	The bus coupler applies the configuration. Result: If valid, the configuration is applied and saved in non-volatile memory. Any pre-existing configuration stored in non-volatile memory is overwritten. Result: If an invalid configuration is detected, the configuration is not applied. Consult the Error Diagnostics Modbus registers and the Serial Line Bus Coupler Status Diagnostics, page 100 registers for error information. Error description is also saved in log file, which can be retrieved through the Web server. Delete configuration saved in non-volatile memory and send again the correct configuration. Refer to Deleting Permanent Configuration, page 90 on how to delete configuration.

NOTE:

- Step 1 to 3 must be completed within 10 minutes. After 10 minutes, a configuration timeout occurs and the bus coupler interrupts the configuration process.
- Once a configuration is started, no further configuration initialization is allowed until the completion of the configuration, or a configuration timeout has occurred.
- For Analog channels, you must set the minimum and maximum values suitable for this application. The bus coupler firmware does not automatically adjust the minimum and maximum values according to type chosen. The analog values from module are scaled according to the range between the minimum and maximum configuration.
For example, if channel type is 0 – 10 V, and minimum/maximum is set to 0 V and 10000 V respectively, this means the unit of measure would be $10\text{ V} / 10000 = 1\text{ mV}$.
- For the following types of configuration, it is required to configure the specific minimum and maximum value as defined in the respective compatibility table. Configuring another value results in a configuration error.
 - TM3AI8 -> 0 – 20 mA extended range and 4 – 20 mA extended range.
 - A temperature input with scope set to either in Celsius or Fahrenheit, except for Type B and Type C thermocouple in Fahrenheit. For these two specific use cases, refer to the compatibility table for the configuration (see [Direct TM3 Configuration through Modbus Commands: Registers and Default Values for Supported Modules](#), page 105).
 - Input is set to Ohmmeter

Using Rotary Switch to Define the First Module after Expander Value

You can define this value through Modbus command or by using the **TENS** rotary switch.

To define the the First Module After Expander Value by using the **TENS** rotary switch:

Step	Action
1	Ensure that the TENS rotary switch is set to a position between 0 and 7 . NOTE: The ERR LED flashes red if the rotary switch position is changed after boot-up. You can return the rotary switch to its original position after the configuration process is complete.
2	Start the configuration.
3	During configuration process, write the value 254 to the Register 15001.
4	When the required configuration values have been written, apply the configuration. Result: The bus coupler replaces the value in the Register 15001 with the value defined by the TENS rotary switch after configuration is applied successfully.

How to Configure: Module Parameters Registers

This table describes registers dedicated to the overall management of the feature:

Register Address	Description	Access	Comments
15000	Control Start/Stop Configuration	RW	Write: 1 = Start configuration (start to accept modules configuration commands). 0 = Apply configuration. Other values result in "Illegal Data Value" exception. Read: 1 = In configuration state 0 = Not in configuration state
15001	First module after expander	RW	Index of the first module after the expander module 255 (default) = No modules after the expander 0 = 1st physical module 1 = 2nd physical module 2 = 3rd physical module 3 = 4th physical module 4 = 5th physical module 5 = 6th physical module 6 = 7th physical module 7 = 8th physical module 254 = Use TENS rotary switch value. See <i>Using Rotary Switch to Define the First Module after Expander Value</i>, page 84. No other values allowed.
15002	Remove Permanent Configuration	RW	Allows you to remove saved configuration from non-volatile memory. See <i>Deleting Permanent Configuration</i> , page 90.
15003	Monitoring Timeout	RW	Timeout value of the bus in millisecond. Range value: 0 – 65535. Default value: 10000.
15004-15049	Reserved	RO	The registers are reserved and the value is 0.
15050	Configurable	RO	0 = The connected expansion modules are not configurable by using the Modbus command. 1 = The connected expansion modules are configurable by using the Modbus command.
15051	Number of modules	RO	Indicates the number of connected expansion modules.
15052	Enabling feature	RO	0 = TM3 configuration through Modbus command is disabled 1 = TM3 configuration through Modbus command is enabled
15053-15059	Reserved	RO	The registers are reserved and the value is 0.
15060	Number of errors	RO	Number of errors detected. NOTE: A maximum of 10 errors can be detected; subsequent errors are ignored.

Register Address	Description	Access	Comments
15061	1 st Error - Error Code	RO	Error codes: - Register value 0: <i>RESERVED</i> - Register value 1: Invalid Analog channel type - Register value 2: Invalid Analog minimum value - Register value 3: Invalid Analog maximum value - Register value 4: Configured Analog minimum value is greater than configured maximum value - Register value 5: <i>RESERVED</i> - Register value 6: Invalid filter value (TM3 Analog modules) - Register value 7: Invalid sampling value - Register value 8: Invalid fallback value (TM3 Analog modules) - Register value 9: Invalid Analog scope - Register value 10: Invalid resistance reference value R_ref (used with NTC thermistor only) - Register value 11: Invalid temperature reference value T_ref (used with NTC thermistor only) - Register value 12: Invalid sensitivity value Beta (used with NTC thermistor only) - Register value 13: Invalid value used to configure Functional Mode (TM3 Digital modules) - Register value 14: Invalid filter value (TM3 Digital modules) - Register value 15: Invalid fallback mode selected (TM3 Digital modules) - Register value 16: Invalid fallback value (TM3 Digital modules) - Register value 17: Invalid value used to enable or disable module diagnostics - Register value 18: Configured Functional mode value is not supported by TM3D• modules with SV < 2.0 - Register value 19: Invalid low threshold value (used with Threshold mode only in TM3 Analog modules) - Register value 20: Invalid high threshold value (used with Threshold mode only in TM3 Analog modules) - Register value 21: Configured low threshold value is greater than configured high threshold value (used with Threshold mode only in TM3 Analog modules) - Register value 22 – 99: <i>RESERVED</i> - Register value 100: Invalid "First module after expander" value - Register value 101: Connected module does not support direct configuration through Modbus commands - Register value 102: More than 10 TM3S• Safety modules are connected - Register value 103 – 65534: <i>RESERVED</i> - Register value 65535: Default value (No error)
15062	1 st Error - Module and channel	RO	[Bits 0 – 4] Channel index (Value range: 0 – 31) [Bits 5 – 7] Reserved [Bit 8] 0 = Output, 1 = Input [Bit 9] 0 = Channel error, 1 = Module error [Bits 10 – 11] Reserved [Bits 12 – 15] Module index (Value range: 0 – 13) Module error is applicable to error code 13, 17, 18, 101 and 102. Examples: 1st physical module, 3rd physical output channel = 0x0002 4th physical module, 3rd physical input channel = 0x3102 5th physical module, 4th physical output channel = 0x4003 14th physical module, 32nd physical input channel = 0xD11F 8th physical module, Module error = 0x7200
15063-15080	2 nd to 10 th Error - Code, and Error - Module and channel	RO	See registers values Error Code and Error - Module and channel, above.
15081-15099	Reserved	RO	The registers are reserved and the value is 0.

This table describes the configuration registers division:

Address	Description
15100 - 15199	Configuration parameters of TM3 module at slot number 0
15200 - 15299	Configuration parameters of TM3 module at slot number 1
15300 - 15399	Configuration parameters of TM3 module at slot number 2
15400 - 15499	Configuration parameters of TM3 module at slot number 3
15500 - 15599	Configuration parameters of TM3 module at slot number 4
15600 - 15699	Configuration parameters of TM3 module at slot number 5
15700 - 15799	Configuration parameters of TM3 module at slot number 6
15800 - 15899	Configuration parameters of TM3 module at slot number 7
15900 - 15999	Configuration parameters of TM3 module at slot number 8
16000 - 16099	Configuration parameters of TM3 module at slot number 9
16100 - 16199	Configuration parameters of TM3 module at slot number 10
16200 - 16299	Configuration parameters of TM3 module at slot number 11
16300 - 16399	Configuration parameters of TM3 module at slot number 12
16400 - 16499	Configuration parameters of TM3 module at slot number 13

For each section:

Address Offset	Description	Access	Comments
1XY00	Module Type	RO	Module ID of TM3 module.
1XY01	Number of Configuration Parameters	RO	Depends on the module type. For example, "6" means addresses from [1XY08 - 1XY13] are available for configuration.
1XY02 - 1XY07	Reserved	RO	The registers are reserved and the value is 0.
1XY08 - 1XY99	Specific Configuration Parameters	RW	For specific parameter configuration 0xFFFF = the register is not available or invalid for modification.

NOTE: XY indicates the slot to which module is connected. $51 \leq XY \leq 64$.

Example: For the first module, "Module Type" is at address 15100 and the 14th module is at address 16400.

How to Configure: TM3 Module Specific Registers

Module Type	Module ID (Read only 1XY00)	Configuration Size (Read only 1XY01) (Read/Write Memory starts from 1XY08)
TM3DI8 / TM3DI8G, page 106	132	9
TM3DI8A	132	0
TM3DI16 / TM3DI16G, TM3DI16K, page 106	128	17
TM3DI32K, page 107	130	33
TM3DQ8R / TM3DQ8RG, TM3DQ8T / TM3DQ8TG, TM3DQ8U / TM3DQ8UG, page 108	133	17
TM3DQ16R / TM3DQ16RG, TM3DQ16T / TM3DQ16TG, TM3DQ16TK, TM3DQ16U / TM3DQ16UG, TM3DQ16UK, page 109	129	33
TM3DQ32TK, TM3DQ32UK, page 111	131	65
TM3DM8R / TM3DM8RG, page 114	134	13
TM3DM24R / TM3DM24RG, page 115	135	33
TM3AI2H / TM3AI2HG, page 116	192	11
TM3AI4 / TM3AI4G, page 117	193	21
TM3AI8 / TM3AI8G, page 119	194	41
TM3TI4 / TM3TI4G, page 122	199	25
TM3TI4D / TM3TI4DG, page 124	203	25
TM3TI8T / TM3TI8TG, page 126	200	89
TM3AQ2 / TM3AQ2G, page 131	195	9
TM3AQ4 / TM3AQ4G, page 132	196	17
TM3AM6 / TM3AM6G, page 134	197	29
TM3TM3 / TM3TM3G, page 136	198	17
TM3SAC5R / TM3SAC5RG	146	0
TM3SAF5R / TM3SAF5RG	145	0
TM3SAFL5R / TM3SAFL5RG	147	0
TM3SAK6R / TM3SAK6RG	144	0
TM3XTYS4	136	0

