Modicon TM2

Modules Configuration Programming Guide

11/2015

EIO0000000396.07

www.schneider-electric.com

Schneider Electric

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

No part of this document may be reproduced in any form or by any means, electronic or mechanical, including photocopying, without express written permission of Schneider Electric.

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

© 2015 Schneider Electric. All rights reserved.

Table of Contents

	Safety Information	**5**
	About the Book	**7**
Chapter 1	**I/O Configuration General Information**	**11**
	I/O Configuration General Practices	12
	General Description	13
	Adding an Expansion Module	16
	Optional I/O Expansion Modules	18
Chapter 2	**TM2 Digital I/O Modules**	**21**
	TM2DAI8DT	22
	TM2DDI8DT	23
	TM2DDI16DT	24
	TM2DDI16DK	26
	TM2DDI32DK	28
	TM2DRA8RT	31
	TM2DRA16RT	32
	TM2DDO8UT	34
	TM2DDO8TT	36
	TM2DDO16UK	38
	TM2DDO16TK	40
	TM2DDO32UK	42
	TM2DDO32TK	45
	TM2DMM8DRT	48
	TM2DMM24DRF	49
Chapter 3	**TM2 Analog I/O Modules**	**53**
	TM2AMI2HT	54
	TM2AMI2LT	56
	TM2AMI4LT	59
	TM2AMI8HT	63
	TM2ARI8HT	66
	TM2ARI8LRJ	71
	TM2ARI8LT	75
	TM2AMO1HT	79
	TM2AVO2HT	81

TM2AMM3HT 83
TM2AMM6HT 86
TM2ALM3LT 90
Analog I/O Modules Diagnostic 93
Chapter 4 TM2 Expert Modules 95
TM200HSC206DF and TM200HSC206DT 95
Chapter 5 TM2 Communication Module 97
TWDNOI10M3 97
Glossary 99
Index 103

Safety Information

Important Information

NOTICE

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

At a Glance

Document Scope

This document describes the configuration of the TM2 Input/Output modules. For further information, refer to the separate documents provided in the SoMachine online help.

Validity Note

This document has been updated for the release of SoMachine V4.1 SP2.

Related Documents

Title of Documentation	Reference Number
Modicon M238 Logic Controller Programming Guide	EIO0000000384 (ENG); EIO0000000385 (FRE); EIO0000000386 (GER); EIO0000000388 (SPA); EIO0000000387 (ITA); EIO0000000389 (CHS)
Magelis XBTGC HMI Controller Programming Guide	EIO0000000632 (ENG); EIO0000000633 (FRE); EIO0000000634 (GER); EIO0000000635 (SPA); EIO0000000636 (ITA); EIO0000000637 (CHS)
Modicon TM2 Digital I/O Modules Hardware Guide	EIO0000000028 (ENG); EIO0000000029 (FRE); EIO0000000030 (GER); EIO0000000031 (SPA); EIO0000000032 (ITA); EIO0000000033 (CHS)
Modicon TM2 Analog I/O Modules Hardware Guide	EIO0000000034 (ENG); EIO0000000035 (FRE); EIO0000000036 (GER); EIO0000000037 (ITA); EIO0000000038 (SPA); EIO0000000039 (CHS)

Title of Documentation	Reference Number
Modicon TM2 High Speed Counter Modules Hardware Guide	EIO0000000022 (ENG); EIO0000000023 (FRE); EIO0000000024 (GER); EIO0000000025 (SPA); EIO0000000026 (ITA); EIO0000000027 (CHS)
Modicon TWDNOI10M3 AS-Interface Master Module Hardware Guide	EIO0000000608 (ENG); EIO0000000609 (FRE); EIO0000000610 (GER); EIO0000000611 (SPA); EIO0000000612 (ITA); EIO0000000613 (CHS)

You can download these technical publications and other technical information from our website at http://download.schneider-electric.com

Product Related Information

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.[1]
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed 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.

Terminology Derived from Standards

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

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

Among others, these standards include:

Standard	Description
EN 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2008	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
EN 1088:2008 ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2006	Safety of machinery - Emergency stop - Principles for design
EN/IEC 62061:2005	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.

Standard	Description
IEC 61784-3:2008	Digital data communication for measurement and control: Functional safety field buses.
2006/42/EC	Machinery Directive
2004/108/EC	Electromagnetic Compatibility Directive
2006/95/EC	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 *EC Machinery Directive* (*EC/2006/42*) 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.

Chapter 1
I/O Configuration General Information

Introduction

This chapter provides the general information to configure I/O expansion modules.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
I/O Configuration General Practices	12
General Description	13
Adding an Expansion Module	16
Optional I/O Expansion Modules	18

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, 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 will no longer function while the embedded I/O that may be present in your controller will continue 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.

Use the `GetRightBusStatus` function regularly to monitor the expansion bus status.

General Description

Introduction

The range of TM2 expansion modules includes:

- Digital expansion modules
- Analog expansion modules
- Communication expansion module
- Expert 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 *(see page 22)*
TM2DDI8DT	8	Inputs	24 Vdc 7 mA	TM2DDI8DT *(see page 23)*
TM2DDI16DT	16	Inputs	24 Vdc 7 mA	TM2DDI16DT *(see page 24)*
TM2DDI16DK	16	Inputs	24 Vdc 5 mA	TM2DDI16DK *(see page 26)*
TM2DDI32DK	32	Inputs	24 Vdc 5 mA	TM2DDI32DK *(see page 28)*
Output Modules				
TM2DRA8RT	8	Outputs Relay	30 Vdc/230 Vac 2 A max	TM2DRA8RT *(see page 31)*
TM2DRA16RT	16	Outputs Relay	30 Vdc/230 Vac 2 A max	TM2DRA16RT *(see page 32)*
TM2DD08UT	8	Outputs Transistor sink	24 Vdc 0.3 A max per output	TM2DDO8UT *(see page 34)*
TM2DD08TT	8	Outputs Transistor source	24 Vdc 0.5 A max per output	TM2DDO8TT *(see page 36)*
TM2DDO16UK	16	Outputs Transistor sink	24 Vdc 0.1 A max per output	TM2DDO16UK *(see page 38)*
TM2DDO16TK	16	Outputs Transistor source	24 Vdc 0.4 A max per output	TM2DDO16TK *(see page 40)*
TM2DDO32UK	32	Outputs Transistor sink	24 Vdc 0.1 A max per output	TM2DDO32UK *(see page 42)*

Module reference	Channels	Channel type	Voltage/current	Reference page
TM2DDO32TK	32	Outputs Transistor source	24 Vdc 0.4 A max per output	TM2DDO32TK *(see page 45)*
Mixed Modules				
TM2DMM8DRT	4 4	Inputs Outputs Relay	24 Vdc/7 mA 30 Vdc/230VAC 2 A max	TM2DMM8DRT *(see page 48)*
TM2DMM24DRF	16 8	Inputs Outputs Relay	24 Vdc/7 mA 30 Vdc/230VAC 2 A max	TM2DMM24DRF *(see page 49)*

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 *(see page 54)*
TM2AMI2LT	2	Low-level inputs	Thermocouple type J,K,T	TM2AMI2LT *(see page 56)*
TM2AMI4LT	4	Inputs	0...10 Vdc 0...20 mA PT100/1000 Ni100/1000	TM2AMI4LT *(see page 59)*
TM2AMI8HT	8	Inputs	0...20 mA 0...10 Vdc	TM2AMI8HT *(see page 63)*
TM2ARI8HT	8	Inputs	NTC / PTC	TM2ARI8HT *(see page 66)*
TM2ARI8LRJ	8	Inputs	PT100/1000	TM2ARI8LRJ *(see page 71)*
TM2ARI8LT	8	Inputs	PT100/1000	TM2ARI8LT *(see page 75)*
Output Modules				
TM2AMO1HT	1	Outputs	0...10 Vdc 4...20 mA	TM2AMO1HT *(see page 79)*
TM2AVO2HT	2	Outputs	+/- 10 Vdc	TM2AVO2HT *(see page 81)*

Module reference	Channels	Channel type	Voltage/current	Reference page
Mixed Modules				
TM2AMM3HT	2 1	Inputs Outputs	0...10 Vdc 4...20 mA 0...10 Vdc 4...20 mA	TM2AMM3HT *(see page 83)*
TM2AMM6HT	4 2	Inputs Outputs	0...10 Vdc 4...20 mA 0...10 Vdc 4...20 mA	TM2AMM6HT *(see page 86)*
TM2ALM3LT	2 1	Low-level inputs Outputs	Thermo J,K,T, PT100 0...10 Vdc 4...20 mA	TM2ALM3LT *(see page 90)*

Expert Expansion Modules Features

The following table shows the expert expansion modules features:

Module reference	Channels	Channel type	Refer to
TM200HSC206DF	2	HSC	Expansion Module HSC *(see page 95)*
TM200HSC206DT	2	HSC	

Communication Expansion Module Features

The following table shows the communication expansion module features:

Reference module	Type	Refer to
TWDNOI10M3	AS-Interface Master	AS-Interface Configuration *(see Modicon M238 Logic Controller, Programming Guide)*

Adding an Expansion Module

Procedure

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

For more information on adding a device to your project, refer to:

• Using the Drag-and-drop Method *(see SoMachine, Programming Guide)*

• Using the Contextual Menu or Plus Button *(see SoMachine, Programming Guide)*

NOTE: To install physically a TM2 expansion I/O module, first install a TM2DOCKN adaptor module. However, the TM2DOCKN does not appear in the **Devices tree**.

I/O Configuration

To configure an expansion module, proceed as follows:

Step	Action
1	In the **Devices tree**, double-click the expansion module you added. **Result:** The **I/O Mapping** tab is displayed.
2	For an analog expansion module, select the **I/O Configuration** tab.

I/O Mapping Tab Description

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

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

Column	Description
Variable	Lets you map the channel to a variable. Double-click the variable icon to enter the variable name; if it is a new variable, the variable is created. You can also map a channel to an existing variable using the variables. Click the **...** button to access **Input Assistant**. New variables are automatically created on each channel according to the **Automatic I/O mapping** project option settings.
Mapping	An icon indicates if the channel is mapped to a new variable or an existing variable.
Channel	Name of the channel of the device
Address	Address of the channel
Type	Data type of the channel
Current Value	Current value of the channel, displayed in online mode

Column	Description
Default Value	Double-click to change the default value. **NOTE:** The default value is applied to the I/O memory variable during certain states assumed by the controller. For more information on when and how the value is applied, see the Programming Guide of your controller.
Unit	Unit of the channel value
Description	Description of the channel. Double-click to enter a description.

NOTE: Expansion I/Os are always physically updated by the MAST task.

I/O Configuration Tab Description

Digital expansion modules are configured using the **I/O Configuration** tab.

The **I/O Configuration** tab contains these columns:

Column	Description	Editable
Parameter	Parameter name	No
Type	Parameter data type	No
Value	Value of the parameter	If the parameter is editable, double-click the field to select or to enter a value.
Default Value	Default parameter value	No
Unit	Unit value of the parameter	No
Description	Short description of the parameter	No

NOTE: If a parameter is unavailable, the row is grayed.

Optional I/O Expansion 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:
- TM3 I/O expansion modules
- TM2 I/O expansion modules

NOTE: TM3 Transmitter/Receiver modules (TM3XTRA1 and the TM3XREC1) and TMC4 cartridges cannot be marked as optional.

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

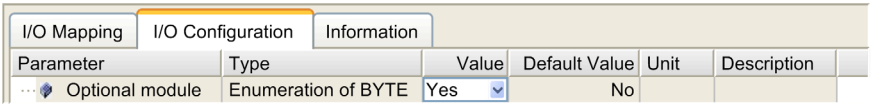
UNINTENDED EQUIPMENT OPERATION

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

To add an expansion module and mark it as optional in the configuration:

Step	Action
1	Add the expansion module to your controller.
2	Double-click the expansion module in the **Devices tree**.
3	Select the **I/O Configuration** tab
4	In the **Optional module** line, select **Yes** in the **Value** column: 

Shared 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.

