Twido Programmable Controllers

Analog I/O Modules Hardware Guide

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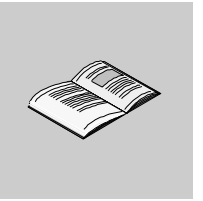
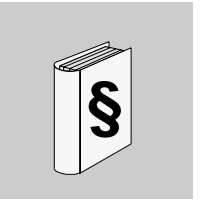
All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

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

Table of Contents



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

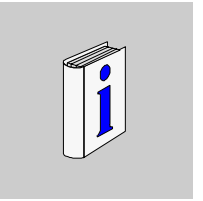
CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** equipment damage.

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 Analog I/O modules.

Validity Note

The information in this manual is applicable **only** for Twido programmable controllers. This documentation is valid for TwidoSuite Version 2.3.

User Comments

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

TWD Analog I/O Modules

I

Introduction

This part of the guide provides parts descriptions, specifications, wiring diagrams, installation, set up, and troubleshooting information about Twido Analog I/O modules.

What's in this Part?

This part contains the following chapters:

Overview for TWD Analog I/O Modules

1

About TWD Analog I/O Modules

Introduction

There are 10 Analog I/O modules which can be added to Twido bases.

Analog I/O Modules

The following table shows the analog I/O modules features, with corresponding channel type, voltage/current and terminal type:

Reference module	Channels	Channel type	Voltage/current	Terminal type
Input Modules				
TWDAMI2HT	2	High-level inputs	0...10 VDC 4...20 mA	Removable terminal block
TWDAMI2LT	2	Low-level inputs	Thermocouple type J,K,T	
TWDAMI4LT	4	Inputs	0...10 VDC 0...20 mA PT100/1000 Ni100/1000	
TWDAMI8HT	8	High-level inputs	0...20 mA 0...10 VDC	
TWDARI8HT	8	Low-level inputs	NTC / PTC	
Output Modules				
TWDAMO1HT	1	Output	0...10 VDC 4...20 mA	Removable terminal block
TWDAVO2HT	2	Outputs	+/- 10 VDC	

Reference module	Channels	Channel type	Voltage/current	Terminal type
Mixed Modules				
TWDAMM3HT	2 1	High-level inputs Outputs	0...10 VDC 4...20 mA 0...10 VDC 4...20 mA	Removable terminal block
TWDAMM6HT	4 2	High-level inputs Outputs	0...10 VDC 4...20 mA 0...10 VDC 4...20 mA	
TWDALM3LT	2 1	Low-level inputs Outputs	Thermo J,K,T, PT100 0...10 VDC 4...20 mA	

Installation

2

Introduction

This chapter provides installation overall instructions with safety information and installation preparation, installation and mounting instructions for the Twido Analog I/O modules, and how to connect the power supply.

What's in this Chapter?

This chapter contains the following sections:

2.1 Installation Overall Instructions

Introduction

This section provides information for installation preparation, safety, how to assemble and disassemble Analog I/O modules, and minimum clearances for Analog I/O modules.

What's in this Section?

This section contains the following topics:

Installation Guidelines

NOTICE

Electrical equipment should be serviced only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material. This document is not intended as an instruction manual for untrained persons.

Additional Information

Those responsible for the application, implementation or use of this product must ensure that the necessary design considerations have been incorporated into each application, completely adhering to applicable laws, performance and safety requirements, regulations, codes and standards.

General Warnings and Cautions

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Remove all power from all devices before inspecting, installing, removing, wiring, or servicing any inputs, outputs, or hardware.
- Connect the grounding wire to a proper ground.
- Always use a properly rated voltage sensing device to confirm power is off.
- Remove the terminal block before installing/removing the module from the rail, rack or enclosure. Terminal blocks must be connected or disconnected with sensor and pre-actuator voltage switched off.
- Replace and secure all covers or elements of the system and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating your Twido and associated products.

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

⚠ WARNING

EXPLOSION HAZARD

- This equipment is suitable for use in Class 1, Division 2, Groups A, B, C and D or non-hazardous locations only.
- Substitution of components may impair suitability for Class I, Division 2 compliance.
- Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- This product is not intended for use in safety critical machine functions. Where personnel and or equipment hazards exist, use appropriate safety interlocks.
- Do not disassemble, repair, or modify the modules.
- This controller is designed for use within an enclosure appropriately rated for its intended environment.
- Install the modules in the operating environment conditions described.
- Use the sensor power supply only for supplying power to sensors connected to the module.
- For power line and output circuits, use a fuse in compliance with local and national requirements for the circuit voltage and current requirements.

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

⚠ 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.
- 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[1].
- Each implementation of the Twido Programmable Controller 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."

Before Starting

Before installing any of the products read the safety information at the beginning of this book.

⚠ CAUTION

EQUIPMENT DAMAGE

Before adding/removing any module or adapter, turn off the power to the controller. Otherwise, the module, adapter, or controller may be damaged, or the controller may not operate correctly.

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

NOTE: All options and expansion I/O modules should be assembled before installing the control system on a DIN rail, onto a mounting plate, or in a control panel. The control system should be removed from a DIN rail, a mounting plate, or a control panel before disassembling the expansion I/O modules.

Installation Preparation

Introduction

The following section provides information on preparation for Analog I/O modules.

Before Starting

Before installing any of the TwidoSuite products read the **Safety Information** at the beginning of this book.

⚠ CAUTION
EQUIPMENT DAMAGE Before adding/removing any module or adapter, turn off the power to the base. Otherwise, the module, adapter, or base may be damaged, or the base may not operate correctly. **Failure to follow these instructions can result in injury or equipment damage.**

NOTE: All options and Analog I/O modules should be assembled before installing a Twido system on a DIN rail, onto a mounting plate, or in a control panel. The Twido system should be removed from a DIN rail, a mounting plate, or a control panel before disassembling the modules.

Compact and Modular Bases Mounting Positions

Introduction

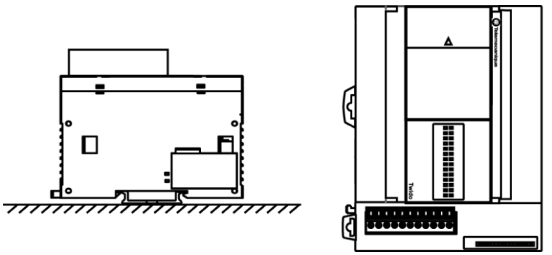
This section shows the correct and incorrect mounting positions for all bases.

NOTE: Keep adequate spacing for proper ventilation and to maintain an ambient temperature between 0° C (32° F) and 55° C (131° F).

⚠ CAUTION
OVERHEATING HAZARD
Do not place heat generating devices such as transformers and power supplies underneath the controllers or expansion I/O modules.
Failure to follow these instructions can result in injury or equipment damage.

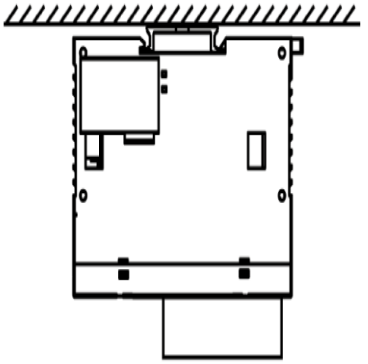
Correct Mounting Position for all Bases

Compact and Modular bases must be mounted horizontally on a vertical plane as shown in the figures below.



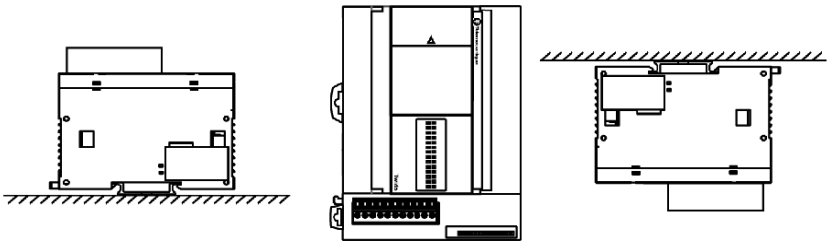
Incorrect Mounting Position for all Bases

This figure below shows the incorrect position mounting for all bases.