How to Configure: Example

This graphic shows the configuration for a TM3 bus coupler and a TM3TI4G:

Edition of Module_3 (TM3TI4/G)

Configuration Mapping Information

Name	Value	Unit	
Optional module	No		
Inputs			
IW0			
Type	0 - 10 V		Range mode
Scope	Normal		Unit
Minimum	DEC 0 [-32768;7999]		Minimum value
Maximum	DEC 8000 [1;32767]		Maximum value
Input Filter	DEC 5 [0;1000]	x 10 ms	Input Filter
Sampling	100	ms/Channel	Input sampling selection
IW1			
Type	K thermocouple		Range mode
Scope	Celsius (0.1 °C)		Unit
Minimum	DEC -2000 [-32768;32766]		Minimum value
Maximum	DEC 13000 [-32767;32767]		Maximum value
Input Filter	DEC 1 [0;1000]	x 10 ms	Input Filter
Sampling	100	ms/Channel	Input sampling selection
IW2			
Type	Not used		Range mode
Scope	Not used		Unit
Minimum	DEC -32768 [-32768;32766]		Minimum value

This table shows the Modbus registers to write:

TM3TI4/G	Address	Value	Description
Ch 0 - type	15108	1	0 – 10 V
Ch 0 - Scope	15109	1	Unit in Normal
Ch 0 - Minimum	15110	0	Minimum
Ch 0 - Maximum	15111	8000	Maximum
Ch 0 - Input filter	15112	5	50 ms filter time
Ch 0 - Sampling	15113	0	100 ms sampling time
Ch 1 - type	15114	7	K Thermocouple
Ch 1 - Scope	15115	2	Unit in Celsius
Ch 1 - Minimum	15116	63536	Minimum (63536 equal to -2000 in signed value)
Ch 1 - Maximum	15117	13000	Maximum
Ch 1 - Input filter	15118	1	10 ms filter time
Ch 1 - Sampling	15119	0	100 ms sampling time

Modbus Command done using “Write Single Register”

- Address: 15000
- Data bytes: [1]

Modbus Command done using “Write Multiple Registers”

- Address: 15108
- Number of registers: 12
- Data bytes: [1, 1, 0, 8000, 5, 0, 7, 2, 63536, 13000, 1, 0]

Modbus Command done using “Write Single Register”

- Address: 15000
- Data bytes: [0]

Deleting Permanent Configuration

The configuration stored in the non-volatile memory can be deleted by using Modbus command. The following conditions are required:

- The configuration through Modbus command is enabled
- The connected modules are configurable through this command
- The bus coupler is not in *configuring* state (see **System State (register 932)**), controlled by the Web server or updating the firmware.

To delete the configuration stored by using Modbus command:

Step	Action
1	Write 0xFF to Register 15002.
2	Within 30 seconds, write 0 to Register 15002. Result: The bus coupler attempts to delete the stored configuration. NOTE: If 0 is not written in the register within 30 seconds, a timeout occurs and the stored configuration is not deleted. Register 15002 is reset to 0 by the bus coupler.
3	Verify the System State (register 932): Result: The bus coupler state is in <i>not configured state</i> which indicates that the permanent configuration has been deleted successfully. The default values are filled in and the error registers are cleared.

Error Management

If the physical setup is not compatible, the register 15050 is set to 0. The configuration using Modbus commands cannot apply and the error is written in the log file. Incompatible physical setup includes the following scenarios:

- One or more TM2 modules are present in the bus
- One or more TM3X•HSC202• modules are present in the bus
- More than 10 safety modules are present in the bus

When the module configuration registers are written, the values are not validated until the configuration is applied. If an error is detected during the validation, the details about the first 10 errors (error code, module index and channel) are indicated in the registers 15061...15080. Validation stops after the first 10 errors. These 10 errors are logged in the log file. The default values for error registers 15061...15080 are 0xFFFF.

During validation, if an analog channel type is set as “Not Used”, the subsequent register values associated with this channel are automatically set to default values. Any values configured are ignored, and no errors are detected.

During validation, if the digital module functional level is set to 1, subsequent configurations associated with functional level 2 (Fallback, Filter) are set to default values. Any values configured are ignored, and no errors are detected.

Register Mapping Presentation

Introduction

The register mapping includes:

- TM3 Modbus Serial Line bus coupler status and configuration
- Attached TM2/TM3 expansion I/O modules input values
- Attached TM2/TM3 expansion I/O modules output values
- Attached TM2/TM3 expansion I/O modules configuration and status
- TM3 Configuration via Modbus Command, page 83

Overview

The Manufacturer Zone is defined by Registers 0 - 1115.

The following table shows register mapping for the TM3 Modbus Serial Line bus coupler:

Functions	Registers	Description
Subset of Module Input Registers	0	Not used
	1 - 99	Input for module NOTE: 1 - 99: is Mirror of 3001 - 3099 ⁽¹⁾
Subset of Module Output Registers	100	Not used
	101 - 199	Output for module NOTE: 101 - 199: is Mirror of 3501 - 3599 ⁽¹⁾
Diagnostics/Status Registers	900	Bus coupler diagnostics
	901	I/O module error Extend to maximum 14 modules
	902 - 929	Reserved
	930 - 931	I/O module status
	932	System state
	990 - 993	Serial line communication diagnostics
Managing TM3 Configuration Behavior Registers	1000 - 1008	TM3 configuration action control
Managing Serial Line Connection Registers	1050 - 1054	Serial line communication configuration
Modules Description on IO Bus	1100 - 1115	Product code/firmware version and module ID code
(1) Access to those registers returns an error when System State (register 932) is not 4 (TM3 controlled by Modbus SL IOScanner)		

The attributes in the table below define the access rights of a particular object:

Attribute	Description
RO	Read Only access.
RW	Read and Write access.

The following zones support the TM3BCSL Modbus data access requirements:

Zone	Registers	Access	Function
Bus Coupler Zone	2500 - 2999	RO	Bus coupler status and configuration
IO Modules Zone	3000 - 3499	RO	Full set of input registers for I/O modules attached to bus coupler ⁽¹⁾
	3500 - 3999	RW	Full set of output registers for I/O modules attached to bus coupler ⁽¹⁾
	4000 - 6999	RW	Configuration of all attached modules
	13000 - 13999	RO	Mirrored I/O data to provide access to HMI device
Direct TM3 Configuration	15000 - 16499	Refer to How to Configure: Configuration Management Registers, page 83	Allow controllers to send TM3 configuration directly through Modbus requests
(1) Access to those registers returns an error when System State (register 932) is not 4 (TM3 controlled by Modbus SL IOScanner)			

The following table shows the sub-function mapping of the TM3BCSL Modbus:

Functions	Registers	Description
Bus Coupler Status and Configuration	2500 - 2627	-
Full set of I/O Modules Inputs Data Registers	3000	Not used
	3001 - 3499	Input values
Full set of I/O Modules Outputs Data Registers	3500	Not used
	3501 - 3999	Output values
All attached Modules Configuration	4000 - 6799	I/O Module Configuration for 1st to 14th module
Full set of I/O Modules Inputs Data Registers (RO) for HMI device	13000	Not used
	13001 - 13499	Input values
Full set of I/O Modules Outputs Data Registers (RO) for HMI device	13500	Not used
	13501 - 13999	Output values

Registers in Manufacturer Zone

Input Registers

The following table shows register mapping for expansion module input value. Note this is for backward compatibility purposes with legacy products and application:

Register	Function	Description
0	Not used	-
1	Input value of first expansion module with inputs	Varies depending on module
...	-	-
99	-	-

Output Registers

The following table shows register mapping for expansion module output value. Note this is for backward compatibility purposes with legacy products and application:

Register	Function	Description
100	Not used	-
101	Output value of first expansion module with outputs	Varies depending on module
...	-	-
199	-	-

Diagnostics Registers

Diagnostic registers manage alert and alarm conditions. There are diagnostics registers dedicated for configuration errors, I/O module errors, and communication errors among others. Refer to status diagnostic table, page 100.

Management Registers

The following table shows the bus couple module management registers:

Registers	Functions
1000 - 1004	Reserved registers
1005	Reset expansion bus. This function is used to update the new expansion module I/O parameters. NOTE: The outputs are set to zero when the bus is reset.
1006 - 1007	Reserved registers
1009	Fieldbus timeout counter
1010 - 1049	Reserved registers

Managing the Serial Line Connection

The following table shows the serial line connection management registers:

Registers	Function
1050	Slave serial line address
1051	Baud rate
1052	
1053	Parity (Default Even - 2)
1054	Mode (RTU - 0)
1055 - 1099	Reserved registers

NOTE: These registers are read only. You cannot modify these parameters through these registers.

