



TCM User Guide

Trip Circuit Management Relay

RMS Mors Smitt

Advanced Protection Devices



User Guide

TCM User Guide

About This Manual

This User Guide covers all TCM relays manufactured from October 2019. Earlier relays do not necessarily incorporate all the features described. Our policy of continuous development means that extra features & functionality may have been added.

The TCM User Guide is designed as a generic document to describe the common operating parameters for all relays built on this platform.

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Documentation

Technical Bulletin

The detailed technical attributes, functional description & performance specifications for the TCM are described in the product Technical Bulletin.

The order of precedence for product information is as follows:

- Technical Bulletin
- User Guide

User Guide

This User Guide covers all TCM relay versions & describes the generic features & attributes common across all versions.

Different relay versions are required to cater for varying customer requirements such as auxiliary voltage range, I/O configuration, case style, relay functionality etc.

Introduction

The Trip Circuit Manager (TCM) relay is a modular high-performance tripping relay with integrated supervision functions designed for power utility protection and control applications.

The TCM relay provides both tripping and supervision functions integrated in a single relay.

The supervision functions monitored by the TCM include:

- Trip supply supervision (TSS)
- Trip relay supervision (TRS)
- Trip circuit supervision (TCS) - Optional

The TCM is offered with a high input burden or alternatively an optional low burden specification.

The trip contact configurations available include 4, 8, 12 and 16 change over contacts fitted with magnetic arc blowouts.

TCM relay variants are available with either self reset contacts or latching contacts with hand and electrical reset.

TCM Variants

The available combinations of TCM are summarised below:

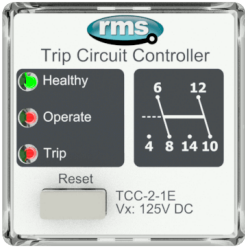
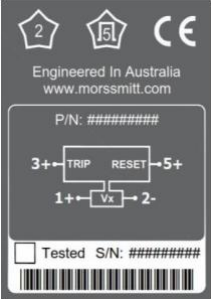
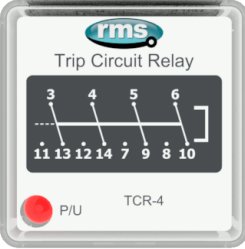
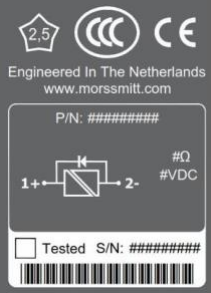
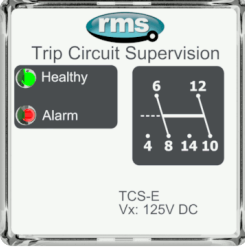
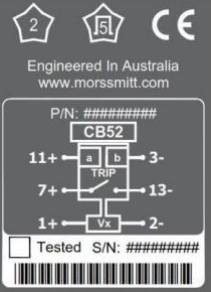
Trip Function	Supervision Function	Trip Contact	Relay chassis size	TCM Variant
TCM-1 Self Reset Contacts Hand Reset Flag	1 (TSS + TRS + 1xTCS)	1 (4 C/O)	4	TCM-111
	0 (TSS + TRS)	2 (8 C/O)	4	TCM-102
	1 (TSS + TRS + 1xTCS)		4	TCM-112
	3 (TSS + TRS + 3xTCS)		6	TCM-132
	0 (TSS + TRS)	3 (12 C/O)	4	TCM-103
	1 (TSS + TRS + 1xTCS)		6	TCM-113
	2 (TSS + TRS + 2xTCS)		6	TCM-123
	0 (TSS + TRS)		4 (16 C/O)	6
	1 (TSS + TRS + 1xTCS)	6		TCM-114

Trip Function	Supervision Function	Trip Contact	Relay chassis size	TCM Variant
TCM-2 Latching Contacts Hand and Electrical Reset Contacts and Flag	1 (TSS + TRS + 1xTCS)	1 (4 C/O)	4	TCM-211
	0 (TSS + TRS)	2 (8 C/O)	4	TCM-202
	1 (TSS + TRS + 1xTCS)		4	TCM-212
	3 (TSS + TRS + 3xTCS)		6	TCM-232
	0 (TSS + TRS)	3 (12 C/O)	4	TCM-203
	1 (TSS + TRS + 1xTCS)		6	TCM-213
	2 (TSS + TRS + 2xTCS)		6	TCM-223
	0 (TSS + TRS)	4 (16 C/O)	6	TCM-204
	1 (TSS + TRS + 1xTCS)		6	TCM-214

Trip Function	Supervision Function	Trip Contact	Relay chassis size	TCM Variant
TCM-3 Latching Contacts Electrical Reset Contacts Hand Reset Contacts and Flag	1 (TSS + TRS + 1xTCS)	1 (4 C/O)	4	TCM-311
	0 (TSS + TRS)	2 (8 C/O)	4	TCM-302
	1 (TSS + TRS + 1xTCS)		4	TCM-312
	3 (TSS + TRS + 3xTCS)		6	TCM-332
	0 (TSS + TRS)	3 (12 C/O)	4	TCM-303
	1 (TSS + TRS + 1xTCS)		6	TCM-313
	2 (TSS + TRS + 2xTCS)		6	TCM-323
	0 (TSS + TRS)	4 (16 C/O)	6	TCM-304
	1 (TSS + TRS + 1xTCS)		6	TCM-314

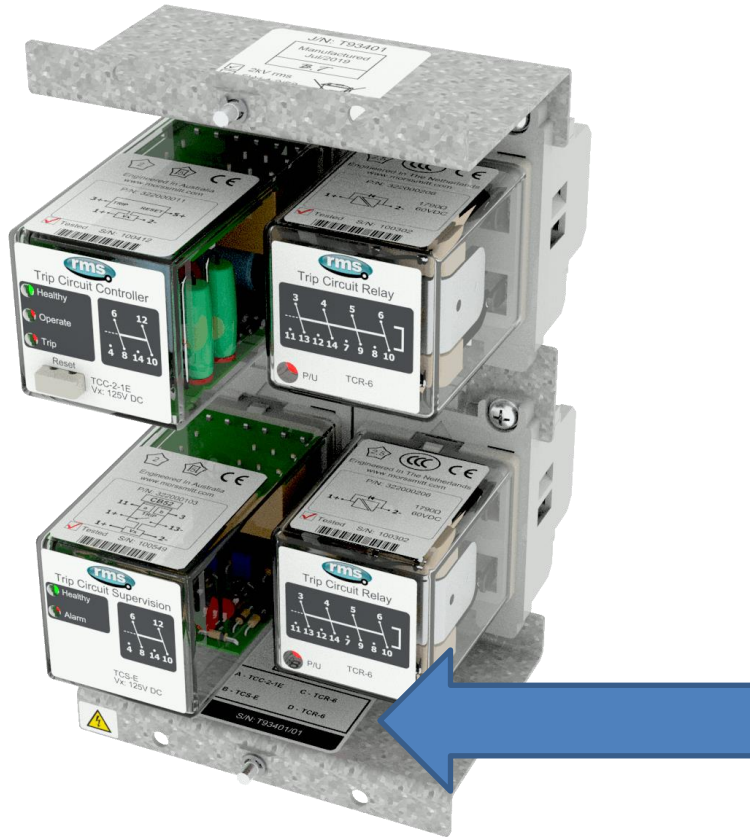
TCM Component Modules

The following modules provide the building blocks for the various TCM variants:

Module Function	Output Connection Diagram	Auxiliary Connection Diagram
<p>TCC (Trip Circuit Controller)</p> <p>(Each TCM has only one TCC which is always installed in TCM position A, refer to TCM Chassis Build Arrangements)</p>	 <p>The diagram shows a Trip Circuit Controller (TCC-2-1E) with a 'Healthy' indicator (green), 'Operate' (red), and 'Trip' (red) buttons. It features a terminal block with terminals 4, 6, 8, 10, 12, and 14. The model is TCC-2-1E, Vx: 125V DC.</p>	 <p>The auxiliary connection diagram shows a terminal block with terminals 2, 3+, 5+, 1+, and 2-. It includes a TRIP terminal connected to 3+ and a RESET terminal connected to 5+. A voltage source Vx is connected between 1+ and 2-. The diagram also shows CE and 2/5 certifications, P/N and S/N fields, and a barcode.</p>
<p>TCR (Trip Circuit Relay)</p>	 <p>The diagram shows a Trip Circuit Relay (TCR-4) with a P/U (Push/Unlock) button. It features a terminal block with terminals 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14. The model is TCR-4.</p>	 <p>The auxiliary connection diagram shows a terminal block with terminals 1+ and 2-. It includes a relay symbol with a coil and contacts. The diagram also shows CE and 2.5/3 certifications, P/N and S/N fields, and a barcode.</p> <p>NOTE: FACTORY PRE-WIRED. NO ADDITIONAL WIRING REQUIRED.</p>
<p>TCS (Trip Circuit Supervision) Optional</p>	 <p>The diagram shows a Trip Circuit Supervision (TCS-E) module with 'Healthy' (green) and 'Alarm' (red) indicators. It features a terminal block with terminals 4, 6, 8, 10, 12, and 14. The model is TCS-E, Vx: 125V DC.</p>	 <p>The auxiliary connection diagram shows a terminal block with terminals 11+, 7+, 1+, 3-, 13-, and 2-. It includes a CB52 relay symbol. The diagram also shows CE and 2/5 certifications, P/N and S/N fields, and a barcode.</p>

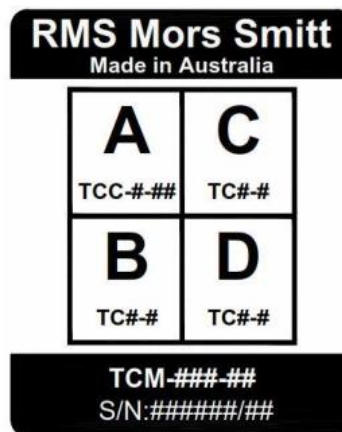
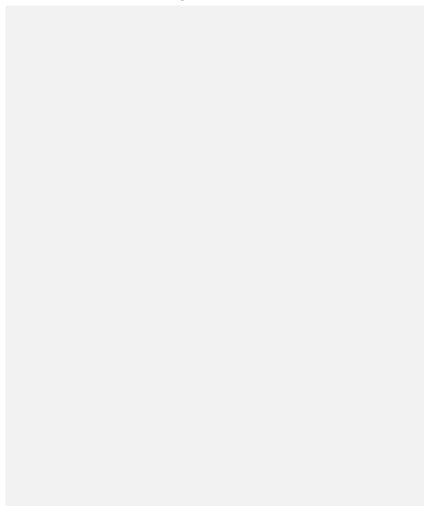
TCM Module Identification within a TCM Variant

The module positions within each TCM variant are identified on a module identification label positioned on the bottom of the TCM chassis:

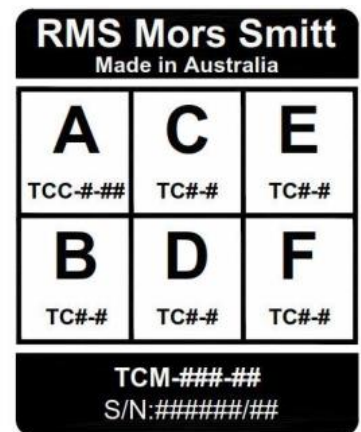


The specific module part numbers for the TCM variant are also shown on the module identification label. Use these part numbers to identify replacement or spare modules that may be required.

