Trusted Versatile FTA

Product Overview

The Trusted® Versatile Field Termination Assembly (VFTA) T8842 is primarily designed to act as the main interface between field devices associated with the detection and suppression of fire and gas hazards, and the Trusted Triple Modular Redundant (TMR) Zone Interface Module T8448. It is also used as the interface for the Trusted TMR Valve Monitor Module T8449, for which digital outputs to solenoid valves alternate with valve position analogue inputs.

Each channel of the VFTA is configurable to enable a variety of field devices to be connected. These include devices generating both analogue and digital input signals, and output devices requiring a digital signal at up to 28 Vdc.

Features:

- 40 channels per VFTA each configurable as inputs or outputs.
- Industrial standard field device connections (2 or 3 wire).
- Standard DIN rail compatibility.
- Simple installation and connection.
- Simple configuration using plug-in fuses and built-in resistors.
- 18 Vdc to 28 Vdc operation.
- Field power supply arranged in five groups of eight channels.
- Option to supply power from a controllable output for each group.
- Fused field power supply per channel.

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PREFACE

In no event will Rockwell Automation be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment. The examples given in this manual are included solely for illustrative purposes. Because of the many variables and requirements related to any particular installation, Rockwell Automation does not assume responsibility or reliability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, with respect to use of information, circuits, equipment, or software described in this manual.

All trademarks are acknowledged.

DISCLAIMER

It is not intended that the information in this publication covers every possible detail about the construction, operation, or maintenance of a control system installation. You should also refer to your own local (or supplied) system safety manual, installation and operator/maintenance manuals.

REVISION AND UPDATING POLICY

This document is based on information available at the time of its publication. The document contents are subject to change from time to time. The latest versions of the manuals are available at the Rockwell Automation Literature Library under "Product Information" information "Critical Process Control & Safety Systems".

TRUSTED RELEASE

This technical manual applies to **Trusted Release: 3.6.1**.

LATEST PRODUCT INFORMATION

For the latest information about this product review the Product Notifications and Technical Notes issued by technical support. Product Notifications and product support are available at the Rockwell Automation Support Centre at
http://rockwellautomation.custhelp.com

At the Search Knowledgebase tab select the option "By Product" then scroll down and select the Trusted product.

Some of the Answer ID’s in the Knowledge Base require a TechConnect Support Contract. For more information about TechConnect Support Contract Access Level and Features please click on the following link:

https://rockwellautomation.custhelp.com/app/answers/detail/a_id/50871

This will get you to the login page where you must enter your login details.

IMPORTANT A login is required to access the link. If you do not have an account then you can create one using the "Sign Up" link at the top right of the web page.

DOCUMENTATION FEEDBACK

Your comments help us to write better user documentation. If you discover an error, or have a suggestion on how to make this publication better, send your comment to our technical support group at http://rockwellautomation.custhelp.com

SCOPE

This manual specifies the maintenance requirements and describes the procedures to assist troubleshooting and maintenance of a Trusted system.

WHO SHOULD USE THIS MANUAL

This manual is for plant maintenance personnel who are experienced in the operation and maintenance of electronic equipment and are trained to work with safety systems.

SYMBOLS

In this manual we will use these notices to tell you about safety considerations.

	SHOCK HAZARD: Identifies an electrical shock hazard. If a warning label is fitted, it can be on or inside the equipment.
	WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which can cause injury or death, property damage or economic loss.
	ATTENTION: Identifies information about practices or circumstances that can cause injury or death.
	CAUTION: Identifies information about practices or circumstances that can cause property damage or economic loss.
	BURN HAZARD: Identifies where a surface can reach dangerous temperatures. If a warning label is fitted, it can be on or inside the equipment.
	This symbol identifies items which must be thought about and put in place when designing and assembling a Trusted controller for use in a Safety Instrumented Function (SIF). It appears extensively in the Trusted Safety Manual.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
NOTE	Provides key information about the product or service.
TIP	Tips give helpful information about using or setting up the equipment.

WARNINGS AND CAUTIONS

WARNING: EXPLOSION RISK

Do not connect or disconnect equipment while the circuit is live or unless the area is known to be free of ignitable concentrations or equivalent

AVERTISSEMENT - RISQUE D'EXPLOSION

Ne pas connecter ou déconnecter l'équipement alors qu'il est sous tension, sauf si l'environnement est exempt de concentrations inflammables ou équivalente

MAINTENANCE

Maintenance must be carried out only by qualified personnel. Failure to follow these instructions may result in personal injury.

CAUTION: RADIO FREQUENCY INTERFERENCE

Most electronic equipment is influenced by Radio Frequency Interference. Caution should be exercised with regard to the use of portable communications equipment around such equipment. Signs should be posted in the vicinity of the equipment cautioning against the use of portable communications equipment.

CAUTION:

The module PCBs contains static sensitive components. Static handling precautions must be observed. DO NOT touch exposed connector pins or attempt to dismantle a module.

