

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

INVENSYS TRICONEX

3721

TMR DIFFERENTIAL ANALOG INPUT MODULE

Used with the applicable Tricon v9-v10 system configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official pages follow this cover with source pagination retained.

Invensys 9700077-012, February 2009

Analog Input Modules

This section describes the Analog Input Modules available with Tricon v9–v10 systems. For installation information, see [Replacing I/O Modules on page 223](#).

Table 11 Analog Input Modules

Model	Voltage Range	Type	Module Description
3700 3700A	0–5 VDC	TMR	Analog Input
3701	0–10 VDC	TMR	Analog Input
3703E	0–5 or 0–10 VDC	TMR	Isolated Analog Input
3704E	0–5 or 0–10 VDC	TMR	High-Density
3720 ¹	0–5 VDC	TMR	High-Density Single-Ended
3721 ¹	0 to 5 or –5 to +5 VDC	TMR	Differential

1. The 3720 and 3721 modules can be installed only in Tricon v10.2 and later systems.

All Analog Input Modules have three independent input channels. Each input channel receives variable voltage signals from each point, converts them to digital values, and transmits the values to the three Main Processors on demand. To ensure correct data for every scan, one value is selected using a mid-value selection algorithm. Sensing of each input point is performed in a manner that prevents a single failure on one channel from affecting another channel.

The 3700A, 3703E, and 3704E, 3720, and 3721 Analog Input Modules provide a six percent over-range measurement capability. The 3703E provides open-input detection, which can be configured as upscale or downscale in TriStation 1131. If an open input (< 0 VDC) goes out of range downscale, the Main Processors receive the integer value –32,767. If an open input (> 5 VDC or 10 VDC) goes out of range upscale, the Main Processors receive the integer value +32,767.

The 3720 and 3721 can be configured in TriStation 1131 for either Standard (12 bit) resolution or High (14 bit) resolution. In High resolution, the 3721 can be configured in TriStation 1131 for Unipolar (0 to 5 VDC) or Bipolar (–5 to +5 VDC) inputs.

Each Analog Input Module sustains complete, ongoing diagnostics for each channel. Failure of any diagnostic on any channel activates the Fault indicator for the module, which in turn activates the chassis alarm signal. The 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 some multiple faults.

Analog Input Modules include the hot-spare feature which allows online replacement of a faulty module. Like all I/O modules, Analog Input Modules require a separate field termination assembly with a cable interface to the Tricon controller backplane. Each module is mechanically keyed to prevent improper installation in a configured chassis.

This figure is a simplified schematic for model 3721, which is a 32-point TMR Analog Input Module with field-to-system isolation.

