



# Delta XRD User Guide

## Supervision Relay

RMS Mors Smitt

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### Advanced Protection Devices



User Guide

# Delta XRD User Guide

## About This Manual

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This User Guide covers all Delta XRD relays manufactured from January 2025. 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 Delta XRD 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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## Contact Us

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RMS Mors Smitt

19 Southern Court • Keysborough 3173 • AUSTRALIA

Phone +61 3 8544 1200

Email [sales.rms@wabtec.com](mailto:sales.rms@wabtec.com) • Web <http://www.morssmitt.com/rms>

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## Documentation

### Technical Bulletin

The detailed technical attributes, functional description & performance specifications for the Delta XRD 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 Delta XRD relay versions & describes the generic features & attributes common across all versions.

## Introduction

The Delta XRD relay series are low burden electro-mechanical supervision relays for application on high security tripping and auxiliary supply circuits.

The Delta XRD models comprise of:

- XRD-4 Trip supply supervision with hand-reset mechanical flag alarm indication
- XRD-5 Trip supply supervision with self-reset LED alarm indication
- XRD-6 Trip circuit supervision with hand reset mechanical flag alarm indication
- XRD-7 Trip circuit supervision with self-reset LED alarm indication

Failure of the circuit or supply being supervised will cause the main relay element to drop out and the alarm contacts to change state.

### **XRD-4 Trip Supply Supervision**

The XRD-4 is designed to supervise DC auxiliary supplies utilised in protection and tripping circuits.

Under healthy conditions, the coil is energised and if the supply fails, the relay will drop out to initiate a supply fail alarm. An alarm is reported through the change in state of the four (4) alarm contacts and the front panel hand reset flag indicator.

A short time delay of 300 - 600ms is incorporated to avoid nuisance tripping due to transients.

### **XRD-5 Trip Supply Supervision**

The XRD-5 is designed to supervise DC auxiliary supplies utilised in protection and tripping circuits.

Under healthy conditions, the coil is energised and if the supply fails, the relay will drop out to initiate a supply fail alarm. An alarm is reported through the change in state of the two (2) alarm contacts and the front panel self reset LEDs extinguishing.

A short time delay of 300 - 600ms is incorporated to avoid nuisance tripping due to transients.

### **XRD-6 Trip Circuit Supervision**

The XRD-6 is designed to supervise Protection Tripping Circuits of Protection and Control schemes.

The XRD-6 is comprised of 2 inputs that combine to hold in the contacts of an attracted armature relay.

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

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

A 400ms relay operate delay caters for trip contact and circuit breaker transitions as well as nuisance alarms due to supply voltage transients.

### **XRD-7 Trip Circuit Supervision**

The XRD-7 is designed to supervise Protection Tripping Circuits of Protection and Control schemes.

The XRD-7 is comprised of 2 inputs that combine to hold in the contacts of an attracted armature relay.

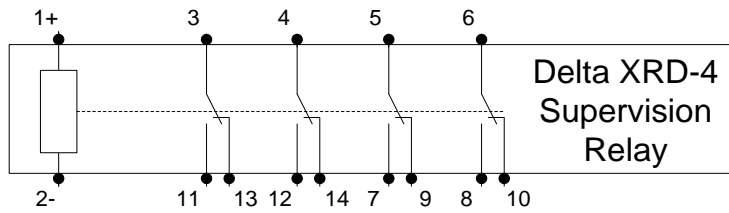
Supervision is active with the circuit breaker in the open or closed position via the “A and B” CB auxiliary contacts.

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

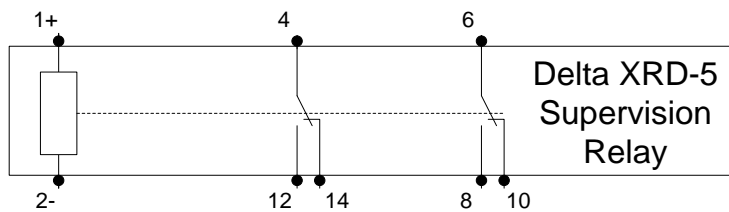
A 400ms relay operate delay caters for trip contact and circuit breaker transitions as well as nuisance alarms due to supply voltage transients.

## Scheme Wiring

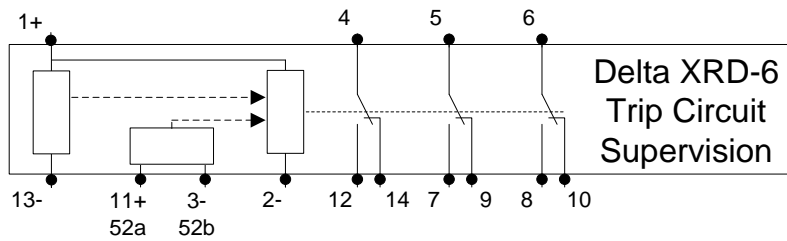
### Delta XRD-4 Trip supply Supervision Connection diagram



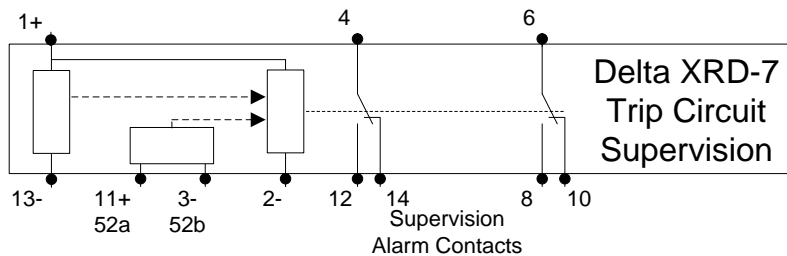
### Delta XRD-5 Trip supply Supervision Connection diagram



