ICS Triplex T8442C

Trusted TMR Speed Monitor Module

ICS Triplex T8442C is a Trusted TMR speed-monitoring module for rotating-machine protection, including turbines, compressors, pumps and generators. T8442C supervises speed and acceleration and provides shutdown outputs through its dedicated termination assemblies.



Technical Specifications

Product Identity	
Manufacturer	Rockwell Automation, Inc.
Model	T8442C
Platform	Trusted TMR
Product type	Speed monitor module
Coating	Conformal coating, C suffix
Functional Configuration	
Machine groups	3
Speed inputs	3 per group; 9 total
Shutdown-output drives	2 per group; 6 total
Probe types	Active and passive, through T8846 FTA
Performance & Power	
Maximum input frequency	30 kHz
IMB supply	20–32 V DC
Typical IMB power	22 W at 24 V DC
Environment	
Operating temperature	0–60 °C

Selected original manufacturer pages follow on pages 3–9.

Compatibility & Selection Guide

System compatibility. T8442C uses the Trusted System Configuration tool; settings are included in System.INI and transferred through the TMR processors. Gear-tooth count, probe limits and overspeed thresholds must match the machine. The system uses T8846 input and T8891 output FTAs with the appropriate TC801 cable assembly.

Wiring & Installation Reference

Probe and shutdown connections

Speed inputs. T8846 SIFTA · Match active/passive probes

Shutdown outputs. T8891 SOFTA · Use the three-group output arrangement

Module interconnection. TC801 assembly · No direct field-device back-connector wiring

Mounting and handling

Inspect the module. Use static precautions. Do not install a damaged housing or bent connector pins, and do not open the housing.

Check cable and slot keys. Fit the correct field cable and check the module-specific key positions before inserting the module.

Seat and lock. Open the ejector tabs, insert without force, press the top and bottom fascia fully home, then close both ejectors until locked.

Installation precautions. Use only the specified termination and cable arrangement. Validate tooth count, speed thresholds and trip behavior against the machine safety requirements. Use static precautions and do not touch connector pins or force module insertion.

View terminal diagram (PDF) · PDF page 4 | View mounting diagram · PDF page 3

Manufacturer sources: ICSTT-RM276I-EN-P, PD-T8442 Issue 10 / Trusted System declaration, ICSTT-CT004L-EN-E; suffix C denotes conformal coating.

2. Installation

2.1. Module Insertion/Removal



CAUTION:

The Module contains static sensitive parts. Static handling precautions must be observed. Specifically ensure that exposed connector pins are not touched. Under no circumstances should the module housing be removed.

Before installation, visually inspect the module for damage. Ensure that the module housing appears undamaged and inspect the I/O connector at the back of the module for bent pins. If the module appears damaged or any pins are bent, do not install the module. Do not try to straighten bent pins. Return the module for replacement.

Ensure that the module is of the correct type.

Record the module type, revision and serial number of the module before installation.

To install the module:

1. Ensure that the field cable assembly is installed and correctly located.
2. Release the ejector tabs on the module using the release key. Ensure that the ejector tabs are fully open.
3. Holding the ejectors, carefully insert the module into the intended slot.
4. Push the module fully home by pressing on the top and bottom of the module fascia.
5. Close the module ejectors, ensuring that they click into their locked position.

The module should mount into the chassis with a minimum of resistance. If the module does not mount easily, do not force it. Remove the module and check it for bent or damaged pins. If the pins have not been damaged, try reinstalling the module.

2.2. External Interfaces

2.2.1. Speed Output Signals

Speed output signals are from normally energized relays with both normally open (de-energize to trip) and normally closed (energize to trip) volt-free contacts available. Hardware fault tolerance is maintained through the use of a quad relay structure with shared paths.

Each group provides an output signal for over-speed and also for over-acceleration.

2.2.2. Speed Input Signals

The speed inputs are arranged as three groups of three inputs. Each external speed sensor input on the Module is monitored by three separate Speed Monitoring circuits.

Hardware fault tolerance is provided for each sensor input on the Module.

2.2.3. Communications

The only external communication interface available to the T8442 Speed Monitor is the Trusted System IMB.

The Trusted System architecture allows many intermediate transport methodologies between the IMB on an I/O Chassis and the IMB on the Main Controller Chassis.

2.3. Field Interface Connector

The field interface on the Module is via a 96 way DIN41612 C type connector. This mates with a TC-801 cable assembly. The cable assembly must be pre-installed in a Trusted Chassis I/O slot that has been configured for use with T8442 Module.

