



# Trusted TMR 24 Vdc Analog Input Module 40 Channel

PD-T8431 Issue 19

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Product Description

Original Instructions

## Application

### Module configuration

There is no configuration required to the physical Input Module. All configurable characteristics of the Module are performed using tools on the Engineering Workstation (EWS) and become part of the application or System.INI file that is loaded into the TMR Processor. The TMR Processor automatically configures the Input Module after applications are downloaded and during Active/Standby changeover.

The IEC 61131 TOOLSET provides the main interface to configure the Input Module. Details of the configuration tools and configuration sequence are provided in Trusted Toolset Suite Product Description, publication [ICSTT-RM249](#) (PD-T8082). There are three procedures necessary to configure the Input Module. These are:

1. Define the necessary I/O variables for the field input data and module status data using the Dictionary Editor of the IEC 61131 TOOLSET.
2. Create an I/O Module definition in the I/O Connection Editor for each I/O Module. The I/O Module definition defines physical information, e.g. Chassis and Slot location, and allows variables to be connected to the I/O channels of the Module.
3. Using the Trusted® System Configuration Manager, define custom LED indicator modes, per-channel threshold levels and noise filtering, and other Module settings.

### T8431 Complex Equipment Definition

The T8431 I/O Complex Equipment Definition includes eight I/O boards, referenced numerically by Rack number:

**Table 3 Complex Equipment Definition**

Rack	I/O Board	Description	Data Type	Direction	No. of channels
1	THRSHIN	OEM Parameters	-	-	-
		Field Input Status	Integer	In	9
2	STATE	Field Input State	Integer	In	40
3	AI	Field Input Engineering Unit	Integer	In	40
4	THRSHOUT	Threshold data	Integer	Out	11
5	LINE_FLT	Line Fault Status	Boolean	In	40
6	DISCREP	Channel Discrepancy	Integer	In	3
7	HKEEPING	Housekeeping Registers	Integer	In	51
8	INFO	I/O Module Information	Integer	In	11

There are two OEM parameters included in the first rack (THRSHIN Board). These OEM parameters define the primary module position; declaring the Module's chassis and slot location. There is no need to define the secondary

module position within the IEC 61131 TOOLSET. Where systems may be required to start-up with a Module in the secondary position as the Active Module, e.g. primary module is not installed when application is started, the secondary module's position should be declared in the module definition of the System Configuration Manager.

**Table 4 OEM Parameters**

OEM Parameter	Description	Notes
TICS_CHASSIS	The number of the Trusted Chassis where the primary I/O Module is installed	The Trusted Controller Chassis is 1, and Trusted Expander Chassis are 2 to 15.
TICS_SLOT	The slot number in the Chassis where the primary I/O Module is installed	The I/O Module slots in the Trusted Controller Chassis are numbered from 1 to 8. The I/O Module slots in the Trusted Expander Chassis are numbered from 1 to 12.

### Rack 1: THRSHIN

This board allows the current thresholds for an analog input channel to be read by the application, under control of the THRSHOUT board (see [Rack 4: THRSHOUT](#) on [page 24](#)).

**Table 5 Rack 1: Threshold Input Descriptions**

Channel	Description
1	Channel number being read. Range 0 to 41.
2	States 2 > 1 falling threshold
3	States 1 > 2 rising threshold
4	States 3 > 2 falling threshold
5	States 2 > 3 rising threshold
6	States 4 > 3 falling threshold
7	States 3 > 4 rising threshold
8	States 5 > 4 falling threshold
9	States 4 > 5 rising threshold

THRSHIN reads in the Module threshold values controlled by THRSHOUT in Rack 4. See Table 1 for a graphical representation of the states and thresholds.

### Rack 2: STATE

This board provides the majority voted numerical input state. This indicates within which threshold band the field input is in and Module channel fault status.

**Table 6 Rack 2: STATE descriptions**

Channel	Description
1	Field input channel 1 state
2	Field input channel 2 state
40	Field input channel 40 state

The numerical input state is returned as an integer value.

**Table 7 Rack 2: STATE Bit Descriptions**

Channel	Description
8-15	Internal channel fault on module
7	Unknown
6	Overrange
5	High-High
4	High
3	Normal
2	Low
1	Line fault
0	Underrange

The input channel has a value 7 (Unknown) when:

1. The input channel cannot be correctly measured by two or more slices of the TMR Input Module.
2. The TMR Processor detects a 2003 channel discrepancy between the three slices of the TMR Input Module.
3. The Module is simulated (not installed or the TMR Processor cannot communicate with 2003 slices of the Module).

### Rack 3: AI

The AI board returns the engineering units for the associated field input.

**Table 8 Rack 3: Channel Field Engineering Units**

Channel	Description
1	Field input channel 1 voltage
2	Field input channel 2 voltage
40	Field input channel 40 voltage

The voltage is the median value taken from the triplicated Module. Field input current is converted to voltage using a 250  $\Omega$  resistor on a standard field termination assembly (FTA). This AI value may be used directly or scaled using the IEC 61131 TOOLSET conversion tables. The voltage is reported as 1024 counts per volt. To allow easy scaling for 4-20 mA inputs, zero volts reports as -1024, one volt reports as 0, and 5 volts reports as 4096.