ISSUE RECORD

Issue	Date	Comments
5	Sep 05	Format
6	Aug 06	Corrections
7	Sep 07	Fire input advice
8	Aug 12	Correction to fig10; switches reversed
9	Jun 16	Rebranded and updated to incorporate IEEE standards with correction of typographical errors and also standardise the Relative Humidity Range and Operating Temperature statements in the Specification Section.

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Table of Contents

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1. Description

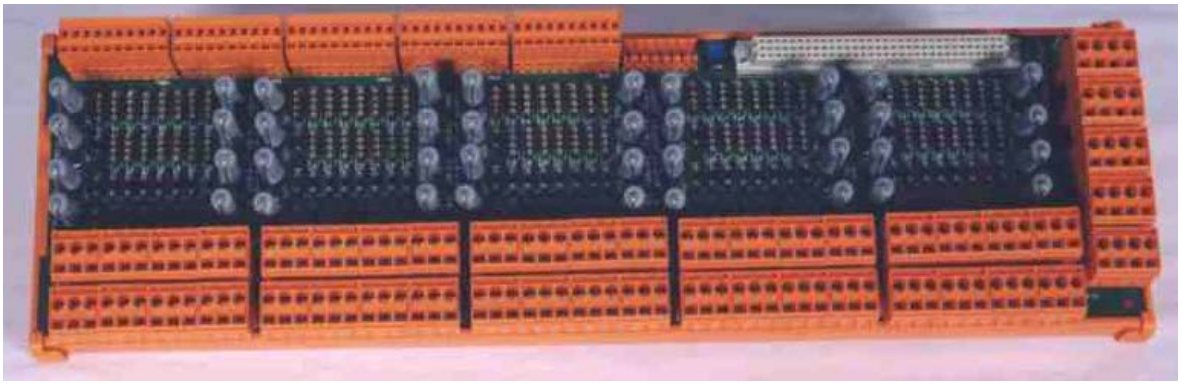

Figure 1 T8842 Layout

The Trusted Versatile FTA T8842 provides termination for a maximum of 40 input or output channels from various types of field devices. The input signals may be analogue (0 mA to 20 mA) or digital, whilst output signals are digital only with the T8448 Zone Interface Module. However, the Versatile FTA T8842 may be used with the T8480 Analogue Output module using the Digital Output configuration shown in this document.

The 40 channels are arranged in five power groups each comprising eight channels. Each channel circuit includes two resistors.

- High power 250 Ω 7 W 1 % resistors to limit short circuit current
- Precision 250 Ω 0.25 W 0.1 % resistors to measure analogue field current

Each circuit contains a set of link positions and can be configured with the following components supplied with the VFTA to enable the user to set the channel for the required input or output configuration.

- 50 mA plug-in TE5 series fuses to protect analogue current inputs
- 315 mA plug-in TE5 series fuses to protect digital inputs
- 2 A plug-in TE5 series fuses to protect digital outputs or act as low resistance links

The first channel of each power group may be configured as a power source for the other seven channels of the group, to allow fire loops to be hard reset by the application.

The cable linking the 40 channels on the Trusted Module to the VFTA is terminated at five 10-way connectors (TBG1 to TBG5). The dual 24 Vdc power supplies are connected to the VFTA via five 4-way connectors (TBFP1 to TBFP5). Forty 3-way connectors are used for the field loops (TB1 to TB40).