The field connector is made up of three columns of 32 pins. The functions of these pins are detailed in Table 1, Table 2 and Table 3. Note that the table below is provided for reference only, since the T8442 Module must always be connected to a T8446 SIFTA for speed inputs, and one or more T8891 SOFTA units for outputs. Direct connection of the field interface connector to field devices is not supported.

Pin	Signal Name	Description
A1	SMART_A	SmartSlot Link A
A2	-	Not used
A3	PASSIVE_PULSE_POS_G1_3	Group 1, Channel 3, Positive Passive Speed input
A4	PASSIVE_PULSE_NEG_G1_3	Group 1, Channel 3, Negative Passive Speed input
A5	PASSIVE_PULSE_MID_G1_3	Group 1, Channel 3, Passive Speed input Bias
A6	SENSOR_G1_1	Group 1, Current Sensor Input 1
A7	SENSOR_G1_3	Group 1, Current Sensor Input 3
A8	COIL_DRIVE_G1_Q1_1	Group 1, Quad 1, Channel 1, Relay coil drive output.
A9	COIL_DRIVE_G1_Q2_1	Group 1, Quad 2, Channel 1, Relay coil drive output.
A10	COIL_DRIVE_G1_Q3_1	Group 1, Quad 3, Channel 1, Relay coil drive output.
A11	COIL_DRIVE_G1_Q4_1	Group 1, Quad 4, Channel 1, Relay coil drive output.
A12	CONTACTS_G1	Group 1, Relay contact status input.
A13	PASSIVE_PULSE_POS_G2_3	Group 2, Channel 3, Positive Passive Speed input
A14	PASSIVE_PULSE_NEG_G2_3	Group 2, Channel 3, Negative Passive Speed input

Pin	Signal Name	Description
A15	PASSIVE_PULSE_MID_G2_3	Group 2, Channel 3, Passive Speed input Bias
A16	SENSOR_G2_1	Group 2, Current Sensor Input 1
A17	SENSOR_G2_3	Group 2, Current Sensor Input 3
A18	COIL_DRIVE_G2_Q1_1	Group 2, Quad 1, Channel 1, Relay coil drive output.
A19	COIL_DRIVE_G2_Q2_1	Group 2, Quad 2, Channel 1, Relay coil drive output.
A20	COIL_DRIVE_G2_Q3_1	Group 2, Quad 3, Channel 1, Relay coil drive output.
A21	COIL_DRIVE_G2_Q4_1	Group 2, Quad 4, Channel 1, Relay coil drive output.
A22	CONTACTS_G2	Group 2, Relay contact status input.
A23	PASSIVE_PULSE_POS_G3_3	Group 3, Channel 3, Positive Passive Speed input
A24	PASSIVE_PULSE_NEG_G3_3	Group 3, Channel 3, Negative Passive Speed input
A25	PASSIVE_PULSE_MID_G3_3	Group 3, Channel 3, Passive Speed input Bias
A26	SENSOR_G3_1	Group 3, Current Sensor Input 1
A27	SENSOR_G3_3	Group 3, Current Sensor Input 3
A28	COIL_DRIVE_G3_Q1_1	Group 3, Quad 1, Channel 1, Relay coil drive output.
A29	COIL_DRIVE_G3_Q2_1	Group 3, Quad 2, Channel 1, Relay coil drive output.
A30	COIL_DRIVE_G3_Q3_1	Group 3, Quad 3, Channel 1, Relay coil drive output.
A31	COIL_DRIVE_G3_Q4_1	Group 3, Quad 4, Channel 1, Relay coil drive output.
A32	CONTACTS_G3	Group 3, Relay contact status input.

Table 1 Field Interface Connector Pin Assignment (column A)

Pin	Signal Name	Description
B1	SMART_B	SmartSlot Link B
B2	-	Not used
B3	PASSIVE_PULSE_POS_G1_2	Group 1, Channel 2, Positive Passive Speed input
B4	PASSIVE_PULSE_NEG_G1_2	Group 1, Channel 2, Negative Passive Speed input
B5	PASSIVE_PULSE_MID_G1_2	Group 1, Channel 2, Passive Speed input Bias
B6	SENSOR_G1_2	Group 1, Current Sensor Input 2
B7	SENSOR_G1_4	Group 1, Current Sensor Input 4
B8	COIL_DRIVE_G1_Q1_2	Group 1, Quad 1, Channel 2, Relay coil drive output.
B9	COIL_DRIVE_G1_Q2_2	Group 1, Quad 2, Channel 2, Relay coil drive output.
B10	COIL_DRIVE_G1_Q3_2	Group 1, Quad 3, Channel 2, Relay coil drive output.
B11	COIL_DRIVE_G1_Q4_2	Group 1, Quad 4, Channel 2, Relay coil drive output.
B12	VF_RTN_G1	Group 1, field power supply return.

