

MANUFACTURER DOCUMENT PACKAGE

# Manufacturer's Manual

Reference package for procurement and maintenance review

TRICONEX

## 3704E

HIGH-DENSITY ANALOG 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

# Product Specifications

## Analog Input Module Specifications

| Model Number               | 3704E                                                 | 3720                                                      | 3721                                              |
|----------------------------|-------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------|
| Voltage                    | 0-5V or 0-10V <sup>a</sup> , + 6%                     | 0-5VDC, + 6%                                              | 0 to 5 VDC or -5 to +5 VDC <sup>a</sup> , + 6%    |
| Type                       | TMR, AI                                               | TMR, AI                                                   | TMR, AI                                           |
| No. of Input Points        | 64, commoned                                          | 64, single-ended                                          | 32 differential, DC-coupled                       |
| Isolated Points            | No                                                    | Yes                                                       | Yes                                               |
| Input Update Rate          | 75 ms                                                 | 10 ms                                                     | 10 ms                                             |
| Resolution                 | 12 bits                                               | 12 bits or 14 bits programmable                           | 12 bits or 14 bits programmable                   |
| Accuracy                   | < 0.25% of FSR from 0° to 60° C                       | < 0.15% of FSR from 0° to 60° C                           | < 0.15% of FSR from 0° to 60° C                   |
| Input Resistance (load)    | 30 MΩ (DC), min.                                      | 10 MΩ (DC), min.                                          | 10 MΩ (DC), min.                                  |
| Power-Off Resistance       | 30 kΩ (DC), typical                                   | 140 kΩ (DC), typical                                      | 140 kΩ (DC), typical                              |
| Common Mode Rejection      | n/a                                                   | n/a                                                       | -85 dB (DC - 100 Hz)                              |
| Common Mode Range          | n/a                                                   | n/a                                                       | -12V to +12V peak                                 |
| Leg-to-Leg Isolation       | 200 kΩ, typical                                       | 420 kΩ, typical                                           | 420 kΩ, typical                                   |
| Normal Mode Rejection      | -1 dB @ 8Hz<br>-12 dB @ 60Hz<br>-18 dB @ 120Hz        | -3 dB @ 8Hz<br>-17 dB @ 60Hz<br>-23 dB @ 120Hz            | -3 dB @ 23 Hz<br>-8 dB @ 60 Hz<br>-14 dB @ 120 Hz |
| Input Overrange Protection | 150 VDC/115 VAC continuous                            | 150 VDC/115 VAC continuous                                | 150 VDC/115 VAC continuous                        |
| Current Range              | 0-20 mA,<br>250 Ω shunt for 5V<br>500 Ω shunt for 10V | 0-20 mA (plus 6% over-range) with<br>250 Ω shunt resistor | 0-20 mA with 250 Ω shunt resistor                 |
| Diagnostic Indicators      |                                                       |                                                           |                                                   |
| Module Status              | PASS, FAULT, ACTIVE                                   | PASS, FAULT, ACTIVE, FIELD                                | PASS, FAULT, ACTIVE, FIELD                        |
| Color Code                 | Copper                                                | Yellow                                                    | Yellow                                            |

a. The voltage is selected using the TriStation 1131 software.

## Analog Output Modules

Analog Output (AO) modules receive 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 outputs. Each 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 a 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 test deactivates the faulty channel and activates the Fault indicator and 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. 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.

AO modules support hot- spare capability, which allows online replacement of a faulty module.

AO modules 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.

# Product Specifications

| Description                                                                                                    | Model No.        | See |
|----------------------------------------------------------------------------------------------------------------|------------------|-----|
| <b>Documentation Sets</b>                                                                                      |                  |     |
| Tricon <i>Planning and Installation</i> , <i>Field Terminations</i> , and <i>Communication</i> printed manuals | Contact Invensys |     |
| Triconex User Documentation, includes all manuals in PDF format (CD-ROM)                                       | Contact Invensys |     |

a. I/O Bus Expansion Cables are available in custom lengths. Please contact Invensys for more information.