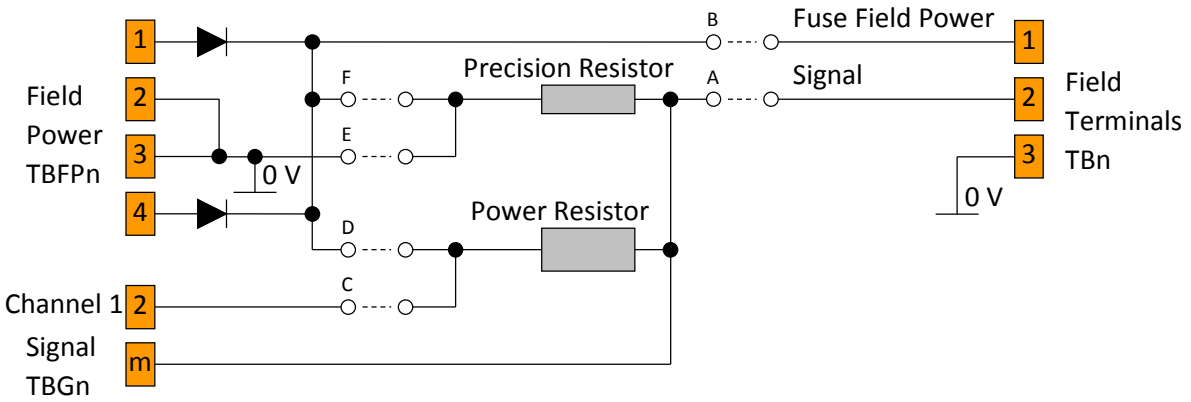

Figure 1 Layout for single channel showing all components

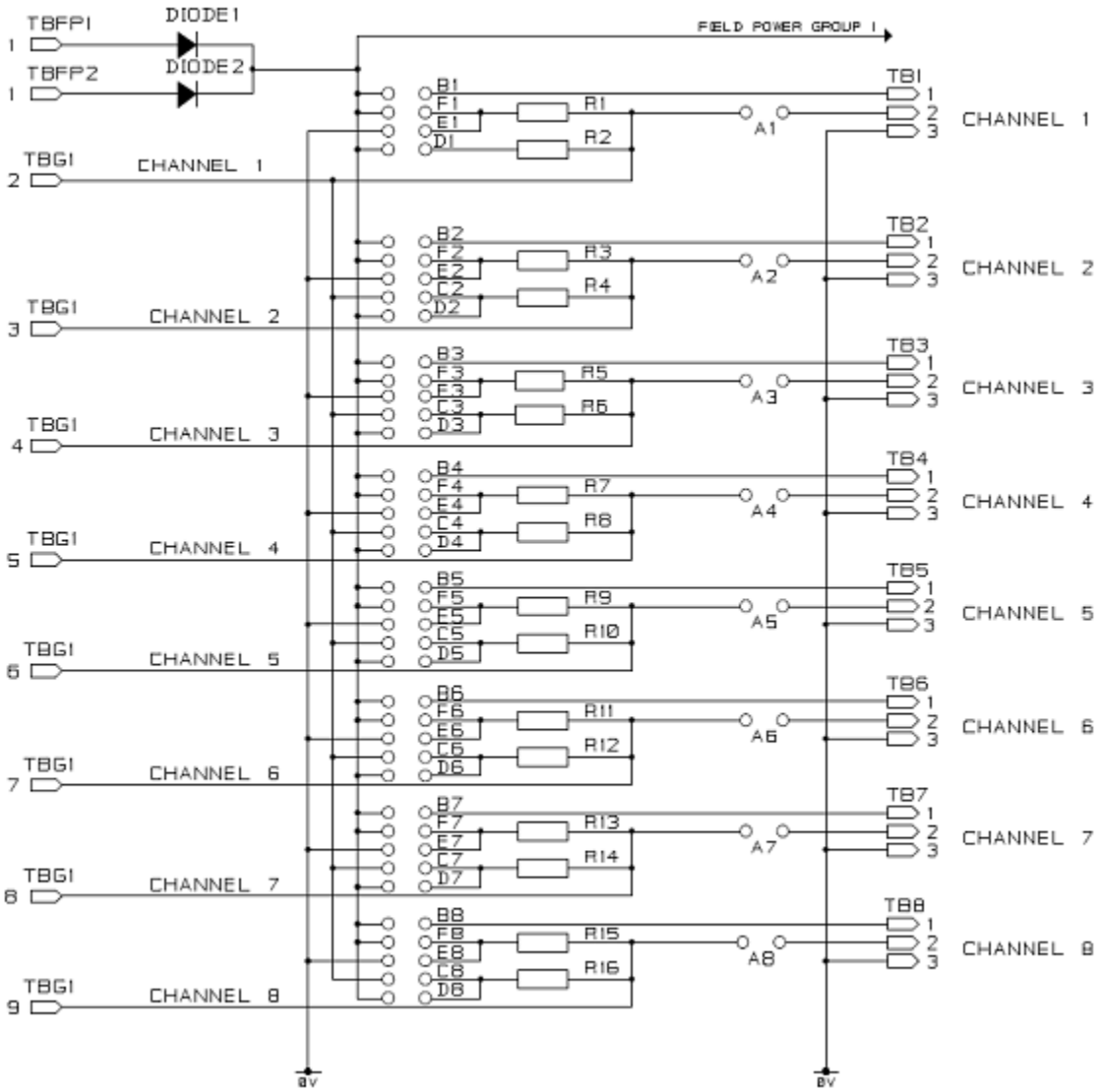

Figure 2 Power Group Configuration

The diagram above shows the full wiring for one power group of eight channels. This circuit is repeated for each of the five power groups.

In the diagram, odd-numbered resistors are precision 250 Ω and even numbered resistors are power 250 Ω. Links E and F cannot be fitted simultaneously, and links C and D cannot be fitted simultaneously.

Note that 24 V field power is required for a Zone Interface Module even if all channels are configured as volt-free inputs. This may be connected via the plug at the chassis end of the cable to a T8290 or T8297 distribution unit (for cables without power wires) or at the VFTA (for integral power cables).

Each power group is supplied from dual 24 Vdc feeds which are 'commoned' via diodes on the VFTA. The supply is then fed to each channel within the group. The feeds are rated at 3 amps maximum and are designed for input circuit power.

The following sub-paragraphs detail each type of input or output configuration.

1.1. Digital Inputs (Powered)

Figure 3 shows a channel configured to accept digital input signals from the field from devices which require power from the loop, e.g. fire input devices.

