Modicon TWDNOI10M3

AS-Interface Master Module
Hardware Guide

06/2011

EIO0000000608.03

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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.

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.

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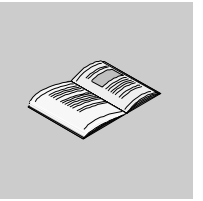
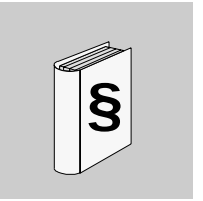


Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, 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 an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

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

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

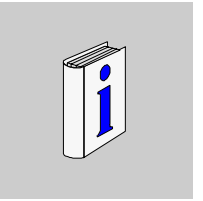
CAUTION
CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** equipment damage.

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 manual provides parts descriptions, specifications, wiring diagrams, installation, setup, and troubleshooting information for the Modicon TWDNOI10M3 AS-Interface Master Module.

Validity Note

This document has been updated with the release of SoMachine V3.0.

The technical characteristics of the device(s) described in this manual also appear online. To access this information online:

Step	Action
1	Go to the Schneider Electric home page *www.schneider-electric.com*.
2	In the **Search** box type the model number of a product or the name of a product range. ● Do not include blank spaces in the model number/product range. ● To get information on a grouping similar modules, use asterisks (*).
3	If you entered a model number, go to the **Product datasheets** search results and click on the model number that interests you. If you entered the name of a product range, go to the **Product Ranges** search results and click on the product range that interests you.
4	If more than one model number appears in the **Products** search results, click on the model number that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click **Download *XXX* product datasheet**.

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

Related Documents

Title of Documentation	Reference Number
Modicon TM2 Expansion Modules Configuration Programming Guide	EIO0000000396 (ENG); EIO0000000397 (FRE); EIO0000000398 (GER); EIO0000000399 (SPA); EIO0000000400 (ITA); EIO0000000401 (CHS)
M238 Controller Hardware Guide	EIO0000000016 (ENG); EIO0000000017 (FRE); EIO0000000018 (GER); EIO0000000019 (SPA); EIO0000000020 (ITA); EIO0000000021 (CS)
Twido Programmable Controllers Modular and Compact Bases Hardware Guide	35011387 (ENG); 35013236 (FRE); 35013235 (GER); 35013245 (SPA); 35013246 (ITA)

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

Product Related Information

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of a hazardous atmosphere.

⚠ DANGER

EXPLOSION HAZARD

This equipment is suitable for use in non-hazardous locations only.

Failure to follow these instructions will result in death or serious injury.

⚠ 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.

User Comments

We welcome your comments about this document. You can reach us by e-mail at techcomm@schneider-electric.com.

Overview of the AS-Interface Module

1

Reminder About the AS-Interface Bus

General

Modicon TWDNOI10M3 AS-Interface Master Module is an AS-Interface bus connection.

The AS-Interface (abbreviation for Actuator-Sensor-Interface) bus is a field bus, and can be used to connect sensors/actuators. The AS-Interface system uses a single 2-conductor cable to transmit digital or analog information between a bus "master" and sensor/actuator type "slave" devices.

An AS-Interface system requires at a minimum three elements:

- an AS-Interface power supply providing a 30 Vdc voltage,
- a bus master,
- one or more slave devices (sensors, actuators and others).

These components are interconnected by a two-wire cable dedicated to data transmission and power supply, please see the AS-Interface Reference Guide.

Description, Specification and Wiring

2

Introduction

This chapter presents the description, specifications and wiring of the Modicon TWDNOI10M3 AS-Interface Master Module.

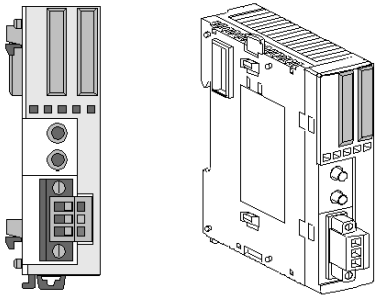
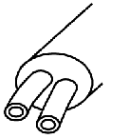
What's in this Chapter?

