ICS Triplex T3411F

Regent Type F Monitored Digital Input Module

ICS Triplex T3411F is the externally powered Type F monitored digital input module for Regent systems. T3411F receives 16 field-switch signals and is intended for circuits where the field supply is wired directly to the switches.



Technical Specifications

Product Identity	
Manufacturer	Industrial Control Services
Model	T3411F
Platform	ICS Regent
Product type	Type F monitored digital input module
Slot key positions	Upper 9; lower 7
Functional Configuration	
Inputs	16
Performance & Power	
Nominal field voltage	24/48 V DC
Field supply range	15–80 V DC
Field-switch power	External supply
Input current	8 mA
Maximum on/off response	10 ms
Field-to-logic isolation	2500 V minimum
Environment	
Operating temperature	0–60 °C

Selected original manufacturer pages follow on pages 3–10.

Compatibility & Selection Guide

System compatibility. Select T3411F in the WINTERPRET I/O Configuration Editor and retain the application's input/fault variables and voting arrangement. Same-type modules support redundant configurations. Do not substitute T3411 or the 120 V AC T3418F solely because the housings look similar.

Wiring & Installation Reference

External field-power connections

Nominal field supply. 24/48 V DC · 15–80 V DC allowable range

Field switch. Externally powered · Switched side returns to the input

Line-monitor device. Voltage/configuration specific · Match the redundancy arrangement

Mounting and handling

Check exact type. Identify T3411F and its external field supply; do not use T3411 or T3418F wiring.

Verify slot keying. Set upper key 9 and lower key 7 in the existing Regent chassis position.

Check input diagnostics. Use the matching line-monitor network and configure input, fault and voting variables in WINTERPRET.

Installation precautions. Energize-to-trip safety circuits require line monitoring and an alarm on line-fault status. Do not connect 120 V AC to the T3411F DC input module. The module has no user-replaceable internal parts; follow approved isolation procedures.

View terminal diagram (PDF) · PDF page 4 | View mounting diagram · PDF page 6

Manufacturer sources: PD-6027, Issue 1, March 2006.

The field power supply voltage is regulated inside the module to power the module's input interface circuits. The power supply is also wired directly to the field input switches and the switched side is wired back to the input module. Inside the input module the input signal passes through a dropping resistor and connects back to the power supply return.

Figure 6 shows the wiring connections for a single monitored input module.

When redundant field sensors are installed, each input module is wired as shown in Figure 6. In a fault tolerant configuration the input signals are connected in parallel across both input modules as shown in Figure 7.