Some example module identification labels are shown below:



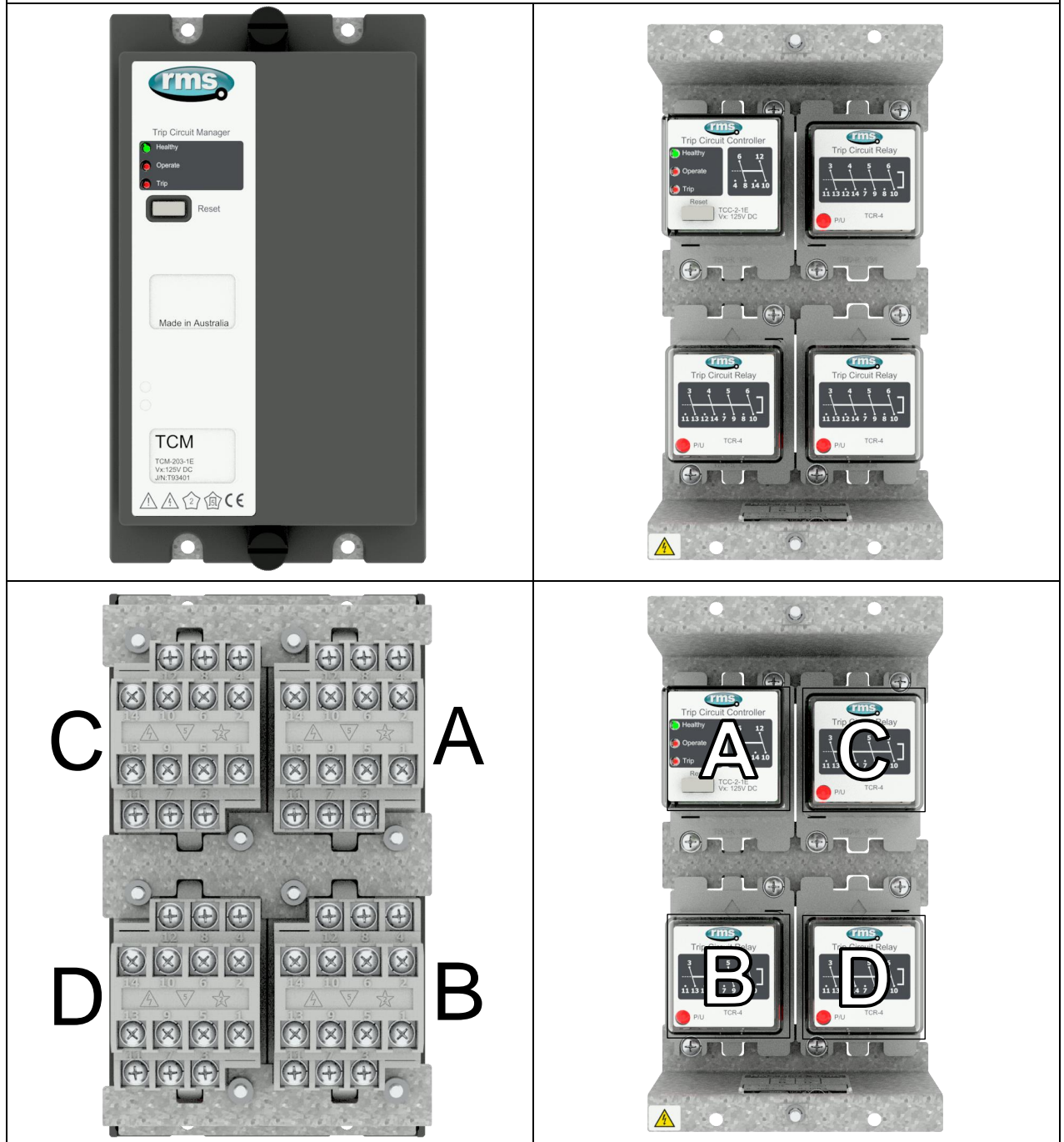
Size 4



Size 6

TCM Chassis Build Arrangements

Size 4 TCM (Showing module positions A, B, C and D)



Notes:

1. All TCM combinations come with factory prewiring from the TCC module to the TCR modules.
2. All factory prewiring must remain undisturbed.
3. The TCC must always be located in position A.
4. TCR modules must never be placed in position A. TCR modules may be damaged if placed in position A.

Size 6 TCM (Showing module positions A, B, C, D, E and F)



Notes:

1. All TCM combinations come with factory prewiring from the TCC module to the TCR modules.
2. All factory prewiring must remain undisturbed.
3. The TCC must always be located in position A.
4. TCR modules must never be placed in position A. TCR modules may be damaged if placed in position A.

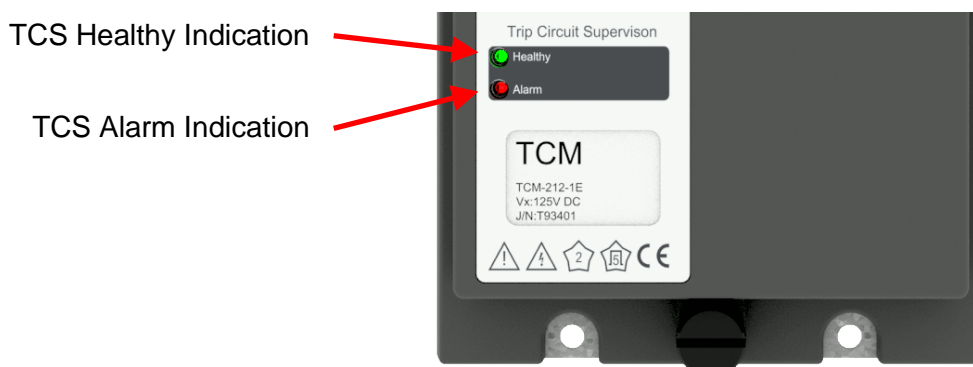
TCM Indications

Front Layout

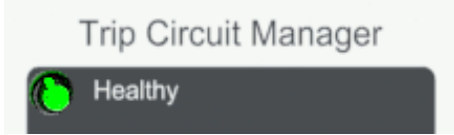
The picture below depicts the indications provided on the front of the TCM.




Additional indications are provided for TCM variants equipped with Trip Circuit Supervision:



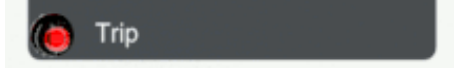
Healthy LED Indicator (TCM)

	<p>Upon power up and provided the supervision status is healthy, the Healthy LED illuminates. In this state, the supervision alarm contacts are also picked up.</p> <p>If either the trip supply is unhealthy or if there is a problem with a TCR module, the LED will extinguish and the TCM supervision alarm contacts will drop out. A TCM supervision alarm should be treated as URGENT and attended to as soon as possible. The supervision alarm is an indication that the protection tripping function has been impaired.</p> <p>A failure of any one TCR will give rise to a TCM supervision alarm condition as described above. Note that under these conditions there will be partial tripping capability on any remaining healthy TCR module circuits in the form of a fixed width 50 msec pulse. The 50 msec pulse will be issued on both self-reset and latching TCM variants regardless of a sustained or momentary operate input.</p> <p>The Healthy LED self resets following reinstatement of all healthy supervision conditions.</p>
---	--


Operate LED Indicator (TCM)

	<p>Indicates when the relay operate input is energised.</p> <p>The Operate LED is self resetting.</p>
---	---

Trip LED Indicator (TCM)

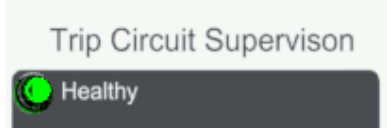
	<p>The Trip LED illuminates to indicate that a trip condition has occurred.</p> <p>Once the relay has operated, the LED will remain illuminated until a Trip indication reset.</p>
---	--

Trip Indicator Reset Push Button (TCM)

	<p>Provided the operate input signal is removed, the trip indicator reset push button will clear the Trip LED and reset latched contacts.</p>
---	---

The following additional indications are provided for TCM variants equipped with Trip Circuit Supervision:

Healthy LED Indicator (TCS)

	<p>Upon power up and provided the supervision status is healthy, the Healthy LED illuminates. In this state the supervision alarm contacts are also picked up.</p> <p>If either the trip supply is unhealthy or if there is a problem with the trip circuit, the LED will extinguish and the TCS supervision alarm contacts will drop out.</p> <p>The Healthy LED self resets following reinstatement of all healthy supervision conditions.</p>
---	--

Alarm LED Indicator (TCS)



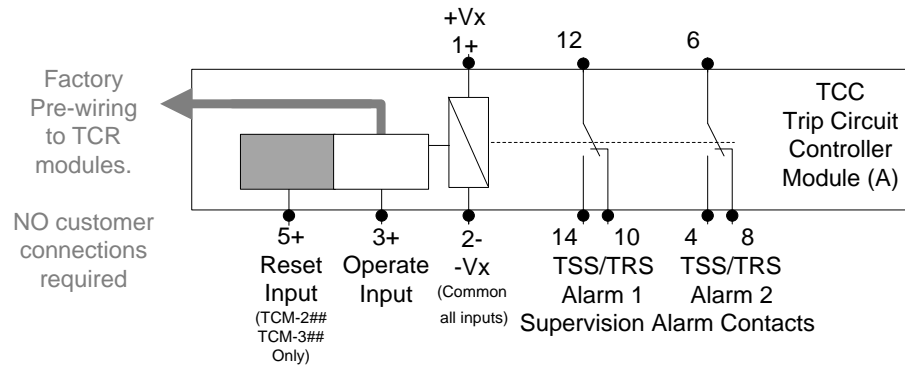
Upon power up and provided the supervision status is healthy, the Alarm LED will be extinguished. In this state the supervision alarm contacts are also picked up.

If there is a problem with the trip circuit, the Alarm LED will illuminate and the TCS supervision alarm contacts will drop out.

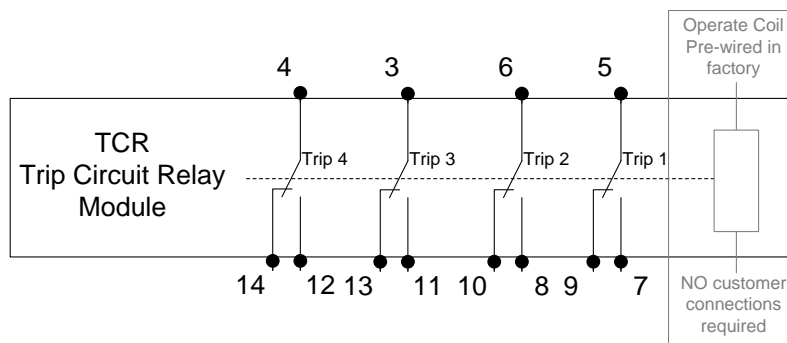
The Alarm LED self resets following reinstatement of all healthy supervision conditions.