You cannot have two modules with the same internal ID code declared as optional without at least one mandatory module placed between them.

This table groups the module references sharing the same internal ID code:

Modules sharing the same internal ID code
TM2DDI16DT, TM2DDI16DK
TM2DRA16RT, TM2DDO16UK, TM2DDO16TK
TM2DDI8DT, TM2DAI8DT
TM2DRA8RT, TM2DDO8UT, TM2DDO8TT
TM2DDO32TK, TM2DDO32UK
TM3DI16K, TM3DI16/G
TM3DQ16R/G, TM3DQ16T/G, TM3DQ16TK, TM3DQ16U, TM3DQ16UG, TM3DQ16UK
TM3DQ32TK, TM3DQ32UK
TM3DI8/G, TM3DI8A
TM3DQ8R/G, TM3DQ8T/G, TM3DQ8U, TM3DQ8UG
TM3DM8R/G
TM3DM24R/G
TM3SAK6R/G
TM3SAF5R/G
TM3SAC5R/G

Modules sharing the same internal ID code
TM3SAFL5R/G
TM3AI2H/G
TM3AI4/G
TM3AI8/G
TM3AQ2/G
TM3AQ4/G
TM3AM6/G
TM3TM3/G
TM3TI4/G
TM3TI8T/G

Chapter 2
TM2 Digital I/O Modules

Introduction

This chapter will help you to configure the TM2 digital I/O modules.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
TM2DAI8DT	22
TM2DDI8DT	23
TM2DDI16DT	24
TM2DDI16DK	26
TM2DDI32DK	28
TM2DRA8RT	31
TM2DRA16RT	32
TM2DDO8UT	34
TM2DDO8TT	36
TM2DDO16UK	38
TM2DDO16TK	40
TM2DDO32UK	42
TM2DDO32TK	45
TM2DMM8DRT	48
TM2DMM24DRF	49

TM2DAI8DT

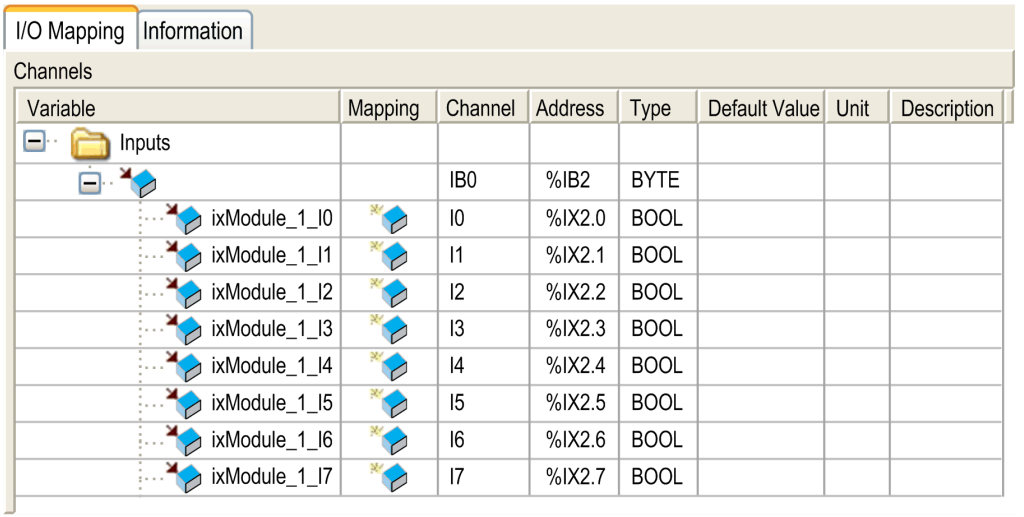
Introduction

This expansion module is an 8-point, 120 Vac input module with a terminal block.

For further hardware information, refer to TM2DAI8DT *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each input and the channel name.



Channel	Type	Description
IB0	BYTE	State of all inputs
I0	BOOL	State of input 0
...		...
I7		State of input 7

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DDI8DT

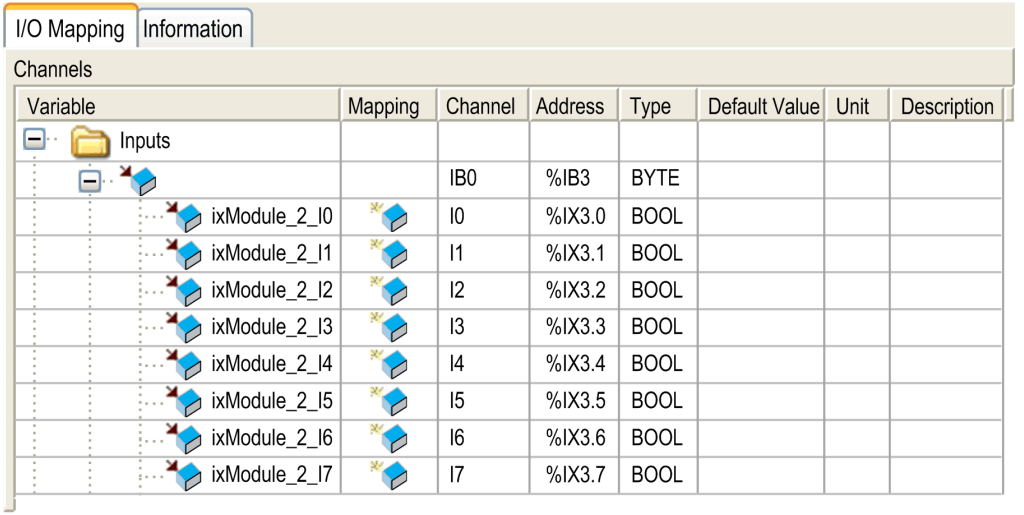
Introduction

This expansion module is an 8-point, 24 Vdc input module with a terminal block.

For further hardware information, refer to TM2DDI8DT *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each input and the channel name.



Channel	Type	Description
IB0	BYTE	State of all inputs
I0	BOOL	State of input 0
...		...
I7		State of input 7

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DDI16DT

Introduction

This expansion module is a 16-point, 24 Vdc input module with a terminal block.

For further hardware information, refer to TM2DDI16DT *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each input and the channel name.

I/O Mapping | Information

Channels

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Inputs							
		IW0	%IW2	WORD			
ixModule_3_I0		I0	%IX4.0	BOOL			
ixModule_3_I1		I1	%IX4.1	BOOL			
ixModule_3_I2		I2	%IX4.2	BOOL			
ixModule_3_I3		I3	%IX4.3	BOOL			
ixModule_3_I4		I4	%IX4.4	BOOL			
ixModule_3_I5		I5	%IX4.5	BOOL			
ixModule_3_I6		I6	%IX4.6	BOOL			
ixModule_3_I7		I7	%IX4.7	BOOL			
ixModule_3_I8		I8	%IX5.0	BOOL			
ixModule_3_I9		I9	%IX5.1	BOOL			
ixModule_3_I10		I10	%IX5.2	BOOL			
ixModule_3_I11		I11	%IX5.3	BOOL			
ixModule_3_I12		I12	%IX5.4	BOOL			
ixModule_3_I13		I13	%IX5.5	BOOL			
ixModule_3_I14		I14	%IX5.6	BOOL			
ixModule_3_I15		I15	%IX5.7	BOOL			

Channel	Type	Description
IW0	WORD	State of all inputs
I0	BOOL	State of input 0
...		...
I15		State of input 15

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DDI16DK

Introduction

This expansion module is a 16-point, 24 Vdc input module with a HE10 connector.

For further hardware information, refer to TM2DDI16DK *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each input and the channel name.

I/O Mapping | Information

Channels

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Inputs							
		IW0	%IW3	WORD			
ixModule_4_I0		I0	%IX6.0	BOOL			
ixModule_4_I1		I1	%IX6.1	BOOL			
ixModule_4_I2		I2	%IX6.2	BOOL			
ixModule_4_I3		I3	%IX6.3	BOOL			
ixModule_4_I4		I4	%IX6.4	BOOL			
ixModule_4_I5		I5	%IX6.5	BOOL			
ixModule_4_I6		I6	%IX6.6	BOOL			
ixModule_4_I7		I7	%IX6.7	BOOL			
ixModule_4_I8		I8	%IX7.0	BOOL			
ixModule_4_I9		I9	%IX7.1	BOOL			
ixModule_4_I10		I10	%IX7.2	BOOL			
ixModule_4_I11		I11	%IX7.3	BOOL			
ixModule_4_I12		I12	%IX7.4	BOOL			
ixModule_4_I13		I13	%IX7.5	BOOL			
ixModule_4_I14		I14	%IX7.6	BOOL			
ixModule_4_I15		I15	%IX7.7	BOOL			

Channel	Type	Description
IW0	WORD	State of all inputs
I0	BOOL	State of input 0
...		...
I15		State of input 15

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DDI32DK

Introduction

This expansion module is a 32-point, 24 Vdc input module with a HE10 connector.

For further hardware information, refer to TM2DDI32DK *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each input and the channel name.

I/O Mapping | Information

Channels

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Inputs							
		ID0	%ID2	DWORD			
ixModule_5_I0		I0	%IX8.0	BOOL			
ixModule_5_I1		I1	%IX8.1	BOOL			
ixModule_5_I2		I2	%IX8.2	BOOL			
ixModule_5_I3		I3	%IX8.3	BOOL			
ixModule_5_I4		I4	%IX8.4	BOOL			
ixModule_5_I5		I5	%IX8.5	BOOL			
ixModule_5_I6		I6	%IX8.6	BOOL			
ixModule_5_I7		I7	%IX8.7	BOOL			
ixModule_5_I8		I8	%IX9.0	BOOL			
ixModule_5_I9		I9	%IX9.1	BOOL			
ixModule_5_I10		I10	%IX9.2	BOOL			
ixModule_5_I11		I11	%IX9.3	BOOL			
ixModule_5_I12		I12	%IX9.4	BOOL			
ixModule_5_I13		I13	%IX9.5	BOOL			
ixModule_5_I14		I14	%IX9.6	BOOL			
ixModule_5_I15		I15	%IX9.7	BOOL			
ixModule_5_I16		I16	%IX1...	BOOL			
ixModule_5_I17		I17	%IX1...	BOOL			
ixModule_5_I18		I18	%IX1...	BOOL			
ixModule_5_I19		I19	%IX1...	BOOL			
ixModule_5_I20		I20	%IX1...	BOOL			
ixModule_5_I21		I21	%IX1...	BOOL			
ixModule_5_I22		I22	%IX1...	BOOL			
ixModule_5_I23		I23	%IX1...	BOOL			
ixModule_5_I24		I24	%IX1...	BOOL			
ixModule_5_I25		I25	%IX1...	BOOL			
ixModule_5_I26		I26	%IX1...	BOOL			
ixModule_5_I27		I27	%IX1...	BOOL			
ixModule_5_I28		I28	%IX1...	BOOL			
ixModule_5_I29		I29	%IX1...	BOOL			
ixModule_5_I30		I30	%IX1...	BOOL			
ixModule_5_I31		I31	%IX1...	BOOL			

Channel	Type	Description
ID0	WORD	State of all inputs
I0	BOOL	State of input 0
...		...
I31		State of input 31

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DRA8RT

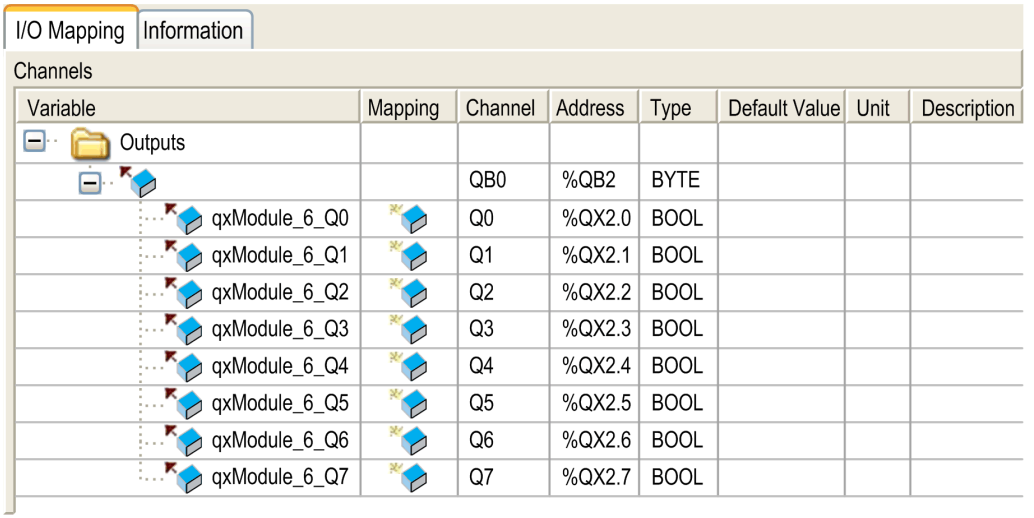
Introduction

This expansion module is an 8-point relay output module with a terminal block.