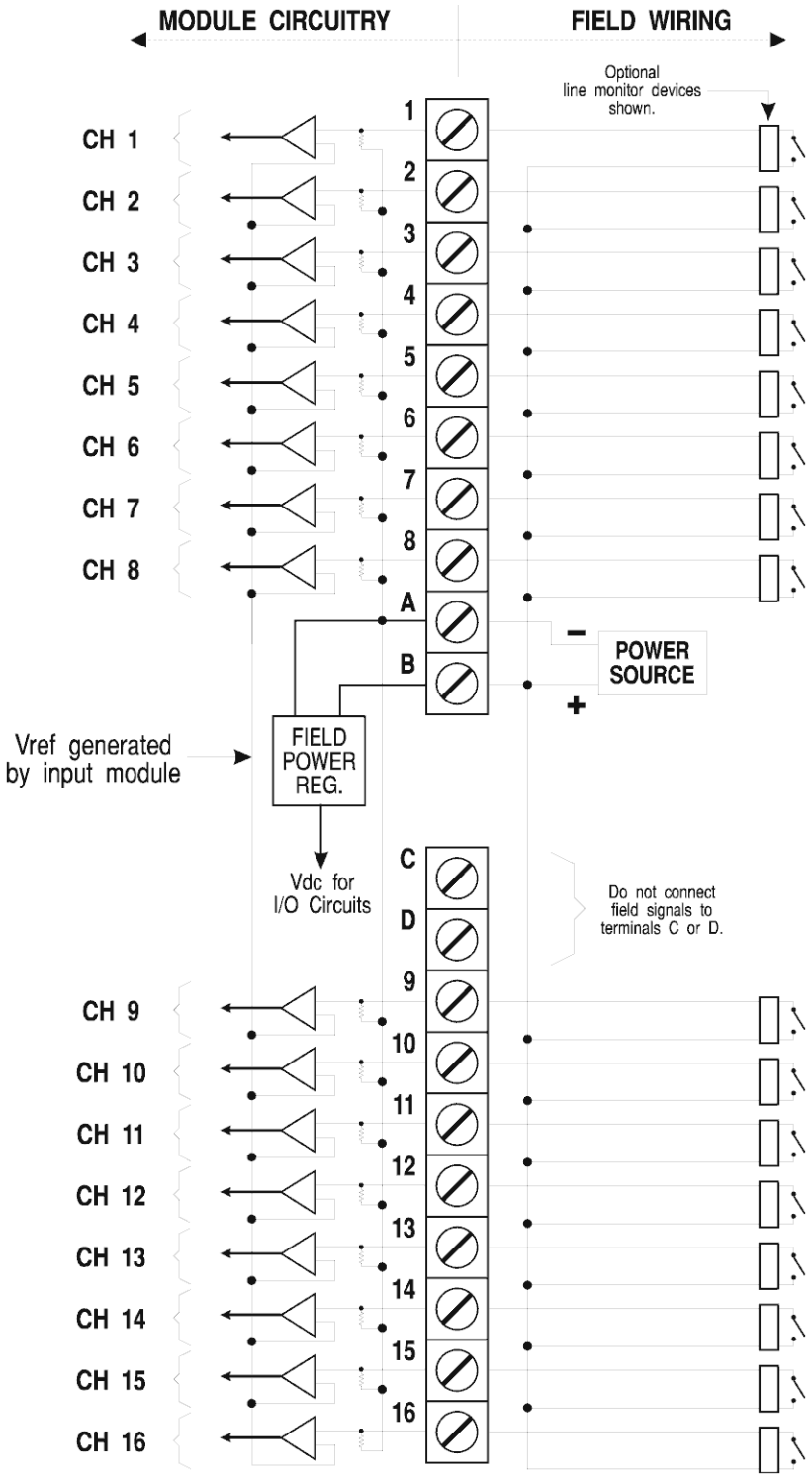
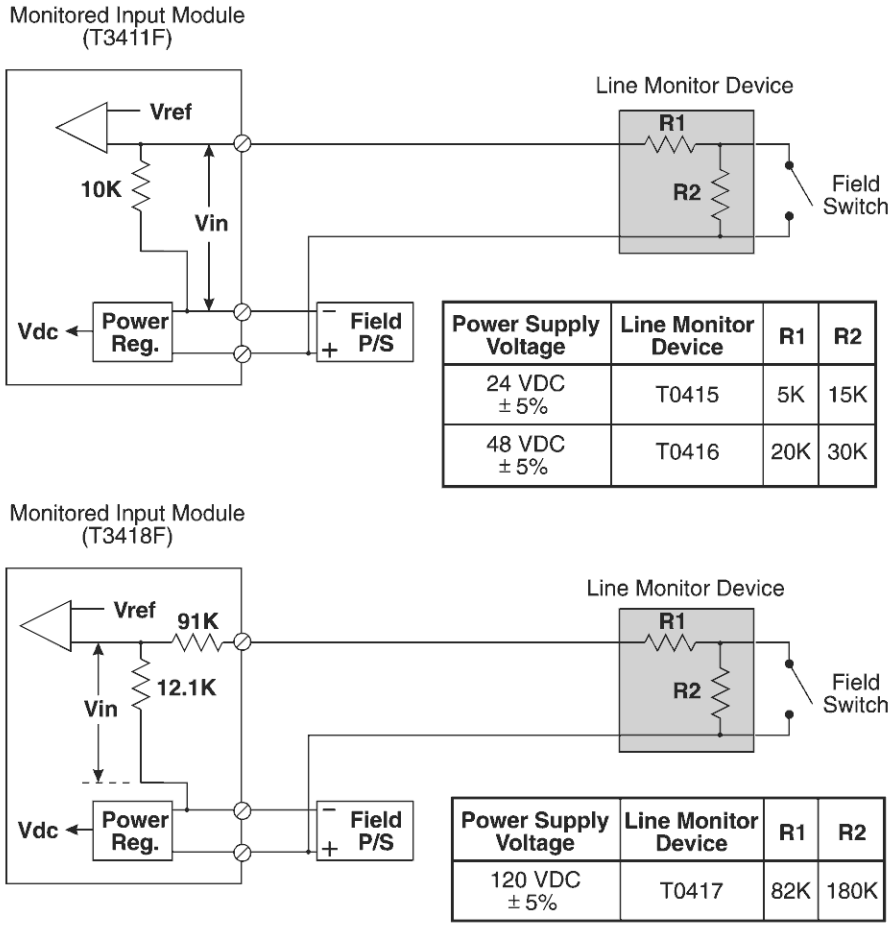


Figure 6. Module Wiring, Single Sensors to a Single Monitored Digital Input Module.