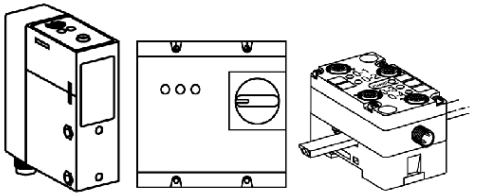
This chapter contains the following topics:

Description

Introduction to the Main Constituent Elements

The following table lists the main constituent elements of an AS-Interface master module:

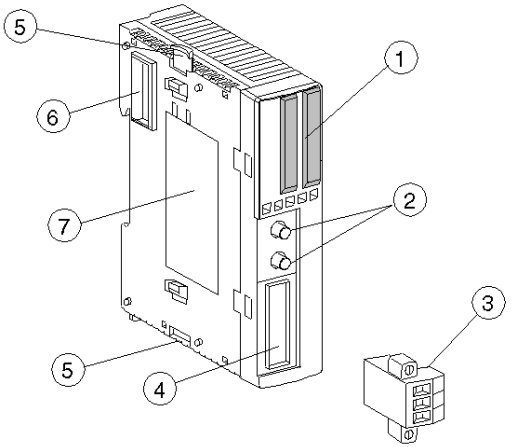
Part	Illustration
AS-Interface Master Module Connected to TM238LFDC24DT•• or TM238LDD24DT or TM238LFAC24DR•• or TM238LDA24DR controller, it manages all data exchange on the AS-Interface network. It also enables slave status to be monitored.	 Module TWDNOI10M3
AS-Interface Power Supply AS-Interface systems require a dedicated power supply regulated to 30 Vdc. A properly rated and certified power supply is required in an AS-Interface system because the power is distributed using the same two wires used for data transfers.	 ASIABLB3002
Cable This transmits data and carries the power. It can be made up from: ● Either a standard two-wire AS-Interface yellow ribbon cable, unshielded and polarized, ● Or a standard round, shielded or unshielded two-wire cable.	 Guiding ribbon cable  Round cable

Part	Illustration
Slaves Different types of slaves can be connected to the AS-Interface fieldbus.	 Sensor Actuator Passive

Parts Description and Legend

Parts Description

The following diagram shows the different parts of the TWDNOI10M3 AS-Interface master module:



Legend

The module is made up of the following elements:

No.	Part	Description
1	Display	• Status display LEDs: show AS-Interface master module status, • I/O LEDs: show the I/O status of a slave specified by the address LEDs, • Address LEDs: show slave addresses.
2	Push Buttons	Allow selection of a slave address and change of mode.
3	User terminal	Is connected to the AS-Interface cable.
4	AS-Interface cable connector	To connect the user terminal.
5	Latch button	Holds/releases the module from a controller.
6	Expansion Connector	Enables connection from controllers or expansion modules to another I/O module.
7	Product Label	Shows the module reference and specification.

Characteristics of the AS-Interface Master Module and the AS-Interface V2 Bus

AS-Interface V2 Bus

Characteristics	Value
Maximum cycle time of AS-Interface bus	● from 1 to 19 slaves = 3 ms, ● from 20 to 62 slaves = (1+n) x 0.156 ms where n = number of active slaves. 5 ms for 31 standard or extended address slaves, 10 ms for 62 extended address slaves.
Maximum number of slaves on the bus	31 standard address slaves or 62 extended address slaves.
Maximum length of AS-Interface bus cables	● without repeater: 100 m (328 ft.) ● with one repeater: 200 m (656 ft.) ● with two repeaters: 300 m (328 ft.)
Maximum number of I/O managed by the bus	standard address slaves: 124 inputs + 124 outputs extended address slaves: 248 inputs + 186 outputs
Nominal bus supply voltage	30 Vdc

Modicon TWDNOI10M3 AS-Interface Master Module

Characteristics	Specifications	
Ambient operating temperature	-	0...55° C (32...131° F)
Storage temperature	-	-25...+70° C (-13...158° F)
Relative humidity	-	30...95% Rh (non-condensing)
Degree of pollution	IEC 60664	2
Degree of protection	IEC 61131-2	IP20
Corrosion immunity	-	Free from corrosive gases
Altitude	-	Operation: 2000 m (6,560 ft.) max. Transport: 3,000 m (9,840 ft.) max.