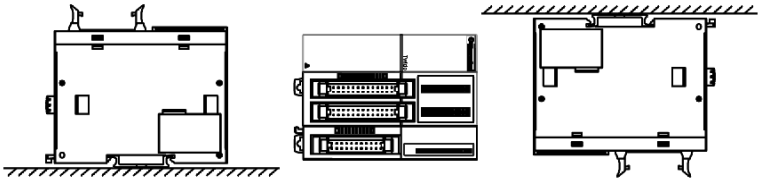
Correct and Incorrect Mounting Positions for Compact Bases

A Compact base should only be positioned as shown in "Correct Mounting Position for all Bases" figure. When the ambient temperature is 35° C (95° F) or below, the Compact base can also be mounted upright on a horizontal plane as shown in (1). When the ambient temperature is 40° C (104° F) or below, the Compact base can also be mounted sideways on a vertical place as shown in figure (2). Figure (3) shows an incorrect mounting position.



Incorrect Mounting Positions for Modular Bases

A Modular base should only be positioned as shown in "Correct Mounting Position for all Bases" figure. The figures below show the incorrect mounting positions for all Modular bases.



Assembling an Expansion I/O Module to a Base

Introduction

This section shows how to assemble an expansion I/O module to a base. This procedure is for both Compact and Modular bases. Your base and expansion I/O module may differ from the illustrations in this procedure.

⚠ WARNING

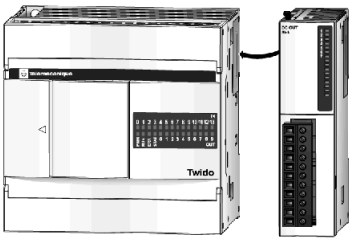
UNEXPECTED EQUIPMENT OPERATION

Update the software each time you change the hardware configuration of the I/O expansion bus. Otherwise, the expansion bus will no longer operate while the local base inputs and outputs will continue to operate.

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

Assembling an Expansion I/O Module to a Base.

The following procedure shows how to assemble a base and an expansion I/O module together.

Step	Action
1	Remove the expansion connector cover from the base.
2	Verify that the black latch button on the I/O module is in the up position. 
3	Align the connector on the left side of the Expansion I/O module with the connector on the right side of the base. 

Step	Action
4	Press the expansion I/O module to the base until it "clicks" into place.
5	Push down the black latch button on the top of the expansion I/O module to lock the module to the base.

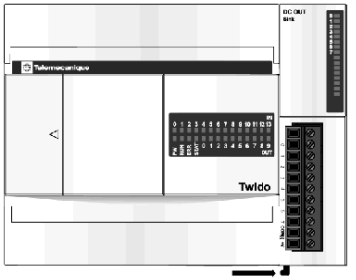
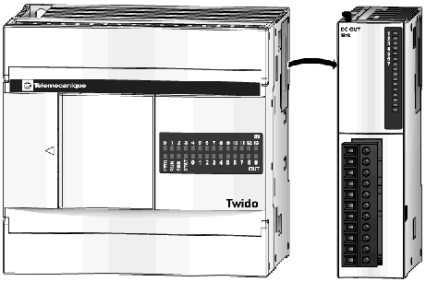
Disassembling an Expansion I/O Module from a Base

Introduction

This section describes how to disassemble an expansion I/O module from a base. This procedure is for both Compact and Modular bases. Your base and expansion I/O module may differ from the illustrations in these procedures but the basic mechanism procedures are still applicable.

Disassembling an Expansion I/O Module from a Base.

The following procedure describes how to disassemble an expansion I/O module from a base.

Step	Action
1	Remove the assembled base and module from the DIN rail *(see page 30)* before disassembling them.
2	Push up the black latch from the bottom of the expansion I/O module to disengage it from the base. 
3	Pull apart the base and module. 

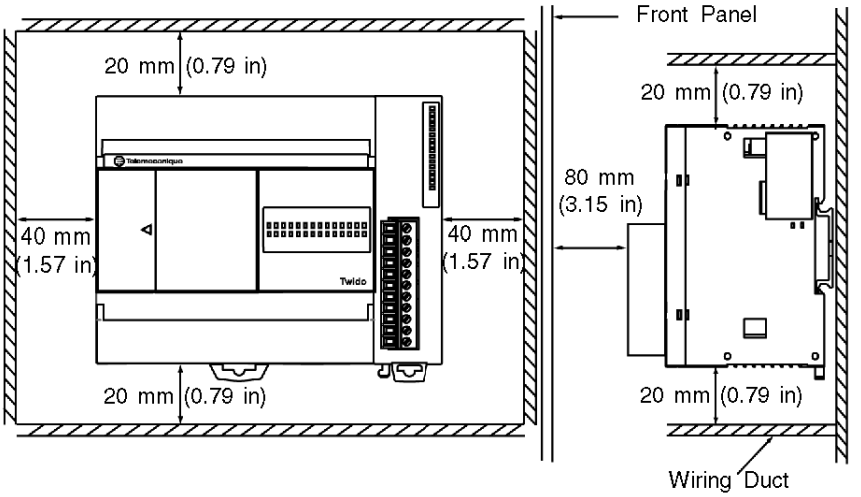
Minimum Clearances for Bases and Expansion I/O Modules in a Control Panel

Introduction

This section provides the minimum clearances for bases and expansion I/O modules in a control panel.

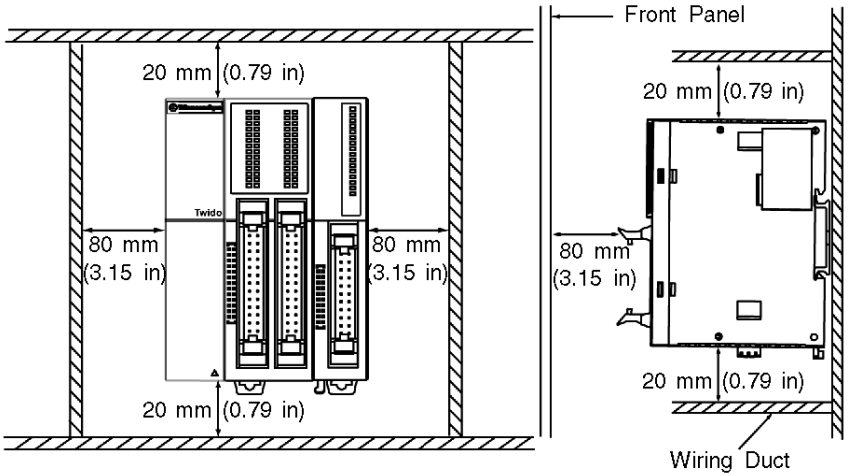
Minimum Clearances for a Compact Base and Expansion I/O Modules

In order to maintain a natural circulation of air around the Compact base and expansion I/O modules in a control panel, observe the minimum clearances shown in the figures below.



Minimum Clearances for a Modular Base and Expansion I/O Modules

In order to maintain a natural circulation of air around the Modular base and expansion I/O modules in a control panel, observe the minimum clearances shown in the figures below.



2.2 Installation of TWD Analog I/O Modules

Introduction

This section provides Information about installing the TWD Analog I/O modules.

What's in this Section?

This section contains the following topics:

Dimensions for the TWD Analog I/O Modules

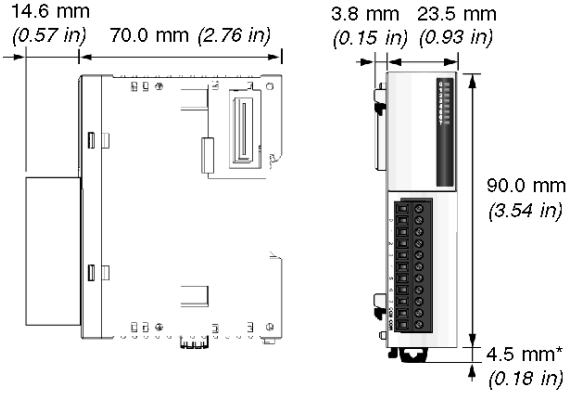
Introduction

The following section shows the dimensions for analog I/O modules.

I/O Analog Modules

The following diagrams show the dimensions for the analog I/O modules.

Illustrations showing a TWDAMI2HT or a TWDALM3LT module:



NOTE: * 8.5 mm *(0.33 in)* when the clip-on lock is pulled out.

How to Directly Mount a TWD Analog I/O Module on a Panel Surface

Introduction

This section shows how to install mounting strips directly on Analog I/O modules. This section also provides mounting hole layouts for each module. Your module may differ from the illustrations in these procedures but the basic mechanism procedures are applicable.