Bus Coupler and Module Description Registers

The following table shows the registers supported by TM3 bus coupler for expansion modules:

Register	Access	Function
1100	RO	TM3 bus coupler product code
1101	RO	TM3 bus coupler software version
1102	RO	Type of expansion module 1
1103	RO	Type of expansion module 2
1104	RO	Type of expansion module 3
1105	RO	Type of expansion module 4
1106	RO	Type of expansion module 5
1107	RO	Type of expansion module 6
1108	RO	Type of expansion module 7
1109	RO	Type of expansion module 8
1110	RO	Type of expansion module 9
1111	RO	Type of expansion module 10
1112	RO	Type of expansion module 11
1113	RO	Type of expansion module 12
1114	RO	Type of expansion module 13
1115	RO	Type of expansion module 14

The following table shows the registers supported by TM3 bus coupler for expansion modules:

Register	Access	Function
1100	RO	TM3 bus coupler product code
1101	RO	TM3 bus coupler software version
1102	RO	Type of expansion module 1
1103	RO	Type of expansion module 2
1104	RO	Type of expansion module 3
1105	RO	Type of expansion module 4
1106	RO	Type of expansion module 5
1107	RO	Type of expansion module 6
1108	RO	Type of expansion module 7
1109	RO	Type of expansion module 8
1110	RO	Type of expansion module 9
1111	RO	Type of expansion module 10
1112	RO	Type of expansion module 11
1113	RO	Type of expansion module 12
1114	RO	Type of expansion module 13
1115	RO	Type of expansion module 14

Registers in Bus Coupler Zone

Bus Coupler Status and Configuration

The following table shows registers used for the Bus Coupler Status and Configuration interface:

Register	Function	Description
2502 - 2506	Reserved	Not used
2507	Firmware major revision	-
2508	Firmware minor revision	-
2512 - 2513	Serial number	-
2514 - 2515	Reserved	Not used
2518	Total number of I/O modules detected	Maximum of 14 modules
2519	Slave 0 module ID, if present	-
2520	Slave 1 module ID, if present	-
2521	Slave 2 module ID, if present	-
2522	Slave 3 module ID, if present	-
2523	Slave 4 module ID, if present	-
2524	Slave 5 module ID, if present	-
2525	Slave 6 module ID, if present	-
2526	Slave 7 module ID, if present	-
2527	Slave 8 module ID, if present	-
2528	Slave 9 module ID, if present	-
2529	Slave 10 module ID, if present	-
2530	Slave 11 module ID, if present	-
2531	Slave 12 module ID, if present	-
2532	Slave 13 module ID, if present	-
2533 - 2600	Reserved	Reserved
2601	Value of Rotary switch ONES	-
2602	Value of Rotary switch TENS	-

Registers in I/O Modules Zone

Expansion I/O Modules Configuration Register

The following table shows the register mapping for TM2/TM3:

Register	Access	Registers	Function
4000 - 6799	RW	n	Module configuration

Input Registers

The following table shows register mapping for expansion module input value:

Register	Function	Bit Assignment
3000	Not used	-
3001	Input value of first expansion module with inputs	Varies depending on module
...	-	-
3499	-	-

Output Registers

The following table shows register mapping for expansion module output value:

Register	Function	Bit Assignment
3500	Not used	-
3501	Output value of first expansion module with outputs	Varies depending on module
...	-	-
3999	-	-

Expansion Module Register Size

The following table provides a reference on the number of read/write registers required to exchange data associated with a particular TM2/TM3:

References	Number of Input Registers	Number of Output Registers
TM2DDI8DT, TM2DAI8DT	1	0
TM2DDI16DT, TM2DDI16DK	1	0
TM2DDI32DK	2	0
TM2DRA8RT, TM2DDO8UT, TM2DDO8TT	0	1
TM2DRA16RT, TM2DDO16UK, TM2DDO16TK	0	1
TM2DDO32TK, TM2DDO32UK	0	2
TM2DMM8DRT	1	1
TM2DMM24DRF	1	1
TM2AMI2HT, TM2AMI2LT	2	0
TM2AMO1HT	0	1
TM2ALM3LT, TM2AMM3HT	2	1
TM2AMM6HT	4	2
TM2AVO2HT	0	2
TM2AMI4LT	4	0
TM2AMI8HT, TM2ARI8HT, TM2ARI8LT, TM2ARI8LRJ	8	0
TM3AI2H, TM3AI2HG	4	0
TM3AI4, TM3AI4G	8	0
TM3AI8, TM3AI8G	16	0
TM3AM6, TM3AM6G	10	2
TM3TI4, TM3TI4G, TM3TI4D, TM3TI4DG	8	0
TM3TI8T, TM3TI8TG	16	0
TM3TM3, TM3TM3G	5	1
TM3AQ2, TM3AQ2G	2	2
TM3AQ4, TM3AQ4G	4	4
TM3DI8, TM3DI8G, TM3DI8A	1	0
TM3DI16, TM3DI16G, TM3DI16K	1	0
TM3DI32K	2	0
TM3DM8R, TM3DM8RG	1	1
TM3DM24R, TM3DM24RG	1	1
TM3DQ8R, TM3DQ8RG, TM3DQ8T, TM3DQ8TG, TM3DQ8U, TM3DQ8UG	0	1
TM3DQ16R, TM3DQ16RG, TM3DQ16T, TM3DQ16TG, TM3DQ16TK, TM3DQ16U, TM3DQ16UG, TM3DQ16UK	0	1
TM3DQ32TK, TM3DQ32UK	0	2
TM3SAC5R, TM3SAC5RG, TM3SAF5R, TM3SAF5RG, TM3SAFL5R, TM3SAFL5RG, TM3SAK6R, TM3SAK6RG	1	1
TM3XTYS4	1	1

Diagnostic

Overview

In online mode, the **Status** tab of the bus coupler provides monitoring and diagnostics information for the bus coupler and connected modules.

The M221 controller diagnoses the communication via system objects and IOScanner status objects. For diagnostic information about communication between the TM3 bus coupler and your controller, refer your controller programming guide.

Displaying Diagnostic Information

Step	Action
1	In the Devices Tree , double-click the bus coupler node.
2	Select the Status tab: • Running: The bus coupler is running. • Configuration error: At least one configured expansion module is not in the physical configuration. • ?: At least one expansion module did not respond to the bus coupler three consecutive times.

Status LEDs

The following graphic shows the LEDs of TM3 Modbus Serial Line bus coupler:



The following table describes the status LEDs:

LED	Color	Status	Description
PWR	Green	On	Power is applied.
		Off	Power is removed. All LED indicators are off.
COM	Green	Flashing	Data sending and receiving.
		Off	No data exchanged.
	Red	Flashing	Device is receiving an incorrect data frame.
ERR	Red	Flashing	Device has detected an error that is, under most circumstances, recoverable. For example: - Rotary switch position changed during operational mode. Return to the initial position to reset the LED behavior. - Error detected during firmware update. - Communication and configuration errors.
		Off	No error detected.
I/O	Green	Flashing	Device has received and applied the expansion modules configuration.
		Solid	Device is communicating with the expansion modules.
	Green Red	Flashing	The physical configuration is inconsistent with the software configuration. No data exchange (status and I/O) is occurring.
		Solid	
	Green Red	Solid	The physical configuration is inconsistent with the software configuration. I/O data is not applied.
		Solid	
	Green Red	Solid	At least one TM2 or TM3 expansion module did not respond to the bus coupler for 10 consecutive cycles.
		Flashing	
		Off	No configuration. Device is not communicating with the expansion modules.

NOTE: With the exception of the **PWR** LED, each LED is ON for a few seconds, then OFF during boot sequence. The LED behavior rules apply when the boot has completed successfully.

Serial Line Bus Coupler Status Diagnostics

The following table provides detailed information regarding the bus coupler status, expansion module status as well as communication statistics:

Register	Function	Bit	Description
900	Bus status	0...8	Reserved
		9	Communication error or external error
		10...12	Reserved
		13	Expansion modules missing or incorrectly configured
		14...15	Reserved
901	Expansions error	0	Module 1 error
		1	Module 2 error
		2	Module 3 error
		3	Module 4 error
		4	Module 5 error
		5	Module 6 error
		6	Module 7 error
		7	Module 8 error
		8	Module 9 error
		9	Module 10 error
		10	Module 11 error
		11	Module 12 error
		12	Module 13 error
		13	Module 14 error
		14...15	Reserved
902 - 929	Reserved	-	Reserved
930	TM2/TM3 bus status	0...1 Module 1	Module status (2 bits per module): 0x0: Module OK 0x1: Module configuration error detected 0x2: Module runtime error detected 0x3: Module not present but it is optional module
		2...3 Module 2	
		4...5 Module 3	
		6...7 Module 4	
		8...9 Module 5	
		10...11 Module 6	
		12...13 Module 7	
		14...15 Module 8	
931	TM2/TM3 bus status	0...1 Module 9	Module status (2 bits per module): 0x0: Module OK 0x1: Module configuration error detected 0x2: Module runtime error detected 0x3: Module not present but it is optional module
		2...3 Module 10	
		4...5 Module 11	
		6...7 Module 12	
		8...9 Module 13	
		10...11 Module 14	
		12...13	Reserved
		14...15	Bus status: 0x0: Bus OK 0x1: Bus configuration error detected 0x2: Bus runtime error detected 0x3: Bus not configured

Register	Function	Bit	Description
932	System State	–	0x0: System is booting. 0x1: TM3 bus is not configured. 0x2: A TM3 configuration is being transferred. 0x3: A valid TM3 configuration has been applied successfully. 0x4: TM3 bus is controlled by Modbus SL IOScanner. 0x5: TM3 bus is controlled by Web server. 0x6: Timeout on fieldbus refresh. 0x7: Firmware update in progress. 0x9: System state transition in progress.
933	TM2/TM3 bus configuration	–	- Bits [0]: Modbus TCP Data consistency 0x0: Disable 0x1: Enable

NOTE: The values of the status registers (900...901, 930...932) reflects the state of the TM3 Bus Coupler and connected TM3 Expansion modules. In Ecostruxure Machine Expert – Basic, these values can be read using their respective %IWN objects. Refer to the Programming Guide of the M221 Logic Controller for details on Input Registers (IOScanner) Objects (%IWN).

Serial Line Bus Coupler Communication Diagnostics

The following table provides information regarding the registers for communication management:

Register	Function	Description
990	Not used	–
991	Number of received messages	Number of messages received
992	Number of sent messages	Number of messages sent
993	Number of non-valid messages	Number of corrupted messages (format error in the request, invalid action or CRC)

USB Configuration

Introduction

To access the Web server through USB, you can download the **SE RNDIS PSX TM3 Bus Coupler Connection** or configure an Ethernet interface of the USB-RNDIS.

Using the SE RNDIS PSX TM3 Bus Coupler Connection

You can download the **SE RNDIS PSX TM3 Bus Coupler Connection** which creates an RNDIS connection automatically.

Configuring the Virtual Ethernet Link

Follow these steps to configure the Ethernet interface of the USB-RNDIS port:

Step	Action
1	Remove power from the bus coupler.
2	Ensure rotary switches are in address setting position, TENS to 0, ONES to 1 (address 1 to 127 are allowed) ⁽¹⁾ .
3	Connect the USB cable to the PC then to the bus coupler.
4	Apply power from the bus coupler.
5	Open Network and sharing center on your PC.
6	Click Change adapter settings > Remote NDIS Compatible Device > Properties .
7	Select Internet Protocol version 4 (TCP/IPv4) .
8	Click Properties .
9	Select Use the following IP address : • IP address: 90.0.0.2 • Subnet mask: 255.0.0.0
10	Click OK .
11	Close the Properties .
12	In the web browser, enter the IP address 90.0.0.1. Result: The Web server is displayed.
(1) For TM3BCSL bus coupler only.	

