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*The Trident supports a complete range of modules for applications with low point counts and distributed I/O.*



# *Product Specifications*

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The Trident supports a range of modules for applications with low point counts and distributed I/O. This section provides detailed specifications for each product in the Trident family.

Also included are:

- International approvals (page 23)
- Environmental specifications (page 24)
- Dimensions and clearances (page 25)

## **Main Processor Modules and Baseplates**

Every Trident system is controlled by three Main Processor (MP) Modules that reside on a single baseplate. Each MP Module acts as one channel of the triplicated Trident system. For details, see page 25.

## **Communication Module and Baseplate**

The Communication Module (CM) is a three-to-one interface to the MPs that enables use of industry-standard communication protocols. A single Trident controller can support up to two CMs on one CM Baseplate with each CM operating independently. Two CMs can provide redundant communication connections or independent communication ports. For details, see page 27.

## **Analog Input Module and Baseplates**

Each Analog Input (AI) Module has three isolated channels which independently process analog inputs from field devices. Each channel transmits the data to the MP associated with the channel. The MPs vote the data before passing it to the application. For details, see

page 32. In addition to the standard AI baseplate, a HART AI baseplate and a hazardous location HART AI baseplate are available.

## **Analog Input/Digital Input Module and Baseplates**

Each Analog Input/Digital Input (AI/DI) Module has three isolated channels which independently process analog and digital inputs from field devices. Each channel transmits the data to the MP associated with the channel. The MPs vote the data before passing it to the application. For details, see page 32.

## **Analog Output Modules and Baseplates**

Each Analog Output (AO) Module has three isolated channels which independently accept data from the MPs. Voter circuitry selects a single channel to drive the output and shunts output from the other channels. For details, see page 33. In addition to the standard AO baseplate, a HART AO baseplate and a hazardous location HART AO baseplate are available.

## **Digital Input Module and Baseplates**

Each Digital Input (DI) Module has three isolated channels which independently process digital input from field devices. Each channel transmits the data to the MP associated with the channel. For details, see page 35.

## **Digital Output Module and Baseplates**

Each Digital Output (DO) Module has three isolated channels which independently accept data from the MP associated with each channel. For details, see page 36.

## **Pulse Input Module and Baseplate**

Each Pulse Input (PI) Module has three isolated channels which independently receive voltage transitions from each point and converts the transitions to frequency (RPM) data. For details, see page 37.

## **Solid-State Relay Output Module and Baseplate**

Each Solid-State Relay Output (SRO) Module has three isolated channels which independently accept data from the MP associated with each channel. The channels provide input to a voter circuit which uses the voted value to drive the coil of the relay. For details, see page 38.

## **I/O Extender Modules**

I/O Extender Module Kits are used to carry I/O messages from one I/O column to another and to provide logic power terminals for each I/O column. For details, see page 39.

## **Interconnect Assemblies**

Trident baseplates within a single I/O column are connected by Interconnect Assemblies that carry I/O messages and logic power across the baseplates. For details, see page 40.

## **Required Accessories**

Accessories such as end caps, terminal covers, and slot covers are required to protect Trident components from dust, liquids, and corrosive atmospheres. For details, see page 40.

Components for the Trident system are offered in TriPaks and kits, as well as by individual parts. For details, see page 18.

# Product Specifications

## Standard Trident Products

Model	Product Name	Qty	Description	Consists of
5101	Main Processor TriPak	3	Main Processor Module	3101
		1	Main Processor Baseplate Kit	2101
5201	Communication Module TriPak	1	Communication Module	3201
		1	Communication Module Baseplate Kit	2201
5351	Analog Input TriPak	1	Analog Input Module	3351
		1	Analog Input Baseplate Kit	2351
5361	Analog Input/Digital Input TriPak	1	Analog Input/Digital Input Module	3361
		1	Analog Input/Digital Input Baseplate Kit	2361
5352	Analog Input Tripak (RTD/TC/4-20 mA)	1	Analog Input Module	3351
		1	Analog Input Baseplate (RTD/TC/4-20 mA)	2352
5381	Analog Output TriPak	1	Analog Output Module	3481
		1	AO Module Baseplate Kit	2481
5382	High-Current Analog Output Tripak	1	High-Current Analog Output Module	3482
		1	AO Module Baseplate Kit	2481
5301	Digital Input TriPak	1	Digital Input Module	3301
		1	Digital Input Baseplate Kit	2301
5302	Digital Input TriPak (high voltage)	1	Digital Input Module	3301
		1	Digital Input Baseplate Kit (high voltage)	2302
5401	Digital Output TriPak	1	Digital Output Module	3401
		1	Digital Output Baseplate Kit	2401
5401L	Digital Output TriPak (low current)	1	Digital Output Module	3401
		1	Digital Output Baseplate Kit (low current)	2401L
5402	Digital Output TriPak (high voltage)	1	Digital Output Module	3401
		1	Digital Output Baseplate Kit (high voltage)	2402
5451	Solid-State Relay Output TriPak	1	Solid-State Relay Output Module	3451
		1	Solid-State Relay Output Baseplate Kit	2451
5481	Pulse Input TriPak	1	Pulse Input Module	3381
		1	Pulse Input Baseplate Kit	2381
2101	Main Processor Baseplate Kit	1	MP Baseplate	3000671-100
		1	MP Interconnect Assembly	2920
		1	Trident User Documentation (hardcopy)	8910-2
		1	Accessories Kit	8401
		1	Top End Cap – I/O	2910
		1	Top End Cap – MP	2912
		1	Bottom End Cap – I/O	2911
		1	Bottom End Cap – MP	2913
2281	I/O Bus Extender Module Kit	2	I/O Extender Module	3000678-100
		3	2-ft. I/O Bus Cables (Set of 3)	4000056-002
		1	I/O Interconnect Assembly	2921
		1	Top End Cap – I/O	2910
		1	Bottom End Cap – I/O	2911
2291	I/O Bus Termination Kit, I/O Baseplate	1	I/O Extender Module	3000678-100
		1	I/O Interconnect Assembly	2921
		1	I/O Bus Terminator Kit	3900064-003
2292	I/O Bus Termination Kit, MP Baseplate	1	I/O Extender Module	3000678-100
		1	MP Interconnect Assembly	2920
		1	I/O Bus Terminator Kit	3900064-003

**Standard Trident Products (Continued)**

<b>Model</b>	<b>Product Name</b>	<b>Qty</b>	<b>Description</b>	<b>Consists of</b>
2301	Digital Input Baseplate Kit	1	I/O Baseplate	3000673-020
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2302	Digital Input Baseplate Kit (high voltage)	1	I/O External Termination Baseplate	3000721-300
		2	External Termination Panel (Solid State Relay Input)	3000762-110
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		2	Interface Cable, 10 ft	9105-310
			SSR Input Modules for use with SSR Input ETP 100 to 240 VAC	1300447-001
2302A	Digital Input Baseplate Kit, Hazardous Location	1	I/O External Termination Baseplate	3000721-300
		1	External Termination Panel Kit	9573-610
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2342	Analog Input/Digital Input Baseplate Kit, External Termination	1	I/O External Termination Baseplate	3000721-130
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2342A	Analog Input/Digital Input Baseplate Kit, Hazardous Location	1	I/O External Termination Baseplate	3000721-130
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
		1	AI/DI ETP Kit, Hazardous Location	9793-610
2351	Analog Input Baseplate Kit	1	I/O Baseplate	3000675-010
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2352	Analog Input Baseplate Kit for TC, RTD, and 4-20mA (requires 2 of part number 9764-510)	1	I/O External Termination Baseplate	3000721-100
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2352A	Analog Input Baseplate Kit, Hazardous Location	1	I/O External Termination Baseplate	3000721-100
		1	External Termination Panel Kit	9792-310
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2354	Analog Input HART Baseplate Kit	1	I/O HART Baseplate	3000851-010
		1	MP Interconnect Assembly	2920
		1	Slot Cover	2900
		1	Terminal Cover	2901
2354A	Analog Input HART Hazardous Location Baseplate Kit—ATEX	1	I/O HART Baseplate	3000851-110
		1	MP Interconnect Assembly	2920
		1	Slot Cover	2900
		1	Terminal Cover	2901

# Product Specifications

## Standard Trident Products (Continued)

Model	Product Name	Qty	Description	Consists of
2361	Analog Input/Digital Input Baseplate Kit	1	I/O Baseplate	3000675-020
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2381	Pulse Input Baseplate Kit	1	I/O Baseplate	3000719-100
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2401	Digital Output Baseplate Kit	1	I/O Baseplate	3000674-030
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2401L	Digital Output Baseplate Kit (low current)	1	I/O Baseplate	3000659-130
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2402	Digital Output Baseplate Kit (high voltage)	1	I/O Baseplate	3000764-300
		1	External Termination Panel (Relay Output ETP)	3000763-110
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Interface Cable, 10 ft	9106-310
			Relay Output Modules for use with Relay Output ETP SSR, 2 A at 75 to 264 VAC SSR, 2 A at 4 to 60 VDC SSR, 1.5 A at 40 to 200 VDC Power (Dry Contact) Relay; 440 VAC max, 125 VDC max	1300462-001 1300471-001 1300472-001 1300463-001
2402A	Digital Output Baseplate Kit, Hazardous Location	1	I/O External Termination Baseplate	3000764-300
		1	External Termination Panel Kit	9671-610
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2451	Solid-State Relay Output Baseplate Kit	1	I/O Baseplate	3000676-310
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2480A	Analog Output Baseplate Kit, Hazardous Location	1	I/O External Termination Baseplate	3000764-300
		1	External Termination Panel Kit	9863-610
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901
2481	Analog Output Baseplate Kit	1	I/O Baseplate	3000674-010
		1	I/O Interconnect Assembly	2921
		1	Slot Cover	2900
		1	Terminal Cover	2901