For further hardware information, refer to TM2DRA8RT *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each output and the channel name.



Channel	Type	Default Value	Description
QB0	BYTE	-	Command byte of all outputs
Q0	BOOL	- TRUE FALSE	Command bit of output 0
...			...
Q7			Command bit of output 7

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DRA16RT

Introduction

This expansion module is a 16-point relay output module with a terminal block.

For further hardware information, refer to TM2DRA16RT *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each output and the channel name.

I/O Mapping | Information

Channels

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Outputs							
		QW0	%QW2	WORD			
qxModule_7_Q0		Q0	%QX4.0	BOOL			
qxModule_7_Q1		Q1	%QX4.1	BOOL			
qxModule_7_Q2		Q2	%QX4.2	BOOL			
qxModule_7_Q3		Q3	%QX4.3	BOOL			
qxModule_7_Q4		Q4	%QX4.4	BOOL			
qxModule_7_Q5		Q5	%QX4.5	BOOL			
qxModule_7_Q6		Q6	%QX4.6	BOOL			
qxModule_7_Q7		Q7	%QX4.7	BOOL			
qxModule_7_Q8		Q8	%QX5.0	BOOL			
qxModule_7_Q9		Q9	%QX5.1	BOOL			
qxModule_7_...		Q10	%QX5.2	BOOL			
qxModule_7_...		Q11	%QX5.3	BOOL			
qxModule_7_...		Q12	%QX5.4	BOOL			
qxModule_7_...		Q13	%QX5.5	BOOL			
qxModule_7_...		Q14	%QX5.6	BOOL			
qxModule_7_...		Q15	%QX5.7	BOOL			

Channel	Type	Default Value	Description
QW0	WORD	-	Command byte of all outputs
Q0	BOOL	-	Command bit of output 0
...		TRUE	...
Q15		FALSE	Command bit of output 15

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DDO8UT

Introduction

This expansion module is an 8-point transistor sink output module with a terminal block.

For further hardware information, refer to TM2DDO8UT *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each output and the channel name.

I/O Mapping | Information

Channels

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Outputs							
		QW0	%QW2	WORD			
qxModule_7_Q0		Q0	%QX4.0	BOOL			
qxModule_7_Q1		Q1	%QX4.1	BOOL			
qxModule_7_Q2		Q2	%QX4.2	BOOL			
qxModule_7_Q3		Q3	%QX4.3	BOOL			
qxModule_7_Q4		Q4	%QX4.4	BOOL			
qxModule_7_Q5		Q5	%QX4.5	BOOL			
qxModule_7_Q6		Q6	%QX4.6	BOOL			
qxModule_7_Q7		Q7	%QX4.7	BOOL			
qxModule_7_Q8		Q8	%QX5.0	BOOL			
qxModule_7_Q9		Q9	%QX5.1	BOOL			
qxModule_7_...		Q10	%QX5.2	BOOL			
qxModule_7_...		Q11	%QX5.3	BOOL			
qxModule_7_...		Q12	%QX5.4	BOOL			
qxModule_7_...		Q13	%QX5.5	BOOL			
qxModule_7_...		Q14	%QX5.6	BOOL			
qxModule_7_...		Q15	%QX5.7	BOOL			

Channel	Type	Default Value	Description
QB0	BYTE	-	Command byte of all outputs
Q0	BOOL	-	Command bit of output 0
...		TRUE	...
Q7		FALSE	Command bit of output 7

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DDO8TT

Introduction

This expansion module is an 8-point transistor source output module with a terminal block.

For further hardware information, refer to TM2DDO8TT *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each output and the channel name.

I/O Mapping | Information

Channels

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Outputs							
		QW0	%QW2	WORD			
qxModule_7_Q0		Q0	%QX4.0	BOOL			
qxModule_7_Q1		Q1	%QX4.1	BOOL			
qxModule_7_Q2		Q2	%QX4.2	BOOL			
qxModule_7_Q3		Q3	%QX4.3	BOOL			
qxModule_7_Q4		Q4	%QX4.4	BOOL			
qxModule_7_Q5		Q5	%QX4.5	BOOL			
qxModule_7_Q6		Q6	%QX4.6	BOOL			
qxModule_7_Q7		Q7	%QX4.7	BOOL			
qxModule_7_Q8		Q8	%QX5.0	BOOL			
qxModule_7_Q9		Q9	%QX5.1	BOOL			
qxModule_7_...		Q10	%QX5.2	BOOL			
qxModule_7_...		Q11	%QX5.3	BOOL			
qxModule_7_...		Q12	%QX5.4	BOOL			
qxModule_7_...		Q13	%QX5.5	BOOL			
qxModule_7_...		Q14	%QX5.6	BOOL			
qxModule_7_...		Q15	%QX5.7	BOOL			

Channel	Type	Default Value	Description
QB0	BYTE	-	Command byte of all outputs
Q0	BOOL	-	Command bit of output 0
...		TRUE	...
Q7		FALSE	Command bit of output 7

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DDO16UK

Introduction

This expansion module is a 16-point transistor sink output module with a HE10 connector.

For further hardware information, refer to TM2DDO16UK *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each output and the channel name.

I/O Mapping | Information

Channels

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Outputs							
		QW0	%QW2	WORD			
qxModule_10_...		Q0	%QX4.0	BOOL			
qxModule_10_...		Q1	%QX4.1	BOOL			
qxModule_10_...		Q2	%QX4.2	BOOL			
qxModule_10_...		Q3	%QX4.3	BOOL			
qxModule_10_...		Q4	%QX4.4	BOOL			
qxModule_10_...		Q5	%QX4.5	BOOL			
qxModule_10_...		Q6	%QX4.6	BOOL			
qxModule_10_...		Q7	%QX4.7	BOOL			
qxModule_10_...		Q8	%QX5.0	BOOL			
qxModule_10_...		Q9	%QX5.1	BOOL			
qxModule_10_...		Q10	%QX5.2	BOOL			
qxModule_10_...		Q11	%QX5.3	BOOL			
qxModule_10_...		Q12	%QX5.4	BOOL			
qxModule_10_...		Q13	%QX5.5	BOOL			
qxModule_10_...		Q14	%QX5.6	BOOL			
qxModule_10_...		Q15	%QX5.7	BOOL			

Channel	Type	Default Value	Description
QW0	WORD	-	Command byte of all outputs
Q0	BOOL	-	Command bit of output 0
...		TRUE	...
Q15		FALSE	Command bit of output 15

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DDO16TK

Introduction

This expansion module is a 16-point transistor source output module with a HE10 connector.

For further hardware information, refer to TM2DDO16TK *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each output and the channel name.

I/O Mapping | Information

Channels

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Outputs							
		QW0	%QW2	WORD			
qxModule_11_Q0		Q0	%QX4.0	BOOL			
qxModule_11_Q1		Q1	%QX4.1	BOOL			
qxModule_11_Q2		Q2	%QX4.2	BOOL			
qxModule_11_Q3		Q3	%QX4.3	BOOL			
qxModule_11_Q4		Q4	%QX4.4	BOOL			
qxModule_11_Q5		Q5	%QX4.5	BOOL			
qxModule_11_Q6		Q6	%QX4.6	BOOL			
qxModule_11_Q7		Q7	%QX4.7	BOOL			
qxModule_11_Q8		Q8	%QX5.0	BOOL			
qxModule_11_Q9		Q9	%QX5.1	BOOL			
qxModule_11_...		Q10	%QX5.2	BOOL			
qxModule_11_...		Q11	%QX5.3	BOOL			
qxModule_11_...		Q12	%QX5.4	BOOL			
qxModule_11_...		Q13	%QX5.5	BOOL			
qxModule_11_...		Q14	%QX5.6	BOOL			
qxModule_11_...		Q15	%QX5.7	BOOL			

Channel	Type	Default Value	Description
QW0	WORD	-	Command byte of all outputs
Q0	BOOL	-	Command bit of output 0
...		TRUE	...
Q15		FALSE	Command bit of output 15

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DDO32UK

Introduction

This expansion module is a 32-point transistor sink output module with a HE10 connector.

For further hardware information, refer to TM2DDO32UK *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each output and the channel name.

I/O Mapping | Information

Channels

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Outputs							
		QD0	%QD2	DWORD			
qxModule_12_Q0		Q0	%QX8.0	BOOL			
qxModule_12_Q1		Q1	%QX8.1	BOOL			
qxModule_12_Q2		Q2	%QX8.2	BOOL			
qxModule_12_Q3		Q3	%QX8.3	BOOL			
qxModule_12_Q4		Q4	%QX8.4	BOOL			
qxModule_12_Q5		Q5	%QX8.5	BOOL			
qxModule_12_Q6		Q6	%QX8.6	BOOL			
qxModule_12_Q7		Q7	%QX8.7	BOOL			
qxModule_12_Q8		Q8	%QX9.0	BOOL			
qxModule_12_Q9		Q9	%QX9.1	BOOL			
qxModule_12_Q...		Q10	%QX9.2	BOOL			
qxModule_12_Q...		Q11	%QX9.3	BOOL			
qxModule_12_Q...		Q12	%QX9.4	BOOL			
qxModule_12_Q...		Q13	%QX9.5	BOOL			
qxModule_12_Q...		Q14	%QX9.6	BOOL			
qxModule_12_Q...		Q15	%QX9.7	BOOL			
qxModule_12_Q...		Q16	%QX1...	BOOL			
qxModule_12_Q...		Q17	%QX1...	BOOL			
qxModule_12_Q...		Q18	%QX1...	BOOL			
qxModule_12_Q...		Q19	%QX1...	BOOL			
qxModule_12_Q...		Q20	%QX1...	BOOL			
qxModule_12_Q...		Q21	%QX1...	BOOL			
qxModule_12_Q...		Q22	%QX1...	BOOL			
qxModule_12_Q...		Q23	%QX1...	BOOL			
qxModule_12_Q...		Q24	%QX1...	BOOL			
qxModule_12_Q...		Q25	%QX1...	BOOL			
qxModule_12_Q...		Q26	%QX1...	BOOL			
qxModule_12_Q...		Q27	%QX1...	BOOL			
qxModule_12_Q...		Q28	%QX1...	BOOL			
qxModule_12_Q...		Q29	%QX1...	BOOL			
qxModule_12_Q...		Q30	%QX1...	BOOL			
qxModule_12_Q...		Q31	%QX1...	BOOL			

Channel	Type	Default Value	Description
QD0	DWORD	-	Command byte of all outputs
Q0	BOOL	-	Command bit of output 0
...		TRUE FALSE	...
Q31			Command bit of output 31

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DDO32TK

Introduction

This expansion module is a 32-point transistor source output module with a HE10 connector

For further hardware information, refer to TM2DDO32TK *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each output and the channel name.