Line Monitoring

For DC powered inputs, the monitored digital input module can perform line monitoring of the field wiring when a suitable line monitor device is installed across the field input switch. A variety of line monitor devices are available to match the voltage and input redundancy used in the application.

Figure 8 shows a single switch connected to a single monitored input module. This type of configuration uses a line monitor device which contains two resistors, one in series with the field switch and one in parallel with the field switch. Figure 8 also applies to fault tolerant input configurations that include redundant sensors connected to redundant input modules.



Power Supply Voltage	Line Monitor Device	R1	R2
24 VDC ± 5%	T0415	5K	15K
48 VDC ± 5%	T0416	20K	30K

Power Supply Voltage	Line Monitor Device	R1	R2
120 VDC ± 5%	T0417	82K	180K

Figure 8. Line Monitoring, Single Switch Connected to Single Module.

With the line monitor device installed, the input voltage, V_{in}, has four possible states as represented in Table 1. When the input module reads the input, the reference voltage, V_{ref}, is set to the values shown in Table 1 to detect the state of the input.

Table 1. Input States and Reference Voltage Thresholds.

V_{ref} Threshold	Voltage	V_{in} with Line Monitor	V_{in} without Line Monitor
Stuck-on Test	32 Vdc		
	24 Vdc	Wire Open	Switch Open
Open Circuit	20 Vdc		
	16 Vdc	Switch Open	NA
On/Off	12 Vdc		
	8 Vdc	Switch Closed	NA
Short Circuit	4 Vdc		
	0 Vdc	Wire Short	Switch Closed
Stuck-Off Test	-5 Vdc		

Note: The actual voltage levels for the T3418F are half that shown in Table 1, e.g. the On/Off threshold is 6 Vdc and a line monitored Switch Open is 8 Vdc. However, when configuring the input module voltage thresholds, the settings should be as shown in Table 1, i.e. 4 Vdc, 12 Vdc and 20 Vdc. The input module will automatically halve these setting values for the input module reference voltages.

Keying

The I/O chassis can be physically keyed to prevent accidental damage caused by inserting a module into a slot wired for a different module type. Figure 10 illustrates how the slot keys are installed on the I/O chassis slot field wiring connectors. The slot key positions for the monitored digital input module are listed in Table 2.

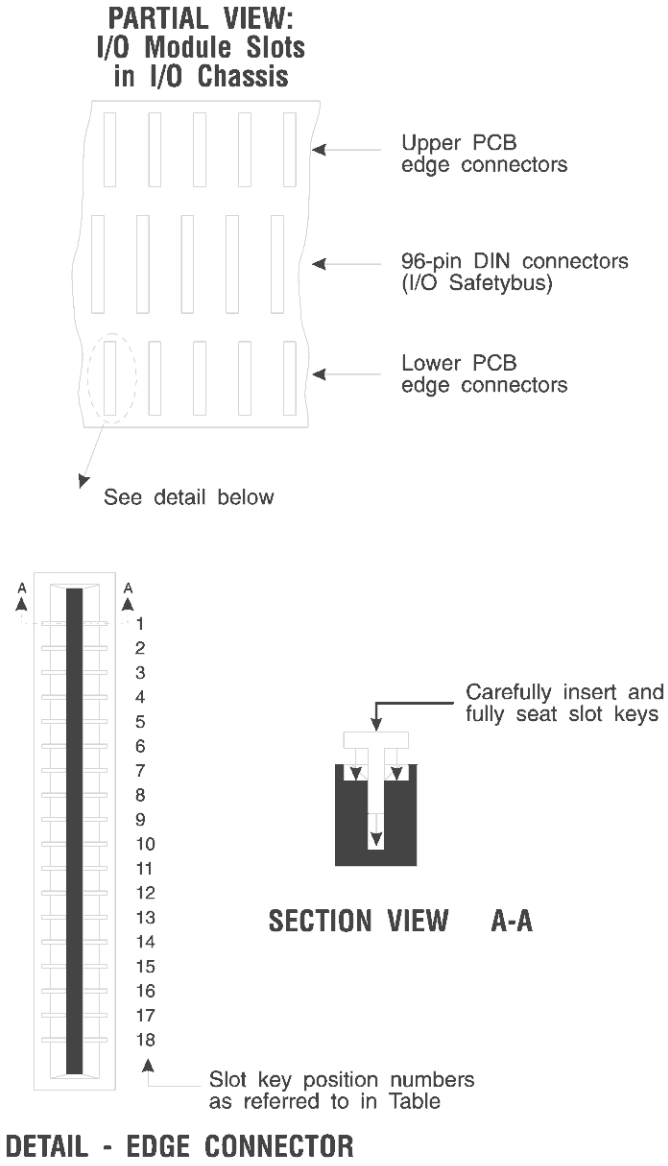


Figure 10. Installing Slot Keys.