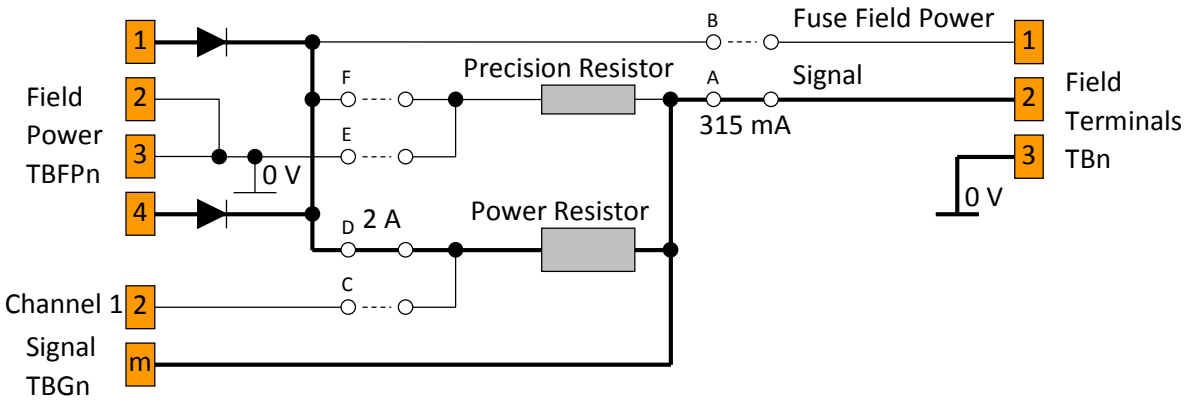

Figure 3 Digital Inputs (with power)

The configuration shown above enables powered digital input devices to be interfaced to the Trusted TMR Zone Interface module. The channel is configured by fitting a 315 mA fuse in position A, which provides circuit protection. Power for the field loop is derived from the dual 24 Vdc source via the 2 A fuse in position D, which acts as a link. The 250 Ω resistor (7 W 1 %) allows the field device status to be monitored via the resistor voltage drop. It also acts as a field current limiter (96 mA at 24 V). The voltage at the field side of the resistor is detected by the module and used to determine the healthy/alarm state from the field device.

For inputs which directly short the input or apply a fixed voltage (e.g. zener diode line monitoring), to a Zone Interface or Valve Monitor module, a 1 k 0.6 W resistor is required in position A. This is because the module requires an impedance to allow internal testing. Note that this will change the voltages seen by the module.

1.2. Digital Inputs (Line Monitored)

Figure 4 shows a channel configured to accept line monitored digital input signals.

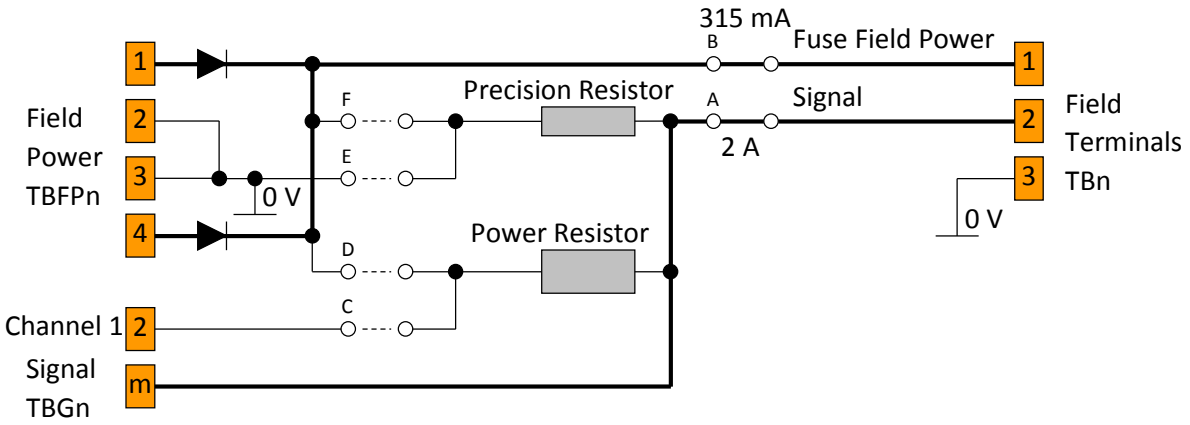

Figure 4 Digital Inputs (Line Monitored without power)

The configuration shown above enables line monitored digital input devices to be interfaced to the Trusted TMR Zone Interface module (or a TMR Digital Input module). The channel is configured by fitting a 315 mA fuse in position B, which provides circuit protection. Power for the field loop is derived from the dual 24 Vdc source. The input signal is returned via a 2 A fuse in position A, which acts as a link.

For inputs without line monitoring components or using zener diodes, to a Zone Interface or Valve Monitor module, a 1 K 0.6 W resistor is required in position A. This is because the module requires an impedance to allow internal testing. Note that this will change the voltages seen by the module.

1.3. Digital Output

Figure 5 shows the configuration required to provide digital outputs to the field.