Characteristics	Specifications	
Resistance to vibration	IEC 60028	When mounted on a DIN rail: ● 0.075 mm (0.003 in.) fixed amplitude from 10...57 Hz ● 9.8 m/s^2 (1 g_n) fixed acceleration from 57...150 Hz (2 hours per axis on each of three mutually perpendicular axes) When mounted on a panel surface: ● 1.6 mm (0.06 in.) fixed amplitude from 2...25 Hz ● 39.2 m/s^2 (4 g_n) fixed acceleration from 25...100 Hz (90 mn per axis on each of three mutually perpendicular axes)
Resistance to shock	IEC 61131	147 m/s^2 (15 g_n) for a duration of 11 ms (3 shocks per axis, on three mutually perpendicular axes
External Power Supply	-	AS-Interface power supply, 29.5...31.6 Vdc
Current consumed on the AS-Interface bus	-	Typically 65 mA / 110 mA maximum
Protection against polarity inversion on bus inputs	-	Yes
Connector on the module	-	MSTB2.5/3-GF-5.08BK (Phoenix contact)
Average number of connector insertions/removals	-	100 times minimum
Current consumed on the expansion bus		80 mA (5 Vdc)
Weight		85 g (3 oz)

The available memory in the AS-interface master module limits to eight the number of analog slaves that can be used on the bus. Above this limit, the analog slaves are not updated.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not attempt to configure or use more than 8 analog I/O slaves per AS-Interface master module.

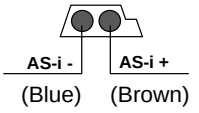
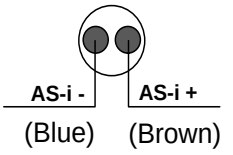
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Wiring and Connections

Different Cable Types

The AS-Interface bus cables carry the signals and provide a 30 Vdc power supply to the sensors and actuators connected to this bus.

Types of AS-Interface cables:

Cable type	Characteristics	Illustration
Polarized AS-Interface ribbon cable	Jacket color: yellow Wire cross-section: 1.5 mm^2 (16 AWG)	
Standard round cable or Separated cables	Wire cross-section: - stranded: 0.5...1.0 mm^2 (20...16 AWG) - solids: 0.75 mm^2...1.5 mm^2 (18...16 AWG)	

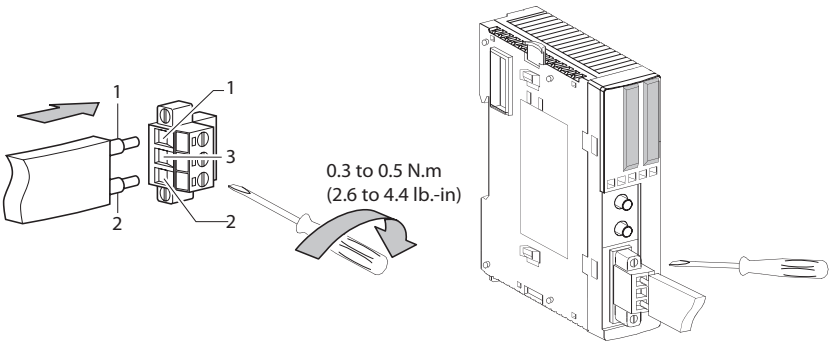
Procedure for Connecting the AS-Interface Master Module to the Bus

The following table describes the connection procedure:

Steps	Description
1	Perform wiring with the user terminal removed from the master module.
2	Respect the polarities of the AS-Interface cable: brown cable for the AS-Interface + pole and blue cable for the AS-Interface – pole. Connect the cable according to the colors shown on the terminal.
3	Connect the AS-Interface ground terminal block.
4	Using a screwdriver, tighten the screws on the terminal between 0.5...0.6 N•m (4.4...5.3 lb.-in) of torque. The use of cable end may help prevent the cable from slipping out of the terminal.
5	Insert the terminal into the module connector. Using a screwdriver, tighten the mounting screws on the terminal between 0.3...0.5 N•m (2.6...4.4 lb.-in) of torque.

Illustration of Connection

Illustration of Connection:



1 Brown (AS-i +)
2 Blue (AS-i -)
3 Black (Earth)

⚠ WARNING
INCOMPATIBLE POWER SUPPLY Use a Protected Extra Low Voltage (PELV) AS-Interface power supply with a nominal voltage of 30 Vdc. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

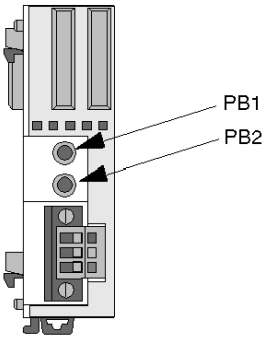
Operating Modes and Push Buttons

At a Glance

The actions performed using the push buttons PB1 and PB2 on the front panel of the AS-Interface module depend on the length of time for which they are pressed. If the length for which the push buttons are pressed does not correspond to either of those mentioned below or the two push buttons are pressed simultaneously, the status of the module remains unchanged.