### Delta XRD-6 Trip Circuit Supervision Connection diagram

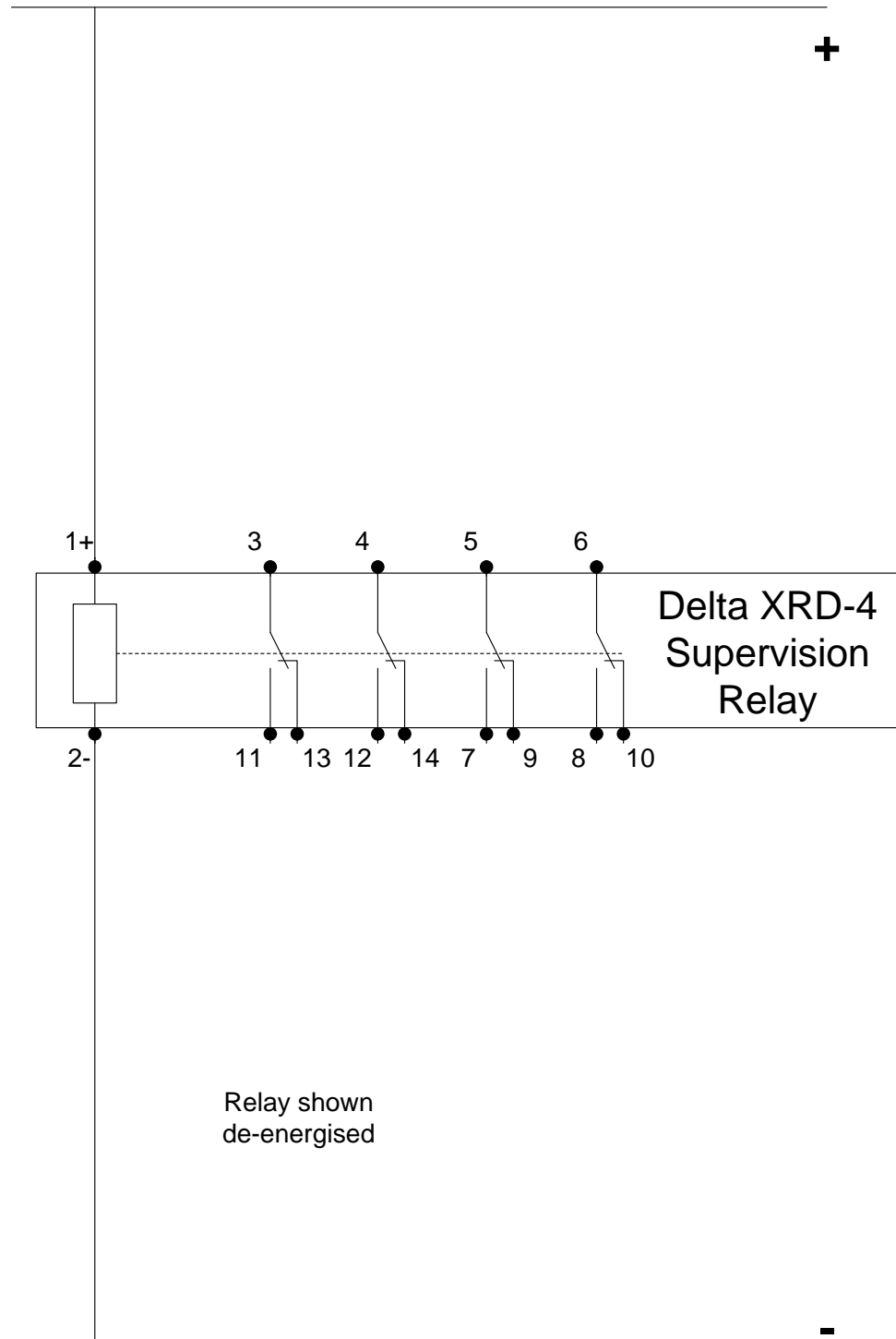


### Delta XRD-7 Trip Circuit Supervision Connection