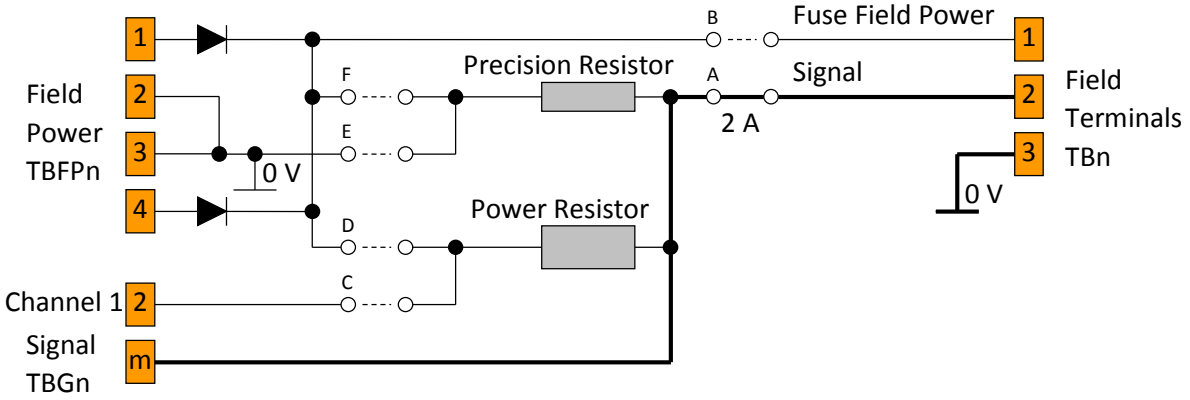

Figure 5 Digital Outputs

Powered digital outputs to the field may be provided by fitting a 2 A fuse in fuse position A, acting as circuit protection.

Note: The maximum output power from any single power group (8 outputs) is 8 A.

1.4. Analogue inputs (4 mA to 20 mA)

Figure 6 below shows the configurations required to accept input signals from current sourcing analogue field devices.

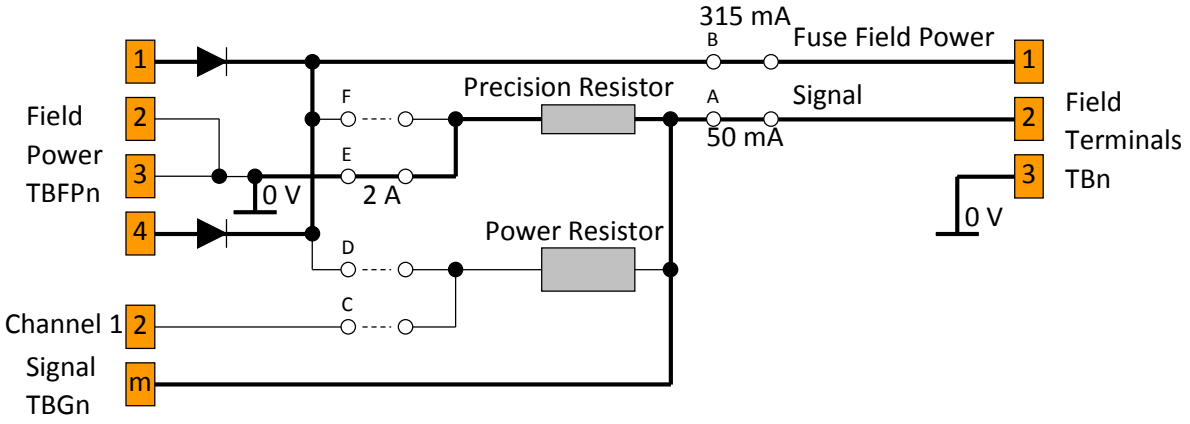

Figure 6 Current Sourcing Analogue Inputs

The (optional) field power for each channel configured for analogue inputs is derived from the dual 24 Vdc supplies via a 315 mA fuse fitted in fuse position B, which provides circuit protection.

Current sourcing analogue field devices may be interfaced to the VFTA by fitting a 2 A fuse in fuse position E, which acts as a link, and a 50 mA fuse in fuse position A, for circuit protection. This enables current detection through the 250 Ω resistor (high precision 0.1 %). The fuse in fuse position A limits the signal current to 50 mA.

Current sinking analogue field devices may only be interfaced to the VFTA using a current mirror interface. This interface may also include I.S. protection, e.g. MTL5040.

1.5. Fire Input Loops

Figure 7 below shows the configuration required to accept input signals from fire input loops. This configuration may be used for both I.S. and non-I.S. applications.