Relay Connections and Scheme Wiring

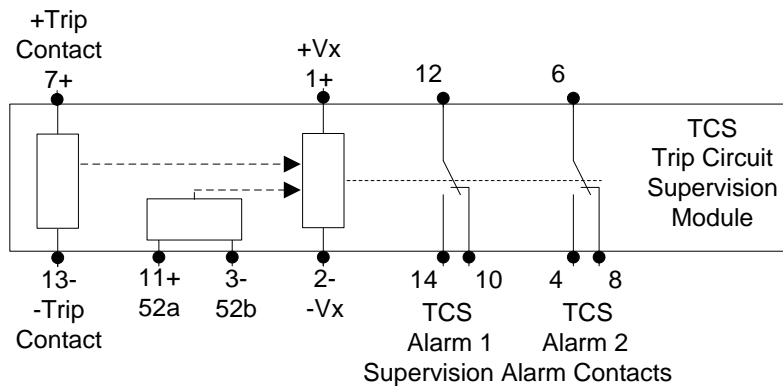
TCM TCC Module Connection diagram



TCM TCR Module Connection diagram

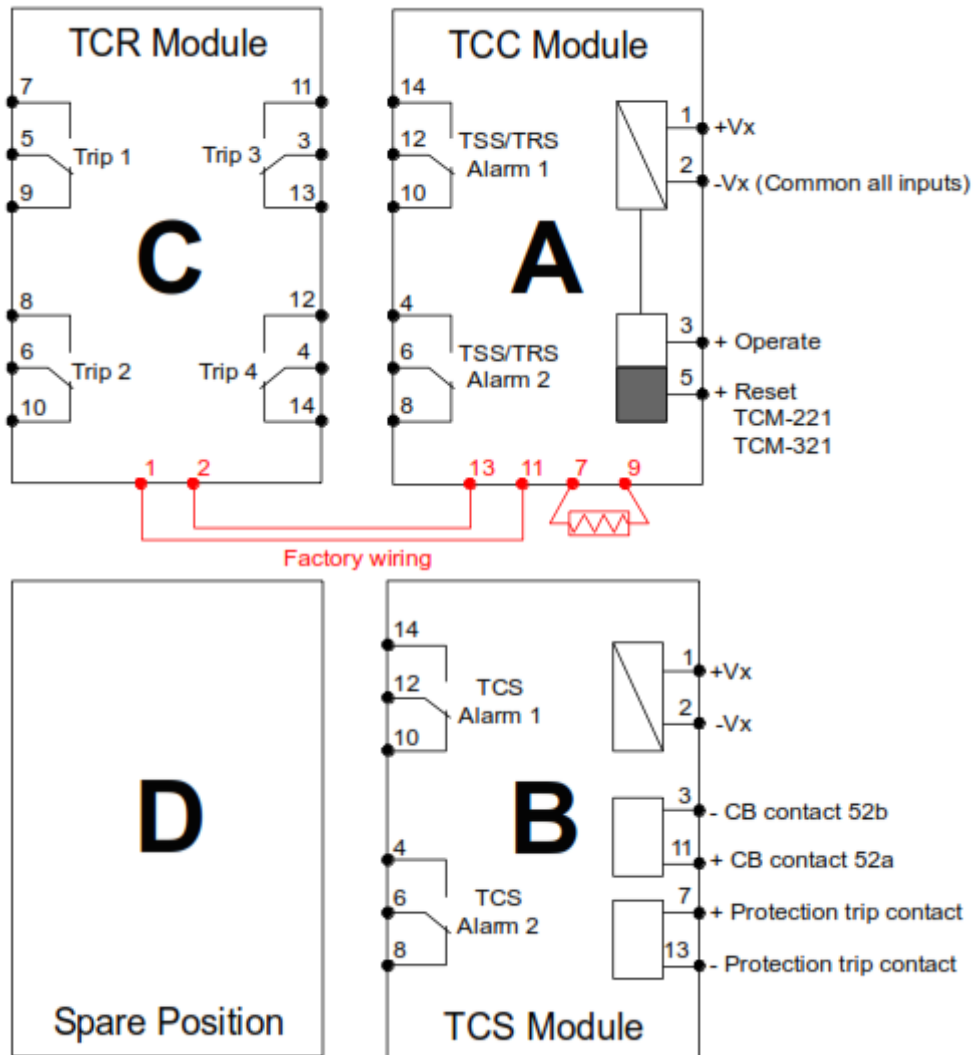


TCS Module Trip Circuit Supervision Connection diagram



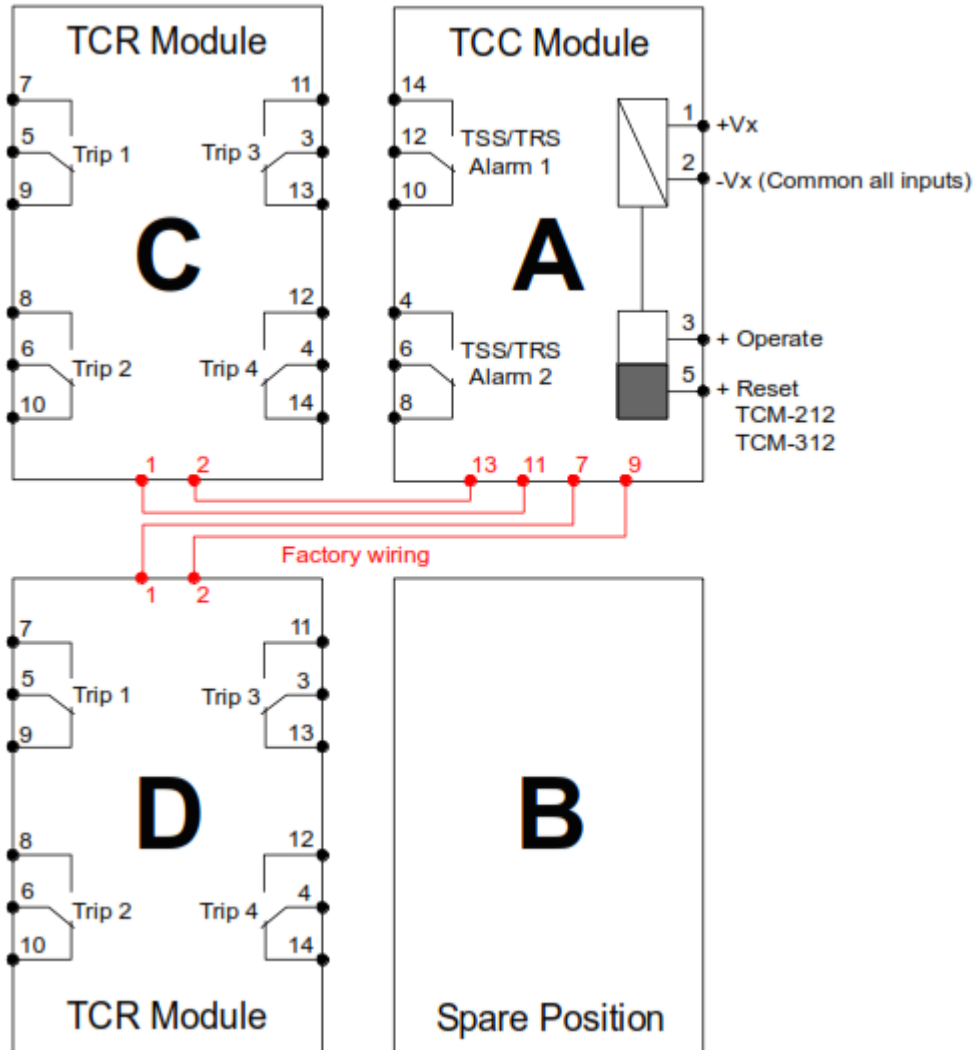
TCM Variant Connection diagrams

TCM-111 / TCM-211 / TCM-311



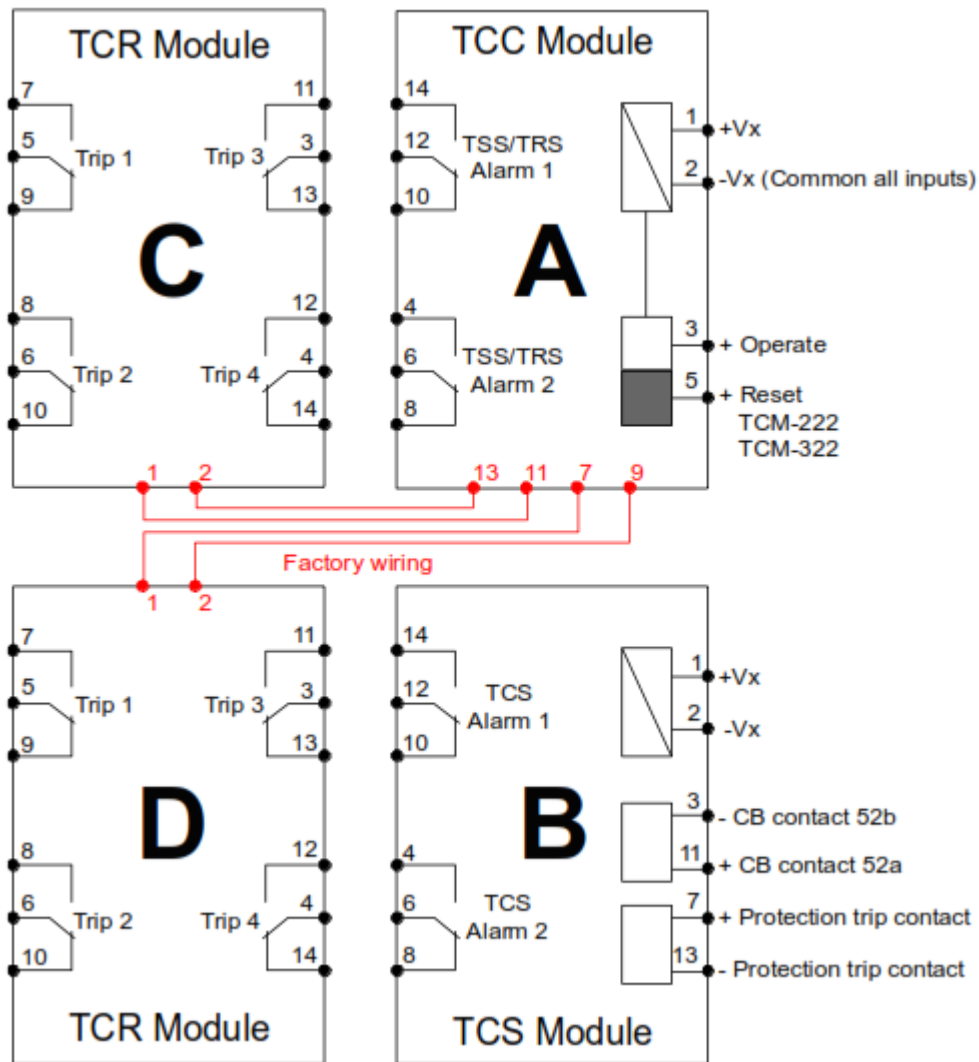
Note: All diagrams are viewed from the rear terminal side – no auxiliary supply connected, and all contacts dropped out.

TCM-102 / TCM-202 / TCM-302



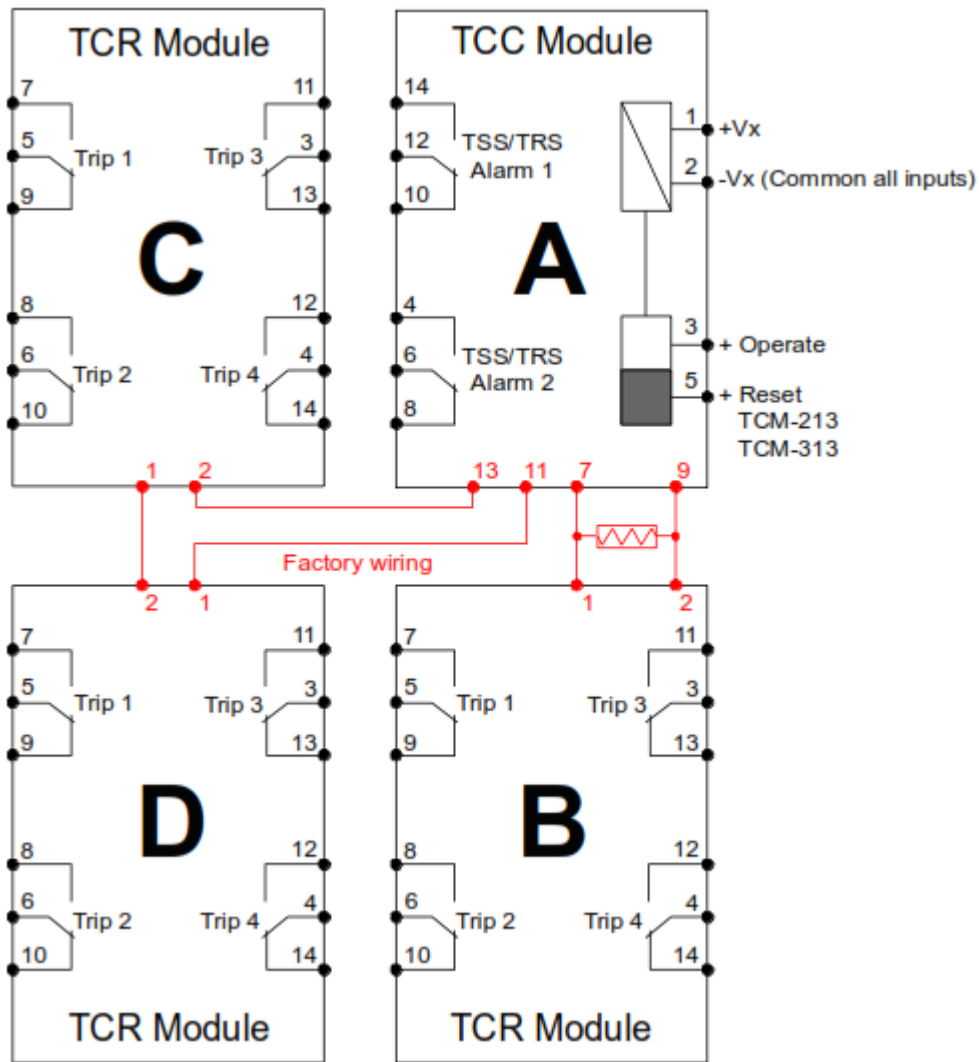
Note: All diagrams are viewed from the rear terminal side – no auxiliary supply connected, and all contacts dropped out.