diagram

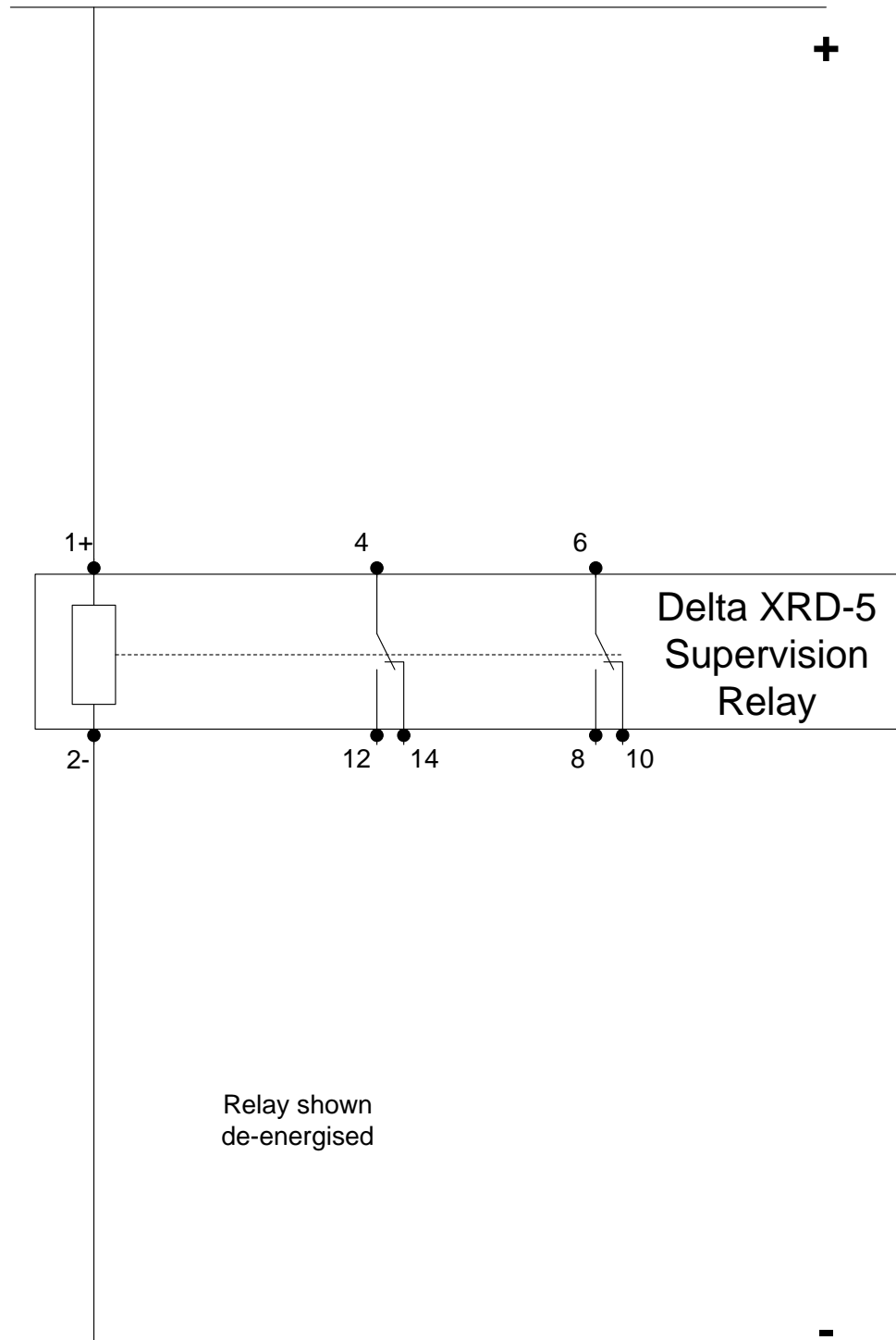




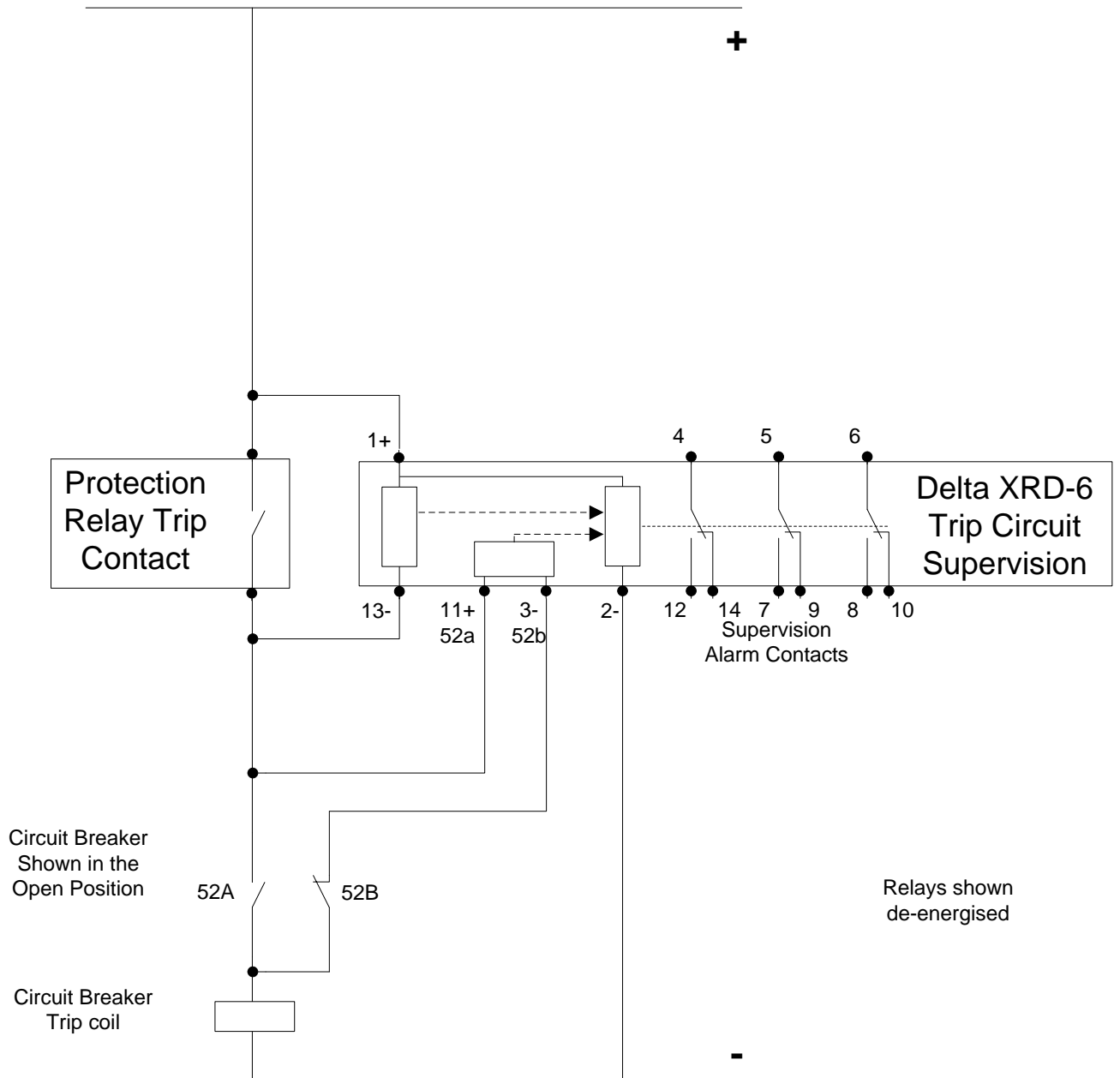
**Example Schematic – XRD-4 Trip Supply Supervision Application**



