



# *Alpha XR User Guide*

## *Supervision Relay*

RMS Mors Smitt

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### **Advanced Protection Devices**



User Guide

# Alpha XR User Guide

## About This Manual

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This User Guide covers all Alpha XR 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 Alpha XR 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 Alpha AR 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 Alpha AR 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.

The product ordering code described in the Technical Bulletin is used to generate a unique version of the relay specification.

## Introduction

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

The Alpha XR models comprise of :

- XR5-xx-1 Trip relay coil supervision
- XR5-xx-4 Trip supply supervision
- XR5-xx-6 Single pole trip circuit supervision

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

### **XR5-XX-1 Trip Relay Coil Supervision**

The XR5-XX-1 relay is designed to supervise trip relay circuits utilising high burden trip relays.

Under healthy conditions supervision current flows through a voltage monitor and the supervising relay coil is energised. If the circuit being supervised becomes open circuit or if the supply fails, the relay will become de-energised and an alarm is given (5 alarm contacts and flag indication).

To prevent the alarm being given when the circuit being supervised is operated, supervision current flows through an alternate voltage monitor to energize the relay coil. For this purpose, an additional normally open contact is required from the latching trip relay as depicted in example application schematic. A short time delay of approximately 100ms, is incorporated to hold up the alarm relay during a normal trip relay operation.

### **XR5-XX-4 Trip Supply Supervision**

The XR5-XX-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 five (5) alarm contacts and the front panel hand reset flag indicator.

A short time delay of 100ms is incorporated to avoid nuisance tripping due to switching transients.

### **XR5-XX-6 Trip Circuit Supervision**

The XR5-XX-6 is designed to supervise Protection Tripping Circuits of Protection and Control schemes.

The XR5-XX-6 is comprised of 2 inputs that combine to hold in the contacts of an attracted armature relay.

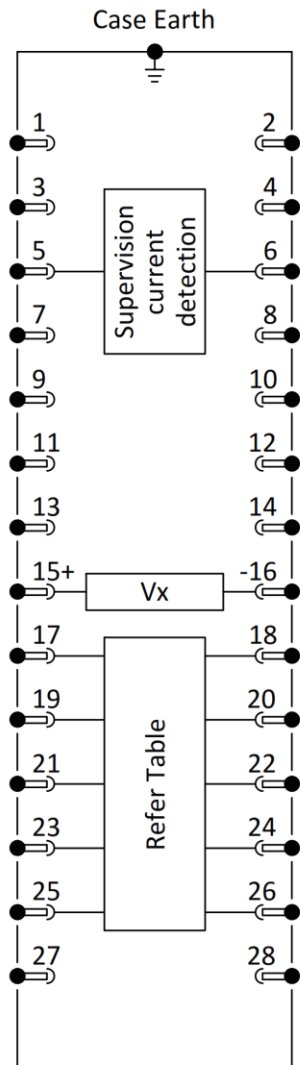
Supervision is active with the circuit breaker in the open or closed position via the “A and B” CB auxiliary contacts.

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.


## Scheme Wiring

### Alpha XR5-XX-1 Trip Relay Coil Supervision Connection diagram

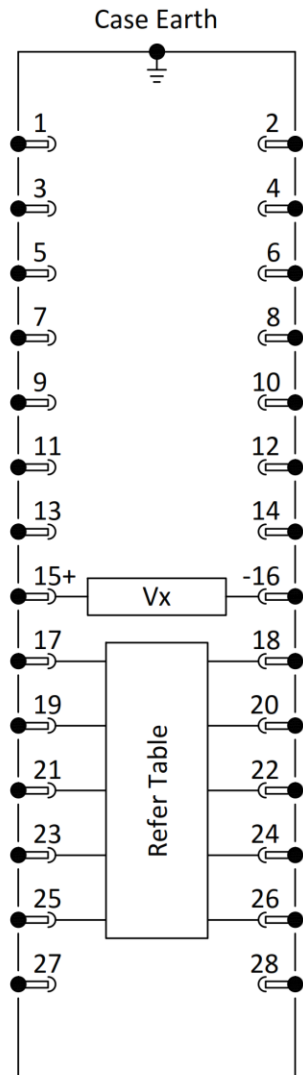


XR5-XX-1 Terminal Number Pairs						
Code	Contacts	17-18	19-20	21-22	23-24	25-26
N	5M 0B	M	M	M	M	M
P	4M 1B	M	M	M	M	B
Q	3M 2B	B	M	M	M	B
R	2M 3B	B	M	M	B	B
S	1M 4B	B	B	M	B	B