TCM-112 / TCM-212 / TCM-312



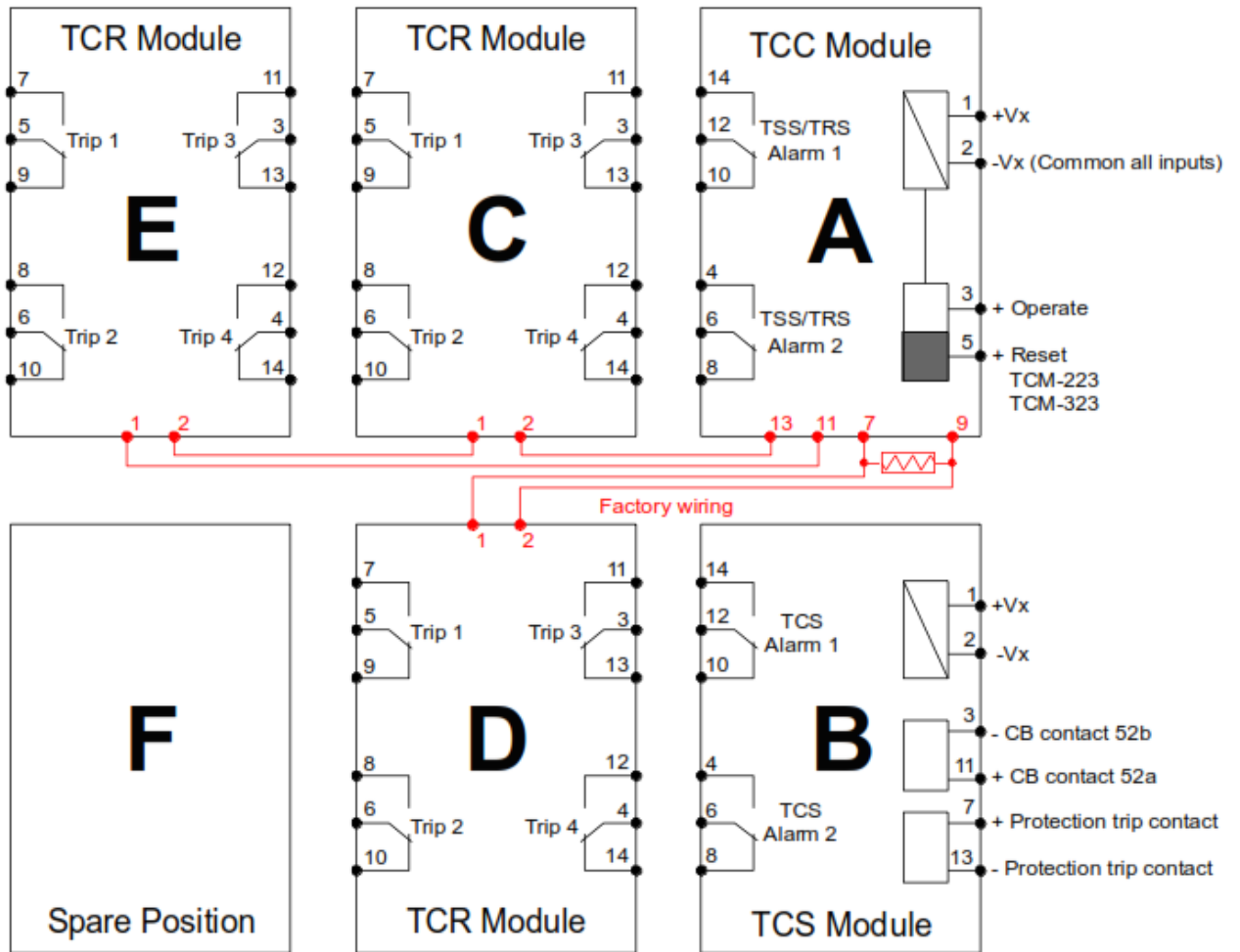
Note: All diagrams are viewed from the rear terminal side – no auxiliary supply connected, and all contacts dropped out.

TCM-103 / TCM-203 / TCM-303



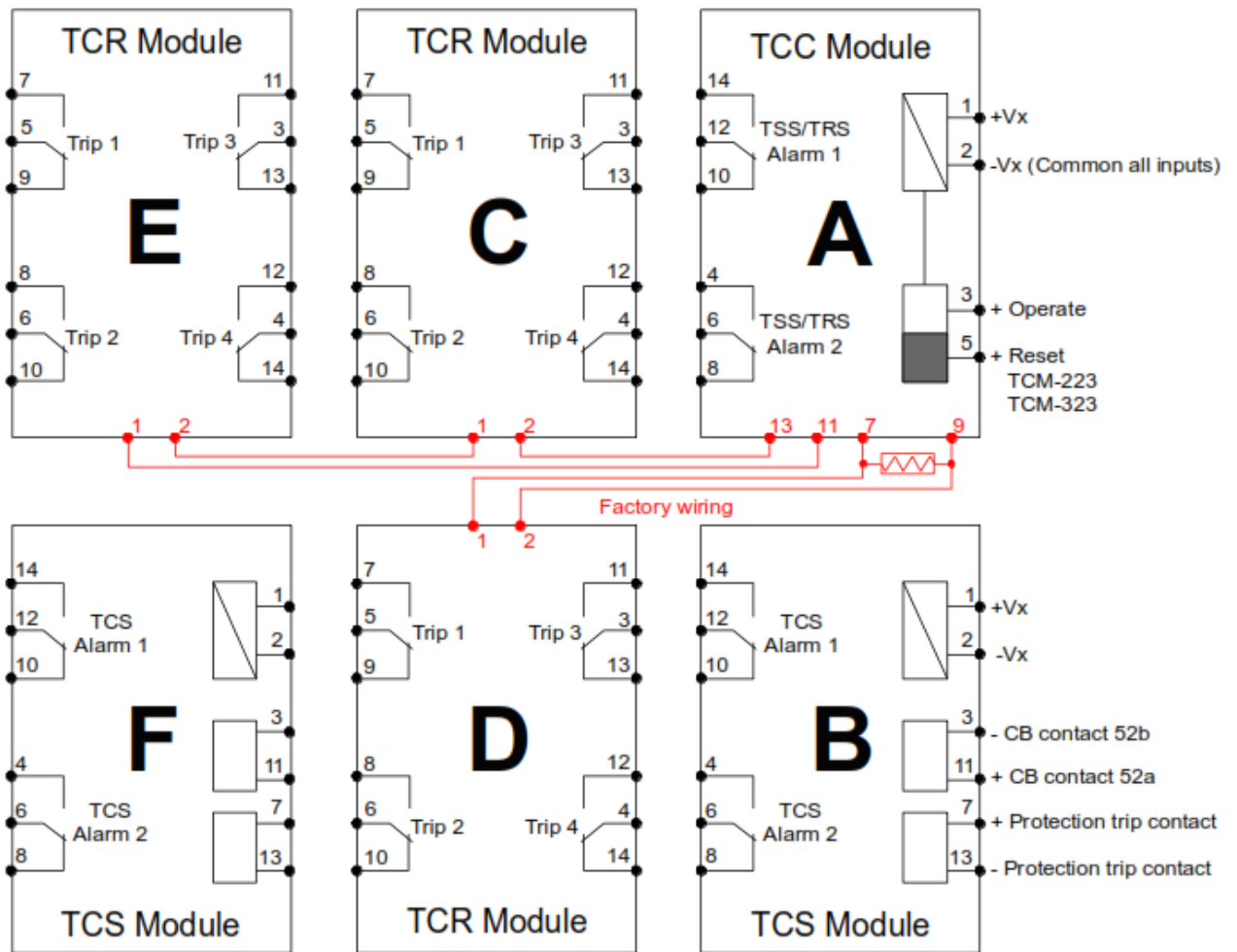
Note: All diagrams are viewed from the rear terminal side – no auxiliary supply connected, and all contacts dropped out.

TCM-113 / TCM-213 / TCM-313



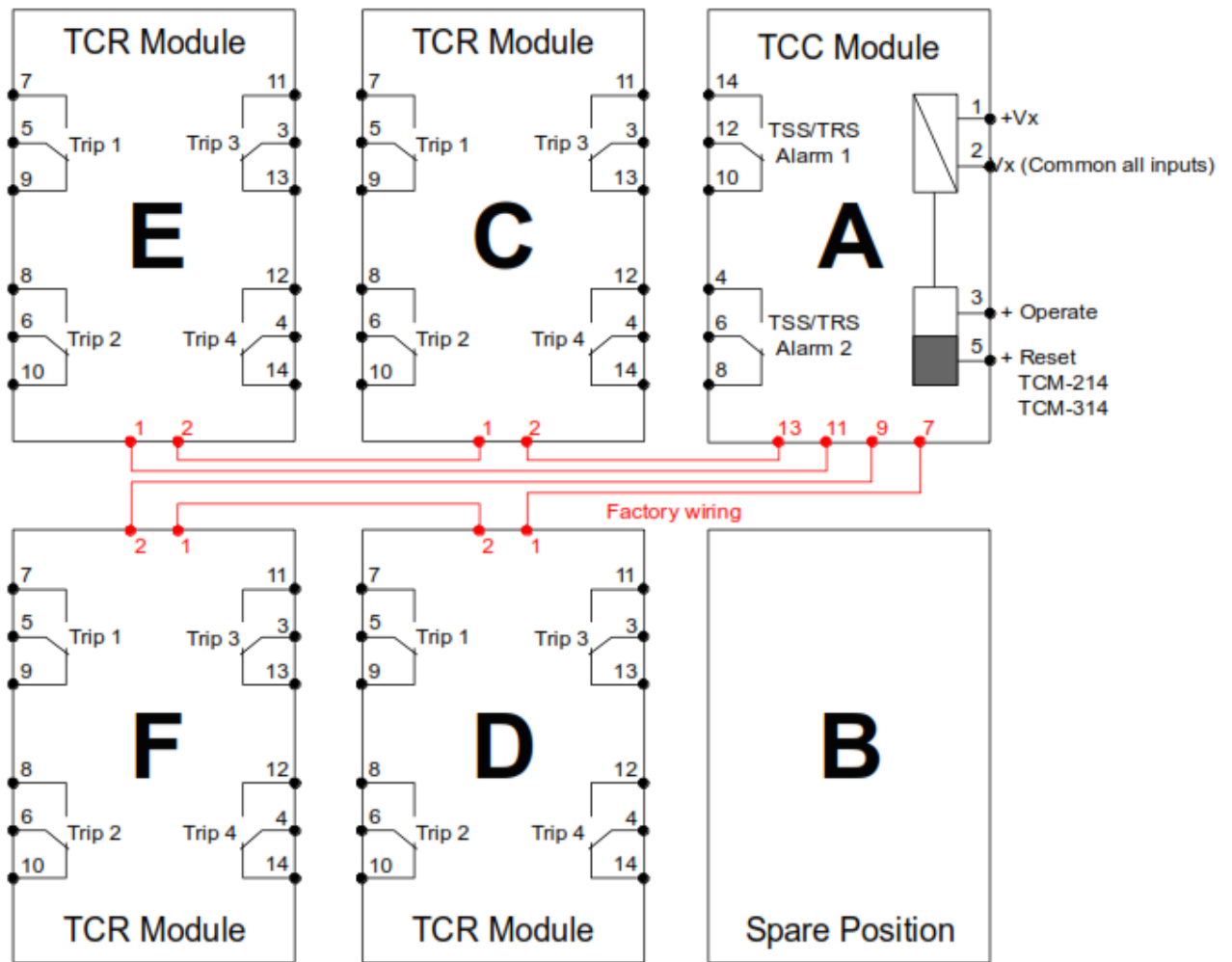
Note: All diagrams are viewed from the rear terminal side – no auxiliary supply connected, and all contacts dropped out.