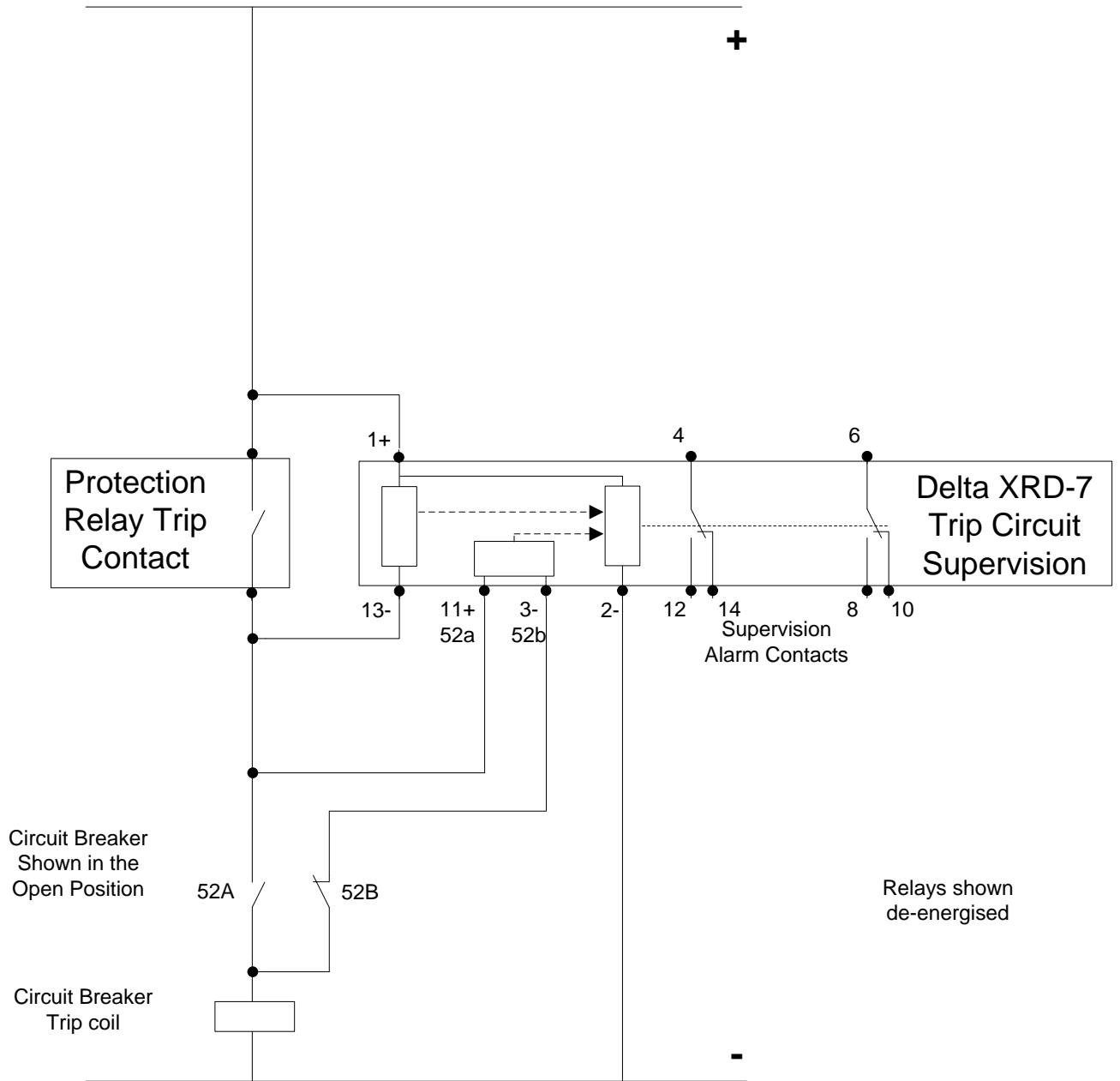
**Example Schematic – XRD-5 Trip Supply Supervision Application**



**Example Schematic – XRD-6 Trip Circuit Supervision Application**

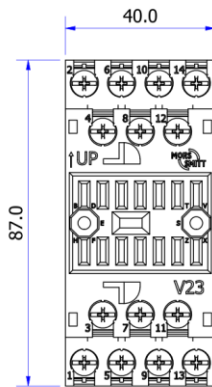


**Example Schematic – XRD-7 Trip Circuit Supervision Application**

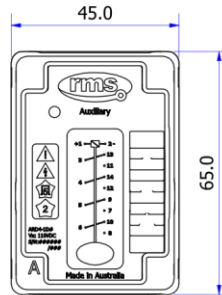


## Mounting and Relay Dimensions

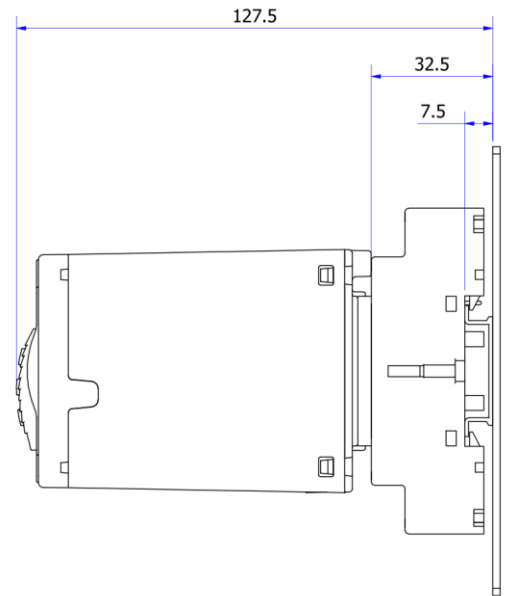
### Surface or Din Rail Mount Using Front Connect Relay Base (TBD-F Terminal Block)