Table 2. Slot Key Positions.

Module	Upper Connector	Lower Connector
T3411F	9	7
T3418F	17	7

the input module and performing a voted reset, the fault bit is turned off, restoring the input configuration to the dual mode.

Programming Triple Fault Tolerant Monitored Inputs

Fault tolerant applications that include triplicated monitored input modules should use the Voter instruction in ladder logic. The voter instruction performs two-out-of-three voting of triplicated inputs, storing the voted result in the defined shared variable. Refer to the Regent User's Guide section 5, Working with Programs and Function Blocks for more details on using the ladder logic Voter instruction.

Maintenance

No periodic maintenance or calibration is required for the monitored digital input modules. There are no user replaceable parts inside these modules.

Safety Considerations

TÜV The monitored digital input modules are TÜV certified for Risk Class 5 safety critical inputs. Safety critical configurations include dual and triple redundant input modules and associated application voting methods.

In safety critical input applications using a single sensor, it is important that the sensor failure modes be predictable and well understood, so there is little probability of a failed sensor not responding to a critical process condition. In such a configuration, it is important that the sensor be tested regularly, either by dynamic process conditions that are verified in the Regent, or by manual intervention testing.

Redundant sensors can be used with redundant input modules to eliminate any single points of failure and extend fault tolerance to include the sensors.

If energize to trip inputs are used in safety critical applications, line monitor devices must be installed at the field switches. The Fault Name variables must be configured and line fault status must be alarmed to plant operations personnel.

For additional safety considerations, please refer to the Safety Considerations section of the Regent User's Guide.

Specifications

Safetybus Power	0.85 load units	
Number of Inputs	16, common power	
	T3411F	**T3418F**
Field Power	24 or 48 Vdc	120 Vac/dc
Voltage, min.:	15 Vdc	90 Vac/dc
Voltage, max.:	80 Vdc	150 Vac/dc
Current:	450 mA, maximum	150 mA, maximum
Turn-On Voltage (default)	> 12 Vdc	> 51 Vdc
Turn-Off Voltage (default)	< 12 Vdc	< 51 Vdc
Input Current	8.0 mA, maximum	2.0 mA, maximum
Turn-On Delay	10 msec, maximum	10 msec, maximum
Turn-Off Delay	10 msec, maximum	100 msec, maximum
Over Voltage Protection		
Field Power Terminals:	100 Vdc continuous	165 Vac continuous
Input Terminals:	100 Vdc continuous, 160 Vdc for 5 seconds	230 Vac continuous, 350 Vac for 5 seconds
Heat Dissipation	8.5 Watts, 29 BTUs/hour	10 Watts, 34 BTUs/hour
Fusing	None, external if required	
Isolation	2500 volts minimum (field wiring to control logic)	

Input Circuit Test Interval	Function of application program scan time and size of I/O configuration. Typically less than 2 seconds (see page 5 for details).
Intrinsic Safety	External barrier, if required. (requires threshold adjustment, see page 18).
Operating Temperature	0 to 60 C (32 to 140 F)
Storage Temperature	-40 to 85 C (-40 to 185 F)
Operating Humidity	0 to 95% relative humidity, non-condensing
Vibration	
10 to 55 Hz:	±0.15mm
Shock	
Operating:	15 g, ½ sine wave, 11 msec
Electromagnetic Interference	
• IEC 801 Part 2 - Electrostatic Discharges	Level 3: Contact discharge of 6 kV
• IEC 801 Part 3 - Radiated Electromagnetic Fields	Level 3: 10 V/M, 27 MHz - 500 MHz
• IEC 801 Part 4 - Transients and Bursts	Level 4: 2 kV, 2.5 kHz for t = 60 seconds
• ANSI/IEEE C37.90 - Surge Withstand Capability	2.5 kV damped 1 MHz sine wave 4 kV bi-directional impulse, 10 nsec rise time, fast transient
Safety	Pending certification to DIN V VDE 0801 for Risk Class 5. Also designed to meet UL 508 and CSA 22.2, No. 142-M1981