Modicon TM3 Bus Coupler HTTPS Certificates

Overview

The TM3 bus coupler has an embedded HTTPS server, used to provide secure web communication.

An HTTPS server uses a certificate so that the client can verify server authenticity. For websites connected to the Internet, certificates are normally signed by a trusted certificate authority. Web browsers are then able to verify the authenticity of the Web server by virtue of its certificate.

Modicon TM3 Bus Coupler Self-Signed Certificate

The TM3 bus coupler uses a self-signed certificate. Self-signed certificates must explicitly be accepted by the user when connecting through the web browser.

TM3 bus coupler Certificate Information	
Issued to	TM3BC
Issued by	TM3BC
Validity	30 years

NOTE: You cannot change the certificate information.

Using the Modicon TM3 Bus Coupler Self-Signed Certificate

To prevent the self-signed certificate message from being displayed:

- Add the certificate to the list of exceptions for the web browser
- Enter the prefix https:// in the address when entering the IP address

NOTE: If you enter an http:// prefix, the bus coupler redirects to the https:// prefix.

Updating the Firmware of the Bus Coupler

Overview

To update the firmware of the bus coupler, connect to the Web server. Refer to Ethernet Bus Coupler Web Server, page 49 or Modbus Serial Line Web Server, page 78.

Appendices

Direct TM3 Configuration through Modbus Commands

List of Supported TM3 Modules

The following tables describe the registers and default values for the supported TM3 modules:

- TM3DI8 / TM3DI8G, page 106
- TM3DI16 / TM3DI16G, TM3DI16K, page 106
- TM3DI32K, page 107
- TM3DQ8R / TM3DQ8RG, TM3DQ8T / TM3DQ8TG, TM3DQ8U / TM3DQ8UG, page 108
- TM3DQ16R / TM3DQ16RG, TM3DQ16T / TM3DQ16TG, TM3DQ16TK, TM3DQ16U / TM3DQ16UG, TM3DQ16UK, page 109
- TM3DQ32TK, TM3DQ32UK, page 111
- TM3DM8R / TM3DM8RG, page 114
- TM3DM24R / TM3DM24RG, page 115
- TM3AI2H / TM3AI2HG, page 116
- TM3AI4 / TM3AI4G, page 117
- TM3AI8 / TM3AI8G, page 119
- TM3TI4 / TM3TI4G, page 122
- TM3TI4D / TM3TI4DG, page 124
- TM3TI8T / TM3TI8TG, page 126
- TM3AQ2 / TM3AQ2G, page 131
- TM3AQ4 / TM3AQ4G, page 132
- TM3AM6 / TM3AM6G, page 134
- TM3TM3 / TM3TM3G, page 136

TM3DI8 / TM3DI8G

This table describes the specific address offsets for TM3DI8 / TM3DI8G configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Functional Mode	RW	1	1 = Normal Mode ⁽¹⁾ 2 = Latch and filter Mode ⁽²⁾
1XY09	Input Ch 0 - Filter		5	0 = 0 ms
1XY10	Input Ch 1 - Filter			1 = 0.3 ms
1XY11	Input Ch 2 - Filter			2 = 0.5 ms
1XY12	Input Ch 3 - Filter			3 = 1 ms
1XY13	Input Ch 4 - Filter			4 = 2 ms
1XY14	Input Ch 5 - Filter			5 = 4 ms
1XY15	Input Ch 6 - Filter			6 = 12 ms
1XY16	Input Ch 7 - Filter			
(1) Input Filter settings are not taken into account if Functional Mode is set to 1.				
(2) Module with SV ≥ 2.0.				

TM3DI16 / TM3DI16G, TM3DI16K

This table describes the specific address offsets for TM3DI16 / TM3DI16G and TM3DI16K configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Functional Mode	RW	1	1 = Normal Mode ⁽¹⁾ 2 = Latch and filter Mode ⁽²⁾
1XY09	Input Ch 0 - Filter	RW	5	0 = 0 ms
1XY10	Input Ch 1 - Filter			1 = 0.3 ms
1XY11	Input Ch 2 - Filter			2 = 0.5 ms
1XY12	Input Ch 3 - Filter			3 = 1 ms
1XY13	Input Ch 4 - Filter			4 = 2 ms
1XY14	Input Ch 5 - Filter			5 = 4 ms
1XY15	Input Ch 6 - Filter			6 = 12 ms
1XY16	Input Ch 7 - Filter			
1XY17	Input Ch 8 - Filter			
1XY18	Input Ch 9 - Filter			
1XY19	Input Ch 10 - Filter			
1XY20	Input Ch 11 - Filter			
1XY21	Input Ch 12 - Filter			
1XY22	Input Ch 13 - Filter			
1XY23	Input Ch 14 - Filter			
1XY24	Input Ch 15 - Filter			
(1) Input Filter settings are not taken into account if Functional Mode is set to 1.				
(2) Module with SV ≥ 2.0.				

TM3DI32K

This table describes the specific address offsets for TM3DI32K configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Functional Mode	RW	1	1 = Normal Mode ⁽¹⁾ 2 = Latch and filter Mode ⁽²⁾
1XY09	Input Ch 0 - Filter		5	0 = 0 ms
1XY10	Input Ch 1 - Filter			1 = 0.3 ms
1XY11	Input Ch 2 - Filter			2 = 0.5 ms
1XY12	Input Ch 3 - Filter			3 = 1 ms
1XY13	Input Ch 4 - Filter			4 = 2 ms
1XY14	Input Ch 5 - Filter			5 = 4 ms
1XY15	Input Ch 6 - Filter			6 = 12 ms
1XY16	Input Ch 7 - Filter			
1XY17	Input Ch 8 - Filter			
1XY18	Input Ch 9 - Filter			
1XY19	Input Ch 10 - Filter			
1XY20	Input Ch 11 - Filter			
1XY21	Input Ch 12 - Filter			
1XY22	Input Ch 13 - Filter			
1XY23	Input Ch 14 - Filter			
1XY24	Input Ch 15 - Filter			
1XY25	Input Ch 16 - Filter			
1XY26	Input Ch 17 - Filter			
1XY27	Input Ch 18 - Filter			
1XY28	Input Ch 19 - Filter			
1XY29	Input Ch 20 - Filter			
1XY30	Input Ch 21 - Filter			
1XY31	Input Ch 22 - Filter			
1XY32	Input Ch 23 - Filter			
1XY33	Input Ch 24 - Filter			
1XY34	Input Ch 25 - Filter			
1XY35	Input Ch 26 - Filter			
1XY36	Input Ch 27 - Filter			
1XY37	Input Ch 28 - Filter			
1XY38	Input Ch 29 - Filter			
1XY39	Input Ch 30 - Filter			
1XY40	Input Ch 31 - Filter			
(1) Input Filter settings are not taken into account if Functional Mode is set to 1.				
(2) Module with SV ≥ 2.0.				

TM3DQ8R / TM3DQ8RG, TM3DQ8T / TM3DQ8TG, TM3DQ8U / TM3DQ8UG

This table describes the specific address offsets for TM3DQ8R / TM3DQ8RG, TM3DQ8T / TM3DQ8TG and TM3DQ8U / TM3DQ8UG configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Functional Mode	RW	1	1 = Normal Mode ⁽¹⁾ 2 = Fallback Mode ⁽²⁾
1XY09	Output Ch 0 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY10	Output Ch 0 - Force Value	RW	0	[0 - 1]
1XY11	Output Ch 1 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY12	Output Ch 1 - Force Value	RW	0	[0 - 1]
1XY13	Output Ch 2 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY14	Output Ch 2 - Force Value	RW	0	[0 - 1]
1XY15	Output Ch 3 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY16	Output Ch 3 - Force Value	RW	0	[0 - 1]
1XY17	Output Ch 4 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY18	Output Ch 4 - Force Value	RW	0	[0 - 1]
1XY19	Output Ch 5 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY20	Output Ch 5 - Force Value	RW	0	[0 - 1]
1XY21	Output Ch 6 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY22	Output Ch 6 - Force Value	RW	0	[0 - 1]
1XY23	Output Ch 7 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY24	Output Ch 7 - Force Value	RW	0	[0 - 1]
(1) Output Mode settings are not taken into account if Functional Mode is set to 1.				
(2) Module with SV ≥ 2.0.				

TM3DQ16R / TM3DQ16RG, TM3DQ16T / TM3DQ16TG, TM3DQ16TK, TM3DQ16U / TM3DQ16UG, TM3DQ16UK

This table describes the specific address offsets for TM3DQ16R / TM3DQ16RG, TM3DQ16T / TM3DQ16TG, TM3DQ16TK, TM3DQ16U / TM3DQ16UG and TM3DQ16UK configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Functional Mode	RW	1	1 = Normal Mode ⁽¹⁾ 2 = Fallback Mode ⁽²⁾
1XY09	Output Ch 0 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY10	Output Ch 0 - Force Value	RW	0	[0 - 1]
1XY11	Output Ch 1 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY12	Output Ch 1 - Force Value	RW	0	[0 - 1]
1XY13	Output Ch 2 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY14	Output Ch 2 - Force Value	RW	0	[0 - 1]
1XY15	Output Ch 3 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY16	Output Ch 3 - Force Value	RW	0	[0 - 1]
1XY17	Output Ch 4 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY18	Output Ch 4 - Force Value	RW	0	[0 - 1]
1XY19	Output Ch 5 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY20	Output Ch 5 - Force Value	RW	0	[0 - 1]
1XY21	Output Ch 6 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY22	Output Ch 6 - Force Value	RW	0	[0 - 1]
1XY23	Output Ch 7 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY24	Output Ch 7 - Force Value	RW	0	[0 - 1]
1XY25	Output Ch 8 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY26	Output Ch 8 - Force Value	RW	0	[0 - 1]
1XY27	Output Ch 9 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY28	Output Ch 9 - Force Value	RW	0	[0 - 1]

Address Offset	Description	Access	Default value	Comments
1XY29	Output Ch 10 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY30	Output Ch 10 - Force Value	RW	0	[0 - 1]
1XY31	Output Ch 11 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY32	Output Ch 11 - Force Value	RW	0	[0 - 1]
1XY33	Output Ch 12 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY34	Output Ch 12 - Force Value	RW	0	[0 - 1]
1XY35	Output Ch 13 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY36	Output Ch 13 - Force Value	RW	0	[0 - 1]
1XY37	Output Ch 14 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY38	Output Ch 14 - Force Value	RW	0	[0 - 1]
1XY39	Output Ch 15 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY40	Output Ch 15 - Force Value	RW	0	[0 - 1]
(1) Output Mode settings are not taken into account if Functional Mode is set to 1. (2) Module with SV ≥ 2.0.				

