

Tricon I/O Modules

Voltage	Description	Type	Model No.	Points	For Details, See
Digital Input Modules					
115 VAC/VDC	Opto-Isolated, Non-Commoned	TMR	3501E/3501T	32	page 33
48 VAC/VDC	Commoned in Groups of 8, Self-Test	TMR	3502E	32	page 33
24 VAC/VDC	Commoned in Groups of 8, Self-Test	TMR	3503E	32	page 33
24/48 VDC	High Density, DC Coupled	TMR	3504E	64	page 34
24 VDC	Low Threshold with Self-test, Commoned	TMR	3505E	32	page 33
24 VDC	Single, Opto-Isolated, Commoned	Single	3564	64	page 34
Pulse Input	Differential, AC Coupled	TMR	3511	8	page 35
Pulse Totalizer	Opto-isolated, Non-commoned	TMR	3515	32	page 36
Digital Output Modules					
115 VAC	Opto-Isolated, Non-commoned	TMR	3601E/3601T	16	page 37
120 VDC	Opto-Isolated, Non-commoned Opto-Isolated, Commoned	TMR	3603B, 3603E/3603T	16	page 37
24 VDC	Opto-Isolated, Non-commoned	TMR	3604E	16	page 37
48 VDC	Opto-Isolated, Non-commoned	TMR	3607E	16	page 37
115 VAC	Galvanically Isolated, Commoned., Supv.	TMR	3611E	8	page 39
48 VDC	Galvanically Isolated, Commoned, Supv.	TMR	3617E	8	page 39
120 VDC	Opto-Isolated, Commoned, Supervised	TMR	3623/3623T	16	page 38
24 VDC	Opto-Isolated, Commoned, Supervised	TMR	3624	16	page 38
24 VDC	Supervised/Non-Supervised, Commoned	TMR	3625	32	page 38
24 VDC	Opto-Isolated, Commoned	Dual	3664	32	page 40
24 VDC	Opto-Isolated, Commoned	Dual	3674	32	page 40
Relay Output	Non-triplicated, Normally Open	Non-triplicated	3636R/3636T	32	page 35
Analog Input Modules					
0-5 VDC	Differential, DC Coupled	TMR	3700A	32	page 41
0-10 VDC	Differential, DC Coupled	TMR	3701	32	page 41
0-5, 0-10 VDC	Differential, Isolated	TMR	3703E	16	page 41
0-5, 0-10 VDC	High-Density, Differential, DC Coupled	TMR	3704E	64	page 41
Thermocouple	Differential, DC Coupled	TMR	3706A	32	page 44
Thermocouple	Differential, Isolated	TMR	3708E	16	page 44
0-5 VDC	Single-Ended	TMR	3720	64	page 41
0 to 5 or -5 to +5 VDC	Differential, DC Coupled	TMR	3721	32	page 41
Analog Output Modules					
4-20 mA	Current Loop, DC Coupled	TMR	3805E	8	page 43
4-20 mA and 20-320 mA	Current Loop, DC Coupled	TMR	3806E	6 and 2	page 43

Analog Output Modules

An analog output (AO) module receives output signals from the main processor module on each of three channels. Each set of data is then voted and a healthy channel is selected to drive the eight outputs. The module monitors its own current outputs (as input voltages) and maintains an internal voltage reference to provide self-calibration and module health information.

Each channel on the module has a current loopback circuit which verifies the accuracy and presence of analog signals independently of load presence or channel selection. The module's design prevents a non-selected channel from driving an analog signal to the field. In addition, ongoing diagnostics

are performed on each channel and circuit of the module. Failure of any diagnostic deactivates the faulty channel and activates the Fault indicator, which in turn activates the chassis alarm. The module Fault indicator merely indicates a channel fault, *not* a module failure. The module continues to operate properly with as many as two channels failed. Open loop detection is provided by a LOAD indicator which activates if the module is unable to drive current to one or more outputs.

The module provides for redundant loop power sources with individual power and fuse indicators called PWR1 and PWR2. External loop power supplies for analog outputs must be provided by the user. Each analog

output module requires up to 1 amp @ 24-42.5 volts. A LOAD indicator activates if an open loop is detected on one or more output points. PWR1 and PWR2 are on if loop power is present. The 3806E High Current (AO) module is optimized for turbomachinery applications.