**Standard Trident Products (Continued)**

Model	Product Name	Qty	Description	Consists of
2483	Analog Output HART Baseplate Kit	1	I/O HART Baseplate	3000852-020
		1	MP Interconnect Assembly	2920
		1	Slot Cover	2900
		1	Terminal Cover	2901
2483A	Analog Output HART Hazardous Location Baseplate Kit—ATEX	1	I/O HART Baseplate	3000852-120
		1	MP Interconnect Assembly	2920
		1	Slot Cover	2900
		1	Terminal Cover	2901
		4	MTL4546 Intrinsic Safety Barrier—Isolator	1600107-001
8401	Trident Accessory Kit	1	Set of Spare Fuses	
		2	Set of Address Plugs (1 through 10)	3000698-010
		1	Set of Address Plugs (11 through 20)	3000698-020
		1	Set of Address Plugs (21 through 32)	3000698-030
9573-610	Digital Input Termination Panel Kit, Hazardous Location (for use with Model 2302A)	2	External Termination Panel, DI	3000771-880
		2	Interface Cable, 10 ft, DI	4000165-310
9671-610	Digital Output Termination Panel Kit, Hazardous Location (for use with Model 2402A)	1	External Termination Panel, DO	3000769-390
		1	Interface Cable, 10 ft, DO	4000166-310
9764-510	RTD/TC/AI Termination Panel Kit (for use with Model 2352)	1	External Termination Panel, RTD/TC/AI	3000712-100
		1	Interface Cable, 10 ft	4000103-510
			Signal Conditioning Modules for use with 9764-510	
			4–20 mA	1600048-220
			32 <sup>0</sup> F to 392 <sup>0</sup> F (0 <sup>0</sup> C to 200 <sup>0</sup> C), RTD	1600048-030
			32 <sup>0</sup> F to 1112 <sup>0</sup> F (0 <sup>0</sup> C to 600 <sup>0</sup> C), RTD	1600048-040
			32 <sup>0</sup> F to 1400 <sup>0</sup> F (0 <sup>0</sup> C to 760 <sup>0</sup> C), Type J TC	1600048-110
			32 <sup>0</sup> F to 2372 <sup>0</sup> F (0 <sup>0</sup> C to 1300 <sup>0</sup> C), Type K TC	1600048-120
			32 <sup>0</sup> F to 752 <sup>0</sup> F (0 <sup>0</sup> C to 400 <sup>0</sup> C), Type T TC	1600048-130
			32 <sup>0</sup> F to 1652 <sup>0</sup> F (0 <sup>0</sup> C to 900 <sup>0</sup> C), Type E TC	1600048-140
			Shorting Plug	1600048-300
9792-310	Analog Input Termination Panel Kit, Hazardous Location (for use with Model 2352A)	1	External Termination Panel, AI	3000771-710
		1	Interface Cable, 10 ft, AI	4000164-510
9793-610	Analog Input/Digital Input Termination Panels Kit, Hazardous Location (for use with Model 2342A)	1	External Termination Panel, AI	3000771-710
		1	External Termination Panel, DI	3000771-880
		1	Interface Cable, 10 ft, AI	4000164-510
		1	Interface Cable, 10 ft, DI	4000165-310
9863-610	Analog Output Termination Panel Kit, Hazardous Location (for use with Model 2480A)	1	External Termination Panel, AO	3000770-960
		1	Interface Cable, 10 ft, AO	4000163-510
Triconex 4850	Triconex 4850 HART Multiplexer	1	Triconex 4850 HART Multiplexer	1600106-001
7254-8	TriStation 1131 Developer's Workbench version 4.5	1	CD containing: Developer's Workbench (software) TriStation 1131 Help Documentation (online)	3000755-814
		1	TriStation 1131 v 4.5 Documentation Set (hardcopy)	
7255-8	TriStation 1131 Developer's Workbench version 4.5 with CEMPLE	1	CD containing: Developer's Workbench (software) TriStation 1131 Help Documentation (online)	3000755-815
		1	TriStation 1131 v 4.5 Documentation Set (hardcopy)	

# Product Specifications

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## Standard Trident Products (Continued)

Model	Product Name	Qty	Description	Consists of
8910-2	Trident User Documentation (hardcopy)	1	Planning and Installation Guide for Trident v2 Systems	9700110-002
		1	Communication Guide for Trident v2 Systems	9700111-002
8747-8	TriStation 1131 version 4.5 User Documentation (hardcopy)	1	TriStation 1131 Developer's Guide	9700100-007
		1	TriStation 1131 Libraries Reference	9700098-007
		1	Safety Considerations Guide for Trident v2	9700112-001
		1	Safety Considerations Guide for Trident v1	9700096-002
		1	Safety Considerations Guide for Tricon	9700097-001
7523-2	Triconex DDE Server 4.1.116	1	CD containing DDE Server software and documentation	3000723-301
		1	DDE Server, v4.1 Documentation Set (hardcopy)	9700108-001
7521-4	SOE Recorder version 4.1	1	CD containing SOE Recorder and documentation SOE Recorder, v4.1 Documentation Set (hardcopy)	3000708-400 9700081-004
7260-4	Enhanced Diagnostic Monitor, v2.2	1	CD containing Enhanced Diagnostic Monitor, v2.2 (software)	3000796-006
		1	Enhanced Diagnostic Monitor, v2.2 Documentation Set (hardcopy)	9700107-004
Contact Triconex for current model number	Triconex Documentation Set	1	CD containing documentation in PDF format	

## International Approvals

The Trident controller has been certified as complying with multiple internationally recognized standards by the following internationally recognized certification agencies, these certifications have qualified the Trident for use around the world in safety critical applications. Test reports from the various certification agencies are available upon request.

## Canadian Standards Association

CSA has certified that the Trident v2.x controller is in full compliance with the following internationally recognized electrical safety standards and is qualified for general use in North American and other jurisdictions requiring compliance with these standards.

## European Union CE Mark

Based upon the independent TÜV evaluation and test results, Triconex has

certified the Trident v2.x controller suitable to use in the European Union and all other jurisdictions requiring compliance with the *European Union EMC Directive No. 89/336/EEC* and *Low Voltage Equipment Directive No. 72/23/EEC*. See Certificate of Compliance for details.

To ensure maximum reliability and trouble-free operation, the Trident and associated wiring must be installed

Certifying Agency	Standard Number	Title
Canadian Standards Association	CAN/CSA-C22.2 No.0-M91	General Requirements—Canadian Electrical Code, Part II
	CSA Std C22.2 No.0.4-M1982	Bonding and Grounding of Electrical Equipment (Protective Grounding)
	CAN/CSA C22.2 No 1010.1-92	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements
	UL 3121-1 1998-07-14	Process Control Equipment
European Union CE Mark	IEC 61131-2	Programmable Controllers Part 2: Equipment Requirements and Test. Overvoltage Category II is assumed.
Factory Mutual	3611	Electrical Equipment for use in Class I-Division 2; Class II-Division 2; and Class III-Divisions 1 and 2, Hazardous Locations
	3810	Electrical and Electronic Test, Measuring and Process Control Equipment
	3600	Electrical Equipment for Use in Hazardous (Classified) Locations-General Requirements
TÜV Rheinland	IEC 61508, Parts 1-7, 2000	Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems
	EN50156-1:2004	Electrical equipment for furnaces and ancillary equipment. Requirements for application design and installation
	IEC 61131-2:2003	Programmable Controllers Part 2: Equipment Requirements and Test. Overvoltage Category II is assumed.
	NFPA 85:2007	Boiler and Combustion Systems Hazards Code, 2007 Edition
	SEMI S2-0200	Safety guidelines for semiconductor manufacturing equipment
	ATEX Directive No. 94/9/EC	ATEX Directive No. 94/9/EC for Zone 2, Group IIB hazardous locations

# Product Specifications

following the guidelines outlined in the *Planning and Installation Guide*.

To comply with the CE Mark requirement for emissions, the Main Processor Modules and the Communication Modules must be mounted in a metal enclosure. To ensure compliance with the EU directives, the following additional guidelines must be followed:

- The Main Processor Modules and the Communication Modules must be mounted in a metal enclosure.
- Field power supplies must be approved for use in safety extra-low-voltage (SELV) circuits according to the requirements of IEC 61010-1.