TCM-123 / TCM-223 / TCM-323



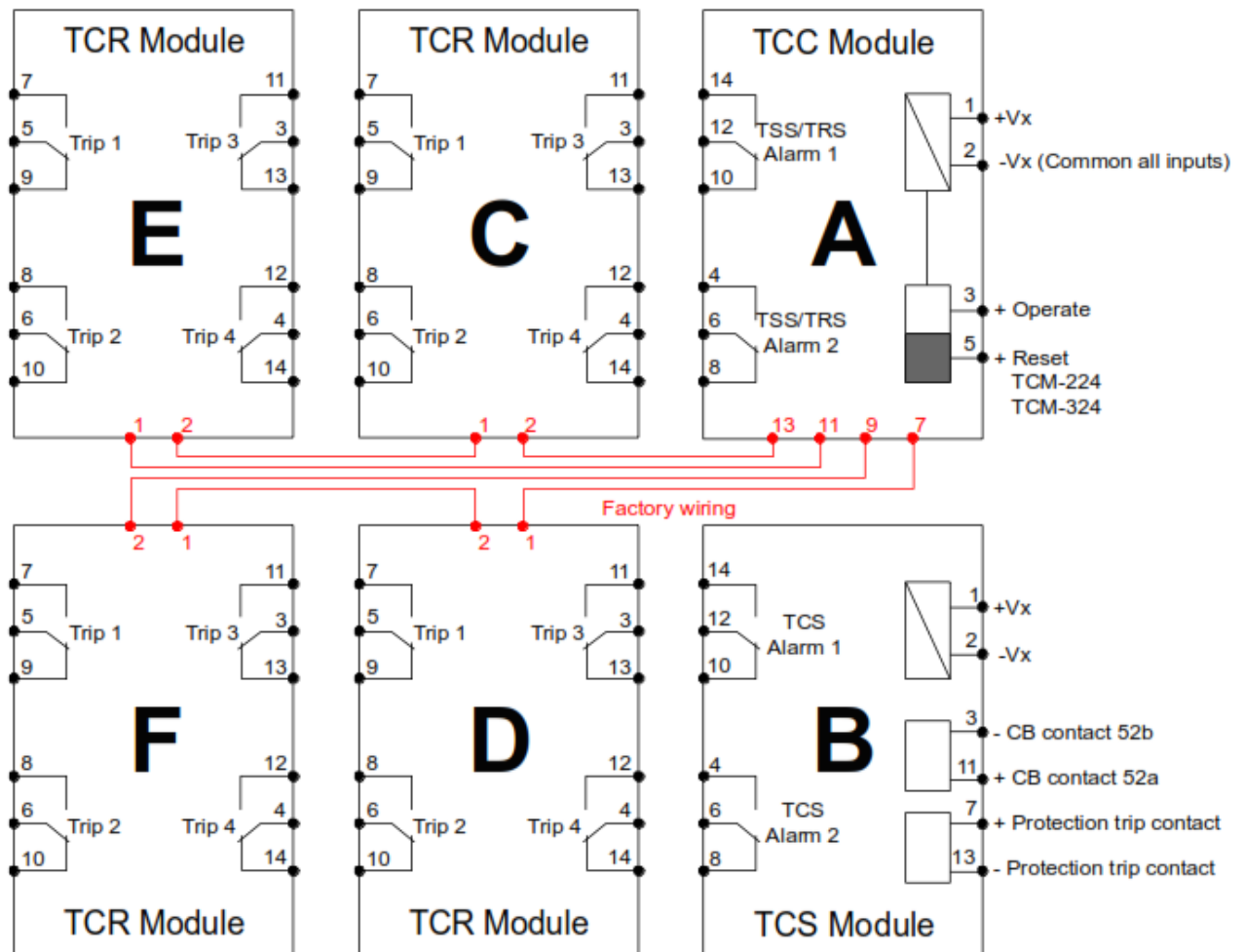
Note: All diagrams are viewed from the rear terminal side – no auxiliary supply connected, and all contacts dropped out.

TCM-104 / TCM-204 / TCM-304



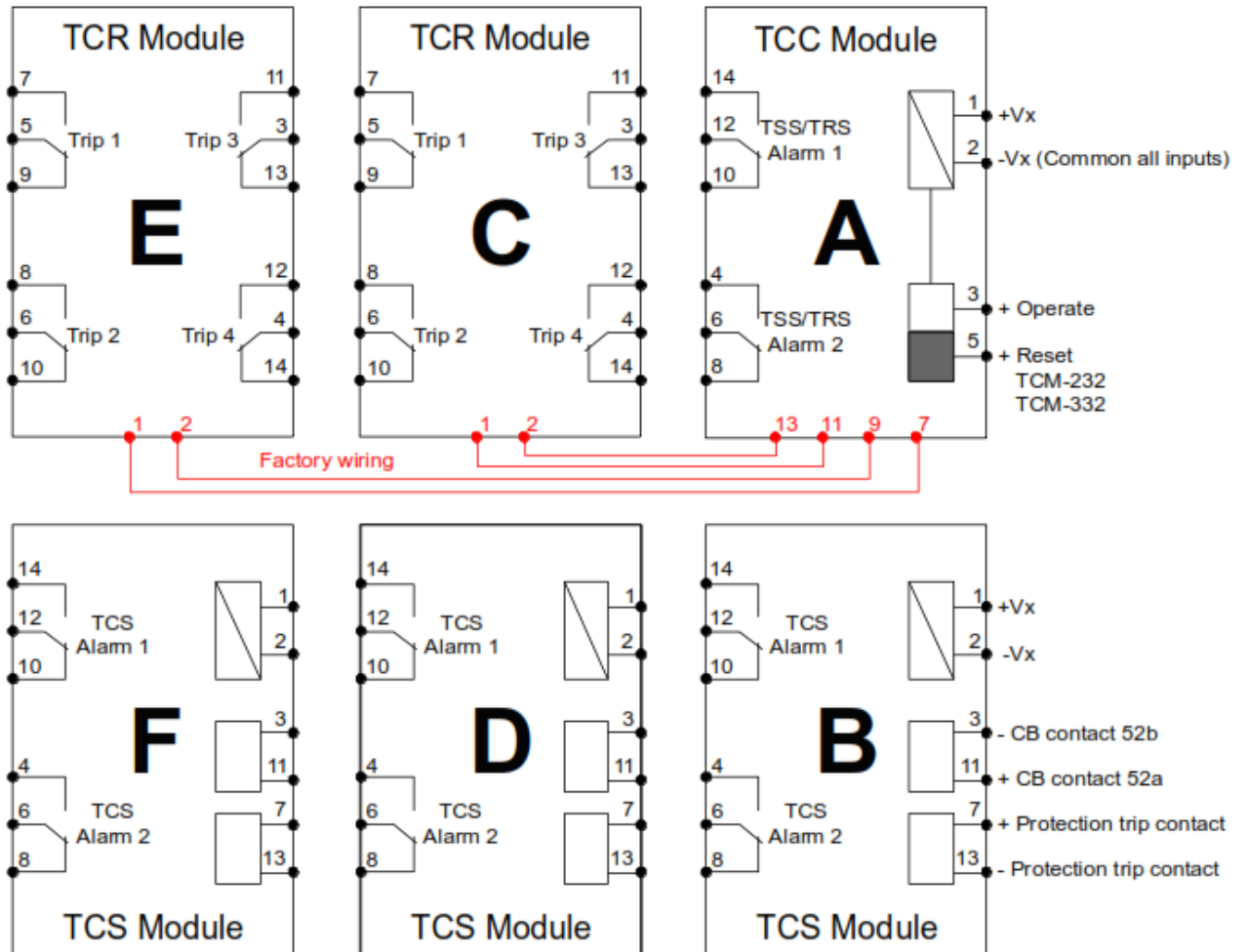
Note: All diagrams are viewed from the rear terminal side – no auxiliary supply connected, and all contacts dropped out.

TCM-114 / TCM-214 / TCM-314



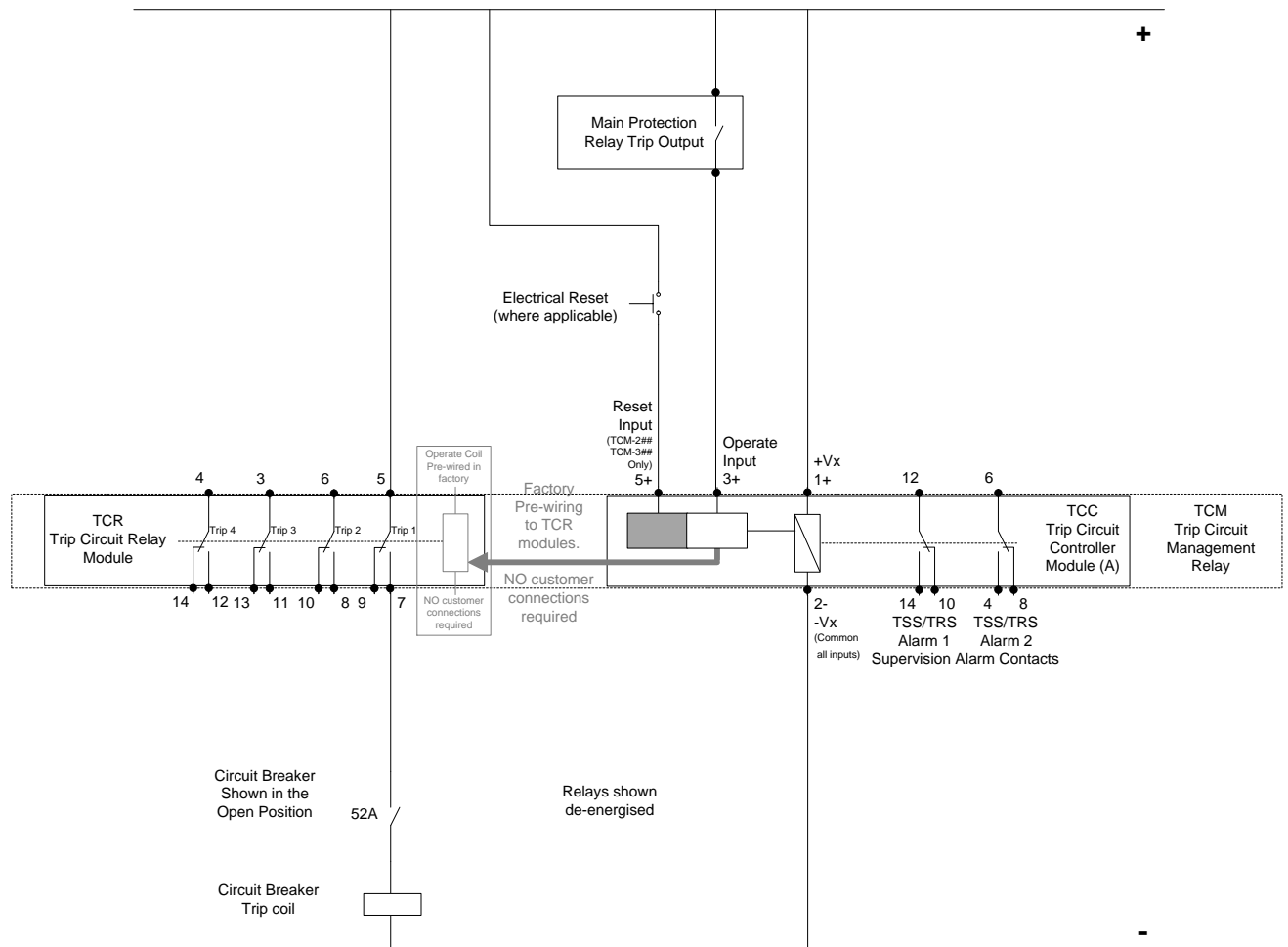
Note: All diagrams are viewed from the rear terminal side – no auxiliary supply connected, and all contacts dropped out.