Analog output modules support hot-spare capability which allows online replacement of a faulty module.

The analog output module requires 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 configured chassis.

Model Number	3805E	3806E		
Type	TMR	TMR		
Output current range	4-20 mA output (+6% overrange)	4-20 mA and 20-320 mA		
Number of output points	8	6 (4-20 mA); 2 (20-320 mA)		
Isolated points	No, commoned return, DC coupled	No, commoned return, DC coupled		
Resolution	12 bits	12 bits		
Output Accuracy	<0.25% (in range of 4-20 mA) of FSR (0-21.2 mA), from 32° to 140° F (0° to 60° C)	<0.25% (in range of 4-20 mA) of FSR (0-21.2 mA and 0-339.2 mA), from 32° to 140° F (0° to 60° C)		
External loop power (reverse voltage protected)	+42.5 VDC, maximum +24 VDC, nominal	+42.5 VDC, maximum +24 VDC, nominal		
Output loop power requirements		<u>Max. load Vx external loop voltage</u>		
<u>Load (Ohms)</u>	<u>Loop power required</u>	<u>4-20 mA</u>		<u>16-320 mA</u>
250	> 20 VDC (1 amp minimum)	20 VDC	≤ 275	≤ 15
500	> 25 VDC (1 amp minimum)	24 VDC	≤ 475	≤ 25
750	> 30 VDC (1 amp minimum)	28 VDC	≤ 650	≤ 40
1000	> 35 VDC (1 amp minimum)	32 VDC	≤ 825	≤ 50
Over-range protection	+42.5 VDC, continuous	< +42.5 VDC		
Switch time on leg failure	< 10 ms, typical	< 10 ms, typical		
Diagnostic Indicators				
Module status (one each per module)	PASS, FAULT, ACTIVE, LOAD, PWR1, PWR2	PASS, FAULT, ACTIVE, LOAD, PWR1, PWR2		
Color code	Pea Green	Light Green		

Field Termination Options

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 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.

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.

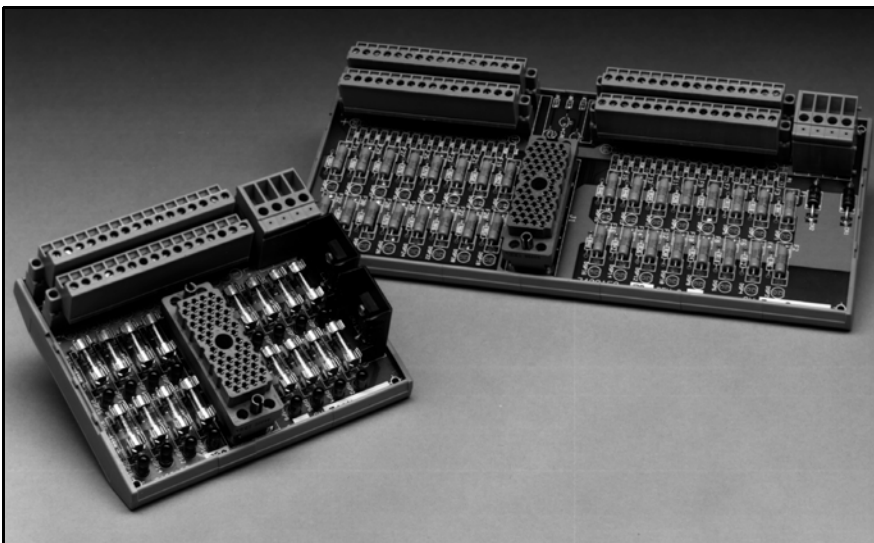
Other features of the basic termination panels are the same as for the standard panels.