Push Buttons

The following figure shows the position of the push buttons:



Push Button Functions

The following table describes the functions of the push buttons:

	Action	Function
PB1	Short press (1)	Increments the slave address. When the last address 31B is reached, pressing PB1 returns you to the first address 0A.
	Long press (2)	-
PB2	Short press (1)	Decrements the slave address. When the first address 0A is reached, pressing PB2 returns you to the last address 31B.
	Long press (2)	Change to or leave the Offline phase.

NOTE: 1: A "short press" corresponds to pressing the push button for not more than 0.5 seconds

NOTE: 2: A "long press" corresponds to pressing the push button for 3 seconds or more.

AS-Interface Master Module Operating Modes

As soon as it is powered up, the AS-Interface module goes into online, Normal protected mode. For more information about various modes, please see the AS-Interface Reference Guide.

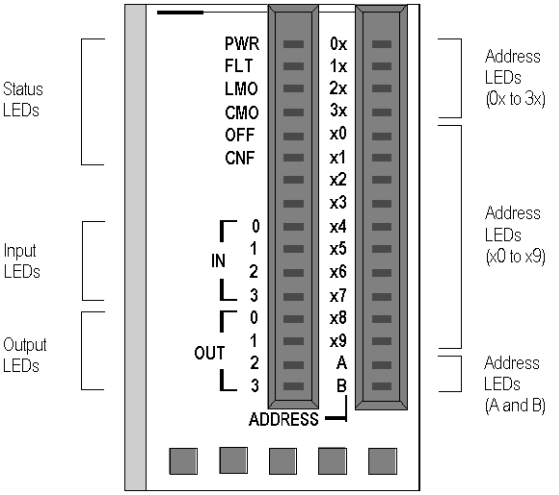
AS-Interface Master Module Display Panel

At a Glance

The AS-Interface master module is equipped with a display consisting of status LEDs, input/output LEDs and address LEDs.

Display Panel

The following figure shows the display panel:



Display of Module Status

The module status is displayed by the status LEDs:

LED	Status	Description
PWR	●	Indicates that sufficient power is being delivered by the AS-Interface power supply to the AS-Interface module.
	○	Indicates that insufficient power is being delivered by the AS-Interface power supply to the AS-Interface module.
FLT	●	Indicates that the configuration loaded onto the AS-Interface master is not correct or that an error has been detected on the AS-Interface bus. Also illuminates when the module is in Offline phase or set to Data Exchange Off.
	○	Indicates that the configuration is correct and the AS-Interface module OK.
LMO	○	This indicator is not used. Note: Flashes on power up.
CMO	●	Indicates that the module can accept commands from the controller.
OFF	●	Indicates that the module is in Offline phase.
	○	Indicates that the module is not in Offline phase.
CNF	○	This indicator is not used. Note: Flashes on power up.
○ Extinguished ● Illuminated		

Display of AS-Interface Master Operating Modes

The operating modes of the AS-Interface module can be changed using the push buttons or dedicated function blocks in the application program. The status LEDs also allow you to determine what mode the AS-Interface module is in.

Mode display table

Operating modes	PWR	FLT	LMO	CMO	OFF	CNF
Normal Protected Mode	●	○	○	●	○	○
Normal Protected Mode (Offline)	●	●	○	●	●	○
Normal Protected Mode (Data Exchange OFF)	●	●	○	●	○	○
○ Extinguished ● Illuminated						

Diagnostics of the AS-Interface Bus

The input/output LEDs and address LEDs can be used to view slaves on the AS-Interface bus and determine their operating status.:

State of address LEDs	State of IN/OUT LEDs	Description
		There is a slave at this address and its inputs/outputs are On.
		There is a slave at this address and its inputs/outputs are Off.
		There is a slave at this address, but an error has been detected.
		No slave is detected at this address.
		Communication on the AS-Interface bus has been interrupted because no power is being supplied or because the AS-Interface module is in the offline normal protected mode.
 Extinguished  Flashing  Illuminated		

The slave address is selected using the buttons PB1 and PB2. An address with an assigned slave can be read using the address LEDs as shown in the following example:

If LEDS 2x, x5 and B are illuminated, this indicates that there is a slave assigned to address 25B.