## TÜV Rheinland

TÜV has certified that the Trident v2.x is in full compliance with the internationally recognized standards listed on page 23.

## Factory Mutual

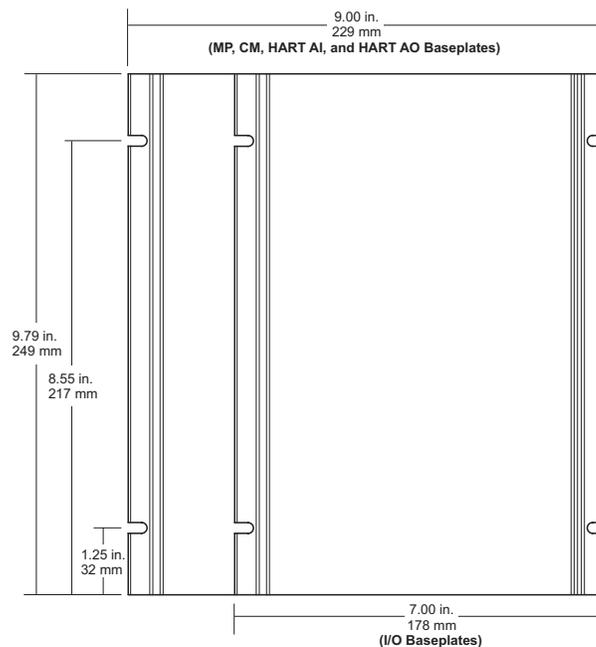
FM has certified the Trident v2.x controller is in full compliance with the international recognized standards listed on page 23 and is qualified for use in Class I, Division 2 Temperature T4, Groups A, B, C, and D hazardous indoor locations. For hazardous location applications, redundant power sources must be used for system power.

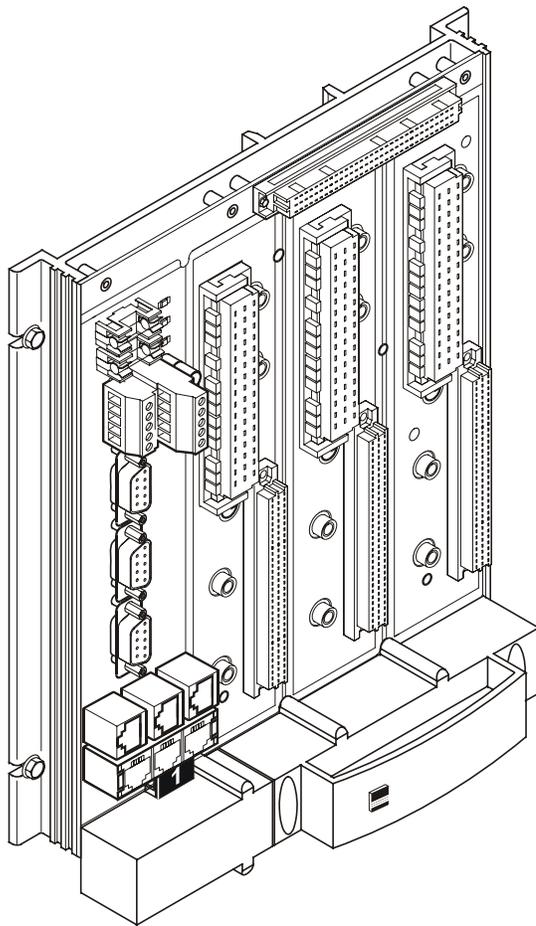
## Environmental Specifications

Designed for critical applications, the Trident performs predictably in a hostile industrial environment. The specifications listed on the table to the right confirm this built-in reliability. However, due to the number of diverse items that make up a Trident system, not all of the listed specifications apply to every item. Please contact Triconex to obtain the specifications for particular items.

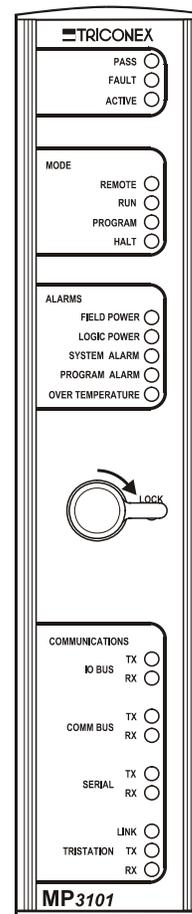
Feature	Specification
Operating temperature	-4° F to +158° F (-20° C to +70° C) ambient (which is the air temperature measured at the bottom of the baseplate), per IEC 60068-2-14, tests Na and Nb
Storage temperature	-40° F to +185° F (-40° C to +85° C) per IEC 60068-2-2, test Bb, IEC 60068-2-1, test Ab, and IEC 60068-2-30, test Db
Relative humidity	5% to 95%, non-condensing
Corrosive environment	Class G3 Level as defined in ISA Standard S71.04, based on exposure testing according to EIA Standard 364-65A, Class III
Sinusoidal vibrations per axis	1 G @ 10 to 150 Hz, per IEC 60068-2-6, Test Fc
Shock	15 G for 6-11 ms in each axis, per IEC 60068-2-27, test Ea
Electrostatic discharge	IEC 61000-4-2, 4 kV contact, 8kV air
Conducted susceptibility	IEC 61000-4-4, Fast Transient/Burst, 2 kV power, 1 kV signal lines IEC 61000-4-5, Surge Withstand, 2 kV CM AC power lines, etc. IEC 61000-4-6, RFI, 0.15-80 MHz, 10 V IEC 61000-4-12, Damped oscillatory wave, 2.5 kV series
Radiated susceptibility	IEC 61000-4-3, 26-100 MHz, 10 V/m
Conducted emissions	CISPR 16, Class A, 0.15-30MHz, 73-79db when installed per the guidelines of the P & I Guide.
Radiated emissions <sup>1</sup>	CISPR 11, Class A, 30-1000 MHz @ 10m, 4-47 db when installed per the guidelines of P & I Guide.

1. The Trident system must be mounted in a metal enclosure for European CE Mark compliance.





**MP Baseplate**



**MP Front Panel**

### Dimensions and Clearances

The dimensions given on the figure to the right are predicated on the vertical mounting of Trident baseplates on a panel.

The dimensions include the following:

- The MP Baseplate, AI HART Baseplates, and AO HART Baseplates are 9 inches (229 millimeters) wide by 9.79 inches (249 millimeters) long
- I/O Baseplates for all types of I/O modules are 7.0 inches (178 millimeters) wide by 9.79 inches (249 millimeters) long

All Trident I/O modules have the same dimensions, which are:

- Height = 8.65 inches (220 mm)
- Width = 1.75 inches (44 mm)
- Depth = 6.65 inches (169 mm)

Clearance should always allow adequate air flow around Trident modules. For typical applications, there should be at least 5 inches (15 centimeters) of clearance between active modules and the walls of the enclosure.

The DIN rails and baseplate assemblies should be arranged on the panel to allow for the installation of wiring channels (such as Panduit) along the left side of vertical columns.

### Main Processor Module

Every Trident system is controlled by three Main Processor (MP) Modules that reside on a single baseplate. Each MP Module acts as one channel of the triplicated Trident system and provides the following features:

- An RS-232 or RS-485 Modbus port for direct TMR connection to a DCS (or other external host) without the need for any other modules
- A 10BaseT Ethernet (IEEE 802.3) port for connection to the TriStation 1131 programming workstation
- A lock lever that indicates whether the module is properly locked on the baseplate

# Product Specifications

## Alarm Indicators

The Trident fault-monitoring circuitry is able to detect and signal an alarm for all single faults and most multiple faults. The following alarm indicators are on the front panel of each MP:

- The Field Power alarm indicates loss of field power or faulty field power supply
- The Logic Power alarm indicates a missing or faulty system power supply
- The System Alarm indicates problems with the application or system integrity
- The Program Alarm indicates problems that are defined by the user-written application
- The Over Temperature alarm indicates when the module is over 183° F (84° C)