I/O Mapping | Information

Channels

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Outputs							
		QD0	%QD3	DWORD			
qxModule_13_...		Q0	%QX1...	BOOL			
qxModule_13_...		Q1	%QX1...	BOOL			
qxModule_13_...		Q2	%QX1...	BOOL			
qxModule_13_...		Q3	%QX1...	BOOL			
qxModule_13_...		Q4	%QX1...	BOOL			
qxModule_13_...		Q5	%QX1...	BOOL			
qxModule_13_...		Q6	%QX1...	BOOL			
qxModule_13_...		Q7	%QX1...	BOOL			
qxModule_13_...		Q8	%QX1...	BOOL			
qxModule_13_...		Q9	%QX1...	BOOL			
qxModule_13_...		Q10	%QX1...	BOOL			
qxModule_13_...		Q11	%QX1...	BOOL			
qxModule_13_...		Q12	%QX1...	BOOL			
qxModule_13_...		Q13	%QX1...	BOOL			
qxModule_13_...		Q14	%QX1...	BOOL			
qxModule_13_...		Q15	%QX1...	BOOL			
qxModule_13_...		Q16	%QX1...	BOOL			
qxModule_13_...		Q17	%QX1...	BOOL			
qxModule_13_...		Q18	%QX1...	BOOL			
qxModule_13_...		Q19	%QX1...	BOOL			
qxModule_13_...		Q20	%QX1...	BOOL			
qxModule_13_...		Q21	%QX1...	BOOL			
qxModule_13_...		Q22	%QX1...	BOOL			
qxModule_13_...		Q23	%QX1...	BOOL			
qxModule_13_...		Q24	%QX1...	BOOL			
qxModule_13_...		Q25	%QX1...	BOOL			
qxModule_13_...		Q26	%QX1...	BOOL			
qxModule_13_...		Q27	%QX1...	BOOL			
qxModule_13_...		Q28	%QX1...	BOOL			
qxModule_13_...		Q29	%QX1...	BOOL			
qxModule_13_...		Q30	%QX1...	BOOL			
qxModule_13_...		Q31	%QX1...	BOOL			

Channel	Type	Default Value	Description
QD0	DWORD	-	Command byte of all outputs
Q0	BOOL	-	Command bit of output 0
...		TRUE FALSE	...
Q31			Command bit of output 31

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DMM8DRT

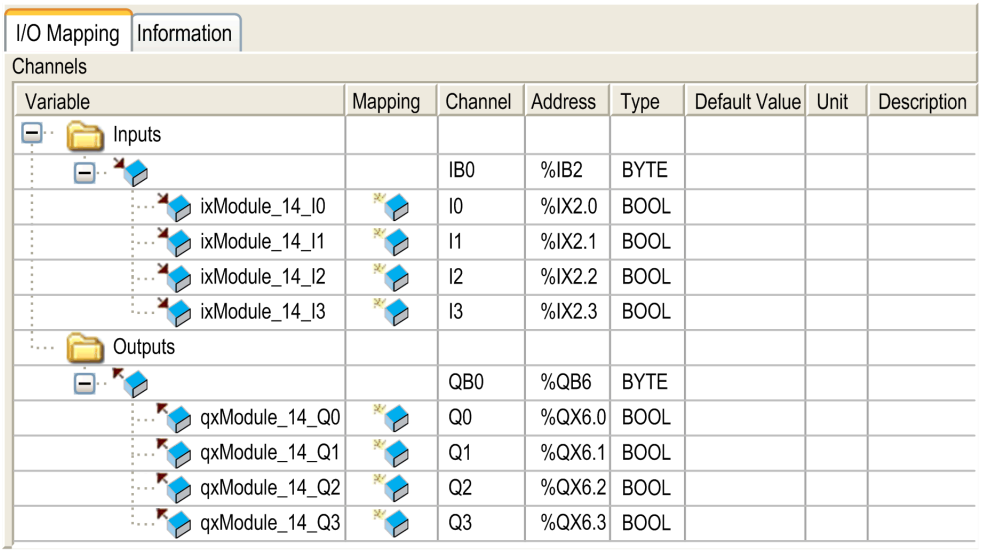
Introduction

This expansion module is a 4-point input/4-point output module with a terminal block.

For further hardware information, refer to TM2DMM8DRT *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each input and output with the channel name.



Channel		Type	Default Value	Description
Inputs	IB0	BYTE	-	State of all inputs
	I0	BOOL	-	State of input 0
	...			...
	I3			State of input 3
Outputs	QB0	BYTE	-	Command byte of all outputs
	Q0	BOOL	- TRUE FALSE	Command bit of output 0
	...			...
	Q3			Command bit of output 3

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2DMM24DRF

Introduction

This expansion module is a 16-point input/8-point output module with a wire-clamp terminal block.

For further hardware information, refer to TM2DDMM24DRF *(see Modicon TM2, Digital I/O Modules, Hardware Guide)*.

I/O Mapping Tab

This table identifies the addresses of each input and output with the channel name.

I/O Mapping | Information

Channels

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Inputs							
		ID0	%IW2	WORD			
ixModule_15_I0		I0	%IX4.0	BOOL			
ixModule_15_I1		I1	%IX4.1	BOOL			
ixModule_15_I2		I2	%IX4.2	BOOL			
ixModule_15_I3		I3	%IX4.3	BOOL			
ixModule_15_I4		I4	%IX4.4	BOOL			
ixModule_15_I5		I5	%IX4.5	BOOL			
ixModule_15_I6		I6	%IX4.6	BOOL			
ixModule_15_I7		I7	%IX4.7	BOOL			
ixModule_15_I8		I8	%IX5.0	BOOL			
ixModule_15_I9		I9	%IX5.1	BOOL			
ixModule_15_I...		I10	%IX5.2	BOOL			
ixModule_15_I...		I11	%IX5.3	BOOL			
ixModule_15_I...		I12	%IX5.4	BOOL			
ixModule_15_I...		I13	%IX5.5	BOOL			
ixModule_15_I...		I14	%IX5.6	BOOL			
ixModule_15_I...		I15	%IX5.7	BOOL			
Outputs							
		QB0	%QB7	BYTE			
qxModule_15_...		Q0	%QX7.0	BOOL			
qxModule_15_...		Q1	%QX7.1	BOOL			
qxModule_15_...		Q2	%QX7.2	BOOL			
qxModule_15_...		Q3	%QX7.3	BOOL			
qxModule_15_...		Q4	%QX7.4	BOOL			
qxModule_15_...		Q5	%QX7.5	BOOL			
qxModule_15_...		Q6	%QX7.6	BOOL			
qxModule_15_...		Q7	%QX7.7	BOOL			

Channel		Type	Default Value	Description
Inputs	IW0	WORD	-	State of all inputs
	I0	BOOL	-	State of input 0
	...			...
	I15			State of input 15
Outputs	QB0	BYTE	-	Command byte of all outputs
	Q0	BOOL	- TRUE FALSE	Command bit of output 0
	...			...
	Q7			Command bit of output 7

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

Chapter 3
TM2 Analog I/O Modules

Introduction

This chapter will help you to configure the TM2 analog I/O modules.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
TM2AMI2HT	54
TM2AMI2LT	56
TM2AMI4LT	59
TM2AMI8HT	63
TM2ARI8HT	66
TM2ARI8LRJ	71
TM2ARI8LT	75
TM2AMO1HT	79
TM2AVO2HT	81
TM2AMM3HT	83
TM2AMM6HT	86
TM2ALM3LT	90
Analog I/O Modules Diagnostic	93

TM2AMI2HT

Introduction

This expansion module is a 2-point input module with a terminal block.

For further hardware information, refer to TM2AMI2HT *(see Modicon TM2, Analog I/O Modules, Hardware Guide)*.

If you have physically wired the analog channel for a voltage signal and you configure the channel for a current signal in SoMachine, you may damage the analog circuit.

NOTICE
INOPERABLE EQUIPMENT Verify that the physical wiring of the analog circuit is compatible with the software configuration for the analog channel. **Failure to follow these instructions can result in equipment damage.**

I/O Configuration Tab

This table allows configuring the inputs.

I/O Mapping | I/O Configuration | Information

Parameter	Type	Value	Default Value	Unit	Description
Inputs					
IW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...4095)	0	0		Minimum value
Maximum	INT(0...32767)	4095	4095		Maximum value
IW1					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...4095)	0	0		Minimum value
Maximum	INT(0...32767)	4095	4095		Maximum value

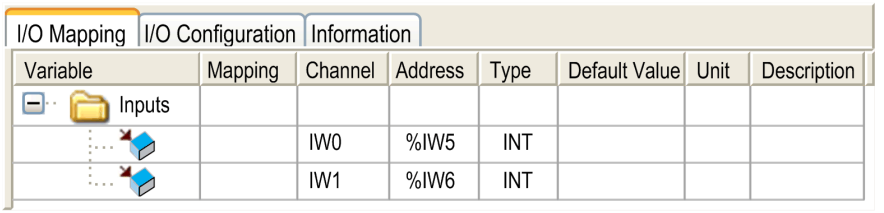
For each input, you can define:

Parameter		Value	Default Value	Description
Type		Not used 0- 10 V 4 - 20 mA	Not used	This identifies the mode of the channel.
Scope		Normal Customized	Normal	This identifies the range of values for the channel.
Minimum	Normal	0	0	Specifies the lower measurement limit.
	Customized	-32768...32767	-32768	
Maximum	Normal	4095	4095	Specifies the upper measurement limit.
	Customized	-32768...32767	32767	

For further generic descriptions, refer to I/O Configuration Tab Description *(see page 17)*.

I/O Mapping Tab

This identifies the addresses of each input and the channel name:



Channel	Type	Description
IW0	INT	Current value of the input 0
IW1	INT	Current value of the input 1

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2AMI2LT

Introduction

This expansion module is a 2-point input thermocouple module with a terminal block.

For further hardware information, refer to TM2AMI2LT *(see Modicon TM2, Analog I/O Modules, Hardware Guide)*.

If you have physically wired the analog channel for a voltage signal and you configure the channel for a current signal in SoMachine, you may damage the analog circuit.

NOTICE
INOPERABLE EQUIPMENT Verify that the physical wiring of the analog circuit is compatible with the software configuration for the analog channel. **Failure to follow these instructions can result in equipment damage.**

I/O Configuration Tab

This table allows configuring the inputs.

I/O Mapping | I/O Configuration | Information

Parameter	Type	Value	Default Value	Unit	Description
Inputs					
IW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
IW1					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value

For each input, you can define:

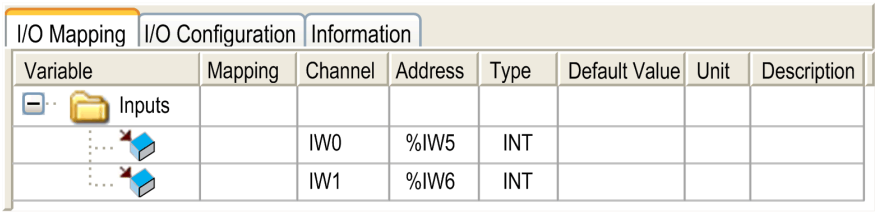
Parameter		Value	Default Value	Description
Type		Not used Thermocouple K Thermocouple J Thermocouple T	Not used	This identifies the mode of the channel.
Scope		Normal Customized Celsius (0.1 °C) Fahrenheit (0.1 °F)	Normal	This identifies the range of values for the channel.
Minimum	Normal	0	0	Specifies the lower measurement limit.
	Celsius (0.1 °C)	See the table below	See the table below	
	Fahrenheit (0.1 °F)			
	Customized	-32768...32767	-32768	
Maximum	Normal	4095	4095	Specifies the upper measurement limit.
	Celsius (0.1 °C)	See the table below	See the table below	
	Fahrenheit (0.1 °F)			
	Customized	-32768...32767	32767	

Scope	Normal		Celsius (0.1 °C)		Fahrenheit (0.1 °F)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Thermocouple K	0	4095	-2700	13700	-4540	24980
Thermocouple J	0	4095	-2000	7600	-3280	14000
Thermocouple T	0	4095	-2700	4000	-4540	7520

For further generic descriptions, refer to I/O Configuration Tab Description *(see page 17)*.