Module Installation

3

Introduction

This chapter provides information for installing Modicon TWDNOI10M3 AS-Interface Master Module.

What's in this Chapter?

This chapter contains the following topics:

Assembling an AS-Interface Master Module to a Controller

Introduction

This section shows how to assemble an AS-Interface master module to a controller. Your controller and AS-Interface master module may differ from the illustrations in this procedure.

Please be aware that it is important to update your application program whenever you attach or detach an expansion module from the controller. If you do not update the application program with each change of the physical configuration, your system may operate in an unintended manner.

⚠ WARNING

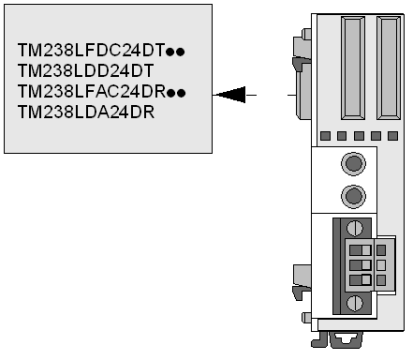
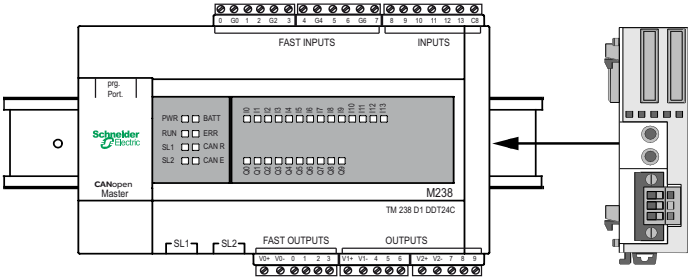
UNINTENDED EQUIPMENT OPERATION

- 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.

Assembling an AS-Interface Master Module to a Controller.

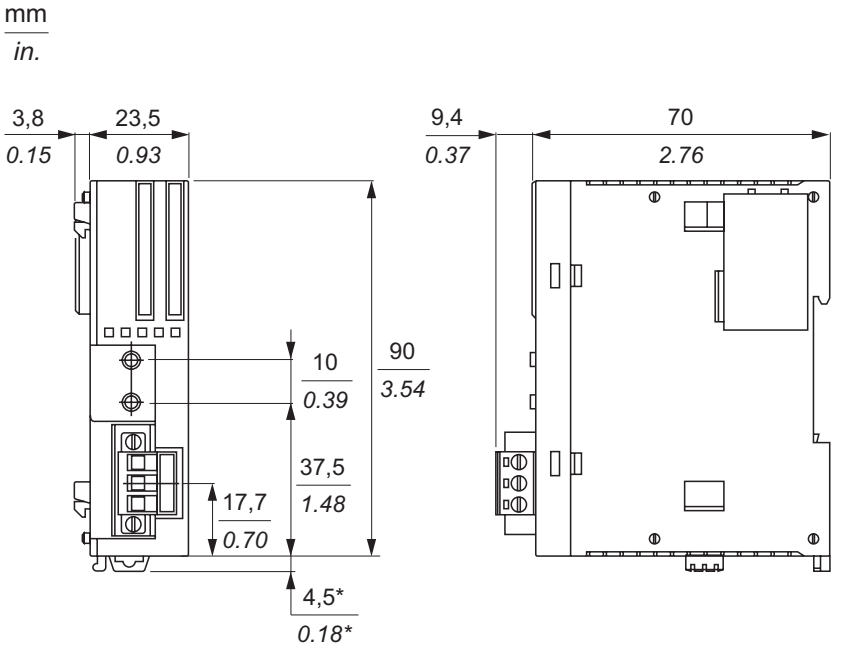
The following procedure shows how to assemble an AS-Interface master module and a controller together.

Step	Action
1	Remove the expansion connector cover from the controller.
2	Make sure the black latch button on the I/O module is in the up position. 
3	Align the connector on the left side of the AS-Interface master module with the connector on the right side of the controller. 
4	Press the AS-Interface master module to the controller until it "clicks" into place.
5	Push down the black latch button on the top of the AS-Interface master module to lock the module to the controller.