TM3DQ32TK, TM3DQ32UK

This table describes the specific address offsets for TM3DQ32TK and TM3DQ32UK configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Functional Mode	RW	1	1 = Normal Mode ⁽¹⁾ 2 = Fallback Mode ⁽²⁾
1XY09	Output Ch 0 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY10	Output Ch 0 - Force Value	RW	0	[0 - 1]
1XY11	Output Ch 1 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY12	Output Ch 1 - Force Value	RW	0	[0 - 1]
1XY13	Output Ch 2 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY14	Output Ch 2 - Force Value	RW	0	[0 - 1]
1XY15	Output Ch 3 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY16	Output Ch 3 - Force Value	RW	0	[0 - 1]
1XY17	Output Ch 4 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY18	Output Ch 4 - Force Value	RW	0	[0 - 1]
1XY19	Output Ch 5 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY20	Output Ch 5 - Force Value	RW	0	[0 - 1]
1XY21	Output Ch 6 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY22	Output Ch 6 - Force Value	RW	0	[0 - 1]
1XY23	Output Ch 7 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY24	Output Ch 7 - Force Value	RW	0	[0 - 1]
1XY25	Output Ch 8 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY26	Output Ch 8 - Force Value	RW	0	[0 - 1]
1XY27	Output Ch 9 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY28	Output Ch 9 - Force Value	RW	0	[0 - 1]
1XY29	Output Ch 10 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾

Address Offset	Description	Access	Default value	Comments
1XY30	Output Ch 10 - Force Value	RW	0	[0 - 1]
1XY31	Output Ch 11 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY32	Output Ch 11 - Force Value	RW	0	[0 - 1]
1XY33	Output Ch 12 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY34	Output Ch 12 - Force Value	RW	0	[0 - 1]
1XY35	Output Ch 13 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY36	Output Ch 13 - Force Value	RW	0	[0 - 1]
1XY37	Output Ch 14 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY38	Output Ch 14 - Force Value	RW	0	[0 - 1]
1XY39	Output Ch 15 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY40	Output Ch 15 - Force Value	RW	0	[0 - 1]
1XY41	Output Ch 16 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY42	Output Ch 16 - Force Value	RW	0	[0 - 1]
1XY43	Output Ch 17 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY44	Output Ch 17 - Force Value	RW	0	[0 - 1]
1XY45	Output Ch 18 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY46	Output Ch 18 - Force Value	RW	0	[0 - 1]
1XY47	Output Ch 19 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY48	Output Ch 19 - Force Value	RW	0	[0 - 1]
1XY49	Output Ch 20 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY50	Output Ch 20 - Force Value	RW	0	[0 - 1]
1XY51	Output Ch 21 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY52	Output Ch 21 - Force Value	RW	0	[0 - 1]
1XY53	Output Ch 22 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY54	Output Ch 22 - Force Value	RW	0	[0 - 1]

Address Offset	Description	Access	Default value	Comments
1XY55	Output Ch 23 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY56	Output Ch 23 - Force Value	RW	0	[0 - 1]
1XY57	Output Ch 24 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY58	Output Ch 24 - Force Value	RW	0	[0 - 1]
1XY59	Output Ch 25 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY60	Output Ch 25 - Force Value	RW	0	[0 - 1]
1XY61	Output Ch 26 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY62	Output Ch 26 - Force Value	RW	0	[0 - 1]
1XY63	Output Ch 27 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY64	Output Ch 27 - Force Value	RW	0	[0 - 1]
1XY65	Output Ch 28 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY66	Output Ch 28 - Force Value	RW	0	[0 - 1]
1XY67	Output Ch 29 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY68	Output Ch 29 - Force Value	RW	0	[0 - 1]
1XY69	Output Ch 30 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY70	Output Ch 30 - Force Value	RW	0	[0 - 1]
1XY71	Output Ch 31 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY72	Output Ch 31 - Force Value	RW	0	[0 - 1]
(1) Output Mode settings are not taken into account if Functional Mode is set to 1.				
(2) Module with SV ≥ 2.0.				

TM3DM8R / TM3DM8RG

This table describes the specific address offsets for TM3DM8R / TM3DM8RG configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Functional Mode	RW	1	1 = Normal Mode ⁽¹⁾ 2 = Latch, filter and fallback Mode ⁽²⁾
1XY09	Input Ch 0 - Filter	RW	5	0 = 0 ms 1 = 0.3 ms 2 = 0.5 ms 3 = 1 ms 4 = 2 ms 5 = 4 ms 6 = 12 ms
1XY10	Input Ch 1 - Filter	RW	5	
1XY11	Input Ch 2 - Filter	RW	5	
1XY12	Input Ch 3 - Filter	RW	5	
1XY13	Output Ch 0 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY14	Output Ch 0 - Force Value	RW	0	[0 - 1]
1XY15	Output Ch 1 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY16	Output Ch 1 - Force Value	RW	0	[0 - 1]
1XY17	Output Ch 2 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY18	Output Ch 2 - Force Value	RW	0	[0 - 1]
1XY19	Output Ch 3 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY20	Output Ch 3 - Force Value	RW	0	[0 - 1]
(1) Input Filter and Output Mode settings are not taken into account if Functional Mode is set to 1.				
(2) Module with SV ≥ 2.0.				

TM3DM24R / TM3DM24RG

This table describes the specific address offsets for TM3DM24R / TM3DM24RG configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Functional Mode	RW	1	1 = Normal Mode ⁽¹⁾ 2 = Latch, filter and fallback Mode ⁽²⁾
1XY09	Input Ch 0 - Filter	RW	5	0 = 0 ms
1XY10	Input Ch 1 - Filter			1 = 0.3 ms
1XY11	Input Ch 2 - Filter			2 = 0.5 ms
1XY12	Input Ch 3 - Filter			3 = 1 ms
1XY13	Input Ch 4 - Filter			4 = 2 ms
1XY14	Input Ch 5 - Filter			5 = 4 ms
1XY15	Input Ch 6 - Filter			6 = 12 ms
1XY16	Input Ch 7 - Filter			
1XY17	Input Ch 8 - Filter			
1XY18	Input Ch 9 - Filter			
1XY19	Input Ch 10 - Filter			
1XY20	Input Ch 11 - Filter			
1XY21	Input Ch 12 - Filter			
1XY22	Input Ch 13 - Filter			
1XY23	Input Ch 14 - Filter			
1XY24	Input Ch 15 - Filter			
1XY25	Output Ch 0 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY26	Output Ch 0 - Force Value	RW	0	[0 - 1]
1XY27	Output Ch 1 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY28	Output Ch 1 - Force Value	RW	0	[0 - 1]
1XY29	Output Ch 2 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY30	Output Ch 2 - Force Value	RW	0	[0 - 1]
1XY31	Output Ch 3 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY32	Output Ch 3 - Force Value	RW	0	[0 - 1]
1XY33	Output Ch 4 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY34	Output Ch 4 - Force Value	RW	0	[0 - 1]
1XY35	Output Ch 5 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY36	Output Ch 5 - Force Value	RW	0	[0 - 1]

Address Offset	Description	Access	Default value	Comments
1XY37	Output Ch 6 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY38	Output Ch 6 - Force Value	RW	0	[0 - 1]
1XY39	Output Ch 7 - Mode	RW	1	0 = Maintain Mode 1 = Fallback Mode ⁽²⁾
1XY40	Output Ch 7 - Force Value	RW	0	[0 - 1]
(1) Input Filter and Output Mode settings are not taken into account if Functional Mode is set to 1.				
(2) Module with SV ≥ 2.0.				

TM3AI2H / TM3AI2HG

This table describes the specific address offsets for TM3AI2H / TM3AI2HG configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Diagnostics Enabled	RW	1	0 = Disable 1 = Enable
1XY09	Ch 0 - Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY10	Ch 0 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY11	Ch 0 - Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY12	Ch 0 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY13	Ch 0 - Sampling	RW	0	0 = 1 ms/channel
1XY14	Ch 1 - Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY15	Ch 1 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY16	Ch 1 - Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY17	Ch 1 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY18	Ch 1 - Sampling	RW	0	0 = 1 ms/channel
(1) Minimum value must be less than maximum value.				
(2) Maximum value must be greater than minimum value.				

TM3AI4 / TM3AI4G

This table describes the specific address offsets for TM3AI4 / TM3AI4G configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Diagnostics Enabled	RW	1	0 = Disable 1 = Enable
1XY09	Ch 0 - Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY10	Ch 0 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY11	Ch 0 - Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY12	Ch 0 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY13	Ch 0 - Sampling	RW	0	0 = 1 ms/channel 1 = 10 ms/channel
1XY14	Ch 1 – Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY15	Ch 1 – Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY16	Ch 1 – Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY17	Ch 1 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY18	Ch 1 - Sampling	RW	0	0 = 1 ms/channel 1 = 10 ms/channel
1XY19	Ch 2 – Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY20	Ch 2 – Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY21	Ch 2 – Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY22	Ch 2 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY23	Ch 2 – Sampling	RW	0	0 = 1 ms/channel 1 = 10 ms/channel
1XY24	Ch 3 – Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA

Address Offset	Description	Access	Default value	Comments
1XY25	Ch 3 – Minimum	RW	-32768	-32767...32767 ⁽²⁾
1XY26	Ch 3 – Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY27	Ch 3 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY28	Ch 3 - Sampling	RW	0	0 = 1 ms/channel 1 = 10 ms/channel
(1) Minimum value must be less than maximum value. (2) Maximum value must be greater than minimum value.				