Hazardous Location (Nonincendive) Termination Panels

Hazardous location (nonincendive) termination panels are suitable for use in Zone 2, and Class 1, Division 2 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



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

Field Termination Options

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

Module Part #	Module Description	Commoned Term Panels	Non-Common. Term Panels	Basic Term Panels	Nonincendive Term Panels	Fanned-out Cables	Bypass Panels	ERT Loop-Back Cables/Panels
3501E 3501T	DI, 115 VAC/VDC, 32 pts.	9561-810	9561-110	9551-110	n/a	9101-010	n/a	9141-010
3502E	DI, 48 VAC/VDC, 32 pts.	9562-810	n/a	9552-610	n/a	9101-010	n/a	9142-010
3503E	DI, 24 VAC/VDC, 32 pts.	9563-810	n/a	9553-610	9572-610	9101-010	BP9228-010	9143-010
3504E	DI, 24/48 VDC, non-isolated, 64 pts.	9566-810, 24V 9565-810, 48V	n/a n/a	9750-310, 24V 9750-410, 48V	9570-610, 24V n/a	n/a n/a	BP9229-010 n/a	n/a n/a
3505E	DI, 24 VDC, low threshold, 32 pts.	9563-810	n/a	9553-610	9572-610	9101-010	BP9228-010	9143-010
3510	PI, 20-20,000 Hz, 8 pts.	n/a	n/a	9753-110	n/a	n/a	n/a	n/a
3511	PI, 20-20,000 Hz, 8 pts.	n/a	n/a	9753-110	9793-110	n/a	n/a	n/a
3515	Pulse totalizer, 24 VDC, 32 pts.	n/a	n/a	9753-110	9572-610	n/a	n/a	n/a
3564	DI, 24 VDC, single, 64 pts.	9566-710	n/a	9553-610	9571-610	9101-010	n/a	n/a
3601E	DO, 115 VAC, 16 pts.	9661-610 9663-610	9661-110 9664-110	9651-110	n/a	9101-010	n/a	9670-110 9670-610
3601T	DO, 115 VAC, 16 pts.	9663-610	9664-110	n/a	n/a	n/a	n/a	n/a
3603B	DO, 120 VDC, 16 pts.	n/a	9251-210	n/a	n/a	n/a	n/a	n/a
3603E	DO, 120 VDC, 16 pts.	9661-910 9664-810	n/a	9651-110	n/a	9101-010	n/a	9673-810
3603T	DO, 120 VDC, 16 pts.	9664-810	n/a	n/a	n/a	n/a	n/a	9673-810
3604E	DO, 24 VDC, 16 pts.	9662-810	9662-110	9653-610	9671-610	9101-010	n/a	9671-810
3607E	DO, 48 VDC, 16 pts.	9667-810	9667-110	9652-610	n/a	9101-010	n/a	9672-810
3611E	DO, 115 VAC, 8 pts.	9661-510	n/a	n/a	n/a	n/a	n/a	n/a
3613E	DO, 120 VDC, 8 pts.	9661-810	n/a	n/a	n/a	n/a	n/a	n/a
3614E	DO, 24 VDC, 8 pts.	9662-910	n/a	n/a	n/a	n/a	n/a	n/a
3615E	DO, 24 VDC, low power, 8 pts.	9662-710	n/a	n/a	n/a	n/a	n/a	n/a
3617E	DO, 48 VDC, 8 pts.	9667-910	n/a	n/a	n/a	n/a	n/a	n/a
3623	DO, 120 VDC, 16 pts.	9661-910	n/a	9651-110	n/a	9101-010	n/a	n/a
3623T	DO, 120 VDC, 16 pts.	9664-810	n/a	n/a	n/a	n/a	n/a	n/a
3624	DO, 24 VDC, 16 pts.	9662-610	n/a	9653-610	9671-610	9101-010	n/a	n/a
3625	DO, 24 VDC, 32 pts.	9662-610	n/a	9653-610	9671-610	9101-010	n/a	n/a
3636R 3636T	Relay output (non-triplicated), 32 pts.	n/a	9668-110	9651-110	n/a	9101-010	n/a	n/a
3664	Dual DO, 24 VDC, self-protected, 32 pts.	9662-610	n/a	9653-610	9671-610	9101-010	n/a	9671-810
3674	Dual DO, 24 VDC, self-protected, 32 pts.	9662-610	n/a	9653-610	9671-610	9101-010	n/a	9671-810
3805E	AO, 4-20 mA, 8 pts.	n/a	n/a	9853-610	9861-610	n/a	n/a	n/a
3806E	AO, 6 4-20 mA outputs, 2 20-320 mA outputs	n/a	n/a	9863-710 (special panel)	n/a	n/a	n/a	n/a