Dimensions

Module Dimensions

The following diagram shows the dimensions of the AS-Interface master module:



NOTE: * 8.5 mm (0.33 in) when the clamp is pulled out.

How to Install and Remove an AS-Interface Master module from a DIN Rail

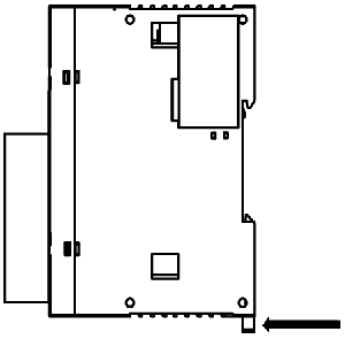
Introduction

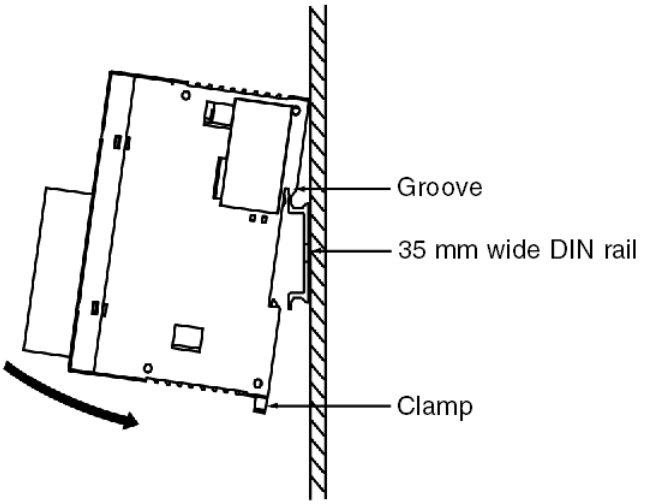
This section describes how to install and remove an AS-Interface bus master module from a DIN rail. The device you want to install or remove may differ from the illustrations in these procedures but the basic procedure remains applicable.

NOTE: When mounting controllers on a DIN rail, use two end stops, type AB1-AB8P35 or equivalent.

Installation

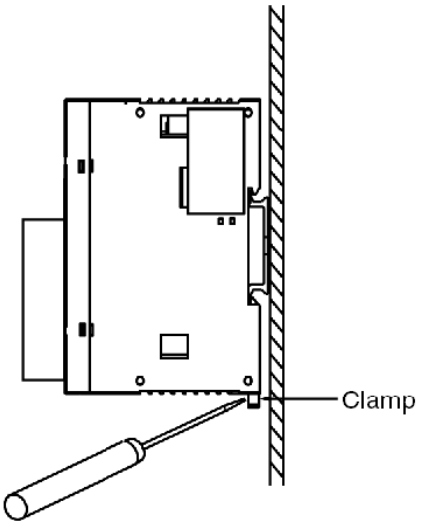
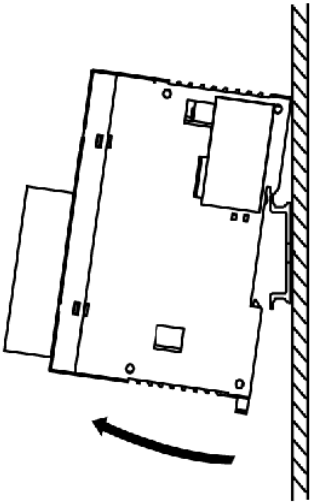
The following procedure shows how to install an AS-Interface bus master module or on a DIN rail.

Step	Action
1	Fasten the DIN rail to a panel using screws.
2	Pull out the clamp at the bottom of the controller and module assembly. 

Step	Action
3	Put the top groove of the controller and module on the DIN rail and press the modules toward the DIN rail. 
4	Push the clamp into the DIN rail.
5	Place mounting clips on both sides of the modules to help minimize side-to-side movement of the assembled devices.

Removal

The following procedure shows how to remove an AS-Interface bus master module from a DIN rail.

Step	Action
1	Insert a flat screwdriver into the slot in the clamp. 
2	Pull out the clamp.
3	Pull the controller and the associated module off the DIN rail from the bottom. 

How to Direct Mount on a Panel Surface

Introduction

This section shows how to install mounting strips directly on AS-Interface master module. This section also provides mounting hole layouts for each module. Your module may differ from the illustrations in these procedures but the basic procedure remains applicable.