TM3AI8 / TM3AI8G

These tables describe the specific address offsets and type/scope inputs for TM3AI8 / TM3AI8G configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Diagnostics Enabled	RW	1	0 = Disable 1 = Enable
1XY09	Ch 0 - Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA 5 = 0...20 mA extended range 6 = 4...20 mA extended range
1XY10	Ch 0 - Minimum	RW	-32768	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽¹⁾ .
1XY11	Ch 0 - Maximum	RW	32767	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽²⁾ .
1XY12	Ch 0 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY13	Ch 0 - Sampling	RW	0	0 = 1 ms/channel 1 = 10 ms/channel
1XY14	Ch 1 – Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA 5 = 0...20 mA extended range 6 = 4...20 mA extended range
1XY15	Ch 1 – Minimum	RW	-32768	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽¹⁾ .
1XY16	Ch 1 – Maximum	RW	32767	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽²⁾ .
1XY17	Ch 1 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY18	Ch 1 - Sampling	RW	0	0 = 1 ms/channel 1 = 10 ms/channel
1XY19	Ch 2 – Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA 5 = 0...20 mA extended range 6 = 4...20 mA extended range
1XY20	Ch 2 – Minimum	RW	-32768	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽¹⁾ .

Address Offset	Description	Access	Default value	Comments
1XY21	Ch 2 – Maximum	RW	32767	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽²⁾ .
1XY22	Ch 2 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY23	Ch 2 – Sampling	RW	0	0 = 1 ms/channel 1 = 10 ms/channel
1XY24	Ch 3 – Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA 5 = 0...20 mA extended range 6 = 4...20 mA extended range
1XY25	Ch 3 – Minimum	RW	-32768	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽¹⁾ .
1XY26	Ch 3 – Maximum	RW	32767	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽²⁾ .
1XY27	Ch 3 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY28	Ch 3 - Sampling	RW	0	0 = 1 ms/channel 1 = 10 ms/channel
1XY29	Ch 4 – Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA 5 = 0...20 mA extended range 6 = 4...20 mA extended range
1XY30	Ch 4 – Minimum	RW	-32768	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽¹⁾ .
1XY31	Ch 4 – Maximum	RW	32767	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽²⁾ .
1XY32	Ch 4 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY33	Ch 4 - Sampling	RW	0	0 = 1 ms/channel 1 = 10 ms/channel
1XY34	Ch 5 – Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA 5 = 0...20 mA extended range 6 = 4...20 mA extended range
1XY35	Ch 5 – Minimum	RW	-32768	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽¹⁾ .

Address Offset	Description	Access	Default value	Comments
1XY36	Ch 5 – Maximum	RW	32767	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽²⁾ .
1XY37	Ch 5 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY38	Ch 5 - Sampling	RW	0	0 = 1 ms/channel 1 = 10 ms/channel
1XY39	Ch 6 – Type	RW	0	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽¹⁾ .
1XY40	Ch 6 – Minimum	RW	-32768	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽²⁾ .
1XY41	Ch 6 – Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY42	Ch 6 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY43	Ch 6 - Sampling	RW	0	0 = 1 ms/channel 1 = 10 ms/channel
1XY44	Ch 7 – Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA 5 = 0...20 mA extended range 6 = 4...20 mA extended range
1XY45	Ch 7 – Minimum	RW	-32768	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽¹⁾ .
1XY46	Ch 7 – Maximum	RW	32767	Values depend on input type. Refer to the Type/Scope Input Table , page 121 ⁽²⁾ .
1XY47	Ch 7 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY48	Ch 7 - Sampling	RW	0	0 = 1 ms/channel 1 = 10 ms/channel
(1) Minimum value must be less than maximum value.				
(2) Maximum value must be greater than minimum value.				

Type/Scope Input Table

Modbus Register value	Input Type	Minimum	Maximum
1	0...10 V	-32767	32767
2	-10...10 V		
3	0...20 mA		
4	4...20 mA		
5	0...20 mA extended range	0	23540
6	4...20 mA extended range	1200	23170
NOTE: The 12-bit data (0...4095) processed in the analog I/O module can be linear-converted to a value between -32768 and 32767. NOTE: The extended ranges are supported by modules from product version (PV) 03, firmware version (SV) 1.4.			

TM3TI4 / TM3TI4G

These tables describe the specific address offsets and type/scope inputs for TM3TI4 / TM3TI4G configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Diagnostics Enabled	RW	1	0 = Disable 1 = Enable
1XY09	Ch 0 - Type	RW	0	Refer to the Type/Scope Input Table , page 123 for supported values for the selected type/range.
1XY10	Ch 0 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit
1XY11	Ch 0 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 123 for supported values for the selected type/range.
1XY12	Ch 0 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 123 for supported values for the selected type/range.
1XY13	Ch 0 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY14	Ch 0 - Sampling	RW	0	0 = 100 ms/channel 1 = 10 ms/channel
1XY15	Ch 1 - Type	RW	0	Refer to the Type/Scope Input Table , page 123 for supported values for the selected type/range.
1XY16	Ch 1 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit
1XY17	Ch 1 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 123 for supported values for the selected type/range.
1XY18	Ch 1 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 123 for supported values for the selected type/range.
1XY19	Ch 1 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY20	Ch 1 - Sampling	RW	0	0 = 100 ms/channel 1 = 10 ms/channel
1XY21	Ch 2 - Type	RW	0	Refer to the Type/Scope Input Table , page 123 for supported values for the selected type/range.
1XY22	Ch 2 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit
1XY23	Ch 2 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 123 for supported values for the selected type/range.
1XY24	Ch 2 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 123 for supported values for the selected type/range.
1XY25	Ch 2 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY26	Ch 2 - Sampling	RW	0	0 = 100 ms/channel 1 = 10 ms/channel

Address Offset	Description	Access	Default value	Comments
1XY27	Ch 3 – Type	RW	0	Refer to the Type/Scope Input Table , page 123 for supported values for the selected type/range.
1XY28	Ch 3 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit
1XY29	Ch 3 – Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 123 for supported values for the selected type/range.
1XY30	Ch 3 – Maximum	RW	32767	Refer to the Type/Scope Input Table , page 123 for supported values for the selected type/range.
1XY31	Ch 3 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY32	Ch 3 - Sampling	RW	0	0 = 100 ms/channel 1 = 10 ms/channel

Type/Scope Input Table

Modbus Register value	Input Type	Scope: 1 = Normal	Scope: 2 = Celsius (0.1 °C)		Scope: 3 = Fahrenheit (0.1 °F, except Thermocouples Type B and C)	
		Range	Minimum	Maximum	Minimum	Maximum
0	NOT USED	–	–	–	–	–
1	Voltage 0...10 V	-32768...32767				
2	Voltage -10...+10 V					
3	Current Input 0...20 mA					
4	Current Input 4...20 mA					
7	K Thermocouple		-2000	13000	-3280	23720
8	J Thermocouple		-2000	10000	-3280	18320
9	R Thermocouple		0	17600	320	32000
10	S Thermocouple		0	17600	320	32000
11	B Thermocouple		0	18200	Not supported ⁽¹⁾ .	
12	E Thermocouple		-2000	8000	-3280	14720
13	T Thermocouple		-2000	4000	-3280	7520
14	N Thermocouple		-2000	13000	-3280	23720
15	C Thermocouple		0	23150	Not supported ⁽²⁾ .	
16	Pt100 RTD		-2000	8500	-3280	15620
17	Pt1000 RTD		-2000	6000	-3280	11120
18	Ni100 RTD		-600	1800	-760	3560
19	Ni1000 RTD		-600	1800	-760	3560

(1) For **Type B** in Fahrenheit, set Scope to *Normal*, with Minimum = 160 and Maximum = 16540. The unit of measure for this configuration is 0.2 °F.

(2) For **Type C** in Fahrenheit, set Scope to *Normal*, with Minimum = 160 and Maximum = 20995. The unit of measure for this configuration is 0.2 °F.

TM3TI4D / TM3TI4DG

These tables describe the specific address offsets and type/scope inputs for TM3TI4D / TM3TI4DG:

Address Offset	Description	Access	Default value	Comments
1XY08	Diagnostics Enabled	RW	1	0 = Disable 1 = Enable
1XY09	Ch 0- Type	RW	0	Refer to the Type/Scope Input Table , page 125 for supported values for the selected type/range.
1XY10	Ch 0 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit
1XY11	Ch 0 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 125 for supported values for the selected type/range.
1XY12	Ch 0 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 125 for supported values for the selected type/range.
1XY13	Ch 0 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY14	Ch 0 - Sampling	RW	0	0 = 100 ms/channel
1XY15	Ch 1 – Type	RW	0	Refer to the Type/Scope Input Table , page 125 for supported values for the selected type/range.
1XY16	Ch 1 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit
1XY17	Ch 1 – Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 125 for supported values for the selected type/range.
1XY18	Ch 1 – Maximum	RW	32767	Refer to the Type/Scope Input Table , page 125 for supported values for the selected type/range.
1XY19	Ch 1 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY20	Ch 1 - Sampling	RW	0	0 = 100 ms/channel
1XY21	Ch 2 – Type	RW	0	Refer to the Type/Scope Input Table , page 125 for supported values for the selected type/range.
1XY22	Ch 2 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit
1XY23	Ch 2 – Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 125 for supported values for the selected type/range.
1XY24	Ch 2 – Maximum	RW	32767	Refer to the Type/Scope Input Table , page 125 for supported values for the selected type/range.
1XY25	Ch 2 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY26	Ch 2 – Sampling	RW	0	0 = 100 ms/channel
1XY27	Ch 3 – Type	RW	0	Refer to the Type/Scope Input Table , page 125 for supported values for the selected type/range.

