Analog Input Modules

This section describes the Analog Input Modules available for use with Tricon v9–v11 systems. For installation information, see Replacing I/O Modules on page 293.

Table 17 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[a]	0–5 VDC	TMR	High-Density Single-Ended
3721[a]	0 to 5 or –5 to +5 VDC	TMR	Differential

a. 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 Model 3700A, 3703E, 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.

Models 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.

Mis-Compare Readings

All Analog Input Modules are susceptible to mis-compare readings which can increase the probability of a fault. Generally, the greater the difference between readings and the longer the period of mis-compares, the more probable that a fault will be declared. The amount of difference and period varies among Analog Input Modules.

- For Models 3700, 3700A, and 3701, if the readings differ by a minimum of 2 percent of full scale and continue for a minimum period of 40 input samples, the probability of a fault increases.
- For Models 3703E and 3704E, if the readings differ by a minimum of 0.5 percent of full scale and continue for a minimum period of 256 input samples, the probability of a fault increases.
- For Model 3720, if the readings differ by a minimum of 0.5 percent of full scale and continue for a minimum period of 25 input samples, the probability of a fault increases.
- For Model 3721, if the readings differ by a minimum of 2 percent of full scale and continue for a minimum period of 25 input samples, the probability of a fault increases.

32-Point Differential Analog Input Modules

This figure is a simplified schematic for Models 3700, 3700A, and 3701, which are 32-point TMR Analog Input Modules.

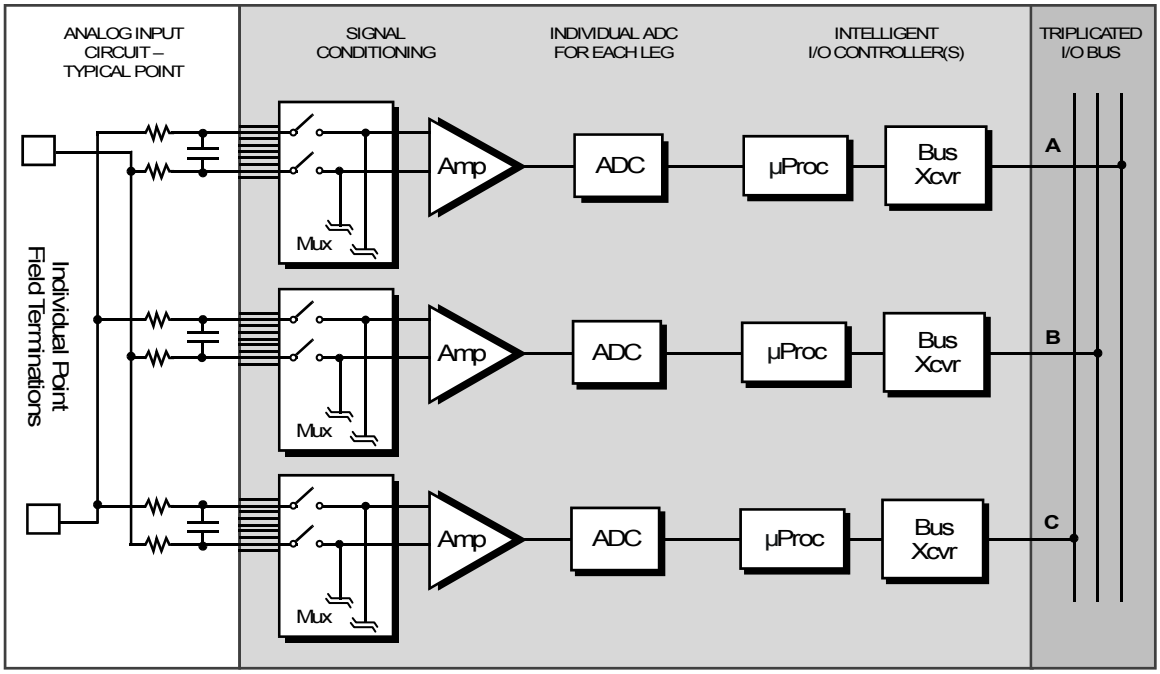

Figure 23 3700, 3700A, and 3701 Simplified Schematic

This figure is a simplified schematic for Model 3720, which is a 64-point TMR Analog Input Module with field-to-system isolation.