Installing a Mounting Strip

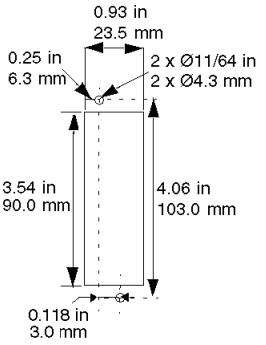
The following procedure shows how to install a mounting strip.

Step	Action
1	Remove the clamp from the rear side of the module by pushing the clamp inwards.
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 for Analog I/O Modules

The following diagram shows the mounting hole layout for the Analog I/O modules.

TWDAMI2LT
TWDALM3LT
TWDAMM3HT
TWDAMM6HT
TWDAMI2HT
TWDAMO1HT
TWDAVO2HT
TWDARI8HT
TWDAMI4LT
TWDAMI8HT



How to Install and Remove a TWD Analog I/O Module from a DIN Rail

Introduction

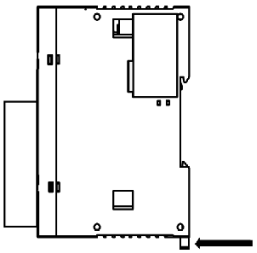
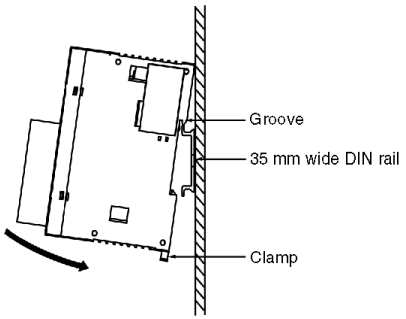
This section describes how to install and remove Analog I/O modules from a DIN rail. The device you want to install or remove may differ from the illustrations in these procedures but the basic mechanism procedures are applicable.

NOTE: When mounting Analog I/O modules on a DIN rail, use two end stops, type AB1-AB8P35 or equivalent.

Additional information about the DIN rail *(see page 65)* can be found in the appendix.

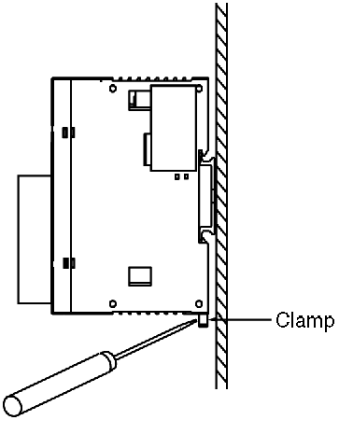
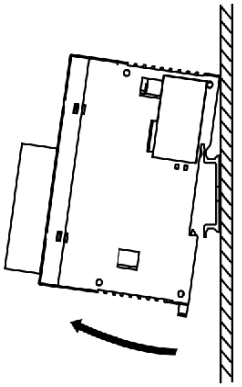
How to Install a Analog I/O Module on a DIN Rail

The following procedure shows how to install a Analog I/O module 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 base and module assembly. 
3	Put the top groove of the compact base 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 system.

How to Remove a Analog I/O Module from a DIN Rail

The following procedure shows how to remove a analog I/O 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 compact base and the associated module off the DIN rail from the bottom. 

Description of TWD Analog I/O Modules

3

Introduction

This chapter provides descriptions, overviews, parts, specifications, wiring rules and recommendations, and wiring schematics for the Twido Analog I/O modules.

What's in this Chapter?

This chapter contains the following sections:

3.1 TWD Analog I/O Modules

Introduction

This section provides an overview and parts description of the TWD Analog I/O modules.

What's in this Section?

This section contains the following topics:

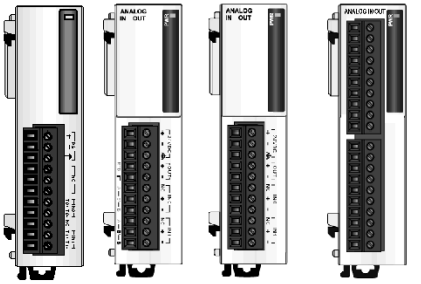
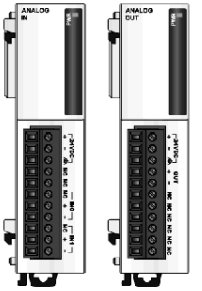
Overview of TWD Analog I/O Modules

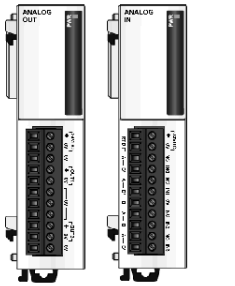
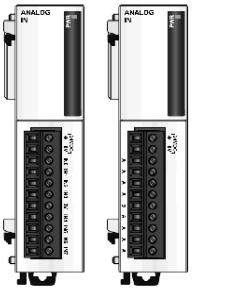
Introduction

The following section provides an overview of the TWD Analog I/O modules.

Illustrations

The following illustrations present the analog I/O modules.

Controller Type	Illustration
These 4 analog I/O modules are: ● 2-point input thermocouple module with a terminal block (TWDAMI2LT) ● 2-point input/1-point output module with a terminal block, accepts thermocouple and resistance thermometer signals (TWDALM3LT) ● 2-point input/1-point output module with a terminal block (TWDAMM3HT) ● 4-point input/2-point output module with 2 terminal blocks (TWDAMM6HT) These modules can be attached to any controller except the Compact 10 I/O and 16 I/O controllers.	TWDAMI2LT TWDALM3LT TWDAMM3HT TWDAMM6HT 
These 2 analog I/O modules are: ● 2-point input module with a terminal block (TWDAMI2HT) ● 1-point output module with a terminal block (TWDAMO1HT) These modules can be attached to any controller except the Compact 10 I/O and 16 I/O controllers.	TWDAMI2HT TWDAMO1HT 

Controller Type	Illustration
These 2 analog I/O modules are: ● 2-point output module with a terminal block (TWDAVO2HT) ● 4-point input module, current, voltage and temperature, with a terminal block (TWDAMI4LT) These modules can be attached to any controller except the Compact 10 I/O and 16 I/O controllers.	TWDAVO2HT TWDAMI4LT 
These 2 analog I/O modules are: ● 8-point input module, current and voltage, with a terminal block (TWDAMI8HT) ● 8-point input module, temperature, with a terminal block (TWDARI8HT) These modules can be attached to any controller except the Compact 10 I/O and 16 I/O controllers.	TWDAMI8HT TWDARI8HT 

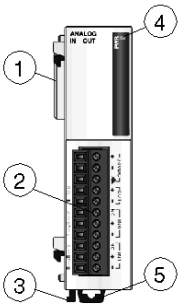
Parts Description of TWD Analog I/O Modules

Introduction

The following section describes the parts of an Analog I/O module. Your I/O module may differ from the illustrations but the parts will be the same.

Parts Description of an Analog I/O Module

The following figure shows the parts of An analog I/O module. This figure is the TWDALM3LT module.



Legend

Label	Description
1	Expansion connector - one on each side, right side not shown
2	Removable terminal block
3	Latch button
4	LEDs
5	Clamp

3.2 Wiring Rules and Recommendations for TWD Analog I/O Modules

Wiring Rules and Recommendations for Analog I/O Modules

Introduction

There are several rules that must be followed when wiring a analog I/O module. Recommendations, when needed, are provided on how to comply with the rules.

⚠ 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.

⚠ WARNING

MALFUNCTION OF OUTPUTS

- Use appropriate interlocks where personal and/or equipment hazards exist.
- Observe all of the rules following this safety message.

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

Rules

- Each terminal accepts up to two 18 AWG (0.82 mm^2) through 28 AWG (0.08 mm^2) fitted with cable ends or tags.
- The power supply wire should be between 18 AWG (0.82 mm^2) and 22 AWG (0.33 mm^2). Use the shortest wire length possible.
- The grounding wire should be 16 AWG (1.30 mm^2).
- Power supply wires routed inside the panel must be kept separate from power wires, I/O wiring and communication wiring. Route wiring in separate cable ducting.
- Verify that the operating conditions and environments are within the specification values.
- Use proper wire size to meet voltage and current requirements.
- Use copper conductors only.
- Use shielded cables for analog signals.
- Twisted pair shielded cable is recommended.