Address Offset	Description	Access	Default value	Comments
1XY28	Ch 3 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit
1XY29	Ch 3 – Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 125 for supported values for the selected type/range.
1XY30	Ch 3 – Maximum	RW	32767	Refer to the Type/Scope Input Table , page 125 for supported values for the selected type/range.
1XY31	Ch 3 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY32	Ch 3 - Sampling	RW	0	0 = 100 ms/channel

Type/Scope Input Table

Modbus Register value	Input Type	Scope: 1 = Normal	Scope: 2 = Celsius (0.1 °C)		Scope: 3 = Fahrenheit (0.1 °F, except Thermocouples Type B and C)	
		Range	Minimum	Maximum	Minimum	Maximum
0	NOT USED	–	–	–	–	–
7	K Thermocouple	-32768...32767	-2000	13000	-3280	23720
8	J Thermocouple		-2000	10000	-3280	18320
9	R Thermocouple		0	17600	320	32000
10	S Thermocouple		0	17600	320	32000
11	B Thermocouple		0	18200	Not supported ⁽¹⁾ .	
12	E Thermocouple		-2000	8000	-3280	14720
13	T Thermocouple		-2000	4000	-3280	7520
14	N Thermocouple		-2000	13000	-3280	23720
15	C Thermocouple		0	23150	Not supported ⁽²⁾ .	

(1) For **Type B** in Fahrenheit, set Scope to *Normal*, with Minimum = 160 and Maximum = 16540. The unit of measure for this configuration is 0.2 °F.

(2) For **Type C** in Fahrenheit, set Scope to *Normal*, with Minimum = 160 and Maximum = 20995. The unit of measure for this configuration is 0.2 °F.

TM3TI8T / TM3TI8TG

These tables describe the specific address offsets and type/scope inputs for TM3TI8T / TM3TI8TG:

Address Offset	Description	Access	Default value	Comments
1XY08	Diagnostics Enabled	RW	1	0 = Disable 1 = Enable
1XY09	Ch 0 - Type	RW	0	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY10	Ch 0 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit 4 = Threshold 5 = Resistance
1XY11	Ch 0 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY12	Ch 0 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY13	Ch 0 - Rref	RW	330	Reference resistance in ohm at reference temperature (used only with NTC Thermistor). Values: 1...65535 Ω.
1XY14	Ch 0 - Tref	RW	25	Reference temperature value in Celsius (used only with NTC Thermistor). Values: 1...1000 °C.
1XY15	Ch 0 - Beta	RW	3569	Sensitivity of NTC thermistor in Kelvin (used only with NTC Thermistor). Values: 1...32767 K.
1XY16	Ch 0 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY17	Ch 0 - Sampling	RW	0	0 = 100 ms/channel
1XY18	Ch 0 - High threshold	RW	3100	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY19	Ch 0 - Low threshold	RW	1500	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY20	Ch 1 - Type	RW	0	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY21	Ch 1 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit 4 = Threshold 5 = Resistance
1XY22	Ch 1 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY23	Ch 1 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY24	Ch 1 - Rref	RW	330	Reference resistance in ohm at reference temperature (used only with NTC Thermistor). Values: 1...65535 Ω.
1XY25	Ch 1 - Tref	RW	25	Reference temperature value in Celsius (used only with NTC Thermistor). Values: 1...1000 °C.
1XY26	Ch 1 - Beta	RW	3569	Sensitivity of NTC thermistor in Kelvin (used only with NTC Thermistor). Values: 1...32767 K.

Address Offset	Description	Access	Default value	Comments
1XY27	Ch 1 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY28	Ch 1 - Sampling	RW	0	0 = 100 ms/channel
1XY29	Ch 1 - High threshold	RW	3100	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY30	Ch 1 - Low threshold	RW	1500	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY31	Ch 2 - Type	RW	0	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY32	Ch 2 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit 4 = Threshold 5 = Resistance
1XY33	Ch 2 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY34	Ch 2 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY35	Ch 2 - Rref	RW	330	Reference resistance in Ohm at reference temperature (used only with NTC Thermistor). Values: 1...65535 Ω.
1XY36	Ch 2 - Tref	RW	25	Reference temperature value in Celsius (used only with NTC Thermistor). Values: 1...1000 °C.
1XY37	Ch 2 - Beta	RW	3569	Sensitivity of NTC thermistor in Kelvin (used only with NTC Thermistor). Values: 1...32767 K.
1XY38	Ch 2 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY39	Ch 2 - Sampling	RW	0	0 = 100 ms/channel
1XY40	Ch 2 - High threshold	RW	3100	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY41	Ch 2 - Low threshold	RW	1500	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY42	Ch 3 - Type	RW	0	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY43	Ch 3 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit 4 = Threshold 5 = Resistance
1XY44	Ch 3 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY45	Ch 3 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY46	Ch 3 - Rref	RW	330	Reference resistance in ohm at reference temperature (used only with NTC Thermistor). Values: 1...65535 Ω.
1XY47	Ch 3 - Tref	RW	25	Reference temperature value in Celsius (used only with NTC Thermistor). Values: 1...1000 °C.
1XY48	Ch 3 - Beta	RW	3569	Sensitivity of NTC thermistor in Kelvin (used only with NTC Thermistor). Values: 1...32767 K.

Address Offset	Description	Access	Default value	Comments
1XY49	Ch 3 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY50	Ch 3 - Sampling	RW	0	0 = 100 ms/channel
1XY51	Ch 3 - High threshold	RW	3100	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY52	Ch 3 - Low threshold	RW	1500	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY53	Ch 4 - Type	RW	0	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY54	Ch 4 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit 4 = Threshold 5 = Resistance
1XY55	Ch 4 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY56	Ch 4 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY57	Ch 4 - Rref	RW	330	Reference resistance in ohm at reference temperature (used only with NTC Thermistor). Values: 1...65535 Ω.
1XY58	Ch 4 - Tref	RW	25	Reference temperature value in Celsius (used only with NTC Thermistor). Values: 1...1000 °C.
1XY59	Ch 4 - Beta	RW	3569	Sensitivity of NTC thermistor in Kelvin (used only with NTC Thermistor). Values: 1...32767 K.
1XY60	Ch 4 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY61	Ch 4 - Sampling	RW	0	0 = 100 ms/channel
1XY62	Ch 4 - High threshold	RW	3100	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY63	Ch 4 - Low threshold	RW	1500	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY64	Ch 5 - Type	RW	0	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY65	Ch 5 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit 4 = Threshold 5 = Resistance
1XY66	Ch 5 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY67	Ch 5 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY68	Ch 5 - Rref	RW	330	Reference resistance in ohm at reference temperature (used only with NTC Thermistor). Values: 1...65535 Ω.
1XY69	Ch 5 - Tref	RW	25	Reference temperature value in Celsius (used only with NTC Thermistor). Values: 1...1000 °C.
1XY70	Ch 5 - Beta	RW	3569	Sensitivity of NTC thermistor in Kelvin (used only with NTC Thermistor). Values: 1...32767 K.

Address Offset	Description	Access	Default value	Comments
1XY71	Ch 5 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY72	Ch 5 - Sampling	RW	0	0 = 100 ms/channel
1XY73	Ch 5 - High threshold	RW	3100	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY74	Ch 5 - Low threshold	RW	1500	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY75	Ch 6 - Type	RW	0	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY76	Ch 6 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit 4 = Threshold 5 = Resistance
1XY77	Ch 6 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY78	Ch 6 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY79	Ch 6 - Rref	RW	330	Reference resistance in ohm at reference temperature (used only with NTC Thermistor). Values: 1...65535 Ω.
1XY80	Ch 6 - Tref	RW	25	Reference temperature value in Celsius (used only with NTC Thermistor). Values: 1...1000 °C.
1XY81	Ch 6 - Beta	RW	3569	Sensitivity of NTC thermistor in Kelvin (used only with NTC Thermistor). Values: 1...32767 K.
1XY82	Ch 6 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY83	Ch 6 - Sampling	RW	0	0 = 100 ms/channel
1XY84	Ch 6 - High threshold	RW	3100	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY85	Ch 6 - Low threshold	RW	1500	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY86	Ch 7 - Type	RW	0	Refer to the Type/Scope Input Table , page 130 for supported values for the selected types.
1XY87	Ch 7 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit 4 = Threshold 5 = Resistance
1XY88	Ch 7 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY89	Ch 7 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY90	Ch 7 - Rref	RW	330	Reference resistance in ohm at reference temperature (used only with NTC Thermistor). Values: 1...65535 Ω.
1XY91	Ch 7 - Tref	RW	25	Reference temperature value in Celsius (used only with NTC Thermistor). Values: 1...1000 °C.
1XY92	Ch 7 - Beta	RW	3569	Sensitivity of NTC thermistor in Kelvin (used only with NTC Thermistor). Values: 1...32767 K.

Address Offset	Description	Access	Default value	Comments
1XY93	Ch 7 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY94	Ch 7 - Sampling	RW	0	0 = 100 ms/channel
1XY95	Ch 7 - High threshold	RW	3100	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.
1XY96	Ch 7 - Low threshold	RW	1500	Refer to the Type/Scope Input Table , page 130 for supported values for the selected type/range.

Type/Scope Input Table

Modbus Register value	Input Type	Scope: 1 = Normal	Scope: 2 = Celsius (0.1 °C)		Scope: 3 = Fahrenheit (0.1 °F, except Thermocouples Type B and C)		Scope: 4 = Threshold	Scope: 5 = Resistance (Ω)	
		Range	Mini- mum	Maxi- mum	Mini- mum	Maxi- mum	Low / High Threshold Range	Mini- mum	Maxi- mum
0	NOT USED	–	–	–	–	–	–	–	–
7	K Thermo-couple	-32768...32767	-2000	13000	-3280	23720			
8	J Thermo-couple		-2000	10000	-3280	18320			
9	R Thermo-couple		0	17600	320	32000			
10	S Thermo-couple		0	17600	320	32000			
11	B Thermo-couple		0	18200	Not supported ⁽¹⁾ .				
12	E Thermo-couple		-2000	8000	-3280	14720			
13	T Thermo-couple		-2000	4000	-3280	7520			
14	N Thermo-couple		-2000	13000	-3280	23720			
15	C Thermo-couple		0	23150	Not supported ⁽²⁾ .				
20	NTC Thermis- tor		-789	580	-1101	1364			
21	PTC Thermis- tor	–	–	–	–	100...10000			
22	Ohmme- ter	–				–	100	32000	

(1) For **Type B** in Fahrenheit, set Scope to *Normal*, with Minimum = 160 and Maximum = 16540. The unit of measure for this configuration is 0.2 °F.

(2) For **Type C** in Fahrenheit, set Scope to *Normal*, with Minimum = 160 and Maximum = 20995. The unit of measure for this configuration is 0.2 °F.