Pin	Signal Name	Description
B13	PASSIVE_PULSE_POS_G2_2	Group 2, Channel 2, Positive Passive Speed input
B14	PASSIVE_PULSE_NEG_G2_2	Group 2, Channel 2, Negative Passive Speed input
B15	PASSIVE_PULSE_MID_G2_2	Group 2, Channel 2, Passive Speed input Bias
B16	SENSOR_G2_2	Group 2, Current Sensor Input 2
B17	SENSOR_G2_4	Group 2, Current Sensor Input 4
B18	COIL_DRIVE_G2_Q1_2	Group 2, Quad 1, Channel 2, Relay coil drive output.
B19	COIL_DRIVE_G2_Q2_2	Group 2, Quad 2, Channel 2, Relay coil drive output.
B20	COIL_DRIVE_G2_Q3_2	Group 2, Quad 3, Channel 2, Relay coil drive output.
B21	COIL_DRIVE_G2_Q4_2	Group 2, Quad 4, Channel 2, Relay coil drive output.
B22	VF_RTN_G2	Group 2, field power supply return.
B23	PASSIVE_PULSE_POS_G3_2	Group 3, Channel 2, Positive Passive Speed input
B24	PASSIVE_PULSE_NEG_G3_2	Group 3, Channel 2, Negative Passive Speed input
B25	PASSIVE_PULSE_MID_G3_2	Group 3, Channel 2, Passive Speed input Bias
B26	SENSOR_G3_2	Group 3, Current Sensor Input 2
B27	SENSOR_G3_4	Group 3, Current Sensor Input 4
B28	COIL_DRIVE_G3_Q1_2	Group 3, Quad 1, Channel 2, Relay coil drive output.
B29	COIL_DRIVE_G3_Q2_2	Group 3, Quad 2, Channel 2, Relay coil drive output.
B30	COIL_DRIVE_G3_Q3_2	Group 3, Quad 3, Channel 2, Relay coil drive output.
B31	COIL_DRIVE_G3_Q4_2	Group 3, Quad 4, Channel 2, Relay coil drive output.
B32	VF_RTN_G3	Group 3, field power supply return.

Table 2 Field Interface Connector Pin Assignment (Column B)

Pin	Signal Name	Description
C1	SMART_C	SmartSlot Link C
C2	-	Not used
C3	PASSIVE_PULSE_POS_G1_1	Group 1, Channel 1, Positive Passive Speed input
C4	PASSIVE_PULSE_NEG_G1_1	Group 1, Channel 1, Negative Passive Speed input
C5	PASSIVE_PULSE_MID_G1_1	Group 1, Channel 1, Passive Speed input Bias
C6	VFIELD_P15_G1_1	Group 1, +15V sensor power supply output 1.
C7	VFIELD_M15_G1_1	Group 1, -15V sensor power supply output 1.
C8	VFIELD_P15_G1_2	Group 1, +15V sensor power supply output 2.
C9	VFIELD_M15_G1_2	Group 1, -15V sensor power supply output 2.
C10	VF_24V_G1_1	Group 1, +24V field power supply input 1.

6. Specifications

The following tables apply to the interface signals existing between the T8442 Speed Monitor Module and the SIFTA and SOFTA. Refer to product descriptions Trusted Speed Monitor Input FTA (SIFTA), publication ICSTT-RM302 (PD-T8846) and Trusted Speed Monitor Output FTA (SOFTA), publication ICSTT-RM309 (PD-T8891) for the specifications relative to signal field connections.