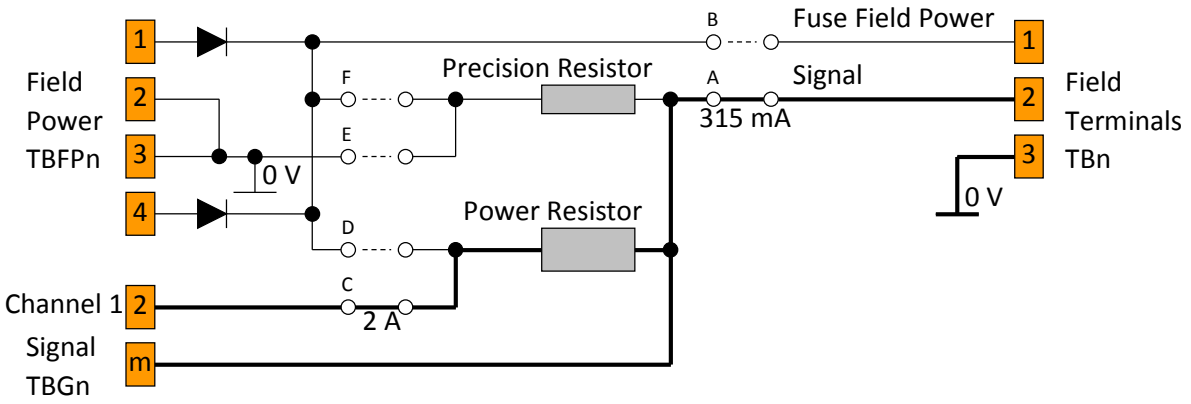

Figure 7 Fire Inputs

Latching fire detectors are reset by the removal of field power. Using this Fire Input configuration, fire loops can have their field power supplied from the Trusted module, using the first channel of a power group as a power supply, configured as a digital output. This provides control of the field loop from the application with no added components. The first channel must be wired as shown in Figure 5.

The supply voltage to the field loop is derived from the first channel in each power group and fed via the 2 A fuse located in fuse position C, which acts as a link. Position C is commoned to the remaining 7 channels in the associated power group. Each channel in the power group with a fire input loop connected requires a 315 mA fuse fitted in fuse position A, which provides circuit protection, and a 2 A fuse in position C, to connect to the switched field power. The 250 Ω resistor (7 W 1 %) allows the field device status to be monitored via the resistor voltage drop. It also acts as a field current limiter. The voltage at the field side of the resistor is detected by the module and used to determine the healthy/alarm state from the field device.

The maximum switched field supply current is 2 A in each power group, distributed across channels 2 to 8. The maximum loop current per channel is 96 mA at 24 V.

Note that the power supply channel 1 needs to be connected to a load of at least 50 mA to protect the output from no-load shutdown.

For inputs without line monitoring components or using zener diodes, to a Zone Interface or Valve Monitor module, a 1 K 0.6 W resistor is required between the Signal connection and the module (in series with the I/O cable). This is because the module requires an impedance to allow internal testing. Note that this will change the voltages seen by the module.

1.6. Monitored Valve Outputs

For a Trusted TMR Valve Monitor Module T8449, an output configuration as shown in Figure 5 is required to drive the safety valve. The valve position is monitored by the next channel configured as an input. This input may be an analogue position sensor, which is wired as shown in Figure 6. This input expects a 4 mA to 20 mA current loop from the position sensor. It may also be wired from a set of limit switches arranged in a resistor network. This

network is powered from 24 V and received as a voltage input as in Figure 4. The network should be arranged so that the voltage seen at the channel input passes through a series of steps as the switches are activated in turn. The steps should continue in one direction through the whole valve travel, or the valve monitor module will not be able to determine the valve position.

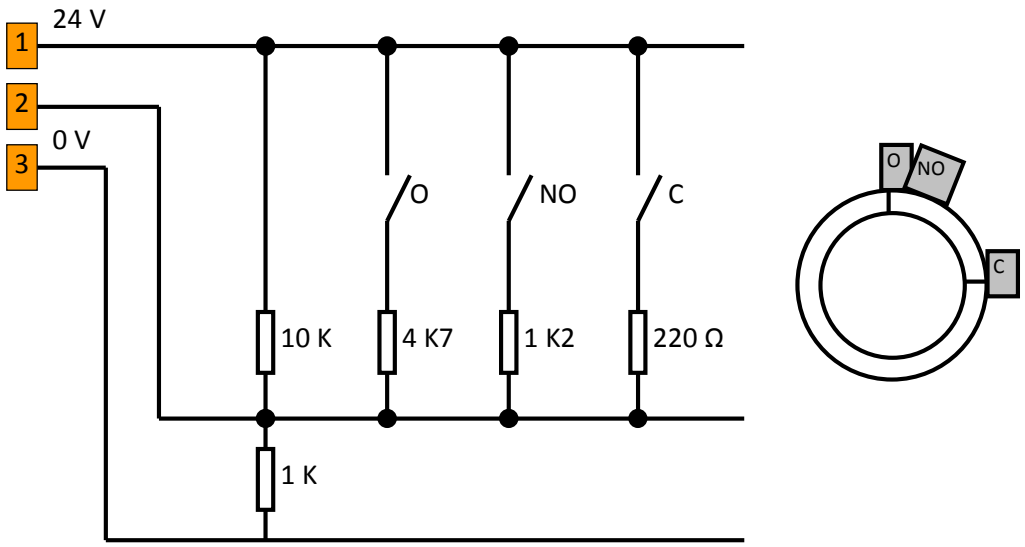

Figure 8 Position Limit Switches and circuit

The diagrams below shows an example switched voltage circuit, using Open, Nearly Open and Closed switches. Each switch is wired to close to the clockwise side of travel (note: 'O' will close when 'not open'). The resistor values shown will ensure that the lowest value resistor will override the state of the others. The thresholds are programmed into the module System.INI and set the target states for the valve test. They also allow room for open and short circuit detection.