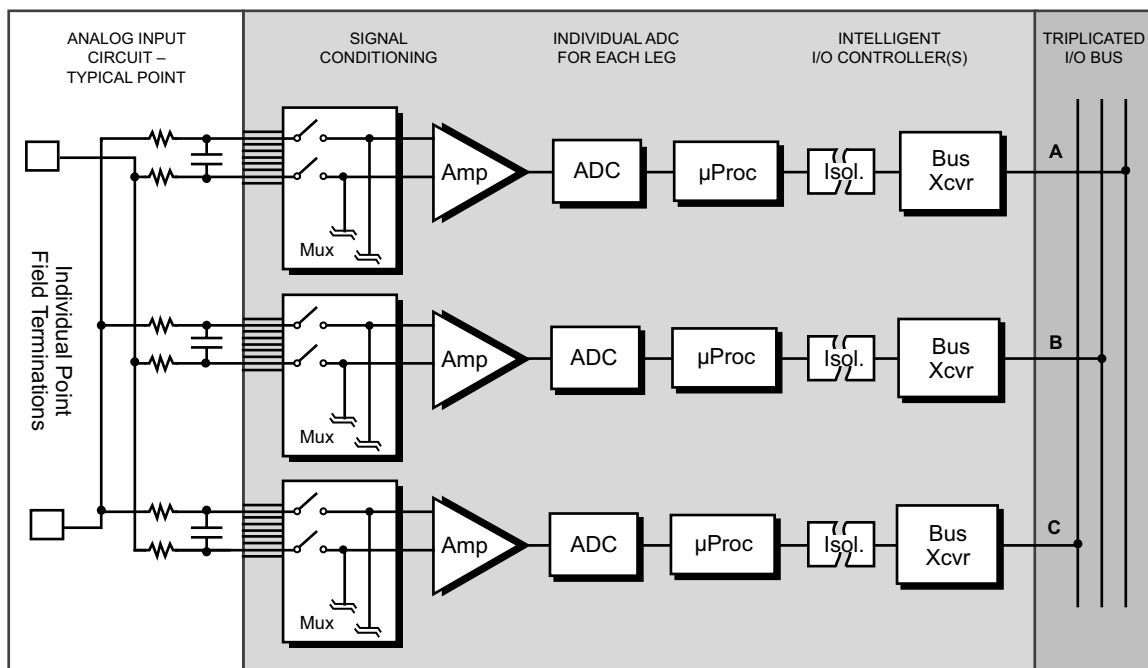


Figure 18 3721 Simplified Schematic

This figure shows the front panels of models 3700, 3700A, 3701, and 3721.