TCM-132 / TCM-232 / TCM-332



Note: All diagrams are viewed from the rear terminal side – no auxiliary supply connected, and all contacts dropped out.

Example TCM Relay Schematic for Tripping



Note: Actual TCR module positions B through to F will be dependent on the TCM variant. Refer to the specific TCM variant connection diagrams.

Optional Trip Circuit Supervision (TCS) Functionality

The trip circuit supervision function is available as an option with TCM and requires the addition of a TCS module for each CB circuit to be monitored.

The abnormal conditions monitored by trip circuit supervision are:

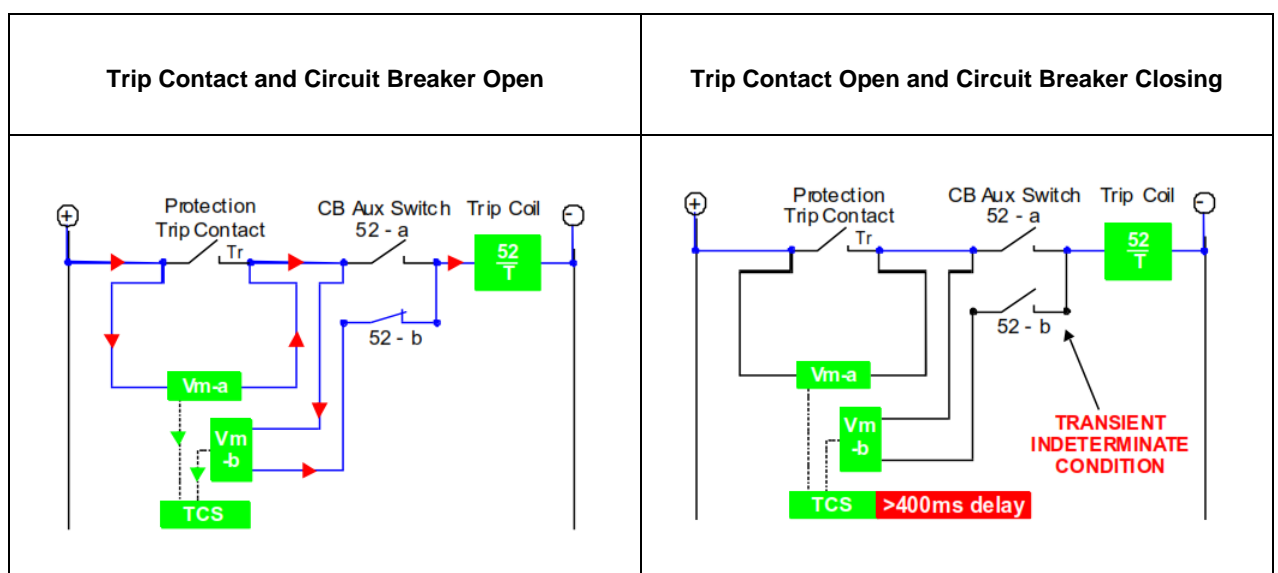
- Trip circuit failure
- Trip coil failure
- Trip supply failure

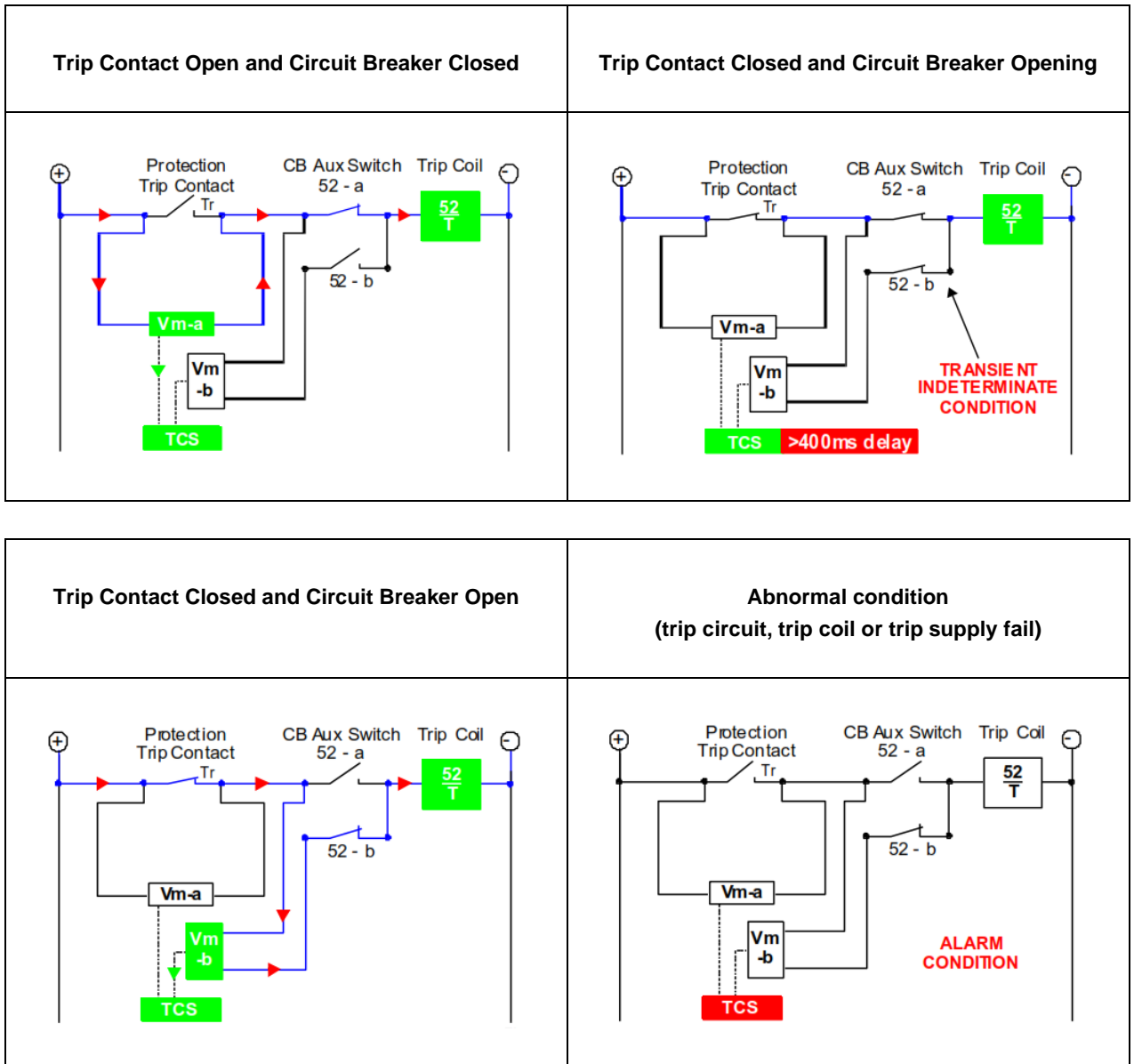
Each TCS module provides two supervision elements to monitor the trip circuit, circuit breaker trip coil and the circuit breaker trip supply.

Supervision is active with the circuit breaker in the open or closed position via the “52a” and “52b” CB auxiliary contacts.

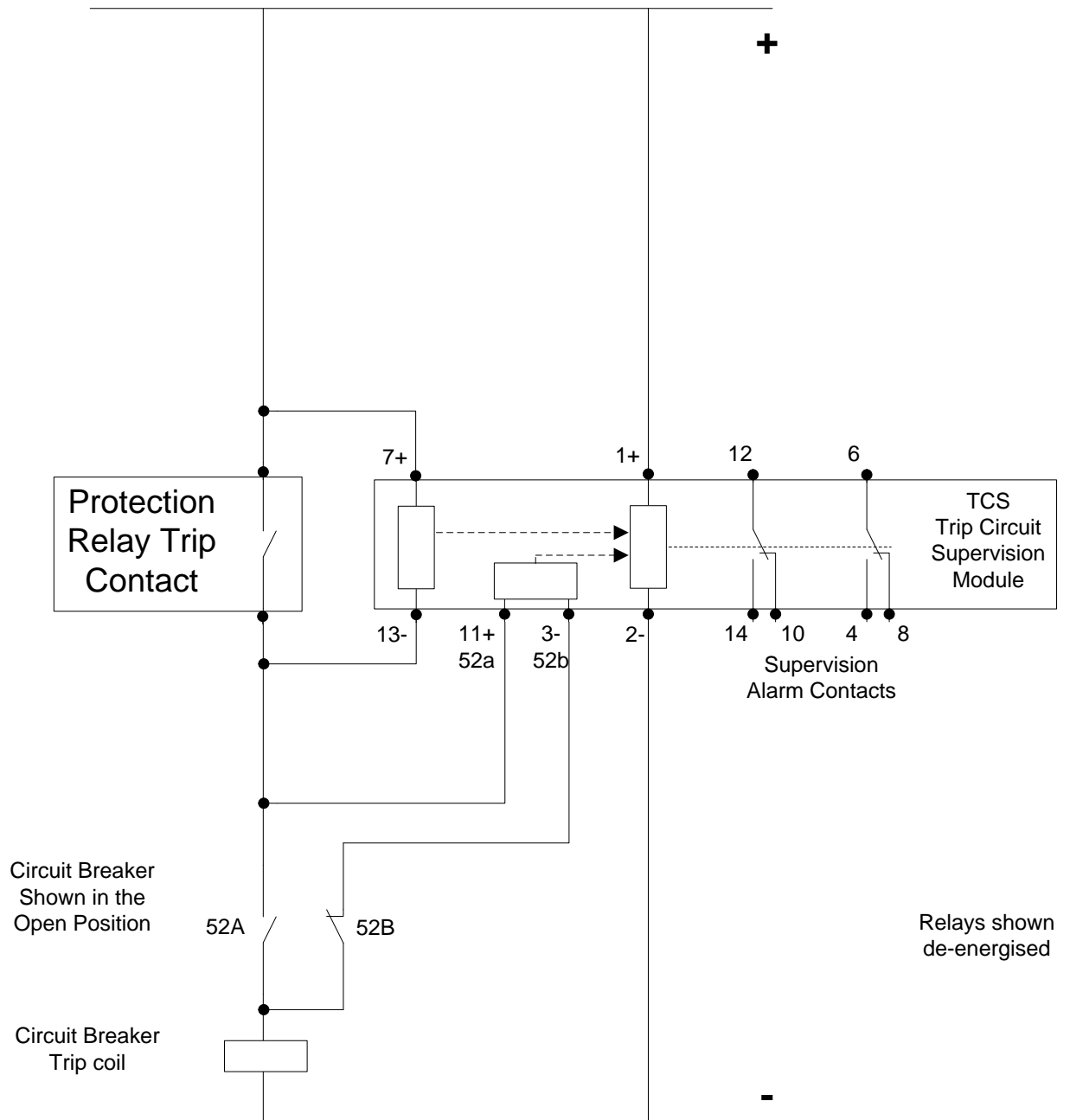
Supervision also remains active during tripping operations irrespective of the status of the tripping relay contact.

The following diagrams provide an explanation of the Trip Circuit Supervision Functionality during various operational states, the blue colouring shows the monitored circuit and the red arrow heads indicate the supervision current flow:





Example Trip Circuit Supervision Schematic



Note: Actual TCR module positions B through to F will be dependent on the TCM variant. Refer to the specific TCM variant connection diagrams.

