

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

TRICONEX

7400090-025

TMR DIGITAL INPUT MODULE

Used with the applicable Triconex safety system configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Tricon Technical Product Guide

TMR Digital Input Modules

Each TMR Digital Input (DI) module has three isolated input 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 upon demand. Then input data is voted at the Main Processors just prior to processing to ensure the highest integrity. All critical signal paths are 100 percent triplicated for guaranteed safety and maximum availability. Each channel conditions signals independently and provides optical isolation between the field and the Tricon controller.

All TMR Digital Input Modules sustain complete, ongoing diagnostics for each channel. Failure of any diagnostic on any channel activates the module Fault indicator, which in turn activates the chassis alarm signal. The module Fault indicator points to a channel fault, *not* a module failure. The module is guaranteed to operate properly in the presence of a single fault and may continue to operate properly with certain kinds of multiple faults.

Models 3502E, 3503E, and 3505E can self-test to detect stuck-On conditions where the circuitry cannot tell whether a point has gone to the Off state. Since most safety systems are set up with a

de-energize-to-trip capability, the ability to detect Off points is an important feature. To test for stuck-On inputs, a switch within the input circuitry is closed to allow a zero input (Off) to be read by the optical isolation circuitry. The last data reading is frozen in the I/O communication processor while the test is running.

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

32-Point Digital Input Module Specifications

Model Number	3501E/3501T	3502E	3503E	3505E
Type	TMR	TMR with Self-Test	TMR with Self-Test	TMR, Low Threshold
Voltage	115 VAC/VDC	48 VAC/VDC	24 VAC/VDC	24 VDC
Points	32, non-commoned, isolated	32, commoned in groups of 8	32, commoned in groups of 8	32, commoned in groups of 8
AC Range/DC Range	90-155 VAC/VDC	35-95 VAC/VDC	20-42.5 VAC/VDC	20-42.5 VDC
Frequency Range	DC or 47-63 Hz	DC or 47-63 Hz	DC or 47-63 Hz	n/a
Maximum Voltage	155 VAC/VDC	95 VAC/VDC	42.5 VAC/VDC	42.5 VDC
Switching Level				
Off to On ^a	< 86 VAC/VDC	< 32 VAC/VDC	< 18 VAC/VDC	< 12 VDC
On to Off ^b	> 28 VAC/VDC	> 11 VAC/VDC	> 6 VAC/VDC	> 4 VDC
Nominal Turn-On	6-9 mA	6-9 mA	6-9 mA	3 mA to 5 mA
Typical Hysteresis	32 VAC/VDC	7 VAC/VDC	4 VAC/VDC	2 VDC
Input Delay				
OFF to ON/ON to OFF	< 8 ms/< 15 ms	< 8 ms/< 15 ms	< 8 ms/< 15 ms	< 8 ms/< 15 ms
Point Isolation	1,500 VDC/ 2500 VDC ^c	1,500 VDC	1,500 VDC	1,500 VDC
Nominal Input Impedance	> 8.5 K Ω	> 2.9 K Ω	> 1.25 K Ω	> 1.25 K Ω
Nominal Field Power Load				
Per On point	1.5 watts	1.0 watts	0.5 watts	0.5 watts
@ max. field voltage	2.9 watts	3.2 watts	1.5 watts	1.5 watts
Diagnostic Indicators				
Input Status	1 per point	1 per point	1 per point	1 per point
Module Status	PASS, FAULT, ACTIVE	PASS, FAULT, ACTIVE	PASS, FAULT, ACTIVE	PASS, FAULT, ACTIVE
Stuck Test	n/a	On	On	On
Color Code	Red	Dark Red	Dark Red	Dark Red

a. Off to On transition is guaranteed at or above this level but it might occur at a lower voltage, depending on the module's hysteresis.

b. On to Off transition is guaranteed at or below this level but it might occur at a higher voltage, depending on the module's hysteresis.

c. For 3501T.

dule number in the first column with termination options on the right. An I/O module can be wired to a maximum of two termination
 be of two different types—for example, commoned and non-commoned.