## System Status Indicators

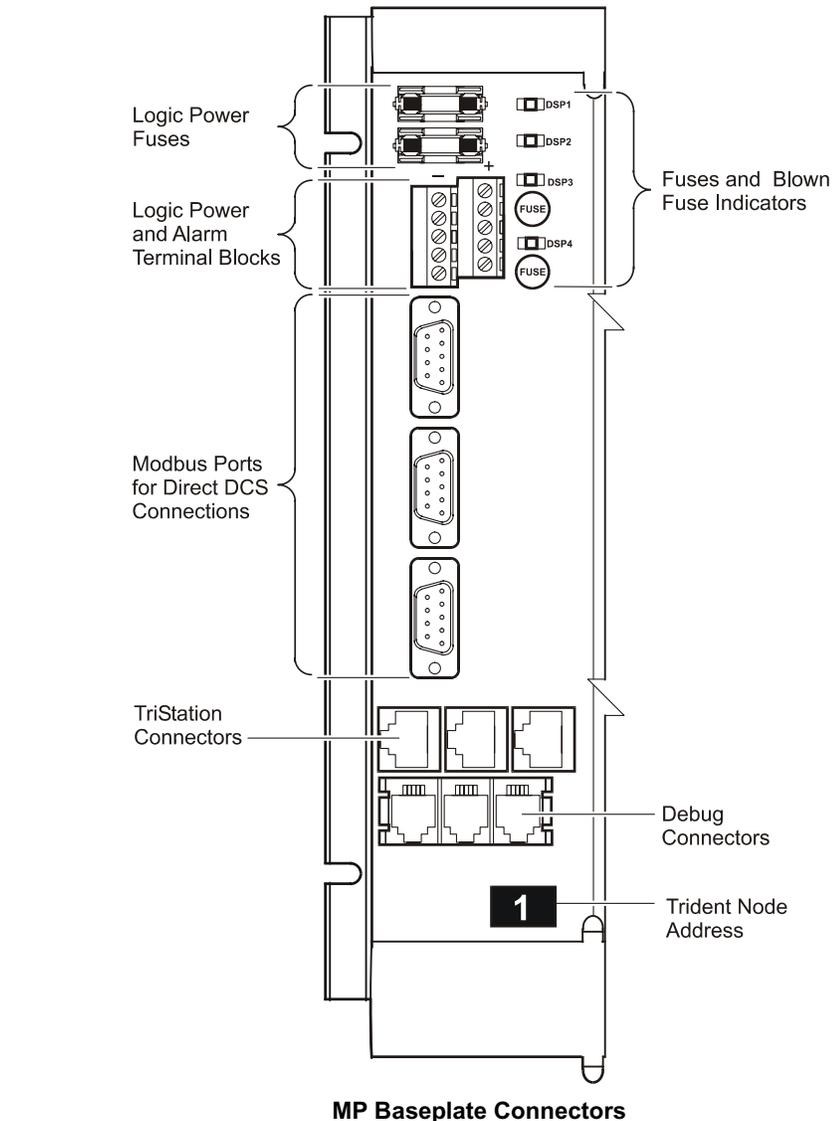
The system status indicators identify the processing state of the module. The status indicators include the following:

- The Pass indicator identifies when the module is operating normally.
- The Active indicator blinks once per scan when executing an application.
- The Fault indicator identifies when the processor has an internal fault.

## Other Indicators

Other indicators on the MP include the following:

- Mode indicators (Remote, Run, Program, and Halt) identify the operating state of the entire Trident system.
- Communication indicators that identify the type of communication occurring



## Physical Description

Each MP provides 16 megabytes of DRAM for the user-written application, sequence-of-events (SOE) and I/O data, diagnostics, and communication buffers.

The three MPs compare their respective data during every scan using the TriBus, a high-speed, fault-tolerant inter-processor bus. The MPs commu-

nicate with the I/O modules over a TMR HDLC I/O bus that operates at 2 megabits per second.

In addition to the TriStation and Modbus ports and alarm connectors, the MP Baseplate provides redundant, 24-volt fused logic power connectors. Logic power supplied here can operate the MPs and carry to the I/O Baseplates as well, so that no other logic power supplies are needed for the column.

## Communication Module

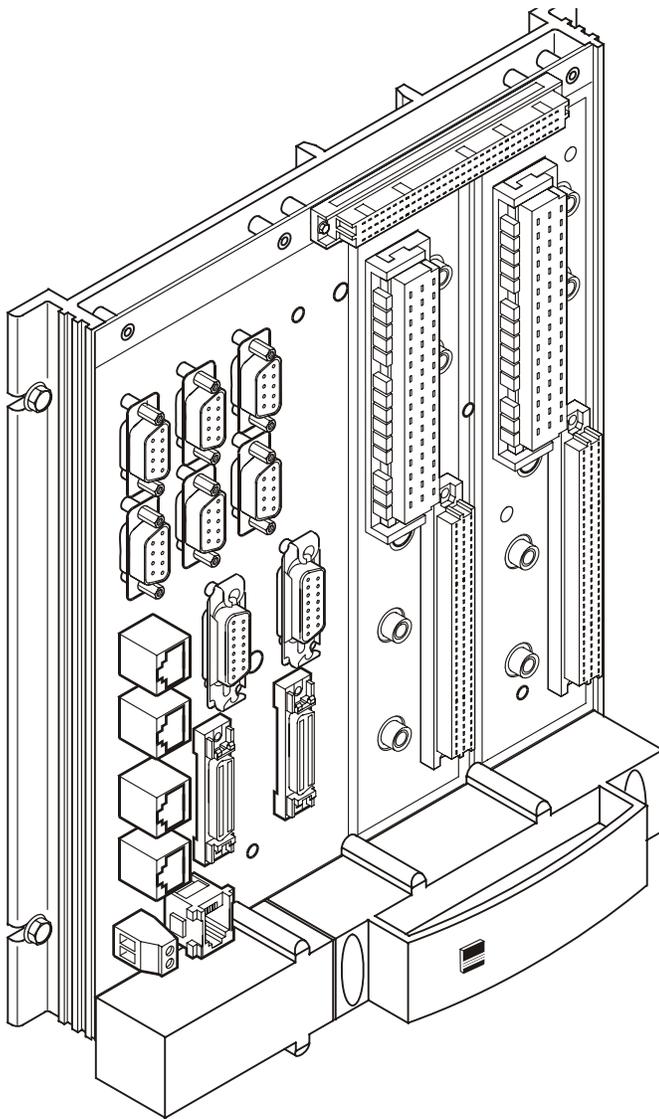
The Communication Module (CM) is a one-to-one interface to the MPs. The Trident v2 CM enables communication with:

- External host computers
- Distributed control systems (DCS)
- Open networks

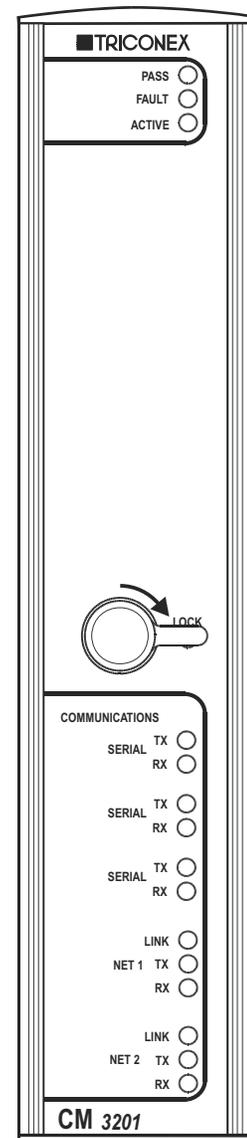
- Network printers
- Other Trident v2 systems
- Tricon version 9–10 systems

A single Trident controller can support up to two CMs on one CM Baseplate. Each CM operates independently and supports three RS-232 or RS-485 serial ports and two Ethernet ports per CM.

Two CMs can provide redundant communication connections or additional independent communications ports.



CM Baseplate



CM Front Panel

# Product Specifications

## Communication Capabilities

Each CM provides the following communication capabilities:

- Serial ports
- Network ports
- Multiple protocol support

### Serial Ports

Each CM provides three optically isolated RS-232 or RS-485 serial ports which are user-configurable for Modbus point-to-point or multi-point (network) connections. Transmission rates up to 115 kilobits per second per port can be selected.

### Network Ports

Each CM provides two network ports which are configured as follows:

One 10-megabit Ethernet port, with the following connectors:

- 10BaseT
- Attachment unit interface (AUI) for a 10-megabit media adapter unit (MAU)

One 100-megabit Ethernet port, with the following connectors:

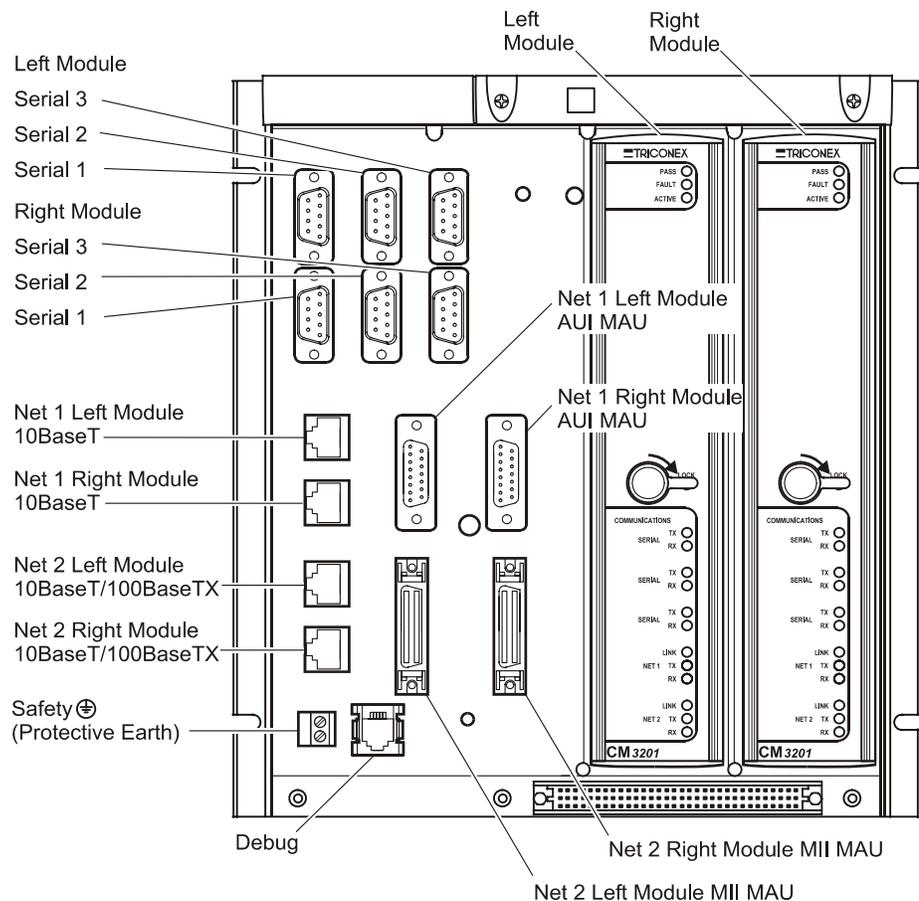
- 100BaseTX
- Media independent interface (MII) for a 100-megabit MAU