TCM Dimensions

Size 4 TCM

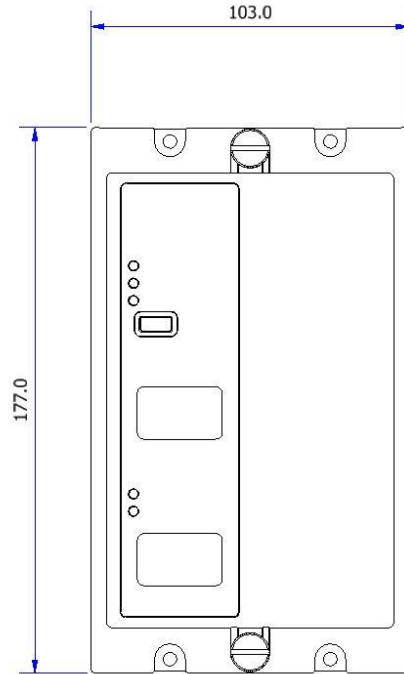
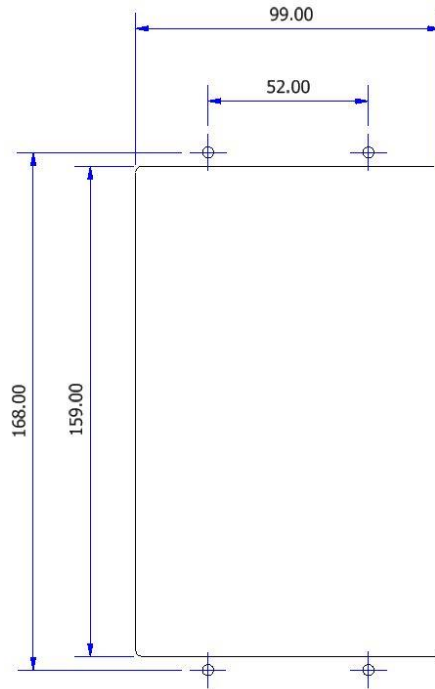
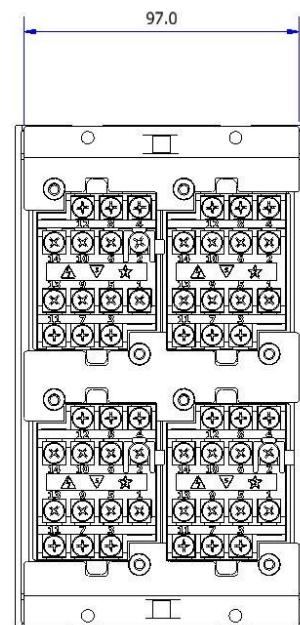
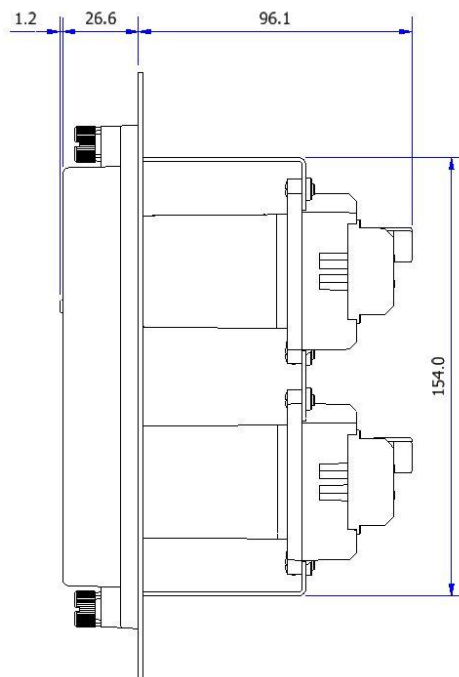


TABLE 1 - HOLE DIA	
PANEL THICKNESS (T)	HOLE DIA (Ø)
1mm < T < 2mm	3.6mm
T > 2mm	3.7mm



Size 6 TCM

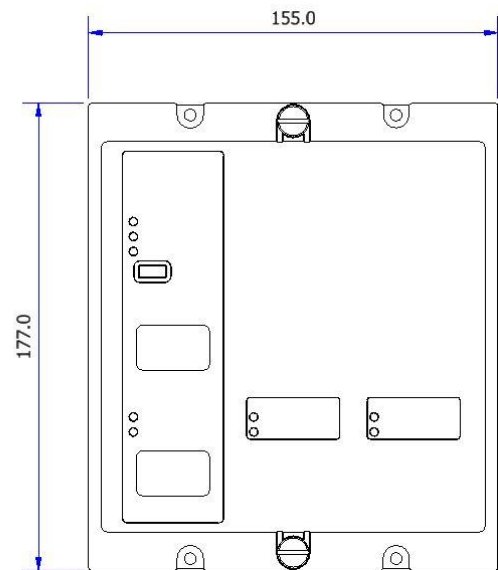
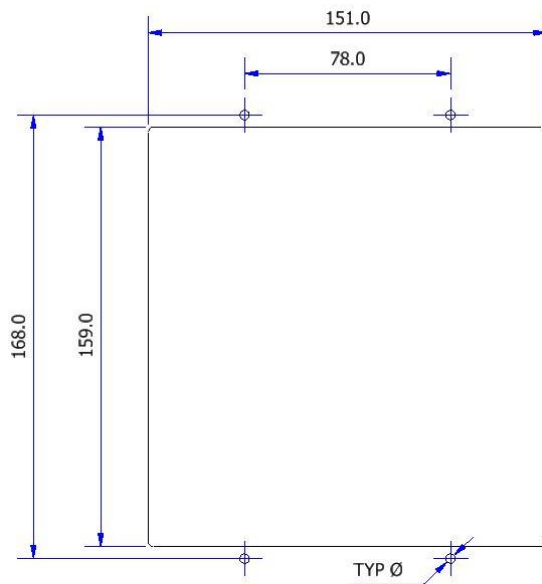
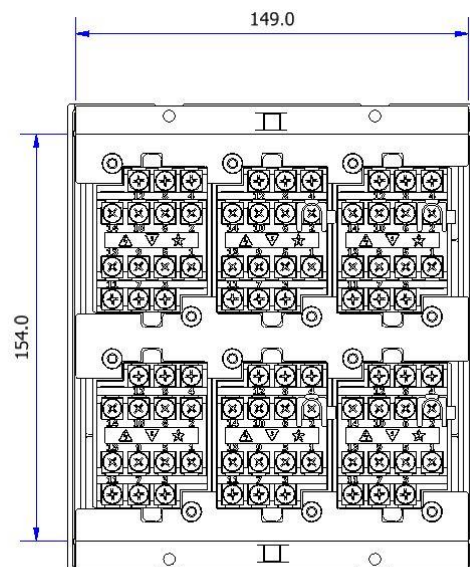
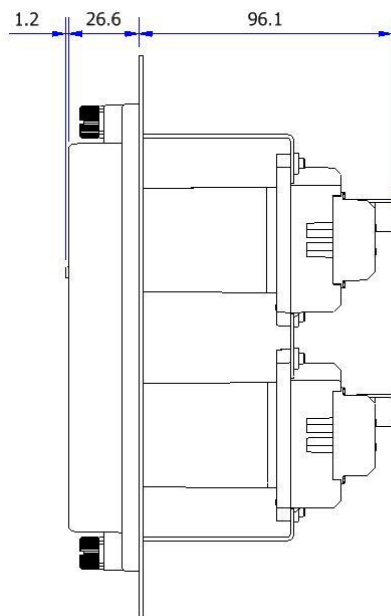


TABLE 1 - HOLE DIA

PANEL THICKNESS (T)	HOLE DIA (Ø)
1mm < T < 2mm	3.6mm
T > 2mm	3.7mm



Commissioning

Commissioning Preliminaries

Carefully examine the module to ensure that no damage has occurred during transit. Check that the model number and rating information are correct.

Insulation

The relay, and its associated wiring, may be insulation tested between:

- all electrically isolated circuits
- all circuits and earth

An electronic or brushless insulation tester should be used, having a dc voltage not exceeding 1000V. Accessible terminals of the same circuit should first be strapped together. Deliberate circuit earthing links, removed for the tests, subsequently must be replaced.

Site Commissioning Verification Checklist

Observe all site-specific standard safety procedures.

The following tests are undertaken following the completion of all TCM wiring.

Preliminary Checks (All Variants)

Item	Description	Complete
1	Confirm all necessary primary equipment isolations	
2	Confirm all necessary secondary equipment isolations	
3	Check installation of the TCM relay	
4	Check the TCM relay is wired to the protection design schematic	
5	Check that all TCM modules are plugged in to their respective bases	
6	In the de-energised and non-operate state confirm the normally open and normally closed contact states against the relevant relay connection diagram using a suitable continuity tester	

Operational Checks (TCM – TCC Module Trip Supply and Trip Relay Supervision)

Item	Description	Complete
1	Apply nominal voltage to the auxiliary supply input and ensure that the TCC module is picked up in the healthy supervision circuit and the Healthy LED illuminates.	
2	Simulate a DC supply failure by removing isolating links or disconnecting the positive supply to terminal 1 of the TCC module. Confirm that the Alarm contacts change state and the Healthy LED extinguishes.	
3	Restore the DC supply connections and ensure the TCC module is picked up and the Healthy LED illuminates.	
4	Simulate a TCR module failure by removing one of the TCR modules. Confirm that the Alarm contacts change state and the Healthy LED extinguishes.	
5	Reinstate the TCR module ensuring it is returned to the correct position and confirm that the Alarm contacts change state and the Healthy LED illuminates.	
6	Repeat steps 4 - 5 for all remaining TCR modules.	

Operate/Reset Operation

Item	Description	Complete
1	Ensure contacts are reset and the trip indicator is in the reset position	
2	On the TCC modules the operate input is terminated to relay base terminals A3(+) and A2(-)	
3	On TCM-2 and TCM-3 relays the electrical reset circuit is terminated to relay base terminals A5(+) and A2(-)	
4	<p>Application of operate and electrical reset test signals are made to terminals A3(+) and A5(+) respectively</p> <p>Note that these inputs have a common negative with the TCM auxiliary supply</p> <p>The operate and electrical reset wiring must be suitably isolated and test signals derived from the same source as the TCM auxiliary supply input</p>	

Item	Description	Complete
5	<p>Check for operation of the operate circuit by energising the relay with 100% of the nominal supply voltage</p> <p>The test voltage is to be applied as a step</p> <p>The relays should switch cleanly with one movement</p> <p>Confirm that the operate input LED illuminates during the application of test signal to the relay</p> <p>Confirm that the Trip LED illuminates, is sustained and provides a visual indication of relay operation</p> <p>Confirm the operate time of the contacts is in accordance with the claimed operate time in the Technical Bulletin</p>	
6	With the relay in the operate state check the continuity of the closed contacts with a suitable continuity tester. For TCM-1 variants the operate input will need to be sustained.	
7	Remove the operate circuit test signal	
8	On self reset relays confirm that the contact state has changed on removal of the operate test signal	
9	<p>On latching relays confirm that the contact state has not changed on removal of the operate test signal</p> <p>Perform a manual contact reset using the reset button and confirm the contact state changes</p>	
10	<p>On relays fitted with an electrical reset circuit, repeat step 5 through to 7</p> <p>Ensure that the operate circuit test supply is removed</p> <p>Check for operation of the reset circuit by energising the reset input with 100% of the nominal supply voltage</p> <p>The electrical reset is to be applied as a step and the relays should reset cleanly with one movement</p> <p>Confirm the contact state change with a suitable continuity tester</p> <p>For TCM-3 reset the trip indicator LED using the reset button</p>	
11	Restore any external wiring connections that may have been isolated during the above tests	