Terminal Tightening Torque

Recommended tightening torque of terminal blocks is listed for all products on the product label.

3.3 Specifications and Wiring Diagrams for TWD Analog Input Modules

Introduction

This section provides general, electrical, input and functional specifications, and wiring diagrams description for TWD Analog Input modules.

What's in this Section?

This section contains the following topics:

General Specifications for the TWD Analog I/O Module

Introduction

This section presents the general specifications for TWD Analog I/O modules.

General Specifications

Reference	TWDAMI2LT*	TWDALM3LT - TWDAMM3HT - TWDAMI2HT - TWDAMO1HT	TWDAMM6HT	TWDAVO2HT - TWDAMI4LT	TWDAMI8HT - TWDARI8HT
Rated power voltage	24 VDC				
Allowable voltage range	from 20.4 to 28.8 VDC			from 19.2 to 30.0 VDC including ripple	
Average number of connector insertions/removals	100 times minimum				
Internal current draw - internal power	60 mA (5 VDC) 0 mA (24 VDC)	50 mA (5 VDC) 0 mA (24 VDC)	60 mA (5 DC) 0 mA (24 VDC)	60 mA (5 VDC) 0 mA (24 VDC)	
Internal current draw - external power	30 mA (24 VDC)	40mA (24 VDC)	80 mA (24 VDC)	60 mA (24 VDC)	45 mA (24 VDC)
Weight	85 g (3 oz)				

NOTE: *In order to use the TWDAMI2LT module, verify that your PLC firmware is version 4.0 or later.

I/O Specifications for the TWD Analog I/O Module

Introduction

This section is I/O specifications for the analog I/O modules.

Voltage and Current Input Specifications

The Analog Modules that comply with the Voltage and Current Input Specifications are: TWDAMI2HT, TWDAMM3HT, TWDAMM6HT, TWDAMI4LT and TWDAMI8HT.

Voltage Input Specifications:

Analog Input Specifications	**Voltage Input**			
	TWDAMI2HT TWDAMM3HT	**TWDAMM6HT**	**TWDAMI4LT**	**TWDAMI8HT**
Input range	from 0 to 10 VDC			
Input impedance	1 MΩ min.	10 KΩ min.	10 KΩ min.	10 KΩ min.
Sample duration time	16 ms max.	64 ms max.for one channel	160 ms	
Sample repetition time	16 ms max.	64 ms max. for one channel	4 x 160 ms	8 x 160 ms
Total input system transfer time	32 ms + 1 scan time[1]	nx64 ms + 1 cycle time, with n=number of configured input channels.	4x160 ms + 1 scan time	8 x 160 ms + 1 scan time
Input type	Single-ended input	Single-ended input	Non differential	
Operating mode	Self-scan			
Conversion mode	ΣΔ type ADC			
Input tolerance-maximum deviation at 25° C (77° F)	±0.2 % of full scale	±0.5 % of full scale	0.5 % of full scale	1 % of full scale
Input error - temperature deviation	±0.006 % of full scale/° C	±0.006 % of full scale/° C	±0.005 % of full scale/° C	
Input error - repeatable after stabilization time	±0.5 full scale	±0.5 % of full scale	2 LSB	
Input deviation - nonlinear	±0.2 % of full scale	±0.4 % of full scale	±0.002 % of full scale	
Input tolerance - maximum deviation	±1 % of full scale	±1 % of full scale	0.5 % of full scale	1 % of full scale
Discrete resolution	4096 increments (12 bits)	4096 increments (12 bits)	12 bits	10 bits
Input value of LSB	2.5 mV	2.5 mV	2.5 mV	9.7 mV

Analog Input Specifications	**Voltage Input**			
	TWDAMI2HT TWDAMM3HT	**TWDAMM6HT**	**TWDAMI4LT**	**TWDAMI8HT**
Data type in application program	0 to 4095 (12 bit data) -32768 to 32767 (optional range designation)[2]	0 to 4095 (12 bit) -32768 to 32767 Custom	0 to 4095 (12 bit) -32768 to 32767 Custom	0 to 1023 (10 bit) -32768 to 32767 Custom
Monotonicity	Yes			
Input data out of range	Detectable[3]			
Noise resistance - maximum temporary deviation during electrical noise tests	±3 % of full scale	±2 % of full scale	±0.5 % of full scale	±1 % of full scale
Noise resistance - common mode characteristics	Common mode reject ratio (CMRR): -50 dB	-92 dB	Common mode reject ratio (CMRR): -90 dB	
Noise resistance - common mode voltage	16 VDC	15 VDC	15 VDC	15 VDC
Noise resistance - input filter	No	ADC's notch filter	ADC's notch filter	
Noise resistance - cable	Twisted-pair shielded cable is necessary	Twisted-pair shielded cable is necessary	Twisted-pair shielded cable is necessary	
Noise resistance - crosstalk	2 LSB maximum	1 LSB maximum	1 LSB maximum	1 LSB maximum
Dielectric strength	500 VAC between input and power circuit	800 VAC	2500 VAC between input and power circuit	
Type of protection	Photocoupler between input and internal circuit			
Maximum permanent allowed overload (no damage)	13 VDC	24 VDC	13 VDC	13 VDC

Analog Input Specifications	Voltage Input			
	TWDAMI2HT TWDAMM3HT	TWDAMM6HT	TWDAMI4LT	TWDAMI8HT
Selection of analog input signal type	Using software programming			
Calibration or verification to maintain rated accuracy	Approximately 10 years			

NOTE:

1. Total input system transfer time = sample repetition x 2 + 1 scan time.
2. The 12-bit data (0 to 4095) and 10-bit data (0 to 1023) processed in the Analog I/O module can be linear-converted to a value between -32768 and 32767. The optional range designation and analog I/O data minimum and maximum values can be selected using data registers allocated to analog I/O modules.
3. When an input error is detected, a corresponding error code is stored to a data register allocated to analog I/O operating status.

Current Input Specifications:

Analog Input Specifications	Current Input			
	TWDAMI2HT TWDAMM3HT	TWDAMM6HT	TWDAMI4LT	TWDAMI8HT
Input range	from 4 to 20 mA DC		from 0 to 20 mA DC	
Input impedance	10 Ω	<250 Ω	470 Ω	
Sample duration time	16 ms max.	160 ms max.	160 ms	
Sample repetition time	16 ms max.	160 ms max.	4x160 ms	8x160 ms
Total input system transfer time	32 ms + 1 scan time[1]	4x160 ms + 1 scan time	4x160 ms + 1 scan time	8x160 ms + 1 scan time
Input type	Differential input	Single-ended input	Non differential	
Operating mode	Self-scan			
Conversion mode	ΣΔ type ADC			
Input tolerance - maximum error at 25° C (77° F)	±0.2% of full scale	±0.5% of full scale	0.5% of full scale	1% of full scale
Input tolerance - temperature coefficient	±0.006% of full scale/° C	±0.006% of full scale/° C	±0.005% of full scale/° C	
Input tolerance - repeatable after stabilization time	±0.5% of full scale	±0.5% of full scale	2 LSB	

Analog Input Specifications	**Current Input**			
	TWDAMI2HT TWDAMM3HT	**TWDAMM6HT**	**TWDAMI4LT**	**TWDAMI8HT**
Input tolerance - nonlinear	±0.2% of full scale	±0.4% of full scale	±0.002% of full scale	
Input tolerance - maximum tolerance	±1% of full scale	±1% of full scale	±0.5% of full scale	±1% of full scale
Discrete resolution	4096 increments (12 bits)	4096 increments (12 bits)	4096 increments (12 bits)	1024 increments (10 bits)
Input value of LSB	4 µA	4 µA	4.8 µA	19.5 µA
Data type in application program	0 to 4095 (12 bit data) -32768 to 32767 (optional range designation)[2]	0 to 4095 (12 bit) -32768 to 32767 Custom	0 to 4095 (12 bit) -32768 to 32767 Custom	0 to 1023 (10 bit) -32768 to 32767 Custom
Monotonicity	Yes			
Input data out of range	Detectable[3]			
Noise resistance - maximum temporary deviation during electrical noise tests	±3% of full scale	±2% of full scale	±0.5% of full scale	±1% of full scale
Noise resistance - common mode characteristics	Common mode reject ratio (CMRR): -50 dB	-92 dB	Common mode reject ratio (CMRR): -90 dB	
Noise resistance - common mode voltage	16 VDC	15 VDC	15 VDC	15 VDC
Noise resistance - input filter	No	ADC's notch filter	ADC's notch filter	
Noise resistance - cable	Twisted-pair shielded cable is necessary	Twisted-pair shielded cable is necessary	Twisted-pair shielded cable is necessary	
Noise resistance - crosstalk	2 LSB maximum	1 LSB maximum	1 LSB maximum	1 LSB maximum
Dielectric strength	500 VAC between input and power circuit	800 VAC	2500 VAC between input and power circuit	
Type of protection	Photocoupler between input and internal circuit			
Maximum permanent allowed overload (no damage)	40 mA DC			