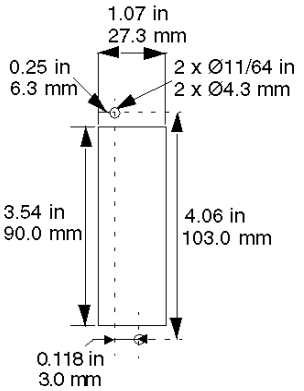
Installing a Mounting Strip

The following procedure explains how to install a mounting strip.

Step	Action
1	Remove the clamp from the back side of the module by pushing the clamp inward.
2	Insert the mounting strip, with the hook entering last, into the slot where the clamp was removed.
3	Slide the mounting strip into the slot until the hook enters into the recess in the module.

Mounting Hole Layout

The following diagram shows the mounting hole layout for the AS-Interface master module:



Appendices

Diagnostic and Mounting

A

Introduction

This appendix provides information about the LEDs used for diagnostic and the mounting on the DIN Rail of the Modicon TWDNOI10M3 AS-Interface Master Module.

What's in this Chapter?

This chapter contains the following topics:

Troubleshooting Using the Front Panel LEDs

Introduction

This section provides information on the module operating status and troubleshooting using the front panel LEDs.

Diagnostic LEDs

The following table summarizes the diagnostic conditions that may occur on AS-Interface master module startup:

LEDs		Causes and action to be taken
PWR		Insufficient power is being delivered to the AS-Interface module. ● Check AS-Interface power supply and connections. ● Check the connection between the M238 module and the AS-Interface master.
FLT		The slave configuration on the AS-Interface bus is incorrect: ● Use SoMachine Software to check that the slaves are correctly connected. If the configuration is correct and the LED remains on: ● Disconnect and reconnect the AS-Interface connector, or switch off the power supply and switch it back on again.
OFF		A slave is connected at address 0 at power up: ● Change the address of the slave and repeat power up.
 Extinguished  Illuminated		

NOTE: Even if the automatic addressing function on the master module is enabled, it is still important to confirm that there are no duplicate addresses on the AS-Interface bus before placing the system into service. The AS-Interface Master does not automatically detect duplicate slave addresses.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Always verify that there are no duplicate slave addresses on the AS-Interface bus before placing your system into service.
- If a slave with a duplicate address is detected, remove this slave from the AS-Interface bus and perform readdressing using the SoMachine software.

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

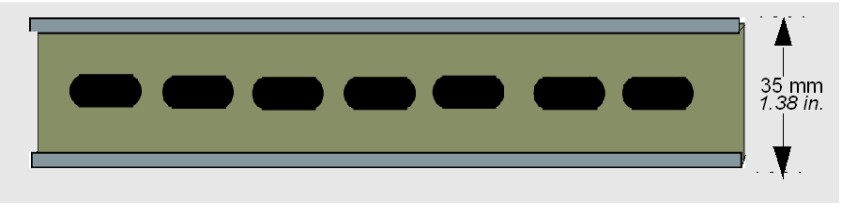
The DIN Rail

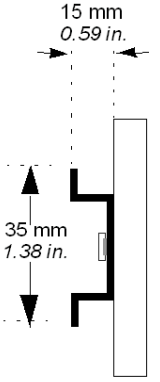
Introduction

You can mount the M238 and its expansions on a DIN rail. A DIN rail can be attached to a smooth mounting surface or suspended from a EIA rack or in a NEMA cabinet.

Dimensions of the DIN Rail

The DIN rail measures 35 mm (*1.38 in.*) high and 15 mm (*0.59 in.*) deep, as shown below.



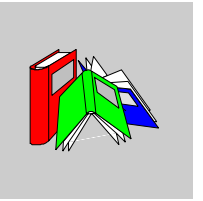


Recommended Equipment

You can order the suitable DIN rail from Schneider Electric:

Rail depth	Catalogue part number
15 mm (*0.59 in.*)	AM1DE200

Glossary



C

controller status output

The controller status output is a special function used in circuits that are external to the controller that control the power supply to the output devices or the controller's power supply.

E

expansion connector

A connector to attach expansion I/O modules.

expansion connector cover

A cover to protect the expansion connector.

expansion I/O module

An expansion input or output module is either a digital or analog module that adds additional I/O to the base controller.

I

I/O

Input/Output.

L

LED

A light emitting diode is an indicator that lights up when electricity passes through it.

N

network

A network includes interconnected devices that share a common data path and protocol for communications.

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