Protection Scheme Confirmation

Item	Description	Complete
1	With the Trip relay connected in the protection tripping scheme perform a trip check of the main protection relay	
2	<p>Confirm intended operation of the TCM relay upon operation of the main protection relay</p> <p>Confirm a TCM contact state change</p> <p>Confirm that the trip indicator LED illuminates to provide a visual indication of relay operation</p>	
3	<p>Ensure that the main protection relay trip output to the TCM has been reset and the operate input to the TCM relay is de-energised</p> <p>On latching relays perform a manual reset and confirm the contact state change with a suitable continuity tester</p> <p>On self reset relays perform a manual reset</p> <p>For both latching and self reset relays confirm that the trip indicator LED resets upon operation of the reset button</p>	
4	<p>On relays fitted with an electrical reset circuit, repeat steps 1 through to 2</p> <p>Ensure that the main protection relay trip output to the TCM has been reset and the operate input to the TCM relay is de-energised</p> <p>Check operation of the reset circuit by performing an electrical reset</p> <p>Confirm the contact state change with a suitable continuity tester</p> <p>On TCM-2 variants confirm that the trip indicator LED resets with the electrical reset</p> <p>Note: on TCM-3 variants the trip indicator LED does not reset with the electrical reset. Confirm that the trip indicator LED resets upon operation of the reset button</p>	

Operational Checks (TCM – TCS Module Trip Circuit Supervision Relay (where fitted))

Item	Description	Complete
1	Apply nominal voltage to the trip circuit and ensure that the TCS module is picked up in the healthy supervision circuit and the Healthy LED illuminates.	
2	Simulate a DC supply failure by removing isolating links or disconnecting the positive supply to terminal 1 of the TCS module, confirm that the Alarm contacts change state and the Healthy LED extinguishes.	
3	Restore the DC supply connections and ensure the TCS module is picked up and the Healthy LED illuminates.	
4	Simulate the operation of the protection trip contacts and confirm that the TCS module remains picked up and there is no change in the Alarm contact state, the TCS Healthy LED remains illuminated and the Alarm LED remains extinguished.	
5	Open and Close the Circuit Breaker several times and confirm that the supervision relay remains picked up and there is no change in the Alarm contact state and the TCS Healthy LED remains illuminated.	
6	Simulate the failure of the trip circuit by opening a trip circuit isolation link upstream of terminal connection 7 of the TCS module. Confirm that the TCS Alarm contacts change state, the Healthy LED extinguishes and the Alarm LED illuminates.	
7	Restore the trip circuit by restoring the trip circuit isolation link upstream of terminal connection 7 of the TCS module. Ensure the TCS module is picked up, the Healthy LED illuminates and the Alarm LED extinguishes.	

TCM Trouble Shooting

Symptom	Things to check
1. TCC Healthy LED extinguished and Alarm contacts have dropped out.	<ol style="list-style-type: none"> 1. Check for correct application of the chosen TCM rated voltage against the site supply voltage Check the auxiliary supply to the TCM 2. Check that the TCC module is properly plugged in 3. Check that all the TCR modules are properly plugged in 4. Check for a faulty TCR module by replacing each TCR module with a known good module
2. TCC operate input fails to trip any TCR modules	<ol style="list-style-type: none"> 1. Check that the TCC Healthy LED is illuminated. If extinguished check all items in symptom 1. 2. Check for correct application of the operate input against the chosen TCM rated voltage
3. TCC operate input only trips some of the TCR modules and provides only a pulsed output (partial operation only)	<ol style="list-style-type: none"> 1. Check that the TCC Healthy LED is illuminated. If extinguished check all items in symptom 1.
4. Trip circuit appears healthy but the TCS indicates an Alarm or a trip circuit failure condition	<ol style="list-style-type: none"> 1. Check for correct trip circuit connections to the TCS inputs 2. Check for correct circuit breaker 52a and 52b function. Check that the 52a and 52b contacts are not exhibiting indeterminate behavior 3. Check that the TCS has been correctly applied according to the maximum CB trip coil resistance for given rated TCS voltages

Installation

Handling of Electronic Equipment

A person's normal movements can easily generate electrostatic potentials of several thousand volts. Discharge of these voltages into semiconductor devices when handling electronic circuits can cause serious damage, which often may not be immediately apparent, but the reliability of the circuit will have been reduced.

The electronic circuits of Relay Monitoring Systems Pty Ltd products are immune to the relevant levels of electrostatic discharge when housed in the case. Do not expose them to the risk of damage by withdrawing modules unnecessarily.

Each module incorporates the highest practicable protection for its semiconductor devices. However, if it becomes necessary to withdraw a module, the following precautions should be taken to preserve the high reliability and long life for which the equipment has been designed and manufactured.

1. Before removing a module, ensure that you are at the same electrostatic potential as the equipment by touching the case.
2. Handle the module by its front-plate, frame, or edges of the printed circuit board.
3. Avoid touching the electronic components, printed circuit track or connectors.
4. Do not pass the module to any person without first ensuring that you are both at the same electrostatic potential. Shaking hands achieves equipotential.
5. Place the module on an antistatic surface, or on a conducting surface which is at the same potential as you.
6. Store or transport the module in a conductive bag.

If you are making measurements on the internal electronic circuitry of equipment in service, it is preferable that you are earthed to the case with a conductive wrist strap.

Wrist straps should have a resistance to ground between 500k – 10M ohms. If a wrist strap is not available, you should maintain regular contact with the case to prevent the build-up of static.

Instrumentation which may be used for making measurements should be earthed to the case whenever possible.

Safety Section

This Safety Section should be read before commencing any work on the equipment.

The information in the Safety Section of the product documentation is intended to ensure that products are properly installed and handled in order to maintain them in a safe condition. It is assumed that everyone who will be associated with the equipment will be familiar with the contents of the Safety Section.

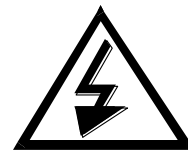
Explanation of Symbols & Labels

The meaning of symbols and labels which may be used on the equipment or in the product documentation is given below.

Caution: refer to product information

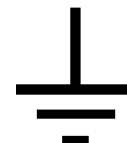


Caution: risk of electric shock



Functional earth terminal

Note: this symbol may also be used for a Protective/safety earth terminal if that terminal is part of a terminal block or sub-assembly e.g. power supply.



Unpacking

Upon receipt inspect the outer shipping carton or pallet for obvious damage.

Remove the individually packaged relays and inspect the cartons for obvious damage.

To prevent the possible ingress of dirt the carton should not be opened until the relay is to be used.
Refer to the following images for unpacking the relay:

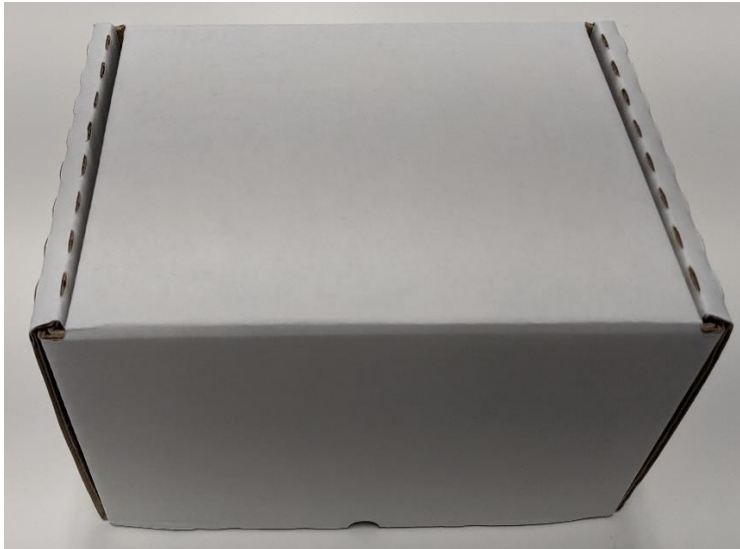


Outer packing carton showing the shipping documentation pouch.

Inner packing system for bulk packaging

Address label on top of carton.

Unpacking (Continued)



Individual inner packing carton

Accessories Supplied with Each Relay



Self threading M4 mounting screws

Storage & Handling

If damage has been sustained a claim should immediately be made against the carrier, also inform Relay Monitoring Systems Pty Ltd and the nearest RMS agent.

When not required for immediate use, the relay should be returned to its original carton and stored in a clean, dry place.

Relays which have been removed from their cases should not be left in situations where they are exposed to dust or damp. This particularly applies to installations which are being carried out at the same time as constructional work.

If relays are not installed immediately upon receipt, they should be stored in a place free from dust and moisture in their original cartons.

Dust which collects on a carton may, on subsequent unpacking, find its way into the relay; in damp conditions the carton and packing may become impregnated with moisture and the de-humidifying agent will lose its efficiency.

Equipment Operating Conditions

The equipment should be operated within the specified electrical and environmental limits.

Protective relays, although generally of robust construction, require careful treatment prior to installation and a wise selection of site. By observing a few simple rules, the possibility of premature failure is eliminated, and a high degree of performance can be expected.

Care must be taken when unpacking and installing the relays so that none of the parts are damaged or their settings altered and must always be handled by skilled persons only.

Relays should be examined for any wedges, clamps, or rubber bands necessary to secure moving parts to prevent damage during transit and these should be removed after installation and before commissioning.

The relay should be mounted on the circuit breaker or panel to allow the operator the best access to the relay functions.

Equipment Connections

Personnel undertaking installation, commissioning or servicing work on this equipment should be aware of the correct working procedures to ensure safety. The product documentation should be consulted before installing, commissioning or servicing the equipment.

Terminals exposed during installation, commissioning and maintenance may present hazardous voltage unless the equipment is electrically isolated.

If there is unlocked access to the rear of the equipment, care should be taken by all personnel to avoid electric shock or energy hazards.

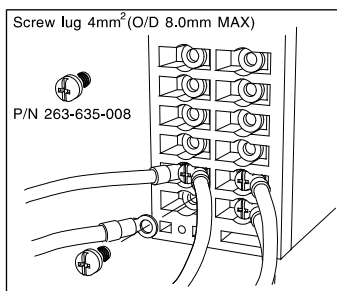
Voltage and current connections should be made using insulated crimp terminations to ensure that terminal block insulation requirements are maintained for safety. To ensure that wires are correctly terminated, the correct crimp terminal and tool for the wire size should be used.

Before energising the equipment, it must be earthed using the protective earth terminal, or the appropriate termination of the supply plug in the case of plug connected equipment. Omitting or disconnecting the equipment earth may cause a safety hazard.

The recommended minimum earth wire size is 2.5mm², unless otherwise stated in the technical data section of the product documentation.

Before energising the equipment, the following should be checked:

1. Voltage rating and polarity;
2. CT circuit rating and integrity of connections;
3. Protective fuse rating;
4. Integrity of earth connection (where applicable)



Decommissioning & Disposal

Decommissioning: The auxiliary supply circuit in the relay may include capacitors across the supply or to earth. To avoid electric shock or energy hazards, after completely isolating the supplies to the relay (both poles of any dc supply), the capacitors should be safely discharged via the external terminals prior to decommissioning.

Disposal: It is recommended that incineration and disposal to water courses is avoided. The product should be disposed of in a safe manner.

Maintenance

Mechanical Inspection

Relay Assembly

Inspect the relay for obvious signs of damage or ingress of moisture or other contamination.

Relay Module

Isolate the relay, remove any securing screws where fitted and unplug the relay from the terminal base.

Inspect the relay for signs of any overheating or burn marks which may have been caused by overvoltage surge or transient conditions on the power supply.

Test Intervals

The maintenance tests required will largely depend upon experience and site conditions, but as a general rule it is recommended that the following inspection and tests are performed every twelve months.

- ◆ Mechanical Inspection
- ◆ Check of Connections
- ◆ Insulation Resistance Test

Defect Report Form

Please copy this sheet and use it to report any defect which may occur.

Customers Name & Address:	Contact Name:
	Telephone No:
	Fax No:
Supplied by:	Date when installed:
Site:	Circuit:

When Defect Found

Date:	Commissioning?	Maintenance?	Systems Fault?	Other, Please State:
Product Part No:			Serial Number:	
Copy any message displayed by the relay:				
Describe Defect:				
Describe any other action taken:				
Signature:		Please Print Name:		Date:

For RMS use only

Date Received:	Contact Name:	Reference No:	Date Acknowledged:	Date of Reply:	Date Cleared:
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