Analog Input Specifications	Current Input			
	TWDAMI2HT TWDAMM3HT	TWDAMM6HT	TWDAMI4LT	TWDAMI8HT
Selection of analog input signal type	Using software programming			
Calibration or verification to maintain rated accuracy	Approximately 10 years			

NOTE:

1. Total input system transfer time = sample repetition x 2 + 1 scan time.
2. The 12-bit data (0 to 4095) and 10-bit data (0 to 1023) processed in the Analog I/O module can be linear-converted to a value between -32768 and 32767. The optional range designation and analog I/O data minimum and maximum values can be selected using data registers allocated to analog I/O modules.
3. When an input error is detected, a corresponding error code is stored to a data register allocated to analog I/O operating status.

Thermocouple and Temperature Input Specifications

The Analog Modules that comply with the Thermocouple and/or Temperature Input Specifications are: TWDAMI2LT, TWDALM3LT, TWDAMI4LT, and TWDARI8HT.

Analog Input Specifications	Thermocouple		Temperature Probes		
	TWDAMI2LT	TWDALM3LT	TWDALM3LT	TWDAMI4LT	TWDARI8HT
Input range	Type K: -270 to.+1370 °C (-454 to 2498 °F) Type J: -200 to +760 °C (-328 to +1400 °F) Type T: -270 to +400 °C (-454 to 752 °F)	Type K: 0 to 1300 °C (32 to 2372 °F) Type J: 0 to 1200 °C (32 to 2192 °F) Type T: 0 to 400 °C (32 to 752 °F)	(RTD) Pt 100 3-wire type -100 to 500 °C (-148 to 932 °F)	(RTD) Pt 100, Pt 1000, Ni 100, Ni 1000 3-wire type Pt sensor -200 to 600 °C (-328 to 1112 °F) Ni sensor -50 to 150 °C (-58 to 302 °F)	NTC or PTC thermistor 100 to 1,000 ohms temperature range
Input impedance	1 MΩ min.	1 MΩ min.		1MΩ min.	1 MΩ min.
Sample duration time	200 ms	50 ms max.		160 ms	
Sample repetition time	400 ms	50 ms max.		4x160 ms	8x160 ms
Total input system transfer time	400 ms + 1 scan time	100 ms + 1 scan time[1]		4x160 ms + 1 scan time	8x160 ms + 1 scan time

Analog Input Specifications	Thermocouple		Temperature Probes		
	TWDAMI2LT	TWDALM3LT	TWDALM3LT	TWDAMI4LT	TWDARI8HT
Input type	Differential input				
Operating mode	Self-scan				
Conversion mode	ΣΔ 16 bits	ΣΔ type ADC			
Maximum overload on input channel	±7.5 VDC	-	-	-	-
Input tolerance - maximum deviation at 25° C (77° F)	0.2 % + temperature correction total deviation K, J,T: ±5 ° C	±0.2 % of full scale plus reference junction compensation accuracy ±4° C max	±0.2 % of full scale	0.5 % of full scale	1 % of full scale
Input tolerance - temperature coefficient	±0.006 % of full scale/° C	±0.006 % of full scale/° C		±0.005 % of full scale/° C	
Input tolerance - repeatable after stabilization time	±0.5 % of full scale	±0.5 % of full scale		2 LSB	
Input deviation - nonlinear	±0.2 % of full scale	±0.2 % of full scale		±0.002 % of full scale	
Input tolerance - maximum deviation	±1 % of full scale	±1 % of full scale		±0.5 % of full scale	±1 % of full scale
Discrete resolution	Type T: 13 bits Type J, K: 14 bits	4096 increments (12 bits)		12 bits	10 bits
Input value of LSB	0.1 ° C (0.18 ° F)	K: 0.325 ° C (K: 0.585 ° F) J: 0.300 ° C (J: 0.540 ° F) T: 0.1 ° C (T: 0.18 ° F)	K: 0.15 ° C (K: 0.27 ° F)	K: 0.15 ° C (K: 0.27 ° F)	Depending on the probe
Data type in application program	0 to 4095 -32768 to 32767 Custom Celsius Fahrenheit	0 to 4095 (12 bit data) -32768 to 32767 (optional range designation)[2]		0 to 4095 (12 bit data) -32768 to 32767 Custom	0 to 1023 (10 bit data) -32768 to 32767 Custom
Monotonicity	Yes	Yes			

Analog Input Specifications	Thermocouple		Temperature Probes		
	TWDAMI2LT	TWDALM3LT	TWDALM3LT	TWDAMI4LT	TWDARI8HT
Input data out of range	Detectable[3]	Detectable[3]			
Noise resistance - maximum temporary deviation during electrical noise tests	±1 % of full scale	±3 % of full scale	Accuracy is not assured when noise is applied	±0.5 % of full scale	±1 % of full scale
Noise resistance - common mode characteristics	Common mode reject ratio (CMRR): -90 dB	Common mode reject ratio (CMRR): -50 dB		Common mode reject ratio (CMRR): - 90 dB	
Noise resistance - common mode voltage	100 VDC/300 VAC	16 VDC		15 VDC	15 VDC
Noise resistance - input filter	ADC 50,60Hz notch filter	No		ADC's notch filter	
Noise resistance - cable	Twisted-pair shielded cable is necessary	Twisted-pair shielded cable is necessary		Twisted-pair shielded cable is necessary	
Noise resistance - crosstalk	2 LSB maximum	2 LSB maximum		1 LSB maximum	1 LSB maximum
Dielectric strength	2500 VAC between input and internal circuit	500 VAC between input and power circuit		2500 VAC between input and power circuit	
Type of protection	Photocoupler between digital and analog circuit External 24 VDC supply is isolated with internal circuits	Photocoupler between input and internal circuit			
Maximum permanent allowed overload (no damage)	—	—		—	—

Analog Input Specifications	Thermocouple		Temperature Probes		
	TWDAMI2LT	TWDALM3LT	TWDALM3LT	TWDAMI4LT	TWDARI8HT
Selection of analog input signal type	Using software programming				None
Calibration or verification to maintain rated accuracy	Approximately 10 years				
50/60 Hz rejection and filtering	50/60 Hz: 120 dB rejection typ. (common mode) 60 dB rejection typ. (differential mode) Numeric filtering function by firmware	-	-	-	-
Temperature drift	30 ppm/° C TBC	-	-	-	-
Cold junction compensation	Internal temperature sensor	-	-	-	-

NOTE:

1. Total input system transfer time = sample repetition x 2 + 1 scan time.
2. The 12-bit data (0 to 4095) and 10-bit data (0 to 1023) processed in the Analog I/O module can be linear-converted to a value between -32768 and 32767. The optional range designation and analog I/O data minimum and maximum values can be selected using data registers allocated to analog I/O modules.
3. When an input error is detected, a corresponding error code is stored to a data register allocated to analog I/O operating status.

Voltage and Current Output Specifications

The Analog Modules that comply with the Voltage and Current Output Specifications are: TWDAMO1HT, TWDAMM3HT, TWDAMM6HT, TWDLM3LT. One Module complies with the Voltage Output Specifications only: TWDAVO2HT.