Front View Relay Base



Front View



Side View

**Surface Mount Using Rear Connect Relay Base (TBD-R1 Terminal Block)**

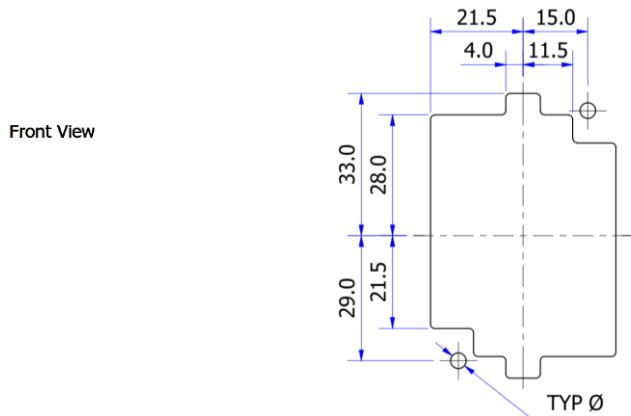
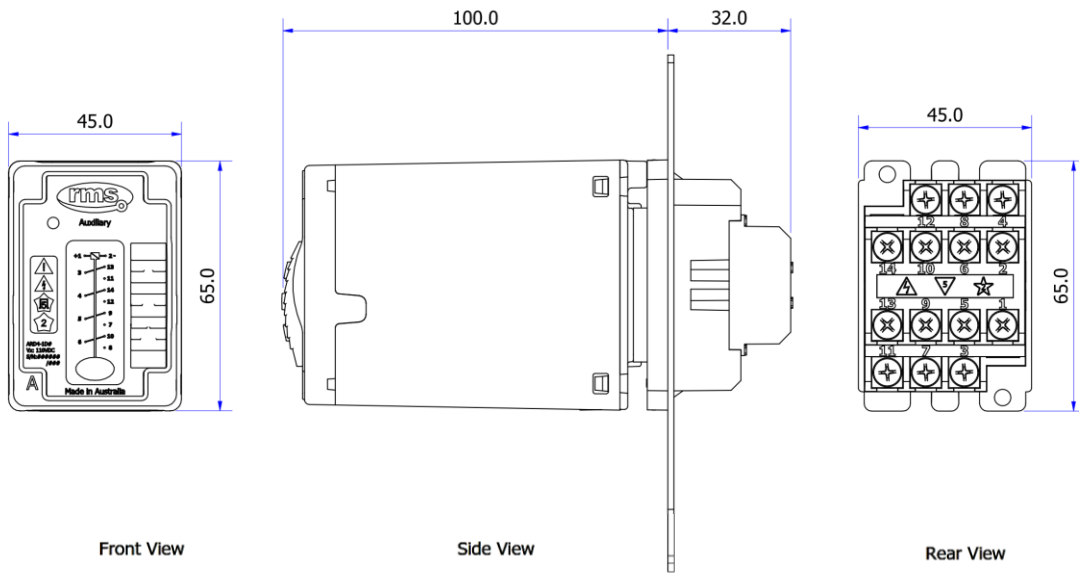


TABLE 1 - HOLE DIA	
PANEL THICKNESS (T)	HOLE DIA (Ø)
1mm < T < 2mm	3.6mm
T > 2mm	3.7mm

Panel Cutout

**Flush Panel Mount Using Rear Connect Relay Base and Retention Plates (TBD-R2 Terminal Block)**

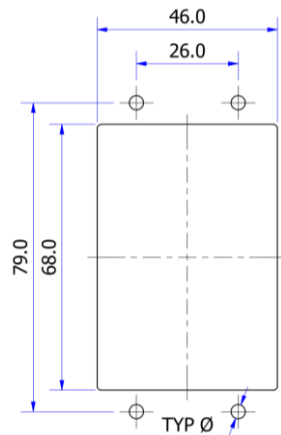
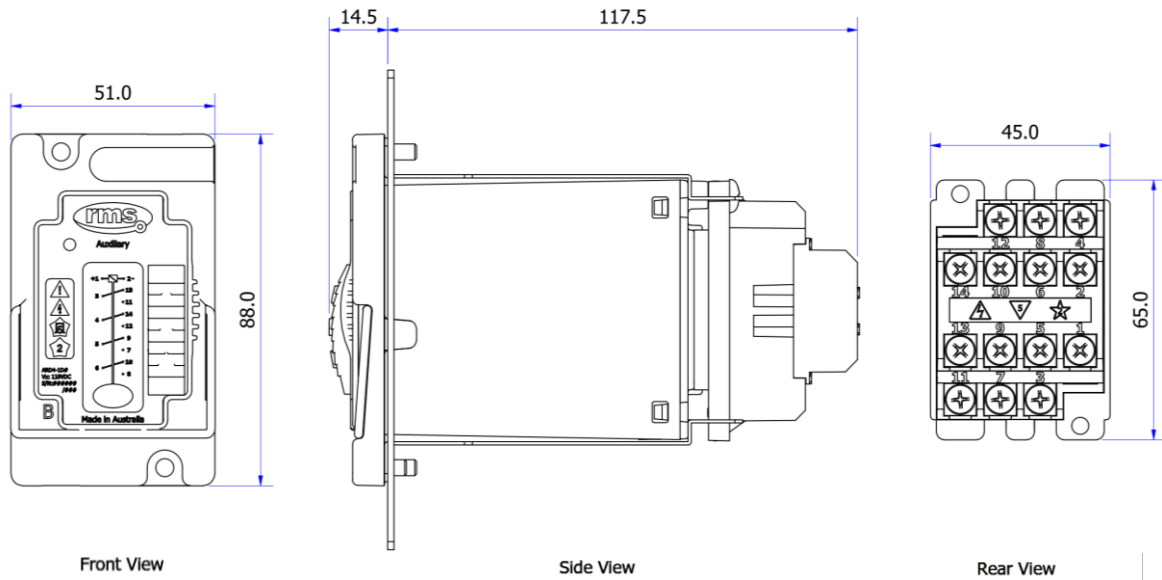
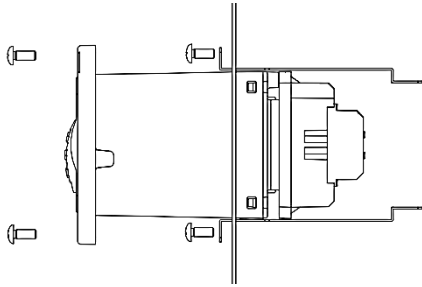