Media adapter units may be used in place of the 10/100 BaseT RJ-45 twisted-pair connections to convert the CM network ports to other Ethernet media types or to extend network distances.

### Supported Protocols

Each CM serial port supports these protocols:

- Modbus master (RTU)
- Modbus slave (ASCII or RTU)



**CM Baseplate Connectors**

Each CM network port supports these protocols:

- TSAA (UDP/IP)
- TSAA with IP Multicast (UDP/IP)
- TriStation
- Peer-to-Peer (UDP/IP)
- Peer-to-Peer (DLC)
- Modbus Master or Slave (TCP)
- Triconex Time Synchronization via UDP/IP
- SNTP Triconex Time Synchronization

- JetDirect Network Printer Server DLC/LLC

### NOTE

*The Trident CM supports a maximum of four Modbus TCP ports.*

Each CM Net1 network port supports Triconex Time Synchronization via DLC.

## Logic Power for CM

Logic power is supplied by the MP Baseplate.

### Logic Power

Feature	Specification
Nominal input voltage	24 VDC
Specified operational voltage range	24 VDC -15% or +20% + 5% AC ripple (19.2 to 30 VDC)
Logic power (without MAUs)	8 W maximum
10 Mb AUI type MAU	6 W maximum additional per MAU
100 Mb MII type MAU	3.75 W maximum additional per MAU
Absolute maximum input voltage	33 VDC
Absolute maximum reverse input voltage	-0.6 VDC
Input power interruption time from nominal value	1 ms maximum 1 sec minimum
Repetition rate	
Reverse current isolation input to input	500 $\mu$ A maximum
Inrush current per input	2.4 A maximum, typically 1.2 A for 50 ms
Short circuit current limit per input	2.4 A maximum
Functional earth to logic ground isolation	0 V, no isolation
Protective earth to functional earth isolation	500 VDC
+12 V AUI output power	12 V $\pm$ 10%, 6 W maximum, current limited
+5 V MII output power	5 V $\pm$ 5%, 3.75 W maximum, current limited

# Product Specifications

## Common Features for I/O Modules and Baseplates

The Digital Input (DI) Module and Baseplate shown below serve as examples for all of the Trident I/O modules and baseplates, whose appearance is similar. The following pages provide detailed specifications for all of the I/O modules and baseplates.

Each I/O module occupies one of two slots on the baseplate that constitute an I/O set. The left module occupies the slot below the “L” label on the base-

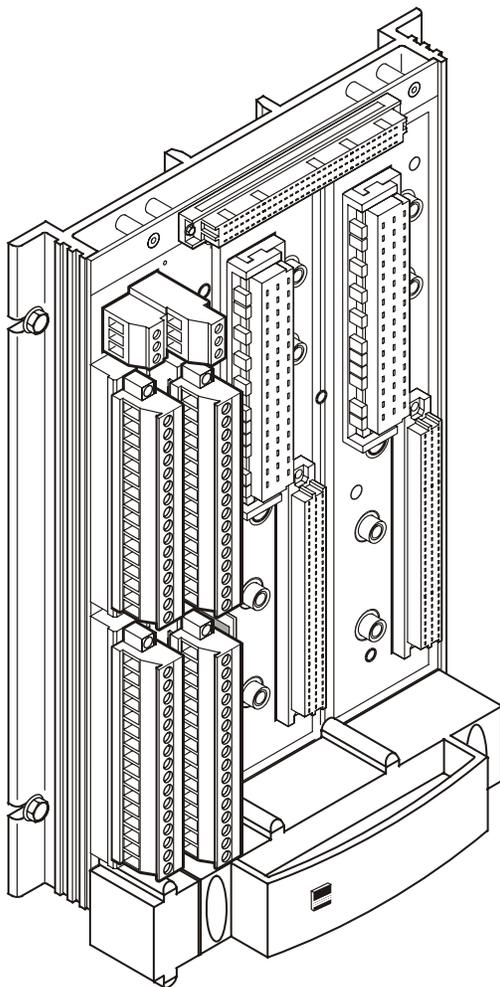
plate and the right module occupies the slot below the “R” label. At any time, the status of either the left or right module can be active or hot-spare depending on which module is in control.

All types of I/O modules support a hot-spare module. Each module is mechanically keyed to prevent improper installation in a configured baseplate.

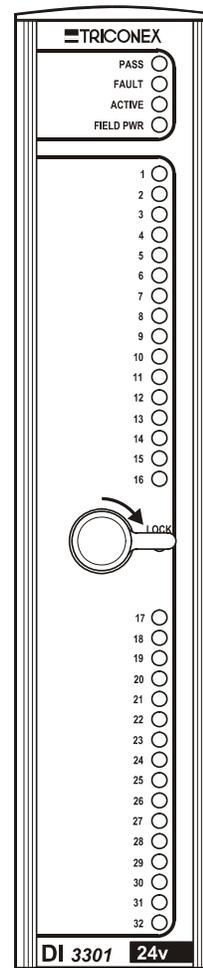
Each I/O Baseplate includes one I/O Interconnect Assembly, one Slot Cover, and one Terminal Cover.

For most types of I/O baseplates, the wiring for field devices is connected directly to terminals on the baseplate, which are compression terminals that are compatible with 24 to 12 (0.2 mm<sup>2</sup> to 3.3 mm<sup>2</sup>) AWG wiring.

The maximum operating temperature for all types of I/O modules is 158° F (70° C) ambient.



DI Baseplate



DI Front Panel

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## Common Specifications for All I/O Modules

The following tables identify the logic and field power specifications for all I/O modules.

### Logic Power

Feature	Specification
Nominal input voltage	24 VDC
Voltage range	24 VDC –15% or +20% +5% AC ripple (+19.2 to +30 VDC)
Logic power	<3 W
Absolute maximum input voltage	33 VDC
Absolute maximum reverse input voltage	– 0.6 VDC
Input power interruption time from nominal	1 ms maximum
Power interruption interval	1 sec minimum
Reverse current isolation input to input	500 $\mu$ A maximum
Inrush current per input	2.4 A maximum
Short circuit current limit per input	2.4 A maximum
Functional earth to logic ground isolation	0 V, no isolation
Protective earth to functional earth isolation	500 VDC, minimum

### Field Power

Feature	Specification
Nominal field voltage	24 VDC
Specified operational voltage range	24 VDC –15% or +20% +5% AC ripple (+19.2 to +30 VDC) <sup>1</sup>
Power	See module specifications
Absolute maximum input voltage	33 VDC
Absolute maximum reverse input voltage	– 0.6 VDC
Input power interruption time from nominal	Not applicable
Power interruption interval	Not applicable
Reverse current isolation	500 $\mu$ A maximum
Functional earth to protective earth isolation	500 VDC, minimum
Functional earth to functional earth (logic ground) isolation	800 VDC, minimum

1. For the PI Module, the voltage range is configurable in TriStation 1131.

# Product Specifications

## Analog Input Module

Each TMR Analog Input Module has three isolated sets of electronics, called channels, which independently process field data input to the module. Each channel places the processed data in an array and transmits this array, on request, to the MP associated with that channel. The MPs vote the data before passing it to the application. In TMR mode, the data passed is mid-value. In dual mode, the data passed is the average.

AI Modules include complete, ongoing diagnostics for each channel. If the diagnostics detect a failure on any channel, the Fault indicator turns on and activates the system alarm. The Fault indicator identifies a channel fault, not a complete module failure. AI Modules are guaranteed to operate properly in the presence of a single fault and may continue to operate properly with multiple faults.

AI Modules support a hot-spare module. Each AI Module is mechanically keyed to prevent improper installation in a configured baseplate.