Analog Output Specifications	**Voltage Output**		
	TWDAMO1HT TWDAMM3HT TWDLM3LT	**TWDAMM6HT**	**TWDAVO2HT**
Output range	from 0 to 10 VDC	from 0 to 10 VDC	from -10 to 10 VDC
Load impedance	> 2 kΩ	> 2 kΩ	> 3 kΩ
Application load type	Resistive load		
Settling time	20 ms	20 ms	2 ms
Total output system transfer Time	20 ms + 1 scan time	20 ms + 1 scan time	2 ms + 1 scan time
Output deviation - maximum error at 25° C (77° F)	±0.2% of full scale	±0.5% of full scale	1% of full scale
Output deviation - temperature coefficient	±0.015% of full scale/° C	±0.01% of full scale/° C	±0.01% of full scale/° C
Output deviation - repeatable after stabilization time	±0.5% of full scale	±0.1% of full scale	±0.1% of full scale
Output deviation - output voltage drop	±1% of full scale	±1.5% of full scale	±0.5% of full scale
Output deviation- nonlinear	±0.2% of full scale	±0.2% of full scale	±0.2% of full scale
Output deviation - output ripple	1 LSB maximum	±4 LSB maximum	1 LSB maximum
Output deviation- overshoot	0%	±1% of full scale	0%
Output deviation - total error	±1% of full scale	±2% of full scale	±1% of full scale
Discrete resolution	4096 increments (12 bits)	4096 increments (12 bits)	11 bits + sign
Output value of LSB	2.5 mV	2.5 mV	+/- 4.8 mV
Data type in application program	0 to 4095 (12 bit data) -32768 to 32767 (optional range designation)[1]	0 to 4095 (12 bit data) -32768 to 32767 (optional range designation)[1]	-2048 to 2047
Monotonicity	Yes		
Current loop open	—	—	Not detectable
Noise resistance - maximum temporary deviation during electrical noise tests	±3% of full scale	±1% of full scale	±1% of full scale

Analog Output Specifications	Voltage Output		
	TWDAMO1HT TWDAMM3HT TWDLM3LT	**TWDAMM6HT**	**TWDAVO2HT**
Noise resistance - cable	Twisted-pair shielded cable is necessary	Twisted-pair shielded cable is necessary	Twisted-pair shielded cable is necessary
Noise resistance - crosstalk	No crosstalk because of 1 channel output	0.1% of full scale maximum	No crosstalk because of 1 channel output
Dielectric strength	500 VAC between output and power circuit	800 VAC	2500 VAC between output and power circuit
Type of protection	Photocoupler between output and internal circuit		
Selection of analog output signal type	Using software programming	Using software programming	None
Calibration or verification to maintain rated accuracy	Approximately 10 years		

Current Output Specifications

Analog Output Specifications	Current Output	
	TWDAMO1HT TWDAMM3HT TWDLM3LT	**TWDAMM6HT**
Output range	from 4 to 20 mA DC	from 4 to 20 mA DC
Load impedance	300 Ω maximum	300 Ω maximum
Application load type	Resistive load	Resistive load
Settling time	20 ms	20 ms
Total output system transfer Time	20 ms + 1 scan time	20 ms + 1 scan time
Output deviation - maximum deviation at 25° C (77° F)	±0.2% of full scale	±0.5% of full scale
Output deviation - temperature coefficient	±0.015% of full scale/° C	±0.015% of full scale/° C
Output deviation - repeatable after stabilization time	±0.5% of full scale	±0.1% of full scale
Output deviation - output voltage drop	±1% of full scale	±1% of full scale
Output deviation - nonlinear	±0.2% of full scale	±0.2% of full scale
Output deviation - output ripple	1 LSB maximum	±4 LSB maximum
Output deviation - overshoot	0%	1%
Output deviation - total deviation	±1% of full scale	±2% of full scale
Discrete resolution	4096 increments (12 bits)	4096 increments (12 bits)
Output value of LSB	4 µA	

Analog Output Specifications	**Current Output**	
	TWDAMO1HT **TWDAMM3HT** **TWDLM3LT**	**TWDAMM6HT**
Data type in application program	0 to 4095 (12 bit data) -32768 to 32767 (custom range)[1]	0 to 4095 (12 bit data) -32768 to 32767 (custom range)[1]
Monotonicity	Yes	Yes
Current loop open	Detectable[2]	Detectable[2]
Noise resistance - maximum temporary deviation during electrical noise tests	±3% of full scale	±1% of full scale
Noise resistance - cable	Twisted-pair shielded cable is necessary	Twisted-pair shielded cable is necessary
Noise resistance - crosstalk	No crosstalk because of 1 channel output	0.1% of full scale maximum
Dielectric strength	500 VAC between output and power circuit	800 VAC
Type of protection	Photocoupler between output and internal circuit	
Selection of analog output signal type	Using software programming	
Calibration or verification to maintain rated accuracy	Approximately 10 years	

TWD Analog I/O Modules Wiring Schematics

Introduction

This section shows examples of wiring schematics for the Analog I/O modules. Symbols used in the following diagrams are explained in the Glossary of Symbols *(see page 67)* in the appendix.

⚠ 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.

⚠ WARNING

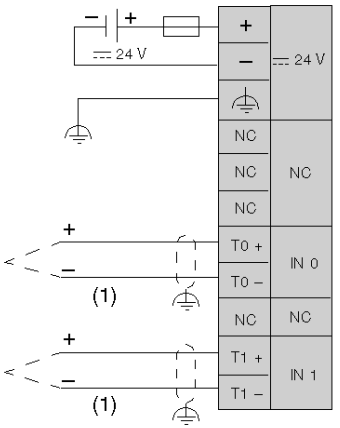
UNINTENDED EQUIPMENT OPERATION

- This product is not intended for use in safety critical machine functions. Where personnel and or equipment hazard exist, use appropriate safety interlocks.
- Do not disassemble, repair, or modify the modules.
- This controller is designed for use within an enclosure appropriately rated for its intended environment.
- Install the modules in the operating environment conditions described.
- Use the sensor power supply only for supplying power to sensors connected to the module.
- For power line and output circuits, use a fuse in compliance with local and national requirements for the circuit voltage and current requirements.
- Do not connect any wiring to unused channels.

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

TWDAMI2LT Wiring Schematic

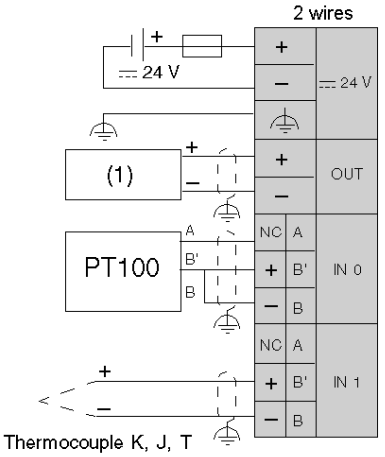
This schematic is for the TWDAMI2LT module.

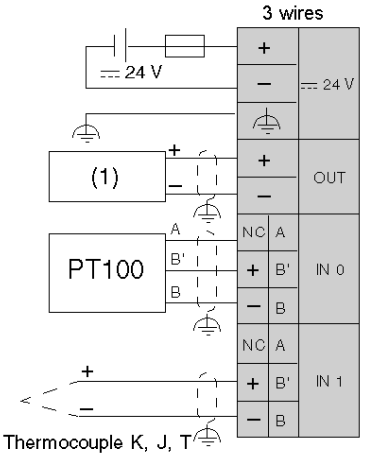


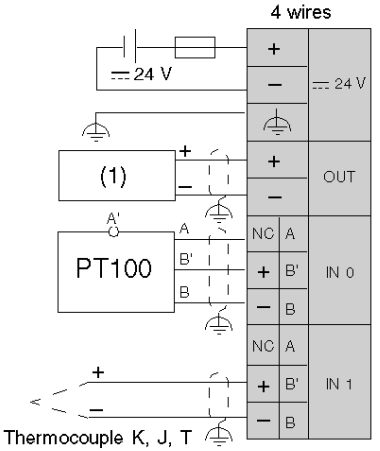
(1) Thermocouple K, J, T

TWDALM3LT Wiring Schematic

This schematic is for the TWDALM3LT module.





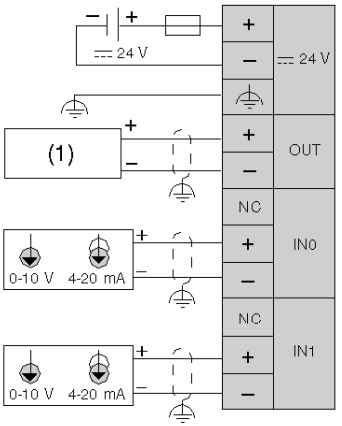


Note: For 4 wires, output A' is not connected.
(1): Voltage/current preactuator.