I/O Mapping Tab

This identifies the addresses of each input and the channel name:



Channel	Type	Description
IW0	INT	Current value of the input 0
IW1	INT	Current value of the input 1

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2AMI4LT

Introduction

This expansion module is a 4-point input module, current, voltage and temperature, with a terminal block.

NOTE: All inputs used must be of the same type (voltage, current, or temperature).

For further hardware information, refer to TM2AMI4LT *(see Modicon TM2, Analog I/O Modules, Hardware Guide)*.

If you have physically wired the analog channel for a voltage signal and you configure the channel for a current signal in SoMachine, you may damage the analog circuit.

NOTICE
INOPERABLE EQUIPMENT Verify that the physical wiring of the analog circuit is compatible with the software configuration for the analog channel. **Failure to follow these instructions can result in equipment damage.**

I/O Configuration Tab

This table allows configuring the inputs.

I/O Mapping | I/O Configuration | Information

Parameter	Type	Value	Default Value	Unit	Description
Mode	Enumeration of BYTE	Voltage	Voltage		Mode
Inputs					
IW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(0...4095)	0	0		Minimum value
Maximum	INT(0...4095)	4095	4095		Maximum value
Lower Limit	INT(0...0)	0	0		Lower limit value
Upper Limit	INT(0...0)	0	0		Upper limit value
IW1					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(0...4095)	0	0		Minimum value
Maximum	INT(0...4095)	4095	4095		Maximum value
Lower Limit	INT(0...0)	0	0		Lower limit value
Upper Limit	INT(0...0)	0	0		Upper limit value
IW2					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(0...4095)	0	0		Minimum value
Maximum	INT(0...4095)	4095	4095		Maximum value
Lower Limit	INT(0...0)	0	0		Lower limit value
Upper Limit	INT(0...0)	0	0		Upper limit value
IW3					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(0...4095)	0	0		Minimum value
Maximum	INT(0...4095)	4095	4095		Maximum value
Lower Limit	INT(0...0)	0	0		Lower limit value
Upper Limit	INT(0...0)	0	0		Upper limit value

For each input, you can define:

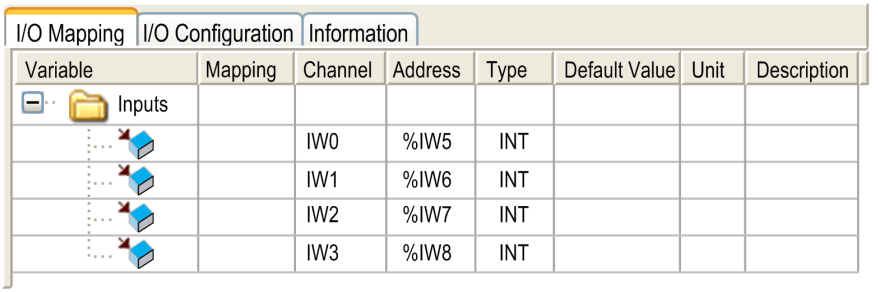
Parameter		Value	Default Value	Description
Mode		Voltage Current Temperature	Voltage	This identifies the mode of all channels.
Type		Not used 0...10 V 0...20 mA PT100 PT1000 NI100 NI1000	Not used	This identifies the type of the channel. If 'Voltage' mode is enabled, then the type 'Not used' and '0...10V' are available. If 'Current' mode is enabled, then the type 'Not used' and '0...20 mA' are available. If 'Temperature' mode is enabled, then the type 'Not used', 'PT100', PT1000', 'NI100' and 'NI1000' are available.
Scope		Not used Normal Customized Resistance (Ohm) Celsius (0.1 °C) Fahrenheit (0.1 °F)	Not used	This identifies the range of values for the channel.
Minimum	Normal	0	0	Specifies the lower measurement limit.
	Celsius (0.1 °C)	See the table below	See the table below	
	Fahrenheit (0.1 °F)			
	Resistance (Ohm)			
	Customized	-32768...32767	-32768	
Maximum	Normal	4095	4095	Specifies the upper measurement limit.
	Celsius (0.1 °C)	See the table below	See the table below	
	Fahrenheit (0.1 °F)			
	Resistance (Ohm)			
	Customized	-32768...32767	32767	

Scope	Normal		Resistance (Ohm)		Celsius (0.1 °C)		Fahrenheit (0.1 °F)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
PT100	0	4095	18	314	-2000	6000	-3280	11120
PT1000	0	4095	184	3138	-2000	6000	-3280	11120
NI100	0	4095	74	199	-500	1500	-580	3020
NI1000	0	4095	742	1987	-500	1500	-580	3020

For further generic descriptions, refer to I/O Configuration Tab Description *(see page 17)*.

I/O Mapping Tab

This identifies the addresses of each input and the channel name:



Channel	Type	Description
IW0	INT	Current value of the input 0
IW1	INT	Current value of the input 1
IW2	INT	Current value of the input 2
IW3	INT	Current value of the input 3

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2AMI8HT

Introduction

This expansion module is an 8-point input module, current, and voltage, with a terminal block.

NOTE: All inputs used must be of the same type (voltage or current).

For further hardware information, refer to TM2AMI8HT *(see Modicon TM2, Analog I/O Modules, Hardware Guide)*.

If you have physically wired the analog channel for a voltage signal and you configure the channel for a current signal in SoMachine, you may damage the analog circuit.

NOTICE
INOPERABLE EQUIPMENT Verify that the physical wiring of the analog circuit is compatible with the software configuration for the analog channel. **Failure to follow these instructions can result in equipment damage.**

I/O Configuration Tab

This table allows configuring the inputs.

I/O Mapping | I/O Configuration | Information

Parameter	Type	Value	Default Value	Unit	Description
Type	Enumeration of BYTE	0 – 10 V	0 – 10 V		Mode
Inputs					
IW0					
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...1023)	0	0		Minimum value
Maximum	INT(0...32767)	1023	1023		Maximum value
IW1					
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...1023)	0	0		Minimum value
Maximum	INT(0...32767)	1023	1023		Maximum value
IW2					
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...1023)	0	0		Minimum value
Maximum	INT(0...32767)	1023	1023		Maximum value
IW3					
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...1023)	0	0		Minimum value
Maximum	INT(0...32767)	1023	1023		Maximum value
IW4					
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...1023)	0	0		Minimum value
Maximum	INT(0...32767)	1023	1023		Maximum value
IW5					
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...1023)	0	0		Minimum value
Maximum	INT(0...32767)	1023	1023		Maximum value
IW6					
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...1023)	0	0		Minimum value
Maximum	INT(0...32767)	1023	1023		Maximum value
IW7					
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...1023)	0	0		Minimum value
Maximum	INT(0...32767)	1023	1023		Maximum value

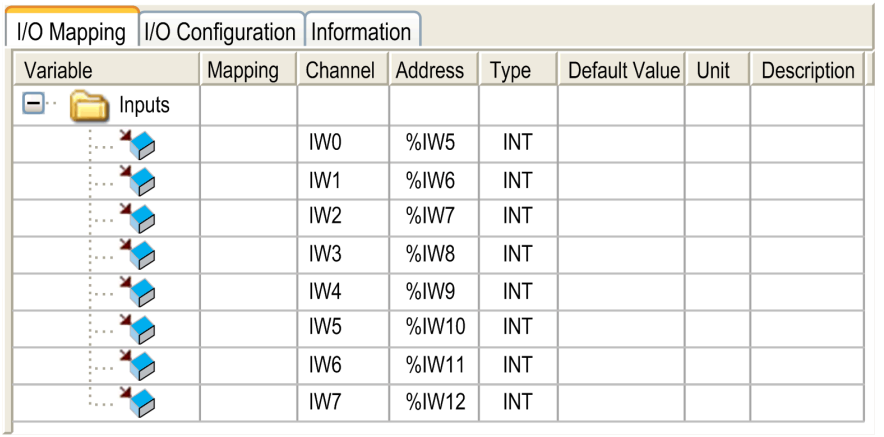
For each input, you can define:

Parameter		Value	Default Value	Description
Type		Not used 0- 10 V 0- 20 mA	Not used	This identifies the mode of all channels.
Scope		Normal Customized	Normal	This identifies the range of values for the channel.
Minimum	Normal	0	0	Specifies the lower measurement limit.
	Customized	-32768...32767	-32768	
Maximum	Normal	1023	1023	Specifies the upper measurement limit.
	Customized	-32768...32767	32767	

For further generic descriptions, refer to I/O Configuration Tab Description *(see page 17)*.

I/O Mapping Tab

This identifies the addresses of each input and the channel name:



Channel	Type	Description
IW0	INT	Current value of the input 0
...	...	...
IW7	INT	Current value of the input 7

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2ARI8HT

Introduction

This expansion module is an 8-point input module, temperature, with a terminal block.

For further hardware information, refer to TM2ARI8HT *(see Modicon TM2, Analog I/O Modules, Hardware Guide)*.

If you have physically wired the analog channel for a voltage signal and you configure the channel for a current signal in SoMachine, you may damage the analog circuit.

NOTICE
INOPERABLE EQUIPMENT Verify that the physical wiring of the analog circuit is compatible with the software configuration for the analog channel. **Failure to follow these instructions can result in equipment damage.**

NTC Probe

The temperature (Tm) varies in relation to the resistance (r) following the equation below:

$$Tm(r) = \frac{1}{\frac{1}{T} + \frac{1}{B}\ln\left[\frac{r}{R}\right]}$$

Where:

- Tm = temperature measured by the probe, in Kelvin
- r = physical value of the resistance in Ohm
- R = reference resistance in Ohm at temperature T
- T = reference temperature in Kelvin
- B = sensitivity of the NTC probe in Kelvin

R,T, and B must be greater or equal to 1.

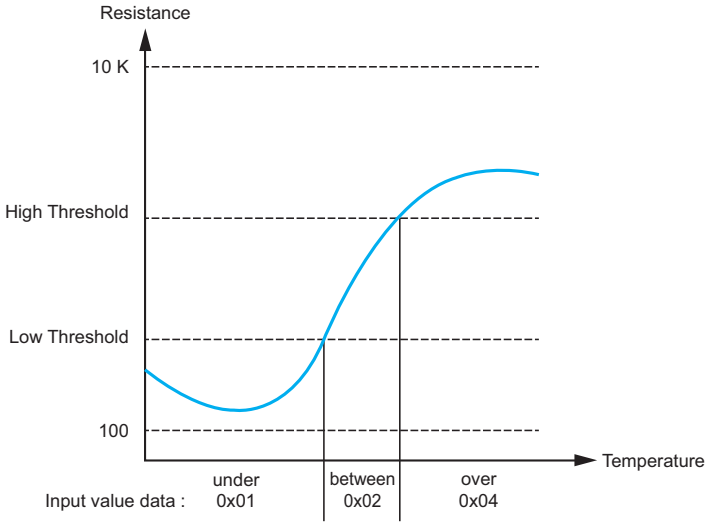
If the resistance is selected as unit, the displayed value is equal to the probe resistance.

NOTE: 25 °C = 77 °F = 298.15 K

PTC Probe

This table shows the read value according to the resistance value:

Resistance Value	Read Value
Less than low threshold	1
Between threshold	2
Greater than high threshold	4



I/O Configuration Tab

This table allows configuring the inputs.