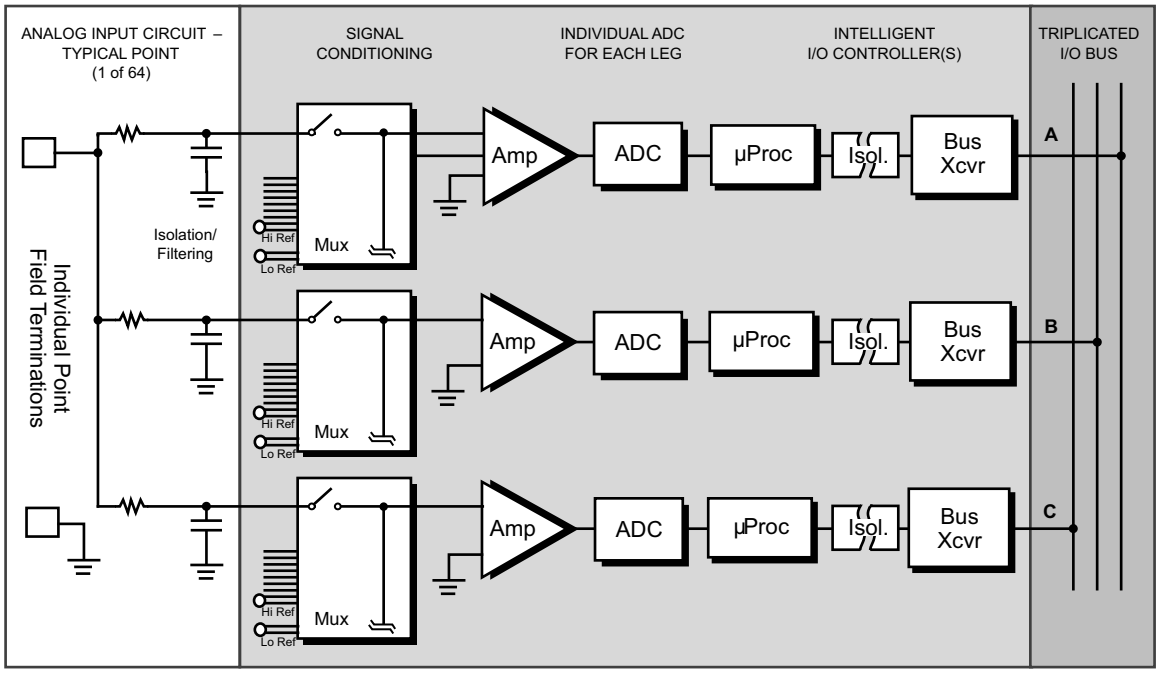

Figure 29 3720 Simplified Schematic

This figure shows the front panels of Models 3704E and 3720.

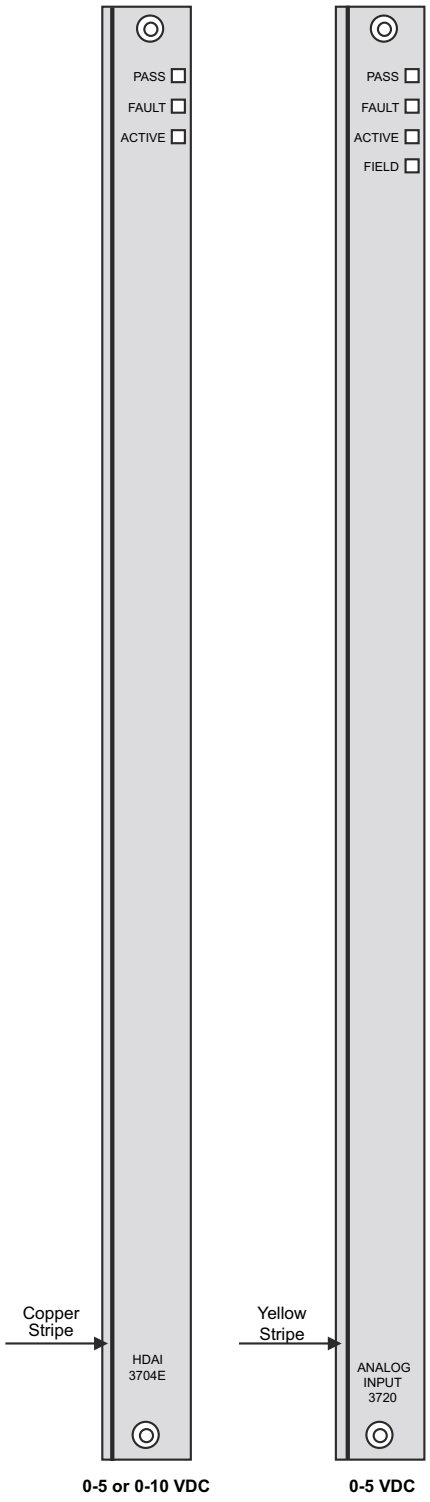

Figure 30 3704E and 3720 Front Panels

3720 Specifications

This section includes specifications for Model 3720, which is a TMR Analog Input Module with a voltage range of 0 to 5 VDC. The 3720 module can be installed only in Tricon v10.2 and later systems.

Table 23 3720 Analog Input Specifications

Feature	Specification
Color code	Yellow
Number of input signals	64, single-ended
Input update rate	10 ms
Resolution	12 bits or 14 bits programmable
Accuracy	< 0.15% of FSR from 32° to 140° F (0° to 60° C)
Input resistance (load)	10 MΩ (DC), minimum
Input resistance at power off	140 kΩ (DC), typical
Channel-to-channel isolation	420 kΩ, typical
Normal mode rejection	-3 dB @ 8 Hz -17 dB @ 60 Hz -23 dB @ 120 Hz
Input voltage range	0 to 5 VDC
Input over-range measurement	+6%, 0 to 5.3 V
Logic power	< 12 watts
Input over-range protection	150 VDC continuous, 115 VAC continuous
Input current range	0 to 20 mA (plus 6% over-range) with 250 Ω shunt resistor
Field to system isolation	800 VDC minimum
Module status indicators	Pass, Fault, Active, Field
Input diagnostic fault coverage[a]	
Minimum input change	0.5% of full scale
Input change sample period	10 ms
Minimum period of mis-compares	25 samples

a. 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 percent from the previous sample, the readings will not be compared.

Note The Model 3720 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–v11 Systems*.