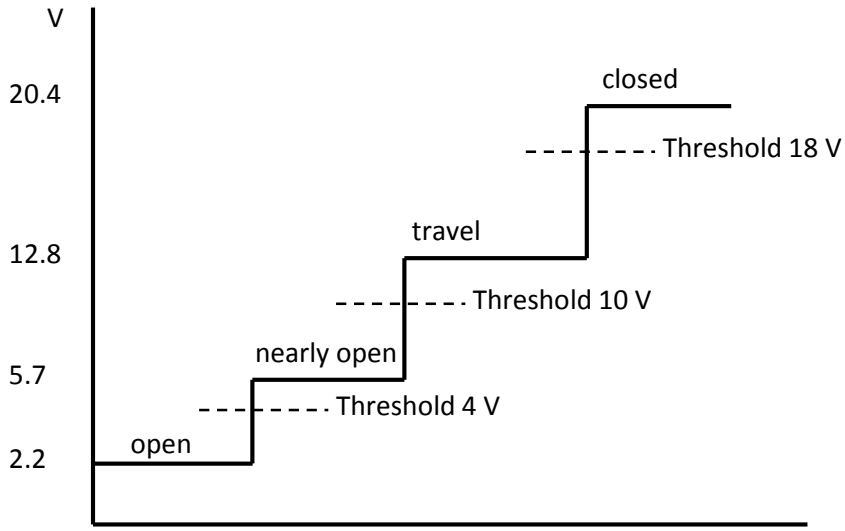

Figure 9 Voltage Input with Limit Switch Position

2. System Functions

The Trusted Versatile FTA 8842 is designed to be mounted on either of the TS32 or TS35 DIN rails in the horizontal or vertical positions as required.

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3. Installation

Note that 24 V field power is required even if all channels are configured as inputs. This may be connected via the plug at the chassis end of the cable to a T8290 or T8297 distribution unit (for cables without power wires) or at the VFTA (for integral power cables).

Refer to the product descriptions detailed below:

PD-TC000	Trusted Power Cables
PD-TC200	Trusted I/O Companion Slot Cables
PD-TC500	Trusted I/O SmartSlot Cables

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4. Assembly Pinout Connections

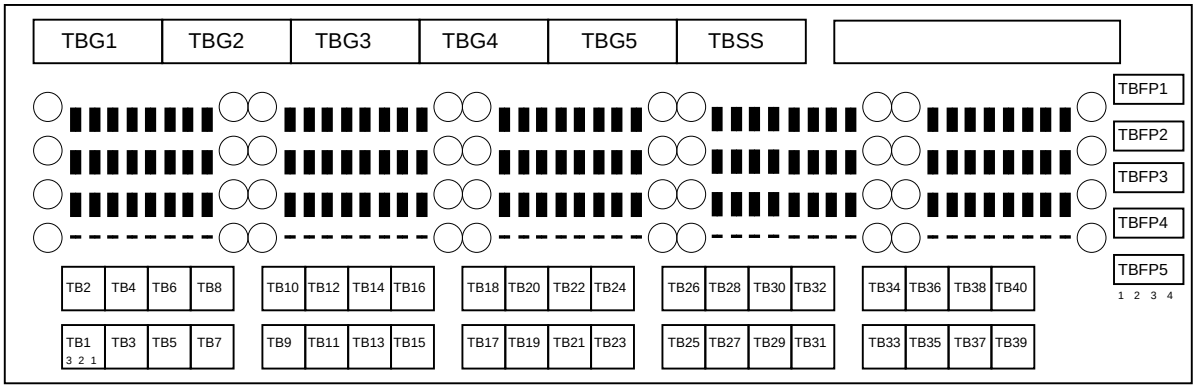

Figure 10 Connector Locations

4.1. TBFP1 to TBFP5 Connections

The pin connections of TBFP1 to TBFP5 are identical and are detailed below:

Pin	Service
1	24 V-1
2	0 V
3	0 V
4	24 V-2

Table 1 TBFP1 to TBFP5 Connections

Note: The 0 V for each group are interconnected on the VFTA.

4.2. TBG1 Connections

Pin	Service
1	0 V
2	Channel 1
3	Channel 2
4	Channel 3

Pin	Service
5	Channel 4
6	Channel 5
7	Channel 6
8	Channel 7
9	Channel 8
10	0 V (Not used)

Table 2 TBG1 Connections

4.3. TBG2 Connections

Pin	Service
1	0 V
2	Channel 9
3	Channel 10
4	Channel 11
5	Channel 12
6	Channel 13
7	Channel 14
8	Channel 15
9	Channel 16
10	0 V (Not used)

Table 3 TBG2 Connections

4.4. TBG3 Connections

Pin	Service
1	0 V

2	Channel 17
3	Channel 18
4	Channel 19
5	Channel 20
6	Channel 21
7	Channel 22
8	Channel 23
9	Channel 24
10	0 V (Not used)