The Model 3351 AI Module can be used with these baseplates:

- Model 2351, which is used in typical 4-20 mA applications.
- AI External Termination Baseplate, which is used with the Model 9764-510 RTD/TC/AI External Termination Panel or the Model 9792-310 AI Hazardous Location External Termination Panel.
- Model 2354, which is used in 4-20 mA applications and enables communication between HART field devices and Configuration and Asset Management Software running on a PC.
- Model 2354A, which is used in 4-20 mA applications in hazardous

## Model 3351 Analog Input Module Specifications

Feature	Specification
Points	32, commoned
Nominal input current	4–20 mA DC
Specified operational current range	2–22 mA DC
Absolute maximum field voltage	33 VDC
Absolute maximum reverse field voltage	– 0.6 VDC
Absolute maximum input current	50 mA DC
Input bandwidth (3dB)	16 Hz
Source impedance	180 Ω
Input impedance (with baseplate)	250 Ω
I to V resistor	100 Ω ± 0.01%
Resolution	12 bits
Absolute error	0.15% of full scale (20 mA)
Diagnostic	Force-to-value diagnostic (FVD)
Scan time	< 1 ms for all 32 points
Functional earth to protective earth isolation	500 VDC, minimum
Functional earth to functional earth (logic) isolation	800 VDC, minimum

locations and enables communication between HART field devices and Configuration and Asset Management Software running on a PC.

## Analog Input/Digital Input Module

The Analog Input/Digital Input Module has 16 digital input points (points 1–16) and 16 analog input points (points 17–32).

The AI/DI Module has three isolated sets of electronics, called channels, which independently process field data input to the module. Sensing of each input point is performed in a manner that prevents a single failure on one channel from affecting another channel.

For analog input points, each channel receives variable voltage signals from each point, converts them to digital values, and transmits the values to the three MPs on demand.

For digital input points, an ASIC on each channel scans each input point, compiles data, and transmits it to the MPs upon demand.

### Model 3361 Analog Input/Digital Input Module Specifications

Features Common to all Points	Specification
Points	32, commoned (16 DI, points 1–16; 16 AI, points 17–32)
Functional earth to protective earth isolation	500 VDC, minimum
Functional earth to functional earth (logic) isolation	800 VDC, minimum
Features of AI Points	Specification
Nominal input current	4–20 mA DC
Specified operational current range	2–22 mA DC
Absolute maximum field voltage	33 VDC
Absolute maximum reverse field voltage	– 0.6 VDC
Absolute maximum input current	50 mA DC
Input bandwidth (3dB)	16 Hz
Source impedance	180 $\Omega$
Input impedance (with baseplate)	250 $\Omega$
I to V resistor	100 $\Omega \pm 0.01\%$
Resolution	12 bits
Absolute error	0.15% of full scale (20 mA)
Diagnostic	Force-to-value diagnostic (FVD)
Scan time	< 1 ms for all 32 points
Features of DI Points	Specification
Nominal input voltage	0–24 VDC
Operational voltage range	15–30 VDC
Absolute maximum input voltage	33 VDC
Absolute maximum reverse input voltage	– 0.6 VDC
Input Delay	< 10 ms, On to Off, Off to On
Input impedance	> 100 k $\Omega$ without baseplate ~ 3 k $\Omega$ with baseplate
Input power	0.2 W/pt, @ 24 VDC 0.5 W/pt, @ 33 VDC
Input threshold	0–5 VDC = Off region 6–14 VDC = transition region 15–30 VDC = On region
Diagnostic (loss of view)	Force-to-value diagnostic (FVD), < 2 ms/test
Maximum input toggle rate to maintain diagnostic fault coverage	< 20/sec
FVD Off state glitch	
Duration	< 2 ms
Magnitude	≈ 36% test voltage
Output impedance	0–5 VDC, ≈ 100 k $\Omega$
ADC scan time	< 1 ms for all DI points

For all points, the MPs vote the data before passing it to the control program. In TMR mode, the data passed is mid-value. In dual mode, the data passed is the average.

AI/DI Modules sustain complete, ongoing diagnostics for each channel. If the diagnostics detect a failure on any channel, the Fault indicator turns on and activates the system alarm. The Fault indicator identifies a channel fault, not a complete module failure. AI/DI Modules are guaranteed to operate properly in the presence of a single fault and may continue to operate properly with multiple faults.

Analog Input/Digital Input Modules include the hot-spare feature which allows online replacement of a faulty module. The AI/DI Module is mechanically keyed to prevent improper installation in a configured baseplate.

The Model 3361 AI/DI Module is compatible with the Model 2361 AI/DI Baseplate and the AI/DI External Termination Baseplate.

### Analog Output Modules

Each TMR Analog Output Module has three isolated sets of electronics, called channels, which independently accept data from the MP associated with each channel. The channels provide input to voter circuitry to select a single channel to drive the output. Special circuitry is used to ensure that the channels that are not driving the output are shunted so they cannot affect the output.

AO Modules include complete, ongoing diagnostics for each channel. If the diagnostics detect a failure on any channel, the Fault indicator turns on and activates the system alarm. The Fault indicator identifies a channel fault, not a complete module failure. AO Modules are guaranteed to operate properly in the presence

# Product Specifications

of a single fault and may continue to operate properly with multiple faults.

AO Modules support a hot-spare module. Each AO Module is mechanically keyed to prevent improper installation in a configured baseplate.

The Model 3481 AO Module can be used with these baseplates:

- Model 2481, which is used in typical applications.
- Model 2483, which enables communication between HART field devices and Configuration and Asset Management Software running on a PC.
- Model 2483A, which is used in hazardous locations and enables communication between HART field devices and Configuration and Asset Management Software running on a PC.
- DO External Termination Baseplate, which is used with the Model 9863-610 External Termination Panel in hazardous locations. Note that “DO” is not a typo, the DO External Termination Baseplate is used with the 9863-610.

The Model 3482 High-Current AO Module is compatible with only the Model 2481 Analog Output Baseplate.

## Model 3481 Analog Output Module Specifications

Feature	Specification
Points	4, commoned-return, DC-coupled
Isolated points	None
Output current range	4–20 mA output, controlled 0–22 mA over-range 0 mA output capability (step function < 2 mA)
Output accuracy	<0.25% (in range of 4–20 mA) of FSR (0–22 mA), from 32° F to 158° F (0° C to 70° C)
Type	TMR
Resolution	12 bits
Diagnostic	Forced-switch diagnostic (FSD)
External loop power (reverse voltage-protected)	32 VDC, maximum 24 VDC, nominal
Output loop power requirements for specified load	300 Ω @ >16 VDC (1 A minimum) 500 Ω @ >20 VDC (1 A minimum) 700 Ω @ >24 VDC (1 A minimum) 800 Ω @ >28 VDC (1 A minimum)
Over-range protection	36 VDC, continuous 0 VDC, continuous
Switch time on leg failure	1 ms, typical 3 ms, maximum

## Model 3482 High-Current Analog Output Module Specification

Feature	Specification
Points	4, commoned-return, DC-coupled
Isolated points	None
Output current range <sup>1</sup> (Points 3 and 4)	4–40 mA output, controlled 0–44 mA over-range 0 mA output capability (step function < 4 mA)
Output accuracy <sup>1</sup> (Points 3 and 4)	< 0.25% (in range of 4–40 mA) of FSR (0–44 mA), from 32° F to 122° F (0° C to 50° C)
Type	TMR
Resolution	12 bits
Diagnostic	Forced-switch diagnostic (FSD)
External loop power (reverse voltage-protected)	32 VDC, maximum 24 VDC, nominal
Output loop power requirements for specified load <sup>1</sup> (Points 3 and 4)	125 Ω @ >16 VDC (1 A minimum) 210 Ω @ >20 VDC (1 A minimum) 295 Ω @ >24 VDC (1 A minimum) 340 Ω @ >28 VDC (1 A minimum)
Over-range protection	36 VDC, continuous 0 VDC, continuous
Switch time on leg failure	1 ms, typical 3 ms, maximum

1. Points 1 and 2 are the same as for Model 3481.

## Digital Input Module

Each TMR Digital Input Module has three isolated sets of electronics, called channels, which independently process field data to the module. Each channel places the processed data in an array and transmits this array, on request, to the MP associated with that channel. The MPs vote on the data before passing it to the application.

DI Modules include complete, ongoing diagnostics for each channel. If the diagnostics detect a failure on any channel, the Fault indicator turns on and activates the system alarm. The Fault indicator identifies a channel fault, not a complete module failure. The DI Module continuously verifies the ability of the system to detect transitions to the opposite state. DI Modules are guaranteed to operate properly in the presence of a single fault and may continue to operate properly with multiple faults.

DI Modules support a hot-spare module. Each DI Module is mechanically keyed to prevent improper installation in a configured baseplate.

The Model 3301 DI Module can be used with these baseplates:

- Model 2301, which is used with typical applications.
- DI External Termination Baseplate, which is used with the Solid State Relay Input External Termination Panel in high-voltage applications, or the Model 9573-610 DI Hazardous Location External Termination Panel.