6.1. Speed Input Specifications

Parameter	Min.	Typ.	Max.	Unit	Note
Speed input frequency range Active sensor			30000	Hz	
Speed input frequency range Passive sensor			30000	Hz	
Speed input duty cycle	20		80	%	Steady State
Speed input speed measurement resolution			±1	RPM	
Speed input accuracy			0.01	%	Of Full Scale or 1 RPM whichever is the greater
Speed input detection threshold dc coupled	200			mV pk-pk	Across entire frequency range

Table 20 Speed Input Specification

The following equation shows the relationship between RPM and number of teeth:

$$RPM = Frequency * \frac{60}{Number\ of\ Teeth}$$

The following graph demonstrates the acceptable range of input for the T8442 module. The outer boundary shows the maximum RPM a T8442 module can detect with a given number of teeth where the frequency is set to 30 KHz.

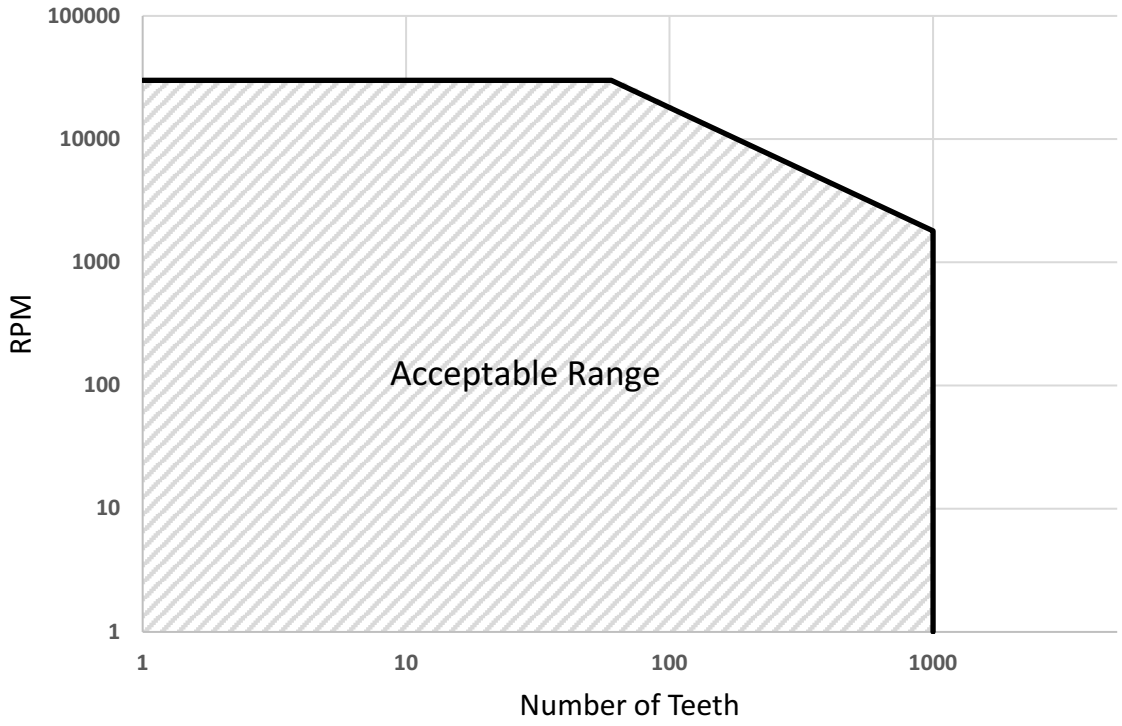


Figure 9 RPM vs Number of Teeth

6.2. Dual VField 24 V Power Supply Input Specifications

Parameter	Min	Typ.	Max	Unit	Note
Input voltage	18	24	32	Vdc	w.r.t. VField Return
Input protection					Fused with reverse polarity protection.

Table 21 Dual VField 24 V Power Supply Input Specifications

6.3. System Power Supply Input Specifications

Parameter	Min	Typ.	Max	Unit	Note
Input voltage	20	24	32	Vdc	
Power consumption		22		W	@ 24 Vdc Input voltage
Input protection					Fused with reverse polarity protection.

Table 22 System Power Supply Input Specifications

6.4. General Module Specifications

Parameter	Min	Typ.	Max	Unit	Note
Sequence of Events (SOE)					
Resolution		1		ms	
Accuracy	-0.5		0.5	ms	
Field Common Insulation					
Basic Insulation		250		Vdc/Vac_{rms}	
Maximum Impulse Withstand		2.5		kV	
Temperature					
Operating temperature	0		+60	°C	
Storage temperature	-25		+70	°C	
Temperature change			±0.5	°C/min	
Humidity					
Relative Humidity range (operating, storage and transport)	10		95	%	Non-condensing