Table 4 TBG3 Connections

4.5. TBG4 Connections

Pin	Service
1	0 V
2	Channel 25
3	Channel 26
4	Channel 27
5	Channel 28
6	Channel 29
7	Channel 30
8	Channel 31
9	Channel 32
10	0 V (Not used)

Table 5 TBG4 Connections

4.6. TBG5 Connections

Pin	Service
1	0 V
2	Channel 33
3	Channel 34
4	Channel 35
5	Channel 36
6	Channel 37
7	Channel 38
8	Channel 39
9	Channel 40
10	0 V (Not used)

Table 6 TBG5 Connections

4.7. TBSS Connections

Pin	Service
1	Auxiliary Input (Not used)
2	Auxiliary Input (Not used)
3	Smart Slot A (Not used)
4	Smart Slot B (Not used)
5	Smart Slot C (Not used)
6	Channel 41
7	Channel 0

Table 7 TBSS Connections

4.8. TB1 to TB40 Connections

The pin connections of TB1 to TB40 are identical and are detailed below:

Pin	Service
1	Field power
2	Signal in
3	0 V

Table 8 TB1 to TB40 Connections

4.9. Links

Links 1 to 6 are not used in this configuration and should be fitted in position B or removed.

Links 1 to 5 wire power from each group to the unused TBSS terminals 2 and 7. Link 6 wires TBSS terminals 1 and 6 to zero V. SmartSlot operation is no longer performed on the VFTA and therefore the links should not be fitted.

Each channel has a set of links to configure the conditioning circuit, as referenced on the previous pages. These are detailed below.

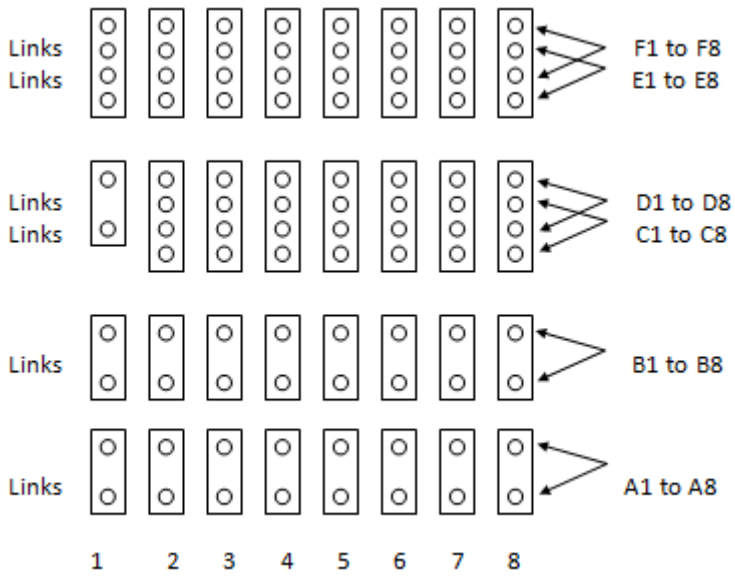

Figure 11 Link Detail (for first group)

Note: The pitch and spacing of the links prevent invalid configuration if the fuses supplied with the VFTA are used.

Groups 2 to 5 are arranged in the same way. The channel links are numbered on the PCB.

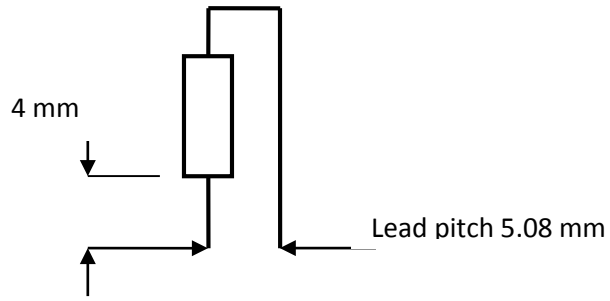

Figure 12 Resistor Forming

Where 1 K resistors are required as described in this document, the resistor leads should be formed as shown below.

5. Specifications

Voltage Range (Field Supply)	18 Vdc to 28 Vdc
Fuses	40-off 2 A plug-in TE-5 series ICS part number 813409 40-off 315 mA plug-in TE-5 series ICS part number 813407 40-off 50 mA plug-in TE-5 series ICS part number 813405
Maximum Current (Field Supply)	2.52 A per power group
Recommended Operating Current (Field Supply)	220 mA per channel
Power Consumption (Field Supply)	9 W maximum
Signal Input Range	0 mA to 20 mA
Operating Temperature	0 °C to +60 °C (+32 °F to +140 °F)
Non-operating Temperature	-25 °C to +70 °C (-13 °F to +158 °F)
Relative Humidity range (operating, storage & transport)	10 % – 95 %, non-condensing
Environmental Specifications	Refer to Document. 552517
Dimensions	
Height	110 mm (4.33 in)
Width	360 mm (14.17 in)
Depth (including mounting rail and connectors)	68 mm (2.67 in)
Weight	950 g (2.1 lb)