## Tricon I/O Modules

| Voltage                       | Description                                            | Type            | Model No.             | Points | For Details, See |
|-------------------------------|--------------------------------------------------------|-----------------|-----------------------|--------|------------------|
| <b>Digital Input Modules</b>  |                                                        |                 |                       |        |                  |
| 115 VAC/VDC                   | Opto-Isolated, Non-Commoned                            | TMR             | 3501E/3501T           | 32     | page 41          |
| 48 VAC/VDC                    | Commoned in Groups of 8, Self-Test                     | TMR             | 3502E                 | 32     | page 41          |
| 24 VAC/VDC                    | Commoned in Groups of 8, Self-Test                     | TMR             | 3503E                 | 32     | page 41          |
| 24/48 VDC                     | High-Density, DC Coupled                               | TMR             | 3504E                 | 64     | page 42          |
| 24 VDC                        | Low Threshold with Self-test, Commoned                 | TMR             | 3505E                 | 32     | page 41          |
| 24 VDC                        | Single, Opto-Isolated, Commoned                        | Single          | 3564                  | 64     | page 42          |
| Pulse Input                   | Differential, AC Coupled                               | TMR             | 3511                  | 8      | page 43          |
| Pulse Totalizer               | Opto-isolated, Non-commoned                            | TMR             | 3515                  | 32     | page 44          |
| <b>Digital Output Modules</b> |                                                        |                 |                       |        |                  |
| 115 VAC                       | Opto-Isolated, Non-commoned                            | TMR             | 3601E/3601T           | 16     | page 45          |
| 120 VDC                       | Opto-Isolated, Non-commoned<br>Opto-Isolated, Commoned | TMR             | 3603B,<br>3603E/3603T | 16     | page 45          |
| 24 VDC                        | Opto-Isolated, Non-commoned                            | TMR             | 3604E                 | 16     | page 45          |
| 48 VDC                        | Opto-Isolated, Non-commoned                            | TMR             | 3607E                 | 16     | page 45          |
| 115 VAC                       | Galvanically Isolated, Commoned., Supv.                | TMR             | 3611E                 | 8      | page 47          |
| 48 VDC                        | Galvanically Isolated, Commoned, Supv.                 | TMR             | 3617E                 | 8      | page 47          |
| 120 VDC                       | Opto-Isolated, Commoned, Supervised                    | TMR             | 3623/3623T            | 16     | page 46          |
| 24 VDC                        | Opto-Isolated, Commoned, Supervised                    | TMR             | 3624                  | 16     | page 46          |
| 24 VDC                        | Supervised/Non-Supervised, Commoned                    | TMR             | 3625/3625A            | 32     | page 46          |
| 24 VDC                        | Opto-Isolated, Commoned                                | Dual            | 3664                  | 32     | page 48          |
| 24 VDC                        | Opto-Isolated, Commoned                                | Dual            | 3674                  | 32     | page 48          |
| Relay Output                  | Non-triplicated, Normally Open                         | Non-triplicated | 3636R/3636T           | 32     | page 43          |
| <b>Analog Input Modules</b>   |                                                        |                 |                       |        |                  |
| 0-5 VDC                       | Differential, DC Coupled                               | TMR             | 3700A                 | 32     | page 49          |
| 0-10 VDC                      | Differential, DC Coupled                               | TMR             | 3701                  | 32     | page 49          |
| 0-5, 0-10 VDC                 | Differential, Isolated                                 | TMR             | 3703E                 | 16     | page 49          |
| 0-5, 0-10 VDC                 | High-Density, Differential, DC Coupled                 | TMR             | 3704E                 | 64     | page 49          |
| Thermocouple                  | Differential, DC Coupled                               | TMR             | 3706A                 | 32     | page 52          |
| Thermocouple                  | Differential, Isolated                                 | TMR             | 3708E                 | 16     | page 52          |

