

TRICON PRODUCT SPECIFICATIONS

Manufacturer's Manual

Amikon cover with selected official Tricon product pages

PRODUCT BRAND

TRICONEX

PRODUCT MODEL

3504E

High-density TMR digital input module with 64 commoned, DC-coupled points and software-selected 24 or 48 VDC operation.

The appended manufacturer pages are reproduced without alteration and are limited to the exact module specification and applicable field-termination guidance.

OFFICIAL SOURCE

Tricon Product Specifications

Selected pages: exact 3504E specification and field termination guidance

Product Specifications

64-Point Digital Input Modules

Each 64-point Digital Input (DI) module has three isolated channels which independently process all data input to the module. A microprocessor on each channel scans each input point, compiles data and transmits it to the Main Processors on demand. Then input data is voted at the Main Processors just prior to processing to ensure the highest integrity.

All Digital Input Modules sustain complete, ongoing diagnostics for each channel. A failure on any channel activates the Fault indicator which in turn activates the chassis alarm. A TMR module is guaranteed to operate properly in the presence of a single fault and

may operate properly with certain kinds of multiple faults.

All Digital Input Modules support hot-spare modules and require a separate external termination panel (ETP) with a cable interface to the Tricon backplane. Each module is mechanically keyed to prevent improper installation in a chassis.

The Model 3504E High-Density Digital Input Module continuously verifies the ability of the Tricon to detect transitions to the opposite state. On this TMR module, all critical signal paths are 100 percent triplicated for guaranteed safety and maximum availability. Each channel conditions signals independently between the field and the Tricon.

The Model 3564 Single Digital Input Module is optimized for safety-critical applications where low cost is more important than maximum availability. On single modules, only those portions of the signal path which are required to ensure safe operation are triplicated. Special self-test circuitry detects all stuck-On and stuck-Off fault conditions in less than half a second. If a single module detects an input fault, it reports that point as Off, which may cause a glitch during switch-over to a hot-spare module.

64-Point Digital Input Module Specifications

Model Number	3564	3504E
Type	Single, DI	TMR, DI
Voltage	24 VDC	24 or 48 VDC ¹
Points	64, commoned	64, commoned, DC coupled
DC Range	15-30 VDC	20-72 VDC
Maximum Voltage	36 VDC	72 VDC
Switching Level		<u>24 V</u> <u>48 V</u>
OFF to ON	> 15 VDC	>18 VDC >32 VDC
ON to OFF	< 6 VDC	< 6 VDC <11 VDC
Nominal Turn-On	2-3 mA	negligible
Typical Hysteresis	4 VDC	4 VDC/7 VDC
Input Delay		
Off to On/On to Off	< 2 ms/< 2 ms	< 10 ms/< 10 ms
Minimum Point Isolation	1,500 VDC	n/a
Nominal Input Impedance	> 3.0 K Ω	> 30 K Ω
Nominal Field Power Load		
Per On point	0.2 watts	negligible
@ maximum field voltage	0.5 watts	negligible
Diagnostic Indicators		
Input Status	1 per point	1 per point
Module Status	PASS, FAULT, ACTIVE	PASS, FAULT, ACTIVE
Stuck Test	On and Off	On and Off
Color Code	Dark Red	Dark Red

1. The voltage is selected using TriStation 1131.

A termination panel and associated cable pass signals to or from the field, permitting replacement of I/O Modules without disturbing field wiring.

Field Termination Options

There are two general types of field termination products available from Triconex:

- External termination panels
- Cables

All termination panels and cables are built to withstand harsh industrial environments. The environmental specifications for components used on these products are the same as for a Tricon chassis. (See “General Environmental and EMC Specifications” on page 21 for details.)

External Termination Panels

An external termination panel (ETP) is an electrically-passive printed circuit board (PCB) to which field wiring is easily attached. A panel connector, terminal blocks and various components are mounted to the PCB and enclosed in a plastic housing. A termination panel and associated cable pass input signals from the field directly to an input module, or pass output signals from an output module directly to field wiring. This arrangement permits the removal or replacement of I/O modules without disturbing field wiring.

External termination panels allow you to marshal field signals in a separate enclosure up to 99 feet (30 meters) from a Tricon.