- Connect a fuse appropriate for the applied voltage and current draw, at the position shown in the diagram.
- When connecting a Pt 100 temperature probe, connect the three wires to terminals A, B', and B of input channel 0 or 1.
- When connecting a thermocouple, connect the two wires to terminals B' and B of input channel 0 or 1.

TWDAMM3HT Wiring Schematic

This schematic is for the TWDAMM3HT module.



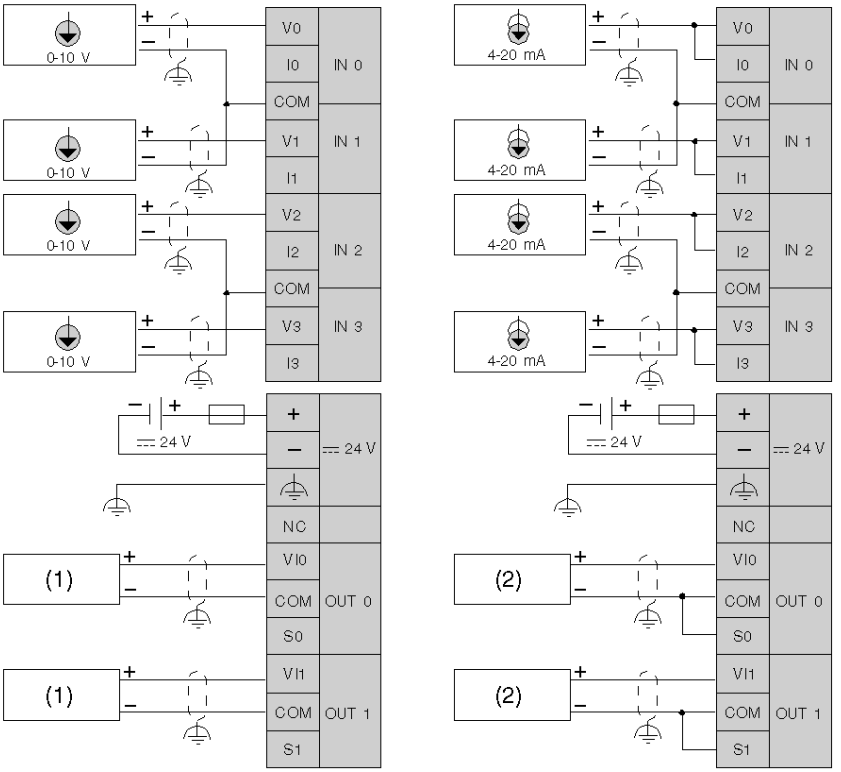
(1): Voltage/current pre-actuator

- Connect a fuse appropriate for the applied voltage and current draw, at the position shown in the diagram.
- Do not connect any wiring to unused channels.

NOTE: The (-) poles of inputs IN0 and IN1 are connected internally.

TWDAMM6HT Wiring Schematic

This schematic is for the TWDAMM6HT module.



(1) Voltage pre-actuator.

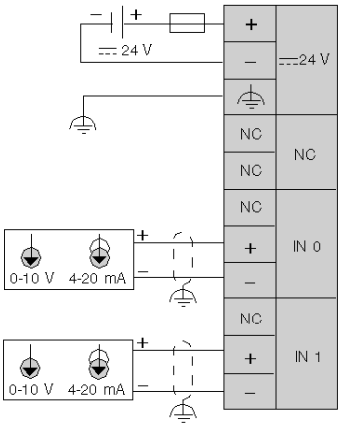
(2) Current pre-actuator.

- Connect a fuse appropriate for the applied voltage and current draw, at the position shown in the diagram.
- Do not connect any wiring to unused channels.

NOTE: to avoid disturbances on the analog I/O, the power supply of theTWDAMM6HT module must be turned on or off at the same time than the base controller power supply.

TWDAMI2HT Wiring Schematic

This schematic is for the TWDAMI2HT module.

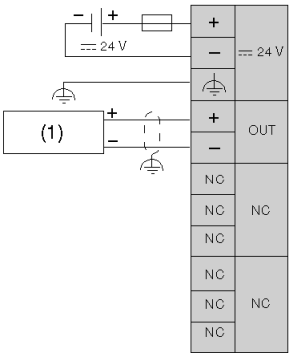


- Connect a fuse appropriate for the applied voltage and current draw, at the position shown in the diagram.
- Do not connect any wiring to unused channels.

NOTE: The (-) poles of inputs IN0 and IN1 are connected internally.

TWDAMO1HT Wiring Schematic

This schematic is for the TWDAMO1HT module.

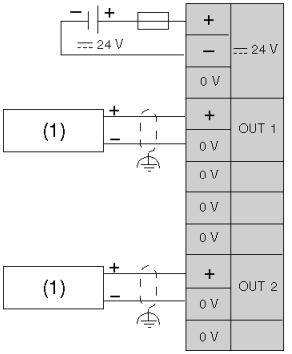


(1): Voltage/current pre-actuator.

- Connect a fuse appropriate for the applied voltage and current draw, at the position shown in the diagram.
- Do not connect any wiring to unused channels.

TWDAVO2HT Wiring Schematic

This schematic is for the TWDAVO2HT module.



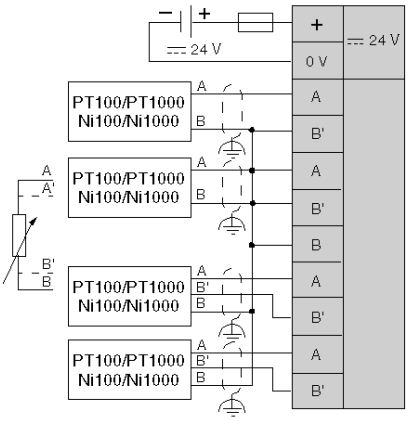
(1): Voltage/current pre-actuator.

- Connect a fuse appropriate for the applied voltage and current draw, at the position shown in the diagram.
- Do not connect any wiring to unused channels.

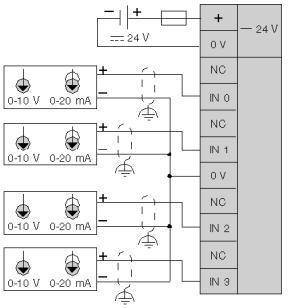
NOTE: to avoid disturbances on the analog I/O, the power supply of the TWDAVO2HT module must be turned on or off at the same time as the base controller power supply.

TWDAMI4LT Wiring Schematic

This schematic is for the TWDAMI4LT module configured for temperature measurements.



This schematic is for the TWDAMI4LT module configured for voltage or current input.

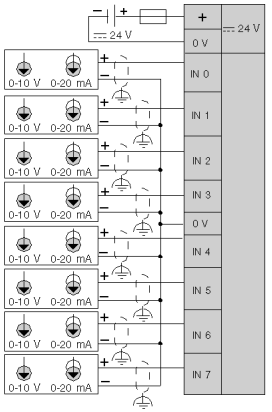


- Connect a fuse appropriate for the applied voltage and current draw, at the position shown in the diagram.
- Do not connect any wiring to unused channels.

NOTE: to avoid disturbances on the analog I/O, the power supply of the TWDAMI4LT module must be turned on or off at the same time as the base controller power supply.

TWDAMI8HT Wiring Schematic

This schematic is for the TWDAMI8HT module.

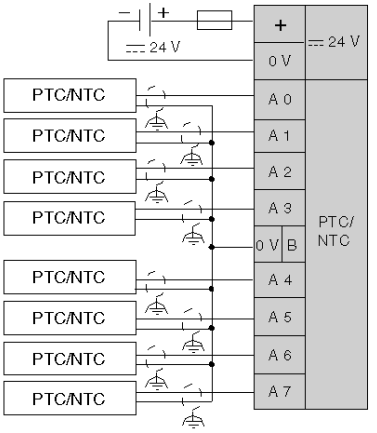


- Connect a fuse appropriate for the applied voltage and current draw, at the position shown in the diagram.
- Do not connect any wiring to unused channels.

NOTE: to avoid disturbances on the analog I/O, the power supply of the TWDAMI8HT module must be turned on or off at the same time as the base controller power supply.