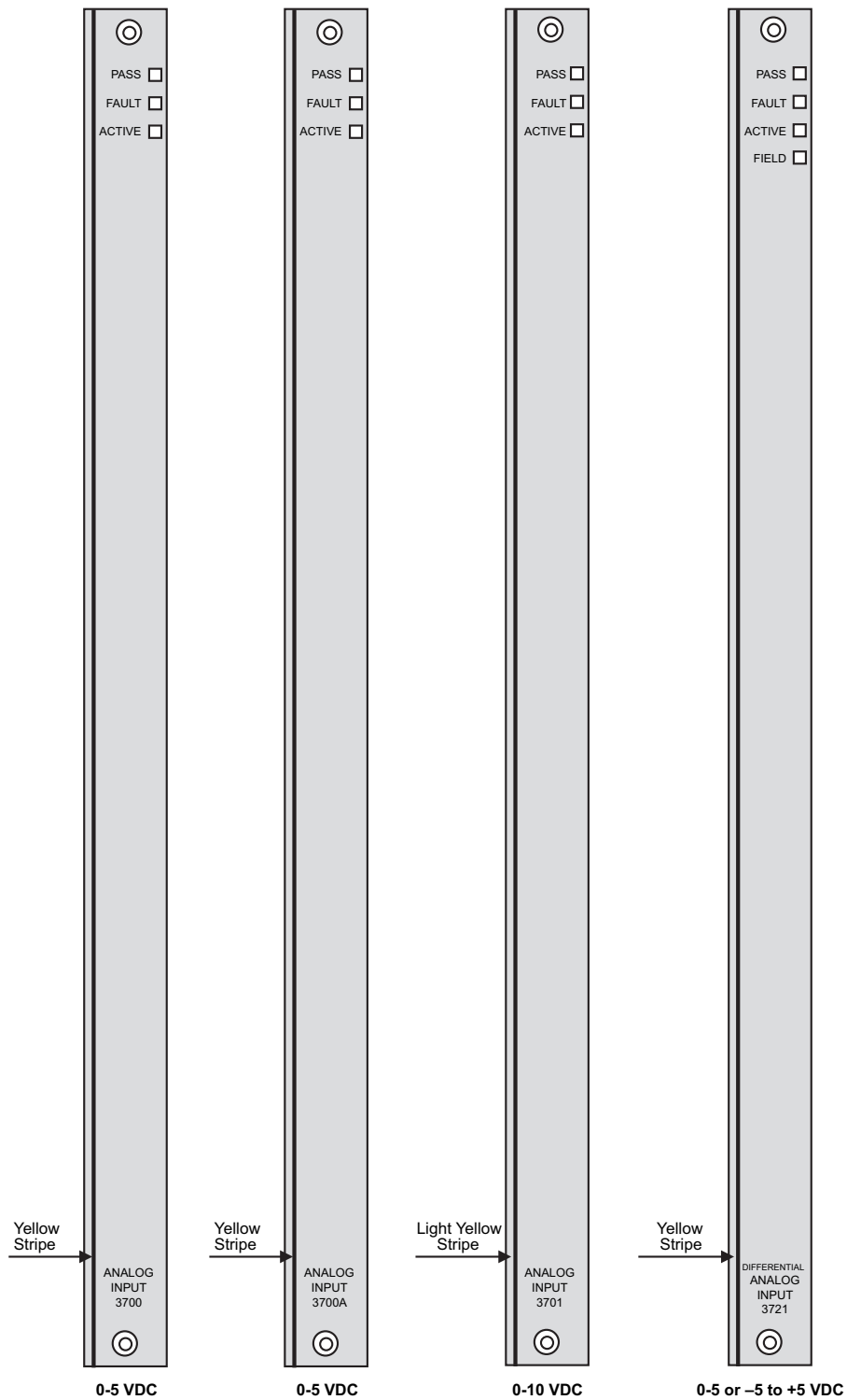


Figure 19 3700, 3700A, 3701, and 3721 Front Panels

3721 Specifications

This section includes specifications for model 3721, which is a TMR Analog Input Module with a voltage range of 0 to 5 VDC or -5 to +5 VDC. The 3721 module can be installed only in Tricon v10.2 and later systems.

Table 14 3721 Analog Input Specifications

Feature	Specification
Color code	Yellow
Number of input signals	32 differential, DC-coupled
Input update rate	10 ms
Resolution	12 bits or 14 bits programmable
Accuracy	< 0.15% of FSR from 0° to 60° C
Input resistance (load)	10 M Ω (DC), minimum
Input resistance at power off	140 k Ω (DC), typical
Common mode rejection (typical)	-85 dB (DC - 100 Hz)
Common mode voltage range	-12V to +12V peak
Channel-to-channel isolation	420 k Ω , typical
Normal mode rejection	-3 dB @ 23 Hz -8 dB @ 60 Hz -14 dB @ 120 Hz
Input voltage range	0 to 5 or -5 to 5 VDC
Input over-range measurement	+6%, -5.3 to +5.3 VDC
Logic power	< 15 watts
Input over-range protection	150 VDC continuous, 115 VAC continuous
Input current range	0 to 20 mA with 250 Ω shunt resistor
Field to system isolation	800 VDC minimum
Module status indicators	Pass, Fault, Active, Field
Input diagnostic fault coverage ¹	
Minimum input change	2% of full scale
Input change sample period	20 ms
Minimum period of mis-compares	25 samples

1. Rapidly or continuously changing inputs may cause the time to detect a fault to increase. If an input sample changes by more than 0.25% from the previous sample the readings will not be compared.

Note The 3721 can be installed in low-density systems that have been upgraded to v10.2.x or later. For more information, see Appendix I, Low-Density Chassis I/O Module Compatibility in the *Field Terminations Guide for Tricon v9-v10 Systems*.

Replacing I/O Modules

This procedure explains how to install an I/O module. If an I/O module has a field fault and a module fault, resolve the field fault first.



Before you remove a faulty I/O module, ensure the following are true:

- The Active indicator is illuminated on the hot-spare module.

–or–

The Active indicator is illuminated on the newly-inserted module if there was an open position in the logical slot and you inserted a replacement module.

- The Active indicator on the faulty module is off.

For fault indicators, see [I/O and Communication Module Indicators](#) on page 236.

Procedure

- 1 If a hot-spare module is installed and the Active indicator is on, remove the other (faulty) module by loosening the retractable fasteners, grasping the fasteners and sliding the module out of the chassis. In the unlikely event that neither module has an Active indicator on, contact the IPS Global Client Support (GCS) center.
- 2 Install an identical type module in the empty slot and push the module in until it is firmly seated. Tighten the retractable fasteners of the module to 10 inch-pounds.
For the replacement module, the Pass indicator should go on after about 1 minute; the Active indicator should go on within 1 to 2 minutes.
- 3 If the replacement module is not a hot-spare, wait until the Active indicator of the faulty module is off, then remove the module.
- 4 Identify the model and serial numbers on the faulty module. Contact the IPS Global Client Support (GCS) center to obtain a Returned Material Authorization (RMA) number. Then return the module to Triconex for repair.

Note In rare cases, a field device malfunction may cause a module to fault. If replacing the module does not resolve the problem, verify that the field device is properly connected and in good working order. If the problem is still not resolved, please contact the IPS Global Client Support (GCS) center for assistance.