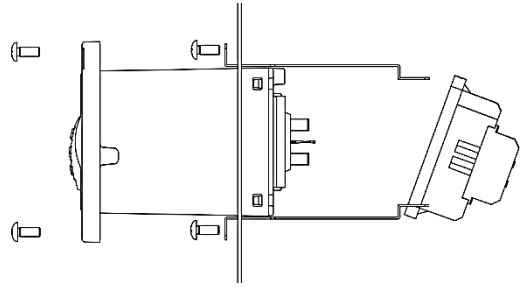
TABLE 1 - HOLE DIA	
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Panel Cutout

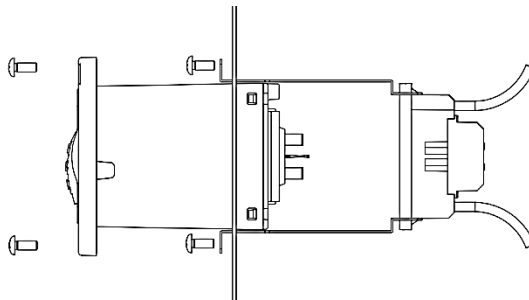
## Rear Connect Relay Base Insertion for Flush Panel Mounting



Insertion of relay and base for capturing relay base into retention plates



Alternative method for capturing relay base into retention plates



Retention of relay base when relay is removed



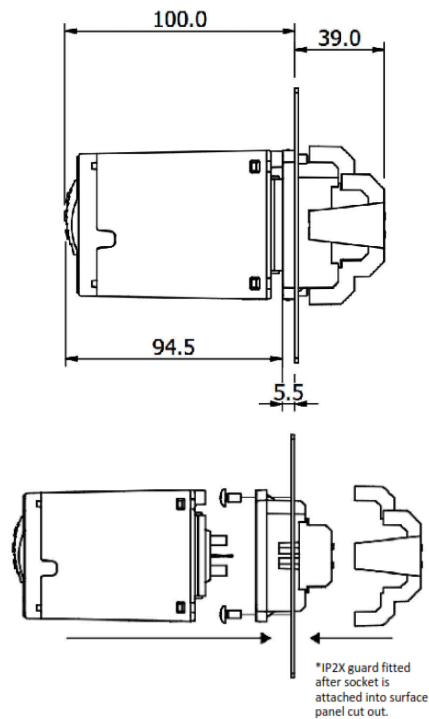
## IP2X Terminal Options

Optional terminal blocks are now available that achieve IP2X ingress protection, details of the optional terminal blocks are provided in the following sections.

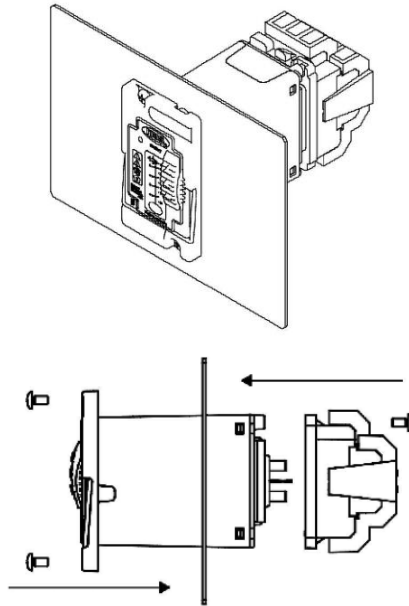
### Surface or Din Rail Mount Using Front Connect Relay Base (TBD-F-IP2X Terminal Block)



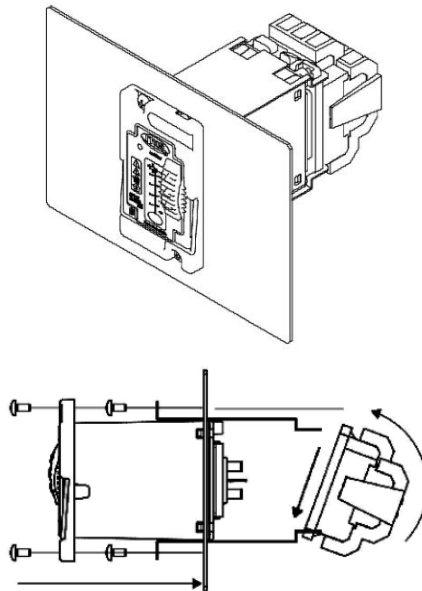
### Surface Mount Using Rear Connect Relay Base (TBD-R1-IP2X Terminal Block)



**Flush Panel Mount Using Rear Connect Relay Base and without Retention Plates (TBD-R1-IP2X Terminal Block)**



**Flush Panel Mount Using Rear Connect Relay Base and Retention Plates (TBD-R2-IP2X Terminal Block)**



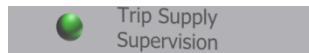
## Delta XRD Indications

### Front Layout

The figure below depicts the indications and the reset push buttons on the front of the relay.