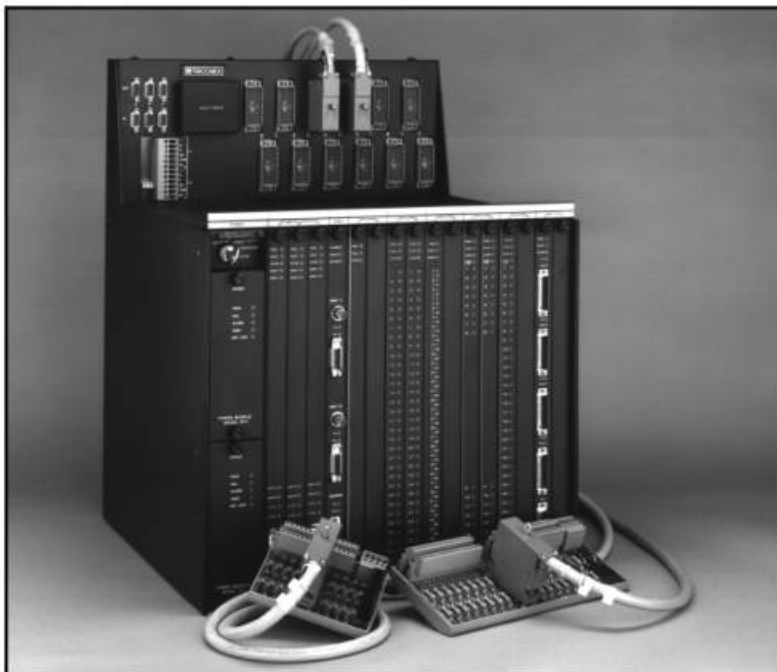
Standard termination panels are best for remote marshaling of field wiring where maximum flexibility, high density and simple maintenance is desired.

A standard termination panel consists of a PCB with all necessary components—such as two-piece terminal blocks, resistors, fuses and blown-fuse indicators—mounted on a DIN rail-compatible plastic housing. The housing snaps into mounting rails in accordance with DIN 50 022.

Compression terminals on the standard panel are designed for use with 24- to 12-gauge (0.3 mm^2 to 2.1 mm^2) wiring. Some panels have an optional current-limiting series resistor, others have a fuse with a blown-fuse indicator, to protect the field wiring and field device.

Standard termination panels are pre-configured for specific applications. For instance, the thermocouple input termination panel provides cold-junction temperature sensors and can be ordered with upscale, downscale or programmable burnout detection. A standard termination panel for analog voltage inputs provides commoned signal returns, while the current-mode version has a precision resistor at each input point to convert current to voltage.

Each standard termination panel is packaged with a matched interface



Tricon Chassis with External Termination Panels and Standard 10' Cables

Field Termination Options

cable that connects the panel to the backplane of a Tricon chassis. A female connector at one end of the cable is keyed to match the male connector on the Tricon backplane. A male connector on the other end of the cable attaches to the standard termination panel. Two types of cables are available—one that exits the Tricon backplane at a ninety-degree angle and one that exits at a zero-degree angle (straight, front-entry).

External termination panel model numbers that end with a “Z” contain zero-degree interface cables. Model numbers for ninety-degree configurations are referenced throughout this guide. It is implied that where a model number is referenced for a ninety-degree configuration, a zero-degree configuration also is available.

Zero-degree cables are designed to be used with G-Series Enclosures for Tricon controllers that have front access. For more information on G-Series Enclosures for Tricon Systems, see the G-Series Enclosures Product Specification Sheet, PSS Number: PSS 21H-2X8 B3, on the IPS Global Client

Support (GCS) Web site at <http://support.ips.invensys.com>.

In addition to standard termination panels, there are other types of termination panels, including:

- Basic termination panels
- Hazardous location (nonincendive) termination panels
- Termination panels with interposing relays
- Bypass panels for digital inputs
- Termination panels with RTD/TC/AI input signal conditioning
- Termination panels for 3603B digital output modules
- Termination panels for 3806E analog output modules

Basic Termination Panels

Basic termination panels are a low-cost means of connecting field wiring to a Tricon. However, basic termination panels do not provide any components other than a 56-pin connector and terminal blocks. These two components are mounted on a DIN rail-compatible plastic housing that snaps into

mounting rails in accordance with DIN 50 022. The user must provide any other components required by his application.

Other features of the basic termination panels are the same as for the standard panels.

Hazardous Location (Nonincendive) Termination Panels

Hazardous location (nonincendive) termination panels are suitable for use in Zone 2 (ATEX), and Class 1, Division 2 (North America) field circuits. These panels contain extra circuitry designed to limit power available to the field terminals and have been examined and certified by TÜV Rheinland as being nonincendive. This guarantees that if the field wires are accidentally opened, shorted, or grounded, and the Tricon is operating normally, the wiring and attached devices will not release sufficient energy to cause ignition in the specified flammable atmosphere.