I/O Mapping | I/O Configuration | Information

Parameter	Type	Value	Default Value	Unit	Description
Inputs					
IW0					
Type	Enumeration of BYTE	Not used	Not used		Unit
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
Rref	UNIT(1...65535)	330	330		Reference resistance in Ohm at reference temperature
Tref	INT(1...65000)	29815	29815		Reference temperature value in Kelvin (0.01 K)
Beta	INT(1...32767)	3569	3569		Sensitivity of the probe
High threshold	INT(1501...10000)	3100	3100		Activation threshold
Low threshold	INT(100...3099)	1500	1500		Reactivation threshold
IW1					
Type	Enumeration of BYTE	Not used	Not used		Unit
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
Rref	UNIT(1...65535)	330	330		Reference resistance in Ohm at reference temperature
Tref	INT(1...65000)	29815	29815		Reference temperature value in Kelvin (0.01 K)
Beta	INT(1...32767)	3569	3569		Sensitivity of the probe
High threshold	INT(1501...10000)	3100	3100		Activation threshold
Low threshold	INT(100...3099)	1500	1500		Reactivation threshold
IW2					
Type	Enumeration of BYTE	Not used	Not used		Unit
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
Rref	UNIT(1...65535)	330	330		Reference resistance in Ohm at reference temperature
Tref	INT(1...65000)	29815	29815		Reference temperature value in Kelvin (0.01 K)
Beta	INT(1...32767)	3569	3569		Sensitivity of the probe
High threshold	INT(1501...10000)	3100	3100		Activation threshold
Low threshold	INT(100...3099)	1500	1500		Reactivation threshold
IW3					
Type	Enumeration of BYTE	Not used	Not used		Unit
Scope	Enumeration of BYTE	Not used	Not used		Unit

For each input, you can define:

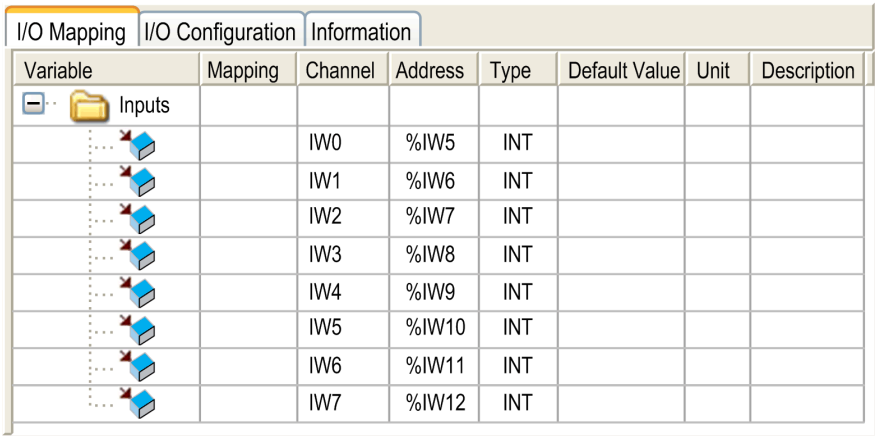
Parameter		Value	Default Value	Description
Type		Not used NTC PTC	Not used	This identifies the mode of the channel.
Scope		Normal Customized Resistance (Ohm) Celsius (0.1 °C) Fahrenheit (0.1 °F)	Normal for NTC type Resistance (Ohm) for PTC type	This identifies the range of values for the channel.
Minimum	Normal	0	0	Specifies the lower measurement limit.
	Customized	-32768...32767	-32768	
Maximum	Normal	1023	1023	Specifies the upper measurement limit.
	Customized	-32768...32767	32767	
Rref (used only with NTC probe)		1...65535	330	Reference resistance in Ohm at temperature Tref
Tref (used only with NTC probe)		1...65000	29815	Reference temperature value in Kelvin (0.01 K)
Beta (used only with NTC probe)		1...32767	3569	Sensitivity of NTC probe in Kelvin (0.01 K)
High threshold (used only with PTC probe)		100...10000	3100	Activation threshold
Low threshold (used only with PTC probe)		100...10000	1500	Reactivation threshold

Scope	Resistance (Ohm)		Celsius (0.1 °C)		Fahrenheit (0.1 °F)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
NTC	100	10000	-789	2114	-1101	4125
PTC	100	10000	-	-	-	-

For further generic descriptions, refer to I/O Configuration Tab Description *(see page 17)*.

I/O Mapping Tab

This identifies the addresses of each input and the channel name:



Channel	Type	Description
IW0	INT	Current value of the input 0
...	...	...
IW7	INT	Current value of the input 7

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2ARI8LRJ

Introduction

This expansion module is an 8-point output module, temperature, with RJ11 connectors.

For further hardware information, refer to TM2ARI8LRJ *(see Modicon TM2, Analog I/O Modules, Hardware Guide)*.

If you have physically wired the analog channel for a voltage signal and you configure the channel for a current signal in SoMachine, you may damage the analog circuit.

NOTICE
INOPERABLE EQUIPMENT Verify that the physical wiring of the analog circuit is compatible with the software configuration for the analog channel. **Failure to follow these instructions can result in equipment damage.**

I/O Configuration Tab

This table allows configuring the inputs.

I/O Mapping | I/O Configuration | Information

Parameter	Type	Value	Default Value	Unit	Description
Inputs					
IW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
IW1					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
IW2					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
IW3					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
IW4					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
IW5					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit

For each input, you can define:

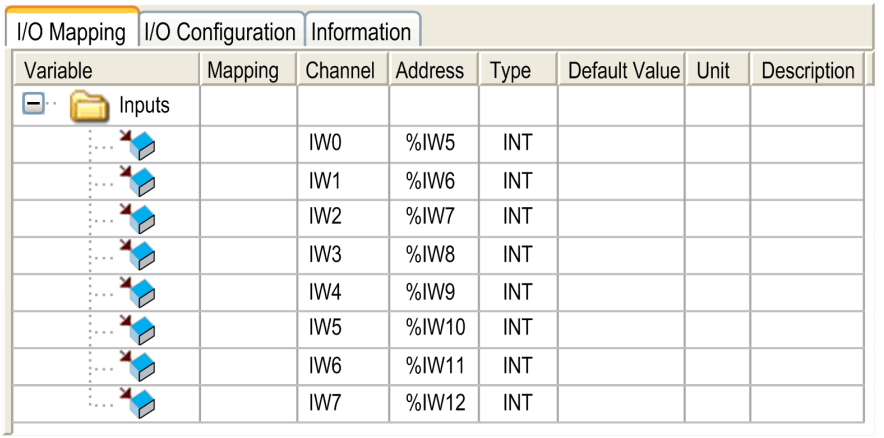
Parameter		Value	Default Value	Description
Type		Not used PT100 PT1000	Not used	This identifies the mode of the channel.
Scope		Not used Normal Customized Celsius (0.1 °C) Fahrenheit (0.1 °F)	Not used	This identifies the range of values for the channel.
Minimum	Normal	0	0	Specifies the lower measurement limit.
	Celsius (0.1 °C)	See the table below	See the table below	
	Fahrenheit (0.1 °F)			
	Customized	-32768...32767	-32768	
Maximum	Normal	4095	4095	Specifies the upper measurement limit.
	Celsius (0.1 °C)	See the table below	See the table below	
	Fahrenheit (0.1 °F)			
	Customized	-32768...32767	32767	

Scope	Normal		Celsius (0.1 °C)		Fahrenheit (0.1 °F)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
PT100	0	4095	-2000	6000	-3280	11120
PT1000	0	4095	-500	2000	-580	3920

For further generic descriptions, refer to I/O Configuration Tab Description *(see page 17)*.

I/O Mapping Tab

This identifies the addresses of each input and the channel name:



Channel	Type	Description
IW0	INT	Current value of the input 0
...	...	...
IW7	INT	Current value of the input 7

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2ARI8LT

Introduction

This expansion module is an 8-point input module, temperature, with 2 terminal blocks.

For further hardware information, refer to TM2ARI8LT *(see Modicon TM2, Analog I/O Modules, Hardware Guide)*.

If you have physically wired the analog channel for a voltage signal and you configure the channel for a current signal in SoMachine, you may damage the analog circuit.

NOTICE
INOPERABLE EQUIPMENT Verify that the physical wiring of the analog circuit is compatible with the software configuration for the analog channel. **Failure to follow these instructions can result in equipment damage.**

I/O Configuration Tab

This table allows configuring the inputs.

I/O Mapping | I/O Configuration | Information

Parameter	Type	Value	Default Value	Unit	Description
Inputs					
IW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
IW1					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
IW2					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
IW3					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
IW4					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
IW5					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value
Maximum	INT(-32768...32767)	32767	32767		Maximum value
IW6					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...32767)	-32768	-32768		Minimum value

For each input, you can define:

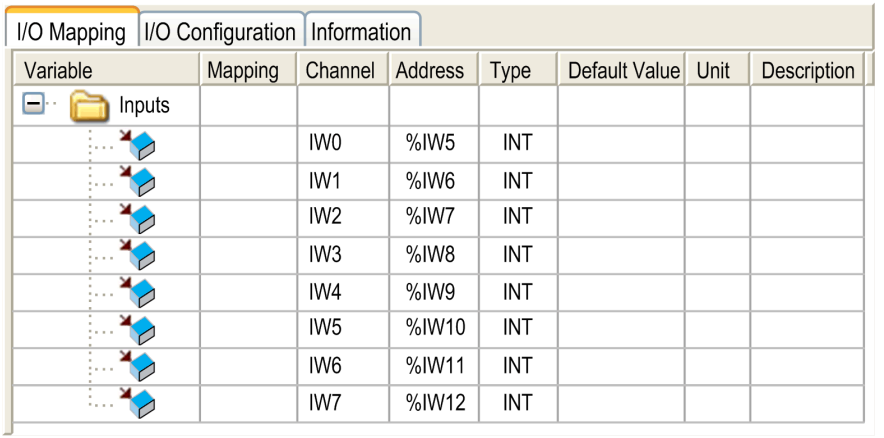
Parameter		Value	Default Value	Description
Type		Not used PT100 PT1000	Not used	This identifies the mode of the channel.
Scope		Not used Normal Customized Celsius (0.1 °C) Fahrenheit (0.1 °F)	Not used	This identifies the range of values for the channel.
Minimum	Normal	0	0	Specifies the lower measurement limit.
	Celsius (0.1 °C)	See the table below	See the table below	
	Fahrenheit (0.1 °F)			
	Customized	-32768...32767	-32768	
Maximum	Normal	4095	4095	Specifies the upper measurement limit.
	Celsius (0.1 °C)	See the table below	See the table below	
	Fahrenheit (0.1 °F)			
	Customized	-32768...32767	32767	

Scope	Normal		Celsius (0.1 °C)		Fahrenheit (0.1 °F)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
PT100	0	4095	-2000	6000	-3280	11120
PT1000	0	4095	-500	2000	-580	3920

For further generic descriptions, refer to I/O Configuration Tab Description *(see page 17)*.

I/O Mapping Tab

This identifies the addresses of each input and the channel name:



Channel	Type	Description
IW0	INT	Current value of the input 0
...	...	...
IW7	INT	Current value of the input 7

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2AMO1HT

Introduction

This expansion module is a 1-point output module with a terminal block.

For further hardware information, refer to TM2AMO1HT *(see Modicon TM2, Analog I/O Modules, Hardware Guide)*.

If you have physically wired the analog channel for a voltage signal and you configure the channel for a current signal in SoMachine, you may damage the analog circuit.

NOTICE
INOPERABLE EQUIPMENT Verify that the physical wiring of the analog circuit is compatible with the software configuration for the analog channel. **Failure to follow these instructions can result in equipment damage.**

I/O Configuration Tab

This table allows configuring the output.