## Model 3301 Digital Input Module Specifications

Feature	Specification
Points	32, commoned
Nominal input voltage	24 VDC
Operational voltage range	15–30 VDC
Absolute maximum input voltage	33 VDC
Absolute maximum reverse input voltage	– 0.6 VDC
Input delay	<10 ms, On to Off or Off to On TC = 6.4 ms, –3dB @ 25Hz
Input impedance	>30 k $\Omega$ , without baseplate $\approx$ 3 k $\Omega$ , with baseplate
Input power	0.2 W/pt, @ 24 VDC 0.5 W/pt, @ 33 VDC
Input threshold	0–5 VDC = Off region 6–14 VDC = transition region 15–30 VDC = On region
Diagnostic (loss of view)	Force-to-value diagnostic (FVD), <2 ms/test
Maximum input toggle rate to maintain diagnostic fault coverage	<20/sec
FVD Off state glitch	
Duration	<2 ms
Magnitude	$\approx$ 36% test voltage
Output Impedance	0–5 VDC, $\approx$ 100 k $\Omega$
ADC scan time	<1 ms for all 32 points
Functional earth to protective earth isolation	500 VDC, minimum
Functional earth to functional earth (logic ground) isolation	800 VDC, minimum

# Product Specifications

## Digital Output Module

Each TMR Digital Output Module has three isolated sets of electronics, called channels, which independently accept data from the MP associated with each channel. The channels use the patented Quad Voter circuitry to vote on individual output signals as they are applied to the load.

This voter circuitry is based on parallel-series paths which pass power if two out of three switches (channels A and B, or channels B and C, or channels A and C) command them to close. The Quad Voter circuitry has multiple redundancy on all critical signal paths, guaranteeing safety and maximum availability.

For each point, the DO Module periodically executes the Output Voter Diagnostic (OVD) routine. To allow unrestricted safe operation under a variety of multiple-fault scenarios, OVD detects and alarms these types of faults:

- Points—all stuck-on and stuck-offs are detected in less than 500 milliseconds.
- Switches—all stuck-on or stuck-off switches or their associated drive circuitry are detected.

DO Modules include complete, ongoing diagnostics for each channel. If the diagnostics detect a failure on any channel, the Fault indicator turns on and activates the system alarm. The Fault indicator identifies a channel fault, not a complete module failure. DO Modules are guaranteed to operate properly in the presence of a single fault and may continue to operate properly with certain multiple faults.

DO Modules support a hot-spare module. Each DO Module is mechanically keyed to prevent improper installation in a configured baseplate.

## Model 3401 Digital Output Module Specifications

Feature	Specification
Points	16, commoned
Nominal output voltage	24 VDC
Specified operational voltage range	15 to 30 VDC
Absolute maximum output voltage	33 VDC
Absolute maximum reverse input voltage	-0.6 VDC
Output current	
Switching	<4.8 A, self-limiting 3.0 A, typical
Degraded mode	> 0.7 A, self-limiting 1.5 A, typical
Field alarms	Loss of field power, output point shorted On or Off
Loop-back thresholds	0-5 VDC = Off region 6-14 VDC = transition region 15-30 VDC = On region
Leakage to load (Off state)	<1 mA
Diagnostic glitch duration	<2 ms, maximum 500 µs, typical
Diagnostic fault coverage	
Maximum toggle rate	>20 ms
Minimum toggle rate	Not applicable
On state voltage drop	<1.0 VDC @ 1.5 A
Loop-back scan time	<1.0 ms for all 16 points
Functional earth to protective earth isolation	500 VDC, minimum
Functional earth to functional earth (logic) isolation	800 VDC, minimum

These baseplates can be used with the Model 3401 DO Module:

- Model 2401, which is used with typical applications.
- Model 2401L, which is used with low-current applications where integral current limiting is required. Each output is provided with a 180 ohm series resistor.
- DO External Termination Baseplate, which is used with the Relay Output External Termination Panel in high-voltage applications, or the Model

9671-610 DO Hazardous Location External Termination Panel.

## Pulse Input Module

Each TMR Pulse Input Module has three isolated sets of electronics, called channels, which independently receive voltage transitions from each point and converts the transitions to frequency (RPM) data. Each channel places the processed data in an array and transmits the array, on request, to the MP associated with that channel. The MPs vote the data before passing it to the application.

The six sensitive, high-frequency inputs can be individually configured for non-amplified and amplified magnetic speed sensors which are common on rotating equipment, such as turbines or compressors. The module is capable of counting over 32,000 transitions per second.

The PI Module senses voltage transitions from the speed sensors, samples every input transition, and measures time to optimize the number of input gear pulses. To ensure correct data for each scan, one value is selected using a mid-value selection algorithm. Sensing of each input point is designed to prevent a single failure on one channel from affecting another channel. The resulting count and time are used to generate a frequency (revolutions per minute), which is transmitted to the Main Processors.

The type of speed sensor typically used with the PI Module consists of an inductive coil and rotating teeth. The sensor is physically close to the teeth of a gear on the rotating shaft. The output frequency is proportional to the rotational speed of the shaft and the number of teeth. As the teeth move past the sensor, the resulting change in the magnetic field causes a sinusoidal signal to be induced in the sensor.

Although the circuitry is designed for high-frequency operation with debounced edge detection, it is sensitive

## Model 3381 Pulse Input Module Specifications

Feature	Specification
Points	6, channel-isolated, commoned ground
Input type	Differential
Sensor compatibility	Magnetic, active, open collector
Maximum operating voltage	±33 VDC
Minimum operating voltage	
Differential	500 mV P-P, 2 Hz to 32,000 Hz 1 V P-P, 0.5 Hz to 2 Hz
Single-ended	1 V P-P, 2 Hz to 32,000 Hz 2 V P-P, 0.5 Hz to 2 Hz
Speed range	0 to 32,000 RPM
Input frequency range	0.5 Hz to 32 kHz
Duty cycle	20% to 80%, or 10 μs minimum pulse width
Maximum continuous slew rate	4,000 Hz/sec with 60 gear teeth
Maximum continuous RPM slew rate	4,000 RPM/sec with 60 gear teeth
Number of gear teeth	1–255
Termination resistor	Baseplate configurable
Pull-up resistor	Baseplate configurable
Resolution	24 bits
Absolute error	±0.01%, 2,000 to 32,000 Hz ±0.1%, 0.5 to 2,000 Hz
Measurement algorithm	Gear multiple tracking
Diagnostic	Precision reference test
Minimum scan update rate	20 ms
Functional-to-protective-earth isolation	500 VDC, minimum
Functional-to -functional-earth (logic) isolation	800 VDC, minimum

to any type of waveform distortion that could result in erroneous measurements. Consequently, ringing on the input signal can result in many additional transitions being counted.

PI Modules include complete, ongoing diagnostics for each channel. If the diagnostics detect a failure on any channel, the Fault indicator turns on and activates the system alarm. The Fault indicator identifies a channel fault, not a complete module failure. PI Modules are guaranteed to operate properly in the presence of a single fault and may continue to operate properly with multiple faults.

PI Modules support hot-spare modules. Each PI Module is mechanically keyed to prevent improper installation in a configured baseplate.

The Model 3381 PI Module is compatible with the Model 2381 PI Baseplate.

# Product Specifications

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## Solid-State Relay Output Module

Each Solid-State Relay Output Module has three isolated sets of electronics, called channels, which independently accept data from the MP associated with each channel. The channels provide input to a voter circuit which uses the voted value to drive the coil of the relay. The output portion of this module is Simplex.

The SRO Module is a non-triplicated module for use on non-critical points which are not compatible with high-side, solid-state output switches; for example, interfacing with annunciator panels. The SRO Module receives output signals from the MPs on each of three channels. The three sets of signals are voted and the voted data is used to drive the 32 individual relays. Each output has a loop-back circuit which verifies the operation of each relay switch independently of the presence of a load. Ongoing diagnostics test the operational status of the SRO Module.

SRO Modules include complete, ongoing diagnostics for each channel. If the diagnostics detect a failure on any channel, the Fault indicator turns on and activates the system alarm. The Fault indicator identifies a channel fault, not a complete module failure. SRO Modules are guaranteed to operate properly in the presence of a single fault and may continue to operate properly with multiple faults.

SRO Modules support a hot-spare module. Each SRO Module is mechanically keyed to prevent improper installation in a configured baseplate.

The Model 3451 SRO Module is compatible with the Model 2451 SRO Baseplate.

## Model 3451 Solid-State Relay Output Module Specifications

Feature	Specification
Points	32, commoned in pairs
Nominal input voltage	±24 V
Operational voltage range	±30 V
Maximum switching voltage	±33 V peak
Maximum switching power	15 W resistive
Maximum off-state leakage	<100 µA
Maximum nominal current	0.5 A per channel
Maximum over current	0.7 A per channel
Voltage drop at baseplate	<0.25 V @ 0.5 A
Fuses, mounted on baseplate	1 per output, 0.75 A, fast-acting
Functional earth to protective earth isolation	500 VDC, minimum
Functional earth to functional earth (logic) isolation	800 VDC, minimum

## I/O Extender Module Kits

I/O Extender Module Kits are used to:

- Carry I/O messages from one I/O column to another
- Provide logic power terminals for each I/O column

You must connect 24 volt logic power sources to every I/O column by using an I/O Extender Module or an MP Baseplate.