#### Supervision LED



The Led illuminates when the supply voltage is healthy and the supervised circuit is healthy. The Led self resets when the supply voltage and the supervised circuit is restored.

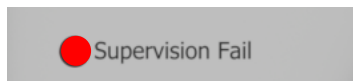
#### Hand Reset Flag and Reset Slide Button (XRD-4 & 6)



The hand reset flag operates if the circuit being supervised becomes open circuited or if the supply fails. The hand reset flag may only be reset when the supervised circuit is returned to the normal condition.



#### Supervision Fail



The Led illuminates when the supervised circuit has failed (provided the supply voltage is >50% of nominal). The Led self resets when the supply voltage and the supervised circuit is restored.

## 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.

#### Injection Testing

Testing of relay function may be undertaken using a secondary test set injecting directly into the relay operate coil or alternatively as part of a complete protection scheme tested in conjunction with the main protection relays.

## Site Commissioning Verification Checklist

Observe all site specific standard safety procedures.

The following tests are undertaken following the completion of all Delta XRD relay 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 Delta XRD relay	
4	Check the Delta XRD relay base is wired to the protection design schematic	
5	Plug the relay into the relay base and ensure that the relay is firmly in place in the base	
6	In the 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 (XRD-4 or 5 Trip Supply Supervision Relay)

Item	Description	Complete
1	Insert the relay into its base, apply nominal voltage and ensure the XRD-4 or 5 relay is picked up in the healthy supervision circuit and: <ul style="list-style-type: none"> <li>• XRD-4: following a hand reset that the mechanical flag is in the reset position</li> </ul> Or <ul style="list-style-type: none"> <li>• XRD-5: Supply Supervision LED illuminates</li> </ul>	
2	Simulate a DC supply failure by removing isolating links or disconnecting the positive supply to terminal 1 of the XRD-4 or 5, confirm that the Alarm contacts change state and: <ul style="list-style-type: none"> <li>• XRD-4: indicating flag drops</li> </ul> Or <ul style="list-style-type: none"> <li>• XRD-5: Supply Supervision LED extinguishes</li> </ul>	
3	Restore the DC supply connections and ensure the XRD-4 or 5 relay is picked up: <ul style="list-style-type: none"> <li>• XRD-4: following a hand reset that the mechanical flag is in the reset position</li> </ul> Or <ul style="list-style-type: none"> <li>• XRD-5: Supply Supervision LED illuminates</li> </ul>	



Item	Description	Complete
4	<p>Simulate a DC supply failure by removing isolating links or disconnecting the negative supply to terminal 2, confirm that:</p> <ul style="list-style-type: none"> <li>• XRD-4: indicating flag drops</li> </ul> <p>Or</p> <ul style="list-style-type: none"> <li>• XRD-5: Supply Supervision LED extinguishes</li> </ul>	
5	<p>Restore the DC supply connections and ensure the XRD-4 or 5 relay is picked up:</p> <ul style="list-style-type: none"> <li>• XRD-4: following a hand reset that the mechanical flag is in the reset position</li> </ul> <p>Or</p> <ul style="list-style-type: none"> <li>• XRD-5: Supply Supervision LED illuminates</li> </ul>	

### Operational Checks (XRD-6 or 7 Trip Circuit Supervision Relay)

Item	Description	Complete
1	<p>Insert the relay into its base, apply nominal voltage to the trip circuit and ensure the XRD-6 or 7 relay is picked up in the healthy supervision circuit and:</p> <ul style="list-style-type: none"> <li>• XRD-6: following a hand reset that the mechanical flag is in the reset position</li> </ul> <p>Or</p> <ul style="list-style-type: none"> <li>• XRD-7: Trip Circuit Supervision LED illuminates</li> </ul>	
2	<p>Simulate a DC supply failure by removing isolating links or disconnecting the positive supply to terminal 1 of the XRD-6 or 7, confirm that the Alarm contacts change state and:</p> <ul style="list-style-type: none"> <li>• XRD-6: indicating flag drops</li> </ul> <p>Or</p> <ul style="list-style-type: none"> <li>• XRD-7: Trip Circuit Supervision LED extinguishes</li> </ul>	
3	<p>Restore the DC supply connections and ensure the XRD-6 or 7 relay is picked up and:</p> <ul style="list-style-type: none"> <li>• XRD-6: following a hand reset that the mechanical flag is in the reset position</li> </ul> <p>Or</p> <ul style="list-style-type: none"> <li>• XRD-7: Trip Circuit Supervision LED illuminates</li> </ul>	
4	<p>Simulate a DC supply failure by removing isolating links or disconnecting the negative supply to terminal 2, confirm that the XRD-6 or 7 Alarm contacts change state and:</p> <ul style="list-style-type: none"> <li>• XRD-6: indicating flag drops</li> </ul> <p>Or</p> <ul style="list-style-type: none"> <li>• XRD-7: Trip Circuit Supervision LED extinguishes</li> </ul>	



Item	Description	Complete
5	Restore the DC supply connections and ensure the XRD-6 or 7 relay is picked up and: <ul style="list-style-type: none"><li>• XRD-6: following a hand reset that the mechanical flag is in the reset position</li></ul> Or <ul style="list-style-type: none"><li>• XRD-7: Trip Circuit Supervision LED illuminates</li></ul>	
6	Simulate the operation of the protection trip contacts and confirm that the XRD-6 or 7 relay remains picked up and there is no change in the Alarm contact state and the flagging remains in the reset position.	
7	Open and Close the Circuit Breaker a number of times and confirm that the supervision relay remains picked up and there is no change in the Alarm contact state and the flagging remains in the reset position	
8	Simulate the failure of the trip circuit or trip coil by removing the connection to terminal 13, confirm that the XRD-6 or 7 Alarm contacts change state and: <ul style="list-style-type: none"><li>• XRD-6: indicating flag drops</li></ul> Or <ul style="list-style-type: none"><li>• XRD-7: Trip Circuit Supervision LED Extinguishes &amp; Supervision Fail LED illuminates</li></ul>	
9	Restore the trip circuit by reconnecting terminal 13. Ensure the XRD-6 or 7 relay is picked up and: <ul style="list-style-type: none"><li>• XRD-6: following a hand reset that the mechanical flag is in the reset position</li></ul> Or <ul style="list-style-type: none"><li>• XRD-7: Trip Circuit Supervision LED Illuminates &amp; Supervision Fail LED extinguishes</li></ul>	

## 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.

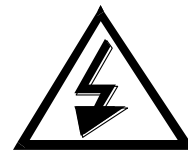
### Explanation of Symbols & Labels

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 eg. 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.  
Address label on top of carton.