TWDARI8HT Wiring Schematic

This schematic is for the TWDARI8HT module.



- Connect a fuse appropriate for the applied voltage and current draw, at the position shown in the diagram.
- Do not connect any wiring to unused channels.

NOTE: to avoid disturbances on the analog I/O, the power supply of the TWDARI8HT module must be turned on or off at the same time as the base controller power supply.

Appendices

Introduction

This appendix provides information on system diagnostic using LED's, operator display operation, troubleshooting, the DIN rail, common IEC symbols used in this manual, and agency compliance.

What's in this Appendix?

The appendix contains the following chapters:

The DIN Rail

A

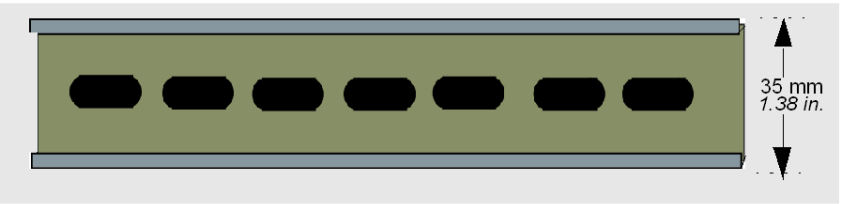
The DIN Rail

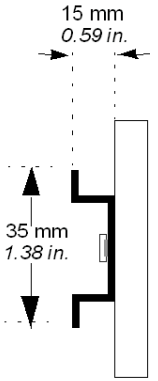
Introduction

You can mount the Twido controller 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

IEC Symbols

B

Glossary of Symbols

Introduction

This section contains illustrations and definitions of common IEC symbols used in describing wiring schematics.

Symbols

Common IEC symbols are illustrated and defined in the table below:

	Fuse
	Load
	AC power
	DC power
	Discrete sensor/input, for example, contact, switch, initiator, light barrier, and so on.
	Ground
	2-wire sensor
	Thermocouple element

Agency Compliance

C

Agency Requirements

Introduction

This section provides agency standards for the Twido products.

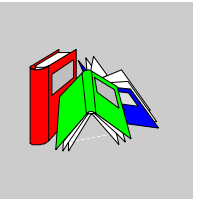
Standards

Twido controllers comply with the main national and international standards concerning electronic industrial control devices.

The following are specific controller requirements:

- EN 61131-2 (IEC 61131-2)
- UL 508
- UL 1604 / CSA 213 Class I Division 2 Groups A, B, C, D

Glossary



A

Analog potentiometer

It can be used to preset a value for an analog timer. All Modular controllers and Compact 10 and 16 I/O controllers have one analog potentiometer. The Compact 24 I/O controller has two:

Analog Voltage Input Connector

Connects an analog voltage source of 0 through 10 VDC. The analog voltage is converted to a discrete value and is stored in a system word.

C

CAN

Controller Area Network: field bus originally developed for automobile applications which is now used in many sectors, from industrial to tertiary.

Cartridge Connector

A connector to attach an optional memory cartridge or an RTC.

Catch Input

Verify that you are receiving short input pulses (rising pulse of 40 µs or falling pulse of 150 µs minimum) from sensors without regard to the scan time.

CiA

CAN in Automation: international organization of users and manufacturers of CAN products.

COB

Communication OBject: transport unit on CAN bus. A COB is identified by a unique identifier, which is coded on 11 bits, [0, 2047]. A COB contains a maximum of 8 data bytes. The priority of a COB transmission is shown by its identifier - the weaker the identifier, the more priority the associated COB has.

Communication Adapter

An optional cartridge that can be attached to any Compact controller or Operator Display Expansion Module to provide an optional Serial Port 2.

Communication Expansion Module

An optional module that can be attached to any Modular controllers communications expansion bus to provide an optional Serial Port 2.

Controller status output

A special function. This function is used in circuits, external to the controller, to control the power supply to the output devices or the controller power supply.

E

EDS

Electronic Data Sheet: description file for each CAN device (provided by the manufacturers).

ERR LED

An LED that illuminates when a detected error is detected in the controller.

Expansion connector

A connector to attach expansion I/O modules.

Expansion Connector Cover

A cover to protect the expansion connector.

Expansion I/O Module

Either a discrete or analog module that adds additional I/O to the base controller.

F

Fast Counting

A special function, it is available as a single up counter and single down counter. These functions enable up counting or down counting of pulses (rising edges)on a discrete I/O. Compact controllers can be equipped with three fast counters. Modular controllers can have two fast counters.

Free Wire

The end of a discrete I/O cable whose wires do not have a connector. This scheme provides connectivity from Modular I/O to discrete I/O points.

I

I/O

Input/Output.

I/O terminals

Terminals on all Modular controllers and expansion I/O modules used to connect input and output signals. The input terminals accept both sink and source DC input signals. The output terminals are either transistor source or sink or relay contacts.

IN LED

An LED that illuminates when a corresponding input is on. All modules have IN LEDs.

Input Filter

A special function that rejects input noises. This function is useful for addressing input noises and chatter in limit switches. All inputs provide a level of input filtering using the hardware. Additional filtering using the software is also configurable through TwidoSuite.

Input Simulators

An optional accessory for Compact controllers that is used for debugging. It can simulate input sensors to test application logic.

Input terminals

Terminals on the top of all Compact controllers used to connect input signals from input devices such as sensors, push buttons, and limit switches. The input terminals accept both sink and source DC input signals.

L

Latching input

A special function. This function is used to memorize any pulse with a duration less than the controller scan time. When a pulse is shorter than one scan and has a value greater than or equal to 100 µs, the controller latches the pulse, which is then updated in the next scan.

M

Memory Cartridge

An optional cartridge available in two sizes: 32 KB and 64 KB (64 KB not available on Compact). It can be added to any controller for removable backup of applications or to load an application, if certain conditions exist. The 64 KB cartridge is also used to increase program memory.

Modbus Master Mode

Allows the controller to initiate a Modbus query transmission, with a response expected from a Modbus slave.

Modbus Slave Mode

Allows the controller to respond to Modbus queries from a Modbus master and is the default communications mode if no communication is configured.

O

Operator display expansion module

An optional module that can be attached to any Modular controller to display program information.

Operator display module

An optional module that can be attached to any Compact controller to display program information.

OUT LED

An LED that illuminates when a corresponding output is on. All modules have OUT LEDs.

Output terminals

Terminals on the bottom of all Compact controllers used to connect output signals from output devices such as electromechanical relays and solenoid valves. The internal output relay contact is rated up to 240 VAC/2A or 30 VDC/2A.

P

PLS

A special function. This user-defined function block generates a signal on output %Q0.0.0 or %Q0.0.1. This signal has a variable period but has a constant duty cycle, or on to off ratio of 50% of the period.

Power Supply Terminals

The power supply is connected to these terminals to provide power to the controller. The power voltage for a Compact controller is 100-240 VAC and 24 VDC for a Modular controller.

PWM

A special function. This user-defined function block generates a signal on output %Q0.0.0 or %Q0.0.1. This signal has a constant period with the possibility of varying the duty cycle, or on to off ratio.

PWR LED

An LED that illuminates when power is supplied to the controller.

R

Removable Cover

A cover on all Compact controllers that can be removed to install an optional Operator Display.

RTC

Real Time Clock.

RTD

Temperature detector of type PT100, PT1000 etc. Resistor Temperature Detector.

RUN LED

An LED that illuminates when the controller is executing a program.

S

Sensor power terminals

Supplies power to the sensors (24 VDC, 400 mA for -40DRF compact controllers and 250 mA for all other controllers). Output terminals are only intended for input devices and not be used as a source for driving external loads.

Serial Port 1

An EIA RS-485 connector used to download and monitor the controller operation using TwidoSuite.

Serial port 2

An optional port that can be configured as either EIA RS-232 or EIA RS-485.

STAT LED

An LED that blinks on and off to indicate a specific status of the user program.

T

Terminal cover

A cover on all Compact controllers to protect the input and output terminals.

V

Very Fast Counting

A special function available as an up/down counter, an up/down 2-phase counter, a single up counter, a single down counter, and frequency meter. The counter functions enable counting of pulses from 0 to 65,535 in single-word mode and from 0 to 4,294,967,295 in double-word mode. The frequency meter function measures the frequency of a periodic signal in Hz.