I/O Mapping | I/O Configuration | Information

Parameter	Type	Value	Default Value	Unit	Description
Outputs					
QW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...4095)	0	0		Minimum value
Maximum	INT(0...32767)	4095	4095		Maximum value

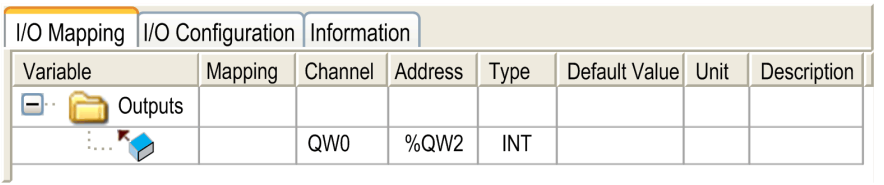
For the output, you can define:

Parameter		Value	Default Value	Description
Type		Not used 0- 10 V 4 - 20 mA	Not used	This identifies the mode of the channel.
Scope		Normal Customized	Normal	This identifies the range of values for the channel.
Minimum	Normal	0	0	Specifies the lower limit.
	Customized	-32768...32767	-32768	
Maximum	Normal	4095	4095	Specifies the upper limit.
	Customized	-32768...32767	32767	

For further generic descriptions, refer to I/O Configuration Tab Description *(see page 17)*.

I/O Mapping Tab

This identifies the addresses of each input and the channel name:



Channel	Type	Default Value	Description
QW0	INT	-32768...32767	Command word of the output 0

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2AVO2HT

Introduction

This expansion module is a 2-point output module with a terminal block.

For further hardware information, refer to TM2AVO2HT *(see Modicon TM2, Analog I/O Modules, Hardware Guide)*.

If you have physically wired the analog channel for a voltage signal and you configure the channel for a current signal in SoMachine, you may damage the analog circuit.

NOTICE
INOPERABLE EQUIPMENT Verify that the physical wiring of the analog circuit is compatible with the software configuration for the analog channel. **Failure to follow these instructions can result in equipment damage.**

I/O Configuration Tab

This table allows configuring the outputs.

I/O Mapping | I/O Configuration | Information

Parameter	Type	Value	Default Value	Unit	Description
Outputs					
QW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...2047)	-2048	-2048		Minimum value
Maximum	INT(-2048...32767)	2047	2047		Maximum value
QW1					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...2047)	-2048	-2048		Minimum value
Maximum	INT(-2048...32767)	2047	2047		Maximum value

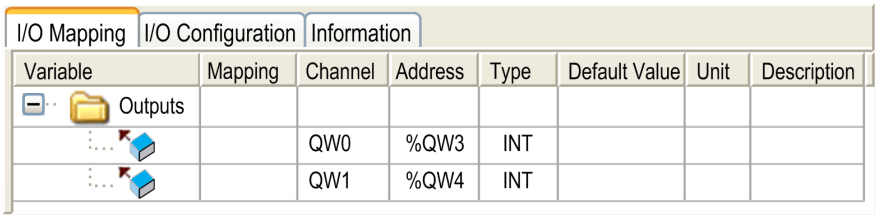
For each output, you can define:

Parameter		Value	Default Value	Description
Type		Not used -10...10 Vdc	Not used	This identifies the mode of the channel.
Scope		Normal Customized	Normal	This identifies the range of values for the channel.
Minimum	Normal	-2048	-2048	Specifies the lower limit.
	Customized	-32768...32767	-32768	
Maximum	Normal	2047	2047	Specifies the upper limit.
	Customized	-32768...32767	32767	

For further generic descriptions, refer to I/O Configuration Tab Description *(see page 17)*.

I/O Mapping Tab

This identifies the addresses of each input and the channel name:



Channel	Type	Default Value	Description
QW0	INT	-32768...32767	Command word of the output 0
QW1	INT	-32768...32767	Command word of the output 1

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2AMM3HT

Introduction

This expansion module is a 2-point input/1-point output module with a terminal block.

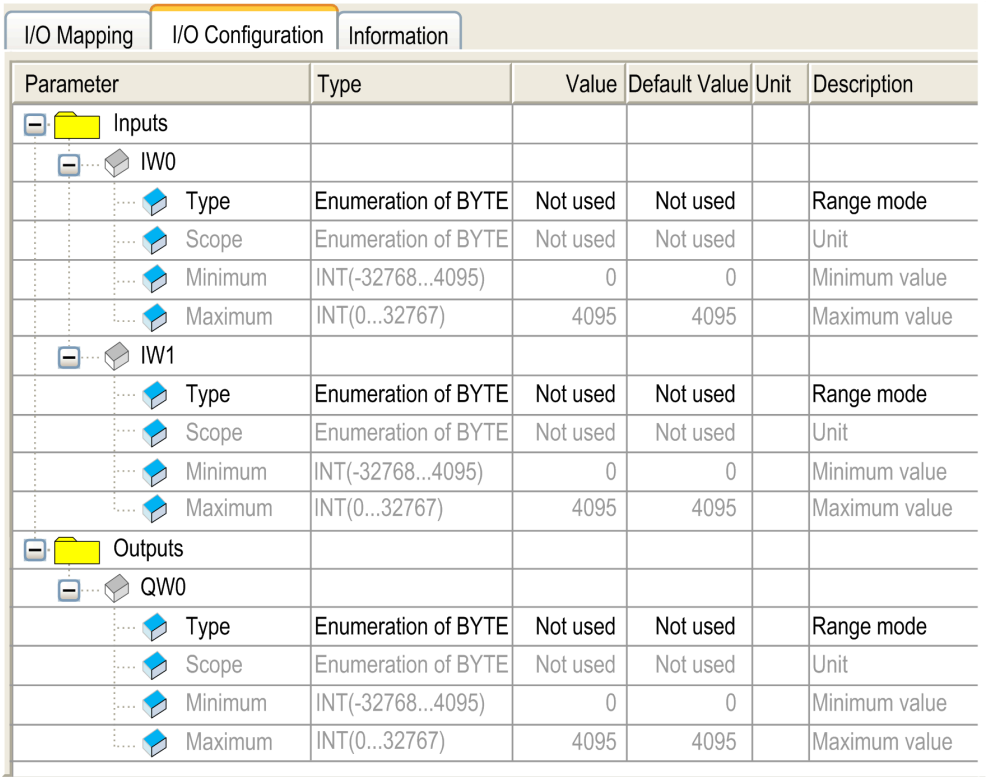
For further hardware information, refer to TM2AMM3HT *(see Modicon TM2, Analog I/O Modules, Hardware Guide)*.

If you have physically wired the analog channel for a voltage signal and you configure the channel for a current signal in SoMachine, you may damage the analog circuit.

NOTICE
INOPERABLE EQUIPMENT Verify that the physical wiring of the analog circuit is compatible with the software configuration for the analog channel. **Failure to follow these instructions can result in equipment damage.**

I/O Configuration Tab

This table allows configuring the inputs and the outputs.



Parameter	Type	Value	Default Value	Unit	Description
Inputs					
IW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...4095)	0	0		Minimum value
Maximum	INT(0...32767)	4095	4095		Maximum value
IW1					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...4095)	0	0		Minimum value
Maximum	INT(0...32767)	4095	4095		Maximum value
Outputs					
QW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...4095)	0	0		Minimum value
Maximum	INT(0...32767)	4095	4095		Maximum value

For each input, you can define:

Parameter		Value	Default Value	Description
Type		Not used 0...10 V 4...20 mA	Not used	This identifies the mode of the channel.
Scope		Normal Customized	Normal	This identifies the range of values for the channel.
Minimum	Normal	0	0	Specifies the lower measurement limit.
	Customized	-32768...32767	-32768	
Maximum	Normal	4095	4095	Specifies the upper measurement limit.
	Customized	-32768...32767	32767	

For each output, you can define:

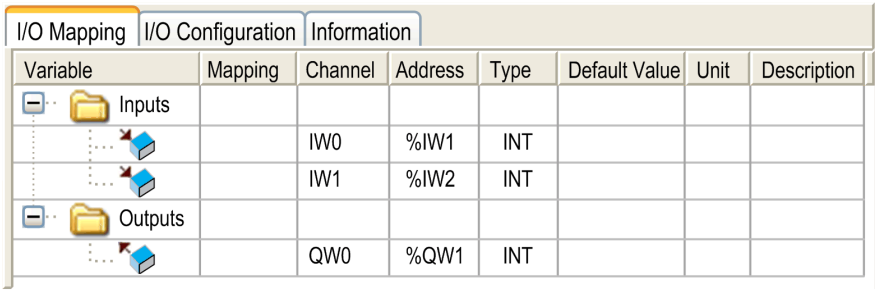
Parameter		Value	Default Value	Description
Type		Not used 0- 10 V 4 - 20 mA	Not used	This identifies the mode of the channel.
Scope		Normal Customized	Normal	This identifies the range of values for the channel.
Minimum	Normal	0	0	Specifies the lower limit.
	Customized	-32768...32767	-32768	
Maximum	Normal	4095	4095	Specifies the upper limit.
	Customized	-32768...32767	32767	

NOTE: When the value set by the controller is lower than the configured range, the analog output of the module configured in 4...20 mA can be lower than 4 mA.

For further generic descriptions, refer to I/O Configuration Tab Description *(see page 17)*.

I/O Mapping Tab

This identifies the addresses of each input and the channel name:



Channel		Type	Default Value	Description
Inputs	IW0	INT	-	Current value of the input 0
	IW1	INT	-	Current value of the input 1
Outputs	QW0	INT	-32768...32767	Command word of the output 0

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2AMM6HT

Introduction

This expansion module is a 4-point input/2-point output module with 2 terminal blocks.

For further hardware information, refer to TM2AMM6HT *(see Modicon TM2, Analog I/O Modules, Hardware Guide)*.

If you have physically wired the analog channel for a voltage signal and you configure the channel for a current signal in SoMachine, you may damage the analog circuit.

NOTICE
INOPERABLE EQUIPMENT Verify that the physical wiring of the analog circuit is compatible with the software configuration for the analog channel. **Failure to follow these instructions can result in equipment damage.**

I/O Configuration Tab

This table allows configuring the inputs and the outputs.

I/O Mapping | I/O Configuration | Information

Parameter	Type	Value	Default Value	Unit	Description
Inputs					
IW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...4095)	0	0		Minimum value
Maximum	INT(0...32767)	4095	4095		Maximum value
IW1					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...4095)	0	0		Minimum value
Maximum	INT(0...32767)	4095	4095		Maximum value
IW2					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...4095)	0	0		Minimum value
Maximum	INT(0...32767)	4095	4095		Maximum value
IW3					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...4095)	0	0		Minimum value
Maximum	INT(0...32767)	4095	4095		Maximum value
Outputs					
QW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...4095)	0	0		Minimum value
Maximum	INT(0...32767)	4095	4095		Maximum value
QW1					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(-32768...4095)	0	0		Minimum value
Maximum	INT(0...32767)	4095	4095		Maximum value

For each input, you can define:

Parameter		Value	Default Value	Description
Type		Not used 0- 10 V 4 - 20 mA	Not used	This identifies the mode of the channel.
Scope		Normal Customized	Normal	This identifies the range of values for the channel.
Minimum	Normal	0	0	Specifies the lower measurement limit.
	Customized	-32768...32767	-32768	
Maximum	Normal	4095	4095	Specifies the upper measurement limit.
	Customized	-32768...32767	32767	

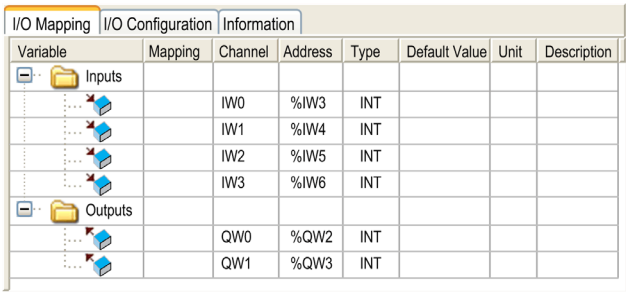
For each output, you can define:

Parameter		Value	Default Value	Description
Type		Not used 0- 10 V 4 - 20 mA	Not used	This identifies the mode of the channel.
Scope		Normal Customized	Normal	This identifies the range of values for the channel.
Minimum	Normal	0	0	Specifies the lower limit.
	Customized	-32768...32767	-32768	
Maximum	Normal	4095	4095	Specifies the upper limit.
	Customized	-32768...32767	32767	

For further generic descriptions, refer to I/O Configuration Tab Description *(see page 17)*.