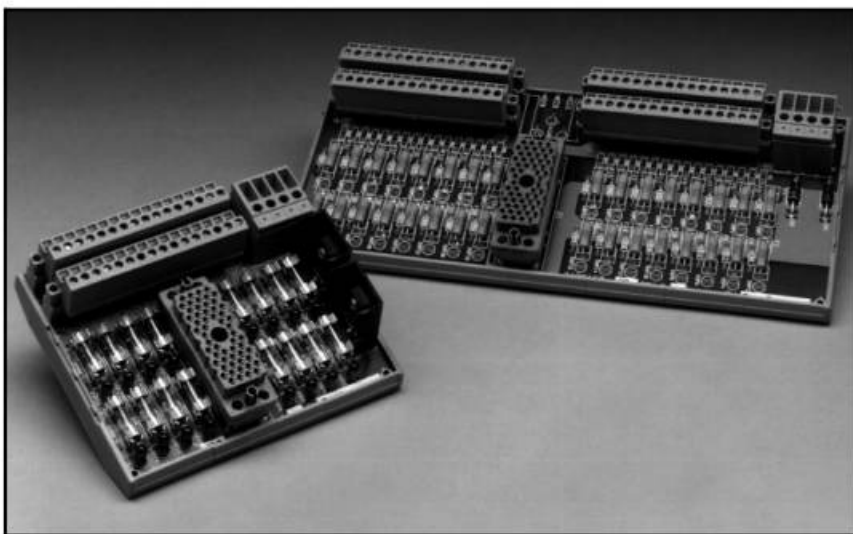
Termination Panels with Interposing Relays

Interposing relays are recommended for applications that have load currents greater than 2 amps, or field voltages greater than 115 VAC which require field-circuit conversion or compatibility with motor-starter circuits.

Each interposing relay provides an auxiliary contact that can be connected to a digital input module by means of an optional loopback cable to verify relay activation by the digital output module. Interposing relay panels use compact general-purpose power relays for maximum reliability and can be used with most digital output modules.

Bypass Panels for Digital Inputs

Bypass termination panels can be used to connect digital inputs using a bank of 32 pre-wired switches. The bypass panel has a master keyswitch and termi-



Standard Termination Panels in 16-Point and 32-Point Styles

nals for redundant +24 VDC power sources. Each input point contains an On status indicator and a position for a user-defined label. Each bypass termination panel comes with one or two 10-foot cables for connecting the termination panel to a Tricon backplane.

Termination Panels for Use with Signal Conditioners

Termination panels which use industry-standard analog signal conditioners provide a flexible, user-configurable interface to resistive thermal devices (RTDs), thermocouples, and 4-20 mA transmitters. Each termination panel supports 16 points and each analog module can support up to 2 panels.

These termination panels are compatible with any signal conditioners in the 1 to 5 volt output range. For example, the 7B series of signal conditioners from Analog Devices are known to work well.

These signal conditioners can be purchased from Triconex, or directly from Analog Devices at:

- <http://www.analog.com/IOS>
- 1-800-426-2564 in the USA
- 781-461-3100 from anywhere in the world

Fanned-Out Cables

Fanned-out cables are a low-cost alternative to using external termination panels. Fanned-out cables allow you to marshal field signals in a separate enclosure up to 99 feet (30 meters) from a Tricon. One end of a fanned-out cable has a female connector that connects to a Tricon chassis backplane. The other end of the cable contains 50 fanned-out leads, each individually labeled with its corresponding connector pin number.

Each fanned-out cable has the following characteristics:

- PVC outer covering
- 56-pin connector at one end
- 50 stranded, stripped, tinned and labeled 22-gauge leads at opposite end

Fanned-out cables should only be used with digital input and digital output modules. They are not certified for use with analog signals. Contact the IPS Global Client Support (GCS) center if you need a fanned-out cable for handling analog signals.

Although the normal length of all cables is 10 feet (3 meters), any length cable can be ordered up to 99 feet (30 meters) in 10-foot increments, using the last two digits of the cable model number to specify the length in feet. For example, the model number 9101-050F specifies a 50-foot cable instead of the normal 10-foot cable.

Termination Configuration Options

Terminations are available in various factory configurations:

- *Non-commoned* Terminations can accommodate individual power supplies for each point.
- *Commoned* Terminations can support one power supply which is shared by multiple points. Points can be commoned in groups of 8 and groups of 16.
- Analog signals can be read as *3-wire transmitter inputs, voltage inputs or current inputs*.
- Thermocouple terminations provide cold-junction temperature sensors and are available for either *upscale or downscale burnout detection*. For Model 3706A, upscale or downscale burnout detection depends on which

termination panel is installed. For Model 3708E, upscale or downscale burnout detection is configured with TriStation 1131.

The "Termination Options" table (on the next two pages) shows the available termination choices for each I/O module and gives the correct model number for each choice.

Over-Current Protection

Non-basic termination panels offer over-current protection in various ways:

- Fuses for individual points and/or field power sources
- Series resistors
- Self-protection for digital output and analog output modules

If you are using basic termination panels, you must supply your own components for over-current protection.