scription	Commoned Term Panels	Non-Common. Term Panels	Basic Term Panels	Nonincendive Term Panels	RG 1.180 Term Panels	Fanned-out Cables	Bypass Panels	ERT Loop- Back Cables/Panels
/VDC, 32 pts.	9561-810F	9561-110F	9551-110F	n/a	n/a	9101-010F	n/a	9141-010F
VDC, 32 pts.	9562-810F	n/a	9552-610F	n/a	n/a	9101-010F	n/a	9142-010F
VDC, 32 pts.	9563-810F	n/a	9553-610F	9572-610F	n/a	9101-010F	BP9228-010F	9143-010F
XC, 64 pts.	9566-810F, 24V 9565-810F, 48V	n/a	9750-310F, 24V 9750-410F, 48V	9570-610F, 24V n/a	n/a	n/a	BP9229-010F n/a	n/a
low threshold,	9563-810F	n/a	9553-610F	9572-610F	n/a	9101-010F	BP9228-010F	9143-010F
9563-910F	9563-910F							
Hz, 8 pts.	n/a	n/a	9753-110F	n/a	n/a	n/a	n/a	n/a
Hz, 8 pts.	n/a	n/a	9753-110F	9793-110F	9794-110F	n/a	n/a	n/a
Hz, 24 VDC,	n/a	n/a	9753-110F	9572-610F	n/a	n/a	n/a	n/a
single, 64 pts.	9566-710F	n/a	9553-610F	9571-610F	n/a	9101-010F	n/a	n/a
16 pts.	9661-610F	9661-110F	9651-110F	n/a	n/a	9101-010F	n/a	9670-110F
16 pts.	9663-610F	9664-110F						9670-610F
16 pts.	9663-610F	9664-110F	n/a	n/a	n/a	n/a	n/a	n/a
C, 16 pts.	n/a	9251-210	n/a	n/a	n/a	n/a	n/a	n/a
C, 16 pts.	9661-910F ^a	n/a	9651-110F	n/a	n/a	9101-010F	n/a	9673-810F ^a
9664-810F ^a	9664-810F ^a							
C, 16 pts.	9664-810F ^a	n/a	n/a	n/a	n/a	n/a	n/a	9673-810F ^a
16 pts.	9662-810F	9662-110F	9653-610F	9671-610F	n/a	9101-010F	n/a	9671-810F
16 pts.	9667-810F	9667-110F	9652-610F	n/a	n/a	9101-010F	n/a	9672-810F
8 pts.	9661-510F	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C, 8 pts.	9661-810F	n/a	n/a	n/a	n/a	n/a	n/a	n/a
8 pts.	9662-810F	n/a	n/a	n/a	n/a	n/a	n/a	n/a
low power,	9662-710F	n/a	n/a	n/a	n/a	n/a	n/a	n/a
8 pts.	9667-910F	n/a	n/a	n/a	n/a	n/a	n/a	n/a
C, 16 pts.	9661-910F	n/a	9651-110F	n/a	n/a	9101-010F	n/a	n/a
C, 16 pts.	9664-810F	n/a	n/a	n/a	n/a	n/a	n/a	n/a
self-protected,	9662-610F	n/a	9653-610F	9671-610F	n/a	9101-010F	n/a	n/a
self-protected,	9662-610F	n/a	9653-610F	9671-610F	n/a	9101-010F	n/a	9671-810F ^b
ed), 32 pts.	n/a	9668-110F	9651-110F	n/a	n/a	9101-010F	n/a	n/a
VDC, self-protected,	9662-610F	n/a	9653-610F	9671-610F	n/a	9101-010F	n/a	9671-810F ^b

Part Number Cross-Reference

The table below identifies the external termination assembly (ETA) part number and the cable part number for each termination panel model number.

There are four cable types included in this table:

- **FT4:** Ninety-degree cables that meet FT4 flame test ratings. Add “F” at the end of the base model number to obtain the complete model number. For example, 9551-110F.
- **Z:** Zero-degree cables, designed to be used with G-Series Enclosures for Tricon systems that have front access. Add “F-Z” at the end of the base model number to obtain the complete model number. For example, 9551-110F-Z.
- **LSZH:** Low Smoke Zero Halogen ninety-degree cables. Add “J” at the end of the base model number to obtain the complete model number. For example, 9551-110J.
- **FT1:** Ninety-degree cables that were shipped with pre-FT4 ETP models. These models did not include a letter at the end of the base model number.

Part Number Cross-Reference—ETPs

Base Model #	ETA	FT4 Cable	Z Cable	LSZH Cable	FT1 Cable (Old)
9551-110	3000400-160	4000187-110	4000192-110	4000140-110	4000093-110
9552-610	3000400-260	4000187-210	4000192-210	4000140-210	4000093-210
9553-610	3000400-360	4000187-310	4000192-310	4000140-310	4000093-310
9561-110	3000560-110	4000187-110	4000192-110	4000140-110	4000093-110
9561-810	3000510-180	4000187-110	4000192-110	4000140-110	4000093-110
9562-810	3000510-280	4000187-210	4000192-210	4000140-210	4000093-210
9563-810	3000510-380	4000187-310	4000192-310	4000140-310	4000093-310
9563-910	3000510-390	4000187-310	4000192-310	4000140-310	4000093-310
9565-810	3000540-280	4000187-210	4000192-210	4000140-210	4000093-210
9566-710	3000530-380	4000187-310	4000192-310	4000140-310	4000093-310
9566-810	3000540-380	4000187-310	4000192-310	4000140-310	4000093-310
9570-610	3000768-370	4000195-310	4000199-310	n/a	4000165-310
9571-610	3000768-390	4000195-310	4000199-310	n/a	4000165-310
9572-610	3000771-380	4000195-310	4000199-310	n/a	4000165-310
9651-110	3000410-160	4000188-110	4000193-110	4000141-110	4000094-110
9652-610	3000410-260	4000188-210	4000193-210	4000141-210	4000094-210
9653-610	3000410-360	4000188-310	4000193-310	4000141-310	4000094-310
9661-110	3000570-110	4000188-110	4000193-110	4000141-110	4000094-110
9661-510	3000550-160	4000188-110	4000193-110	4000141-110	4000094-110