I/O Mapping Tab

This identifies the addresses of each input and the channel name:



Channel		Type	Default Value	Description
Inputs	IW0	INT	-	Current value of the input 0
	...	...	...	...
	IW3	INT	-	Current value of the input 3
Outputs	QW0	INT	-32768...32767	Command word of the output 0
	QW1	INT	-32768...32767	Command word of the output 1

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

TM2ALM3LT

Introduction

This expansion module is a 2-point input/1-point output module with a terminal block and accepts thermocouple and resistance thermometer signals.

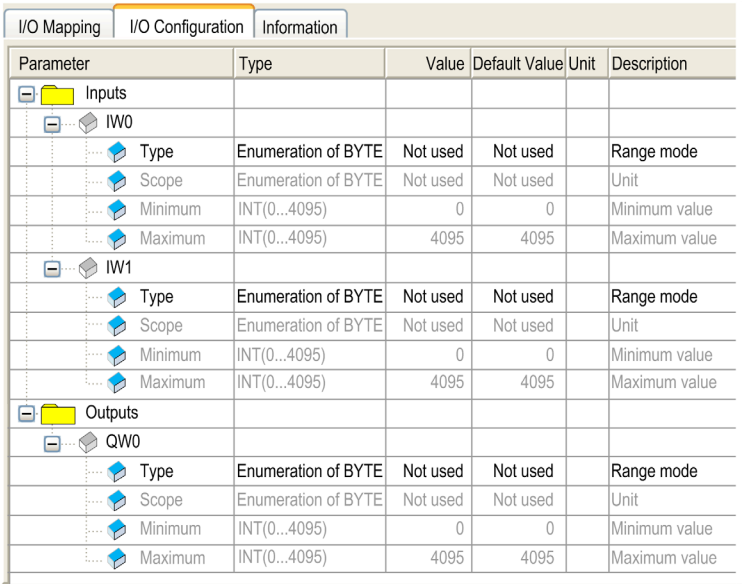
For further hardware information, refer to TM2ALM3LT *(see Modicon TM2, Analog I/O Modules, Hardware Guide)*.

If you have physically wired the analog channel for a voltage signal and you configure the channel for a current signal in SoMachine, you may damage the analog circuit.

NOTICE
INOPERABLE EQUIPMENT Verify that the physical wiring of the analog circuit is compatible with the software configuration for the analog channel. **Failure to follow these instructions can result in equipment damage.**

I/O Configuration Tab

This table allows configuring the inputs and the outputs.


I/O Mapping | I/O Configuration | Information

Parameter	Type	Value	Default Value	Unit	Description
Inputs					
IW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(0...4095)	0	0		Minimum value
Maximum	INT(0...4095)	4095	4095		Maximum value
IW1					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(0...4095)	0	0		Minimum value
Maximum	INT(0...4095)	4095	4095		Maximum value
Outputs					
QW0					
Type	Enumeration of BYTE	Not used	Not used		Range mode
Scope	Enumeration of BYTE	Not used	Not used		Unit
Minimum	INT(0...4095)	0	0		Minimum value
Maximum	INT(0...4095)	4095	4095		Maximum value

For each input, you can define:

Parameter		Value	Default Value	Description
Type		Not used PT100 Thermocouple K Thermocouple J Thermocouple T	Not used	This identifies the mode of a channel.
Scope		Normal Customized Celsius (0.1 °C) Fahrenheit (0.1 °F)	Normal	This identifies the range of values for a channel.
Minimum	Normal	0	0	Specifies the lower measurement limit.
	Celsius (0.1 °C)	See the table below	See the table below	
	Fahrenheit (0.1 °F)			
	Customized	-32768...32767	-32768	
Maximum	Normal	4095	4095	Specifies the upper measurement limit.
	Celsius (0.1 °C)	See the table below	See the table below	
	Fahrenheit (0.1 °F)			
	Customized	-32768...32767	.32767	

Scope	Normal		Celsius (0.1 °C)		Fahrenheit (0.1 °F)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Thermocouple K	0	4095	-2700	13700	-4540	24980
Thermocouple J	0	4095	-2000	7600	-3280	14000
Thermocouple T	0	4095	-2700	4000	-4540	7520
PT100	0	4095	-1000	5000	-1480	9320

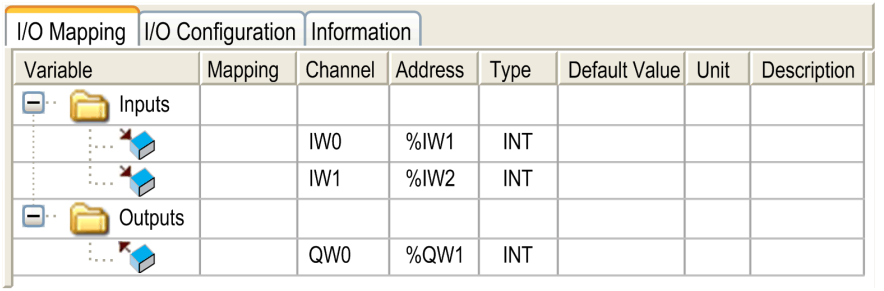
For each output, you can define:

Parameter		Value	Default Value	Description
Type		Not used 0- 10 V 4 - 20 mA	Not used	This identifies the mode of a channel.
Scope		Normal Customized	Normal	This identifies the range of values for a channel.
Minimum	Normal	0	0	Specifies the lower limit.
	Customized	-32768...32767	-32768	
Maximum	Normal	4095	4095	Specifies the upper limit.
	Customized	-32768...32767	32767	

For further generic descriptions, refer to I/O Configuration Tab Description *(see page 17)*.

I/O Mapping Tab

This identifies the addresses of each input and the channel name:



Channel		Type	Default Value	Description
Inputs	IW0	INT	-	Current value of the input 0
	IW1	INT	-	Current value of the input 1
Outputs	QW0	INT	-32768...32767	Command word of the output 0

For further generic descriptions, refer to I/O Mapping Tab Description *(see page 16)*.

Analog I/O Modules Diagnostic

Introduction

The operating status of each I/O channel is given by the diagnostic bytes in the **I/O Mapping** tab:

- IBStatusIWx for input channel x
- IBStatusQWx for output channel x

Diagnostic bytes are available for the following modules:

- TM2AMM3HT
- TM2ALM3LT
- TM2AMI2HT
- TM2AMO1HT

NOTE: If the **Status Enabled** parameter in the **I/O Configuration** tab is deactivated, it is possible to update the value of the diagnostic bytes by calling the `TM3_GetModuleInternalStatus` function.

For more information about `TM3_GetModuleInternalStatus` function:

- Refer to *M241 Controller PLCSystem Library Guide* for Modicon M241 Logic Controller.
- Refer to *M251 Controller PLCSystem Library Guide* for Modicon M251 Logic Controller.

Input Diagnostic Byte Description

This table describes the IBStatusIWx diagnostic byte:

Byte value	Description
0	Normal
1	Undefined
2	Undefined
3	Configuration error detected
4	External power supply error detected
5	Wiring error detected (high limit exceeded)
6	Wiring error detected (low limit exceeded)
7	General hardware error detected
8...255	Undefined

Output Diagnostic Byte Description

This table describes the IBStatusQWx diagnostic byte:

Byte value	Description
0	Normal
1	Undefined
2	Undefined
3	Configuration error detected
4	External power supply error detected
5	Undefined
6	Undefined
7	General hardware error detected
8...255	Undefined

Chapter 4
TM2 Expert Modules

TM200HSC206DF and TM200HSC206DT

Overview

The TM200HSC206DT and TM200HSC206DF HSC modules can be used to add HSC functionality to your system, and also provide additional counting modes (period meter and ratio).

Use the `GetRightBusStatus` function regularly to monitor the expansion bus configuration status.

Access the Configuration Menu

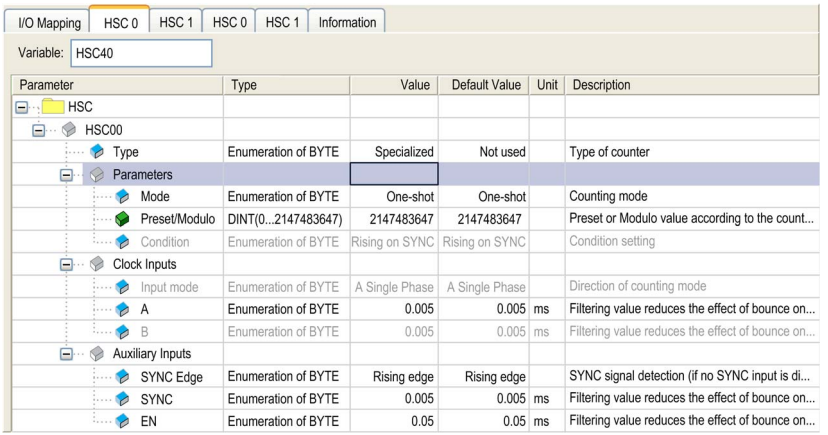
NOTE: Before accessing the configuration menu, add a TM200HSC206DT or a TM200HSC206DF module in the SoMachine software.

This table shows how to access the HSC configuration menu:

Step	Description
1	Double-click the added module node in the **Devices tree**.
2	Select the **HSC x** tab corresponding to the channel you want to configure.

HSC Configuration Window

This figure is a sample HSC configuration window used to configure the HSC:



Step	Action
1	Select the value of the **HSCxx** type parameter.
2	If necessary, change the instance name in the **Variable** field.
3	Refer to Specialized Type Overview for configuring the different parameters.

Chapter 5
TM2 Communication Module

TWDNOI10M3

Introduction

This expansion module is an AS-Interface master module.

To configure the TWDNOI10M3 expansion module, refer to AS-Interface Configuration *(see Modicon M238 Logic Controller, Programming Guide)*.

Glossary

B

BOOL

(*boolean*) A basic data type in computing. A `BOOL` variable can have one of these values: 0 (`FALSE`), 1 (`TRUE`). A bit that is extracted from a word is of type `BOOL`; for example, `%MW10.4` is a fifth bit of memory word number 10.

byte

A type that is encoded in an 8-bit format, ranging from 00 hex to FF hex.

C

control network

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

Two kinds of topologies are supported:

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

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

D

digital I/O

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

DWORD

(*double word*) Encoded in 32-bit format.

E

expansion bus

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

expansion I/O module

(*expansion input/output module*) Either a digital or analog module that adds additional I/O to the base controller.

F

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*)

I

I/O

(*input/output*)

INT

(*integer*) A whole number encoded in 16 bits.

M

MAST

A processor task that is run through its programming software. The MAST task has 2 sections:

- **IN:** Inputs are copied to the IN section before execution of the MAST task.
- **OUT:** Outputs are copied to the OUT section after execution of the MAST task.

S

source output

A wiring arrangement in which the output electronic module provides current to the device. A source output is referenced to +24 Vdc.

T

task

A group of sections and subroutines, executed cyclically or periodically for the MAST task or periodically for the FAST task.

A task possesses a level of priority and is linked to inputs and outputs of the controller. These I/O are refreshed in relation to the task.

A controller can have several tasks.

terminal block

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

V

variable

A memory unit that is addressed and modified by a program.

W

WORD

A type encoded in a 16-bit format.

Index

A

Analog I/O modules, *13*

E

expansion modules
    adding, *16*

T

TM2, *11*
TM2 analog, *11*
TM2 analog I/O modules
    diagnostic, *93*
TM2 digital, *11*
TM2 expert, *11*