Each I/O Extender Module Kit includes:

- Two I/O Extender Modules
- Three two-foot I/O Bus Cables
- One I/O or MP Interconnect Assembly

The main components on an I/O Extender Module are:

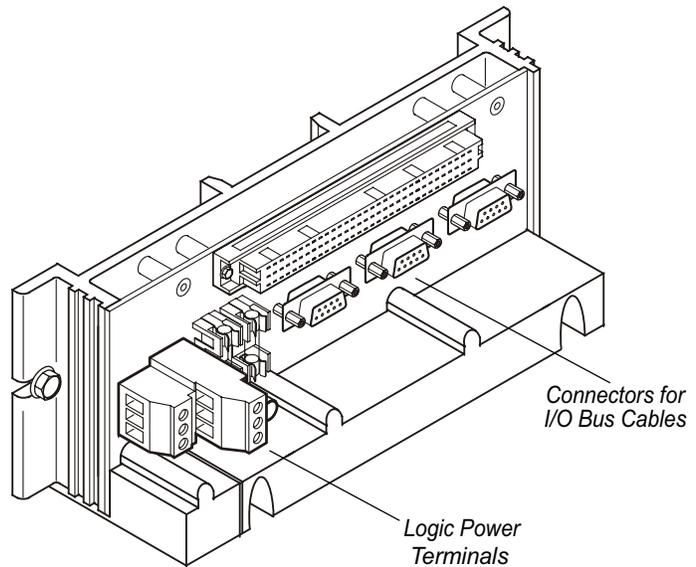
- Two 24-volt logic power input terminal blocks, each with fuse and blown-fuse indicators
- A protective earth (safety ground) terminal
- Three DB-9-pin I/O bus connectors, one per channel

In a typical Trident system, a maximum of eight baseplates may be connected end-to-end in an I/O column. To extend a system beyond eight baseplates or to distribute the baseplates into multiple I/O columns, I/O Extender Modules and I/O Bus Cables are used, as shown on the figure at the right.

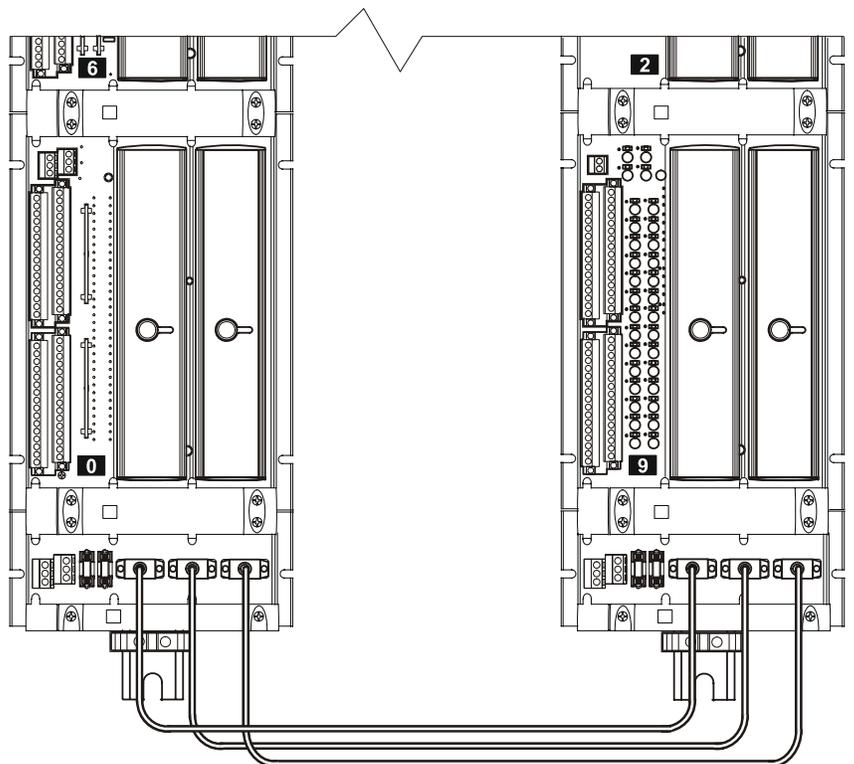
### I/O Bus Cables

An I/O bus cable is required for each TMR channel and is terminated at each end by a male DB-9-pin connector. Various cable lengths are available.

If the I/O bus is longer than 20 feet (6 meters), the bus should be terminated by adding an I/O Bus Terminator Kit to both open ends of the system. The maximum allowable I/O bus length is 650 feet (200 meters).

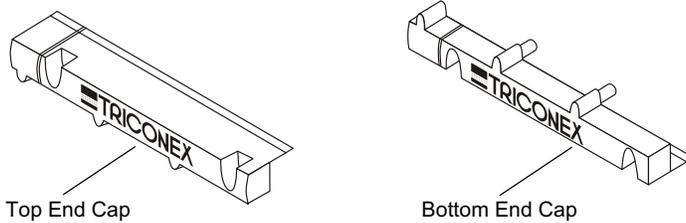
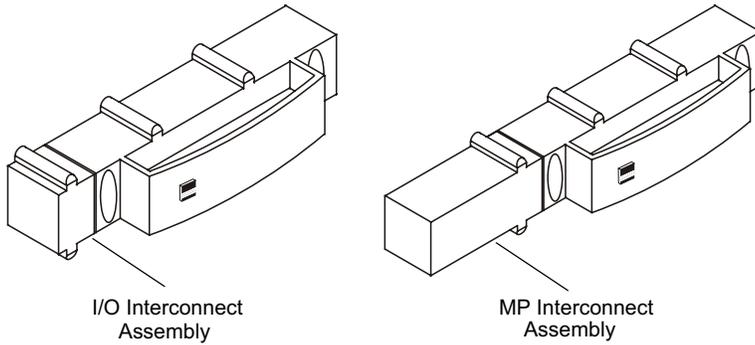


**I/O Extender Module**

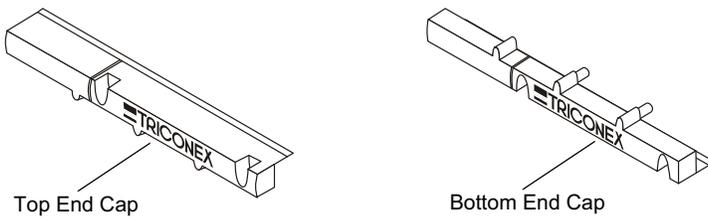


**Two I/O Extender Modules Linked by I/O Bus Cables**

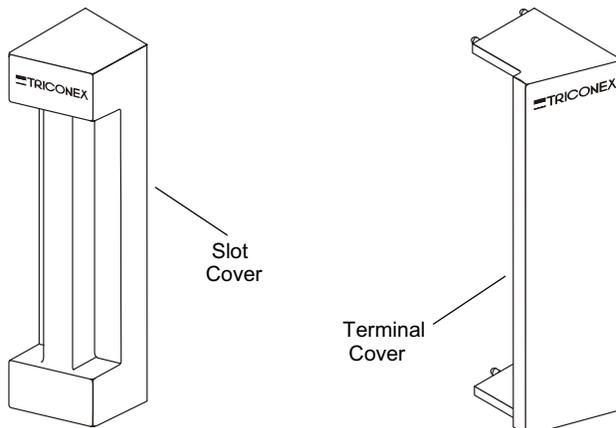
# Product Specifications



**End Caps for I/O Baseplate/I/O Extender Module**



**End Caps for MP Baseplate**



## Interconnect Assemblies

Trident baseplates within a single I/O column are connected by Interconnect Assemblies that carry I/O messages and logic power across the baseplates. The MP Interconnect is connected to an I/O baseplate, and the I/O Interconnects are connected to other I/O Baseplates.

## MP Interconnect Assembly

Physically, an MP Interconnect Assembly consists of a small passive PCB in a molded plastic housing with two DIN-C 96-pin male connectors. The assembly is attached to the top or bottom of an MP Baseplate in order to connect adjacent I/O Baseplates. The MP Interconnect Assembly also is used on AI and AO HART Baseplates because they are the same size as MP Baseplates.

## I/O Interconnect Assembly

Physically, an I/O Interconnect Assembly consists of a small passive PCB in a molded plastic housing with two DIN-C 96-pin male connectors. The assembly is attached to the top or bottom of an I/O baseplate in order to connect other I/O Baseplates.

## Required Accessories

The following accessories are required to protect Trident components from dust, liquids and corrosive atmospheres:

- End caps
- Terminal covers
- Slot covers

End caps protect the top and bottom of each end-of-column baseplate and serve as a card guide. They are available for both MP Baseplates and I/O Baseplates.

Terminal covers protect any terminals on a baseplate that are not connected to field wiring.

Slot covers protect unused baseplate slots.