TM3AQ2 / TM3AQ2G

This table describes the specific address offsets for TM3AQ2 / TM3AQ2G configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Diagnostics Enabled	RW	1	0 = Disable 1 = Enable
1XY09	Ch 0 - Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY10	Ch 0 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY11	Ch 0 - Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY12	Ch 0 - Fallback Value	RW	0	The fallback value must be equal to or greater than the minimum value configured but less than or equal to the maximum value configured.
1XY13	Ch 1 - Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY14	Ch 1 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY15	Ch 1 - Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY16	Ch 1 - Fallback Value	RW	0	The fallback value must be equal to or greater than the minimum value configured but less than or equal to the maximum value configured.
(1) Minimum value must be less than maximum value.				
(2) Maximum value must be greater than minimum value.				

TM3AQ4 / TM3AQ4G

This table describes the specific address offsets for TM3AQ4 / TM3AQ4G configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Diagnostics Enabled	RW	1	0 = Disable 1 = Enable
1XY09	Ch 0 - Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY10	Ch 0 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY11	Ch 0 - Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY12	Ch 0 - Fallback Value	RW	0	The fallback value must be equal to or greater than the minimum value configured but less than or equal to the maximum value configured.
1XY13	Ch 1 -Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY14	Ch 1 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY15	Ch 1 - Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY16	Ch 1 - Fallback Value	RW	0	The fallback value must be equal to or greater than the minimum value configured but less than or equal to the maximum value configured.
1XY17	Ch 2 - Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY18	Ch 2 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY19	Ch 2 - Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY20	Ch 2 - Fallback Value	RW	0	The fallback value must be equal to or greater than the minimum value configured but less than or equal to the maximum value configured.
1XY21	Ch 3 - Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY22	Ch 3 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY23	Ch 3 - Maximum	RW	32767	-32767...32767 ⁽²⁾

Address Offset	Description	Access	Default value	Comments
1XY24	Ch 3 - Fallback Value	RW	0	The fallback value must be equal to or greater than the minimum value configured but less than or equal to the maximum value configured.
(1) Minimum value must be less than maximum value. (2) Maximum value must be greater than minimum value.				

TM3AM6 / TM3AM6G

This table describes the specific address offsets for TM3AM6 / TM3AM6G configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Diagnostics Enabled	RW	1	0 = Disable 1 = Enable
1XY09	Input Ch 0 - Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY10	Input Ch 0 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY11	Input Ch 0 - Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY12	Input Ch 0 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY13	Input Ch 0 - Sampling	RW	0	0 = 100 ms/channel 1 = 10 ms/channel
1XY14	Input Ch 1 – Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY15	Input Ch 1 – Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY16	Input Ch 1 – Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY17	Input Ch 1 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY18	Input Ch 1 - Sampling	RW	0	0 = 100 ms/channel 1 = 10 ms/channel
1XY19	Input Ch 2 – Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY20	Input Ch 2 – Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY21	Input Ch 2 – Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY22	Input Ch 2 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY23	Input Ch 2 – Sampling	RW	0	0 = 100 ms/channel 1 = 10 ms/channel
1XY24	Input Ch 3 – Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA

Address Offset	Description	Access	Default value	Comments
1XY25	Input Ch 3 – Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY26	Input Ch 3 – Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY27	Input Ch 3 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY28	Input Ch 3 - Sampling	RW	0	0 = 100 ms/channel 1 = 10 ms/channel
1XY29	Output Ch 0 - Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY30	Output Ch 0 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY31	Output Ch 0 - Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY32	Output Ch 0 - Fallback Value	RW	0	The fallback value must be equal to or greater than the minimum value configured but less than or equal to the maximum value configured.
1XY33	Output Ch 1 -Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY34	Output Ch 1 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY35	Output Ch 1 - Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY36	Output Ch 1 - Fallback Value	RW	0	The fallback value must be equal to or greater than the minimum value configured but less than or equal to the maximum value configured.
(1) Minimum value must be less than maximum value.				
(2) Maximum value must be greater than minimum value.				

TM3TM3 / TM3TM3G

These tables describe the specific address offsets and type/scope inputs for TM3TM3 / TM3TM3G configuration:

Address Offset	Description	Access	Default value	Comments
1XY08	Diagnostics Enabled	RW	1	0 = Disable 1 = Enable
1XY09	Input Ch 0 - Type	RW	0	Refer to the Type/Scope Input Table , page 137 for supported values for the selected type/range.
1XY10	Input Ch 0 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit
1XY11	Input Ch 0 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 137 for supported values for the selected type/range.
1XY12	Input Ch 0 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 137 for supported values for the selected type/range.
1XY13	Input Ch 0 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY14	Input Ch 0 - Sampling	RW	0	0 = 100 ms/channel 1 = 10 ms/channel
1XY15	Input Ch 1 - Type	RW	0	Refer to the Type/Scope Input Table , page 137 for supported values for the selected type/range.
1XY16	Input Ch 1 - Scope	RW	0	0 = Not used 1 = Normal 2 = Celsius 3 = Fahrenheit
1XY17	Input Ch 1 - Minimum	RW	-32768	Refer to the Type/Scope Input Table , page 137 for supported values for the selected type/range.
1XY18	Input Ch 1 - Maximum	RW	32767	Refer to the Type/Scope Input Table , page 137 for supported values for the selected type/range.
1XY19	Input Ch 1 - Input filter	RW	0	0...1000 Unit: x 10 ms
1XY20	Input Ch 1 - Sampling	RW	0	0 = 100 ms/channel 1 = 10 ms/channel
1XY21	Output Ch 0 - Type	RW	0	0 = Not used 1 = 0...10 V 2 = -10...+10 V 3 = 0...20 mA 4 = 4...20 mA
1XY22	Output Ch 0 - Minimum	RW	-32768	-32768...32766 ⁽¹⁾
1XY23	Output Ch 0 - Maximum	RW	32767	-32767...32767 ⁽²⁾
1XY24	Output Ch 0 - Fallback Value	RW	0	The fallback value must be equal to or greater than the minimum value configured but less than or equal to the maximum value configured.
(1) Minimum value must be less than maximum value.				
(2) Maximum value must be greater than minimum value.				

Type/Scope Input Table

Modbus Register value	Input Type	Scope: 1 = Normal	Scope: 2 = Celsius (0.1 °C)		Scope: 3 = Fahrenheit (0.1 °F, except Thermocouples Type B and C)	
		Range	Minimum	Maximum	Minimum	Maximum
0	NOT USED	–	–	–	–	–
1	Voltage 0...10 V	-32768...32767				
2	Voltage -10...+10 V					
3	Current Input 0...20 mA					
4	Current Input 4...20 mA					
7	K Thermocouple		-2000	13000	-3280	23720
8	J Thermocouple		-2000	10000	-3280	18320
9	R Thermocouple		0	17600	320	32000
10	S Thermocouple		0	17600	320	32000
11	B Thermocouple		0	18200	Not supported ⁽¹⁾ .	
12	E Thermocouple		-2000	8000	-3280	14720
13	T Thermocouple		-2000	4000	-3280	7520
14	N Thermocouple		-2000	13000	-3280	23720
15	C Thermocouple		0	23150	Not supported ⁽²⁾ .	
16	Pt100 RTD		-2000	8500	-3280	15620
17	Pt1000 RTD		-2000	6000	-3280	11120
18	Ni100 RTD		-600	1800	-760	3560
19	Ni1000 RTD		-600	1800	-760	3560
(1) For Type B in Fahrenheit, set Scope to <i>Normal</i> , with Minimum = 160 and Maximum = 16540. The unit of measure for this configuration is 0.2 °F.						
(2) For Type C in Fahrenheit, set Scope to <i>Normal</i> , with Minimum = 160 and Maximum = 20995. The unit of measure for this configuration is 0.2 °F.						

Glossary

A

application:

A program including configuration data, symbols, and documentation.

ARP:

(*address resolution protocol*) An IP network layer protocol for Ethernet that maps an IP address to a MAC (hardware) address.

B

BOOTP:

(*bootstrap protocol*) A UDP network protocol that can be used by a network client to automatically obtain an IP address (and possibly other data) from a server. The client identifies itself to the server using the client MAC address. The server, which maintains a pre-configured table of client device MAC addresses and associated IP addresses, sends the client its pre-configured IP address. BOOTP was originally used as a method that enabled diskless hosts to be remotely booted over a network. The BOOTP process assigns an infinite lease of an IP address. The BOOTP service utilizes UDP ports 67 and 68.

C

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.

controller:

Automates industrial processes (also known as programmable logic controller or programmable controller).

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.)

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.

Ethernet:

A physical and data link layer technology for LANs, also known as IEEE 802.3.

expansion bus:

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

F

firmware:

Represents the BIOS, data parameters, and programming instructions that constitute the operating system on a controller. The firmware is stored in non-volatile memory within the controller.

function:

A programming unit that has 1 input and returns 1 immediate result. However, unlike FBs, it is directly called with its name (as opposed to through an instance), has no persistent state from one call to the next and can be used as an operand in other programming expressions.

Examples: boolean (AND) operators, calculations, conversions (BYTE_TO_INT)

H

HE10:

Rectangular connector for electrical signals with frequencies below 3 MHz, complying with IEC 60807-2.

HSC:

(high-speed counter) A function that counts pulses on the controller or on expansion module inputs.

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.

M

MAC address:

(media access control address) A unique 48-bit number associated with a specific piece of hardware. The MAC address is programmed into each network card or device when it is manufactured.

MIB:

(management information base) An object database that is monitored by a network management system like SNMP. SNMP monitors devices are defined by their MIBs. Schneider Electric has obtained a private MIB, groupeschneider (3833).

R

RJ45:

A standard type of 8-pin connector for network cables defined for Ethernet.

RSTP:

(rapid spanning tree protocol) A high-speed network protocol that builds a loop-free logical topology for Ethernet networks.

S

SNMP:

(simple network management protocol) A protocol that can control a network remotely by polling the devices for their status and viewing information related to data transmission. You can also use it to manage software and databases remotely. The protocol also permits active management tasks, such as modifying and applying a new configuration.

T

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.

terminal block:

(terminal block) The component that mounts in an electronic module and provides electrical connections between the controller and the field devices.

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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