Example of the inner packing carton of 10 relays showing the front label detailing the serial number range, the relay part number & description.



Example of a single relay package showing the label detailing the serial number, relay part number & description.



Inner packing carton with lid open showing protective insert and relay.



Unpacked relay showing reset button transit retention tape.



Unpacked relay ready for installation – the reset button transit retention tape must be removed before use.

### Terminal Block Accessories



**TDB-F Terminal Block**  
For wall or DIN rail mounting  
complete with terminal screws

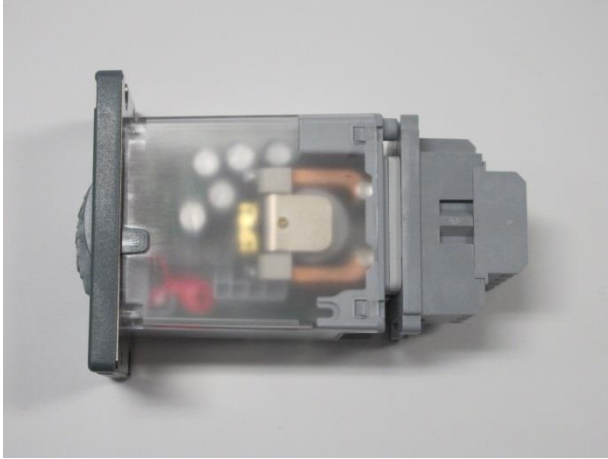


**TDB-R1 Terminal Block kit**  
For projection, flush panel or rack mounting  
complete with terminal screws and base  
fixing screws

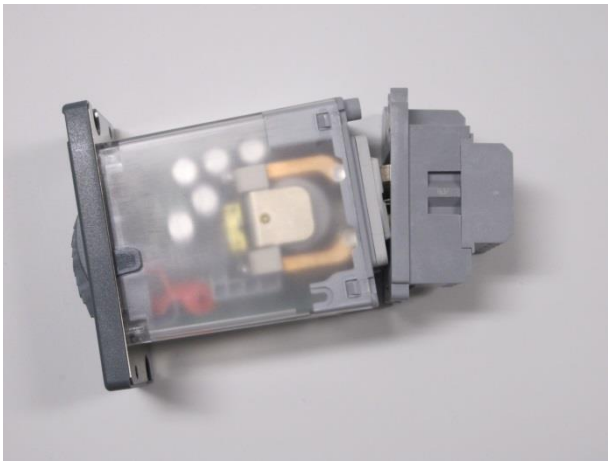


**TDB-R2 Terminal Block kit**  
For flush panel or rack mounting  
complete with terminal block retention  
plates, terminal screws and relay fixing  
screws





Relay plugged into a terminal block



Relay partially removed from terminal block

### **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 at all times 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, the following should be checked:

1. Voltage rating and polarity;
2. Protective fuse rating;

## **External Resistors**

Where external resistors are fitted to relays, these may present a risk of electric shock or burns, if touched.

## **Insulation & Dielectric Strength Testing**

Insulation testing may leave capacitors charged up to a hazardous voltage. At the end of each part of the test, the voltage should be gradually reduced to zero, to discharge capacitors, before the test leads are disconnected.

## **Insertion of Modules**

These must not be inserted into or withdrawn from equipment whilst it is energised, since this may result in damage.

## **Mechanical Adjustments**

The electrical power to the relay contacts should be removed before checking any mechanical settings, to avoid any risk of electric shock.

### **Draw Out Case Relays**

Removal of the cover on equipment incorporating electromechanical operating elements may expose hazardous live parts such as relay contacts.

### **Commissioning Preliminaries**

Carefully examine the module and case to see that no damage has occurred during transit. Check that the relay serial number on the module, case and cover are identical, and that the model number and rating information are correct.

Check that the external wiring is correct to the relevant relay diagram or scheme diagram. The relay diagram number appears inside the case.

Note that shorting switches shown on the relay diagram are fitted internally across the relevant case terminals and close when the module is withdrawn. It is essential that such switches are fitted across all CT circuits.

### 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.

### **Commissioning Tests**

If the relay is wired through a test block it is recommended that all secondary injection tests should be carried out using this block.

Ensure that the main system current transformers are shorted before isolating the relay from the current transformers in preparation for secondary injection tests.

### DANGER

DO NOT OPEN CIRCUIT THE SECONDARY CIRCUIT OF A CURRENT TRANSFORMER SINCE THE HIGH VOLTAGE PRODUCED MAY BE LETHAL AND COULD DAMAGE INSULATION.

It is assumed that the initial preliminary checks have been carried out.

### Relay CT shorting

Check electrically that the CT is shorted before isolating CT secondaries.

### Primary injection testings



It is essential that primary injection testing is carried out to prove the correct polarity of current transformers.

Before commencing any primary injection testing it is essential to ensure that the circuit is dead, isolated from the remainder of the system and that only those earth connections associated with the primary test equipment are in position.

### **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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