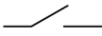
M: Make 


B: Break 

## Alpha XR5-XX-4 Trip supply Supervision Connection diagram



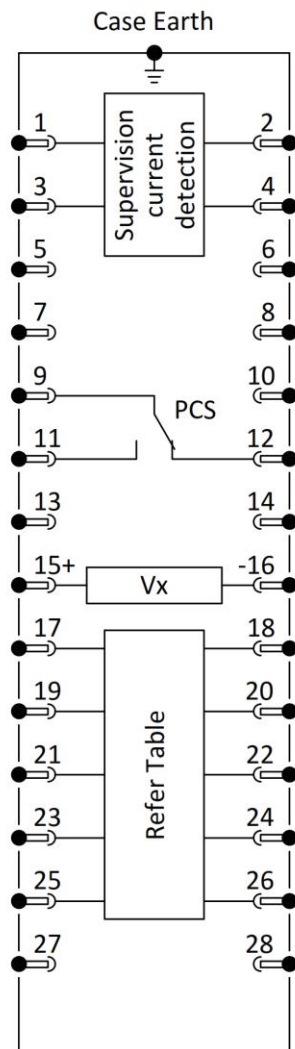
XR5-XX-4 Terminal Number Pairs						
Code	Contacts	17-18	19-20	21-22	23-24	25-26
N	5M 0B	M	M	M	M	M
P	4M 1B	M	M	M	M	B
Q	3M 2B	B	M	M	M	B
R	2M 3B	B	M	M	B	B
S	1M 4B	B	B	M	B	B

M: Make 

B: Break 



## Alpha XR5-XX-6 Trip Circuit Supervision Connection diagram

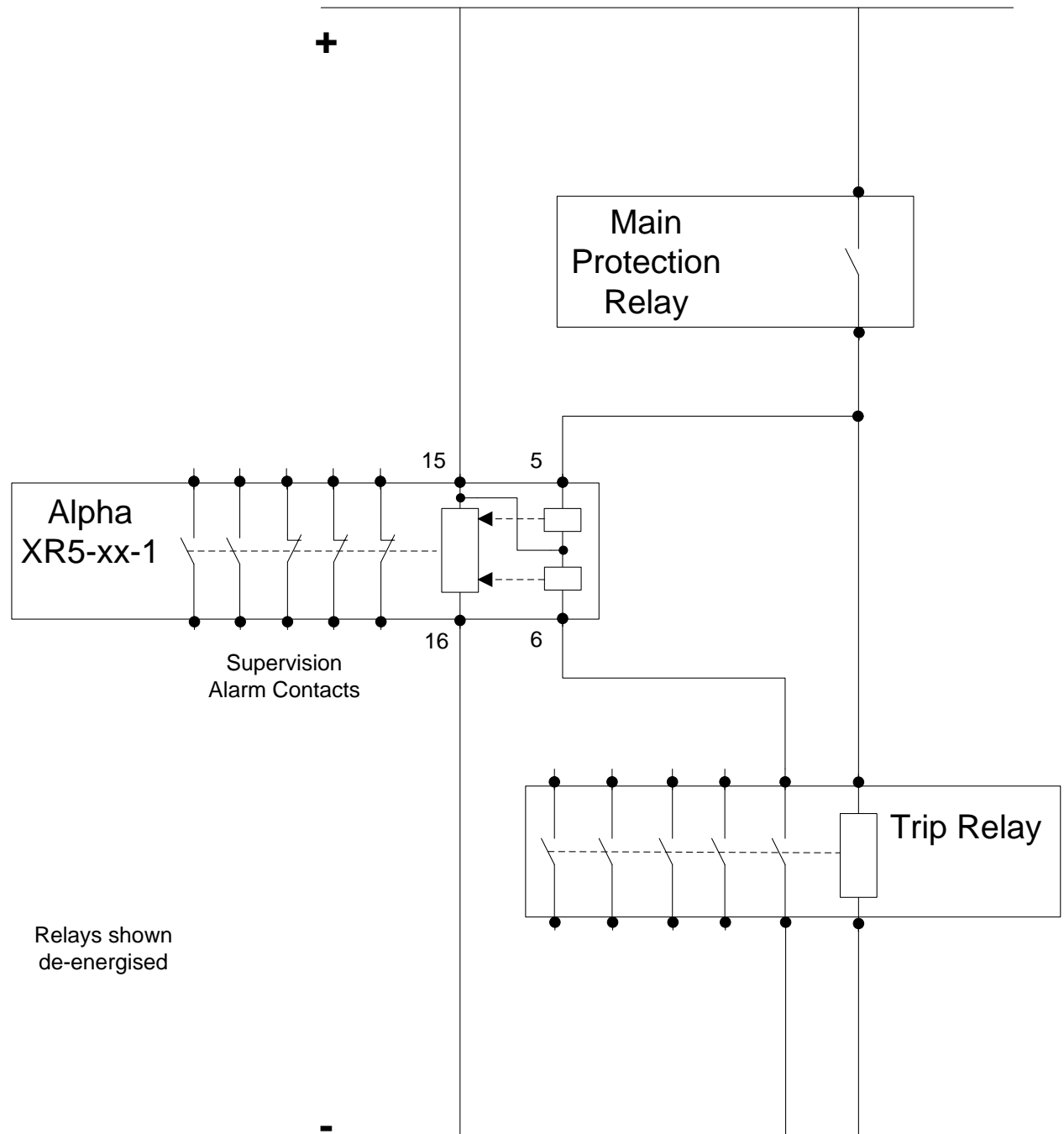


XR5-XX-6 Terminal Number Pairs						
Code	Contacts	17-18	19-20	21-22	23-24	25-26
N	5M 0B	M	M	M	M	M
P	4M 1B	M	M	M	M	B
Q	3M 2B	B	M	M	M	B
R	2M 3B	B	M	M	B	B
S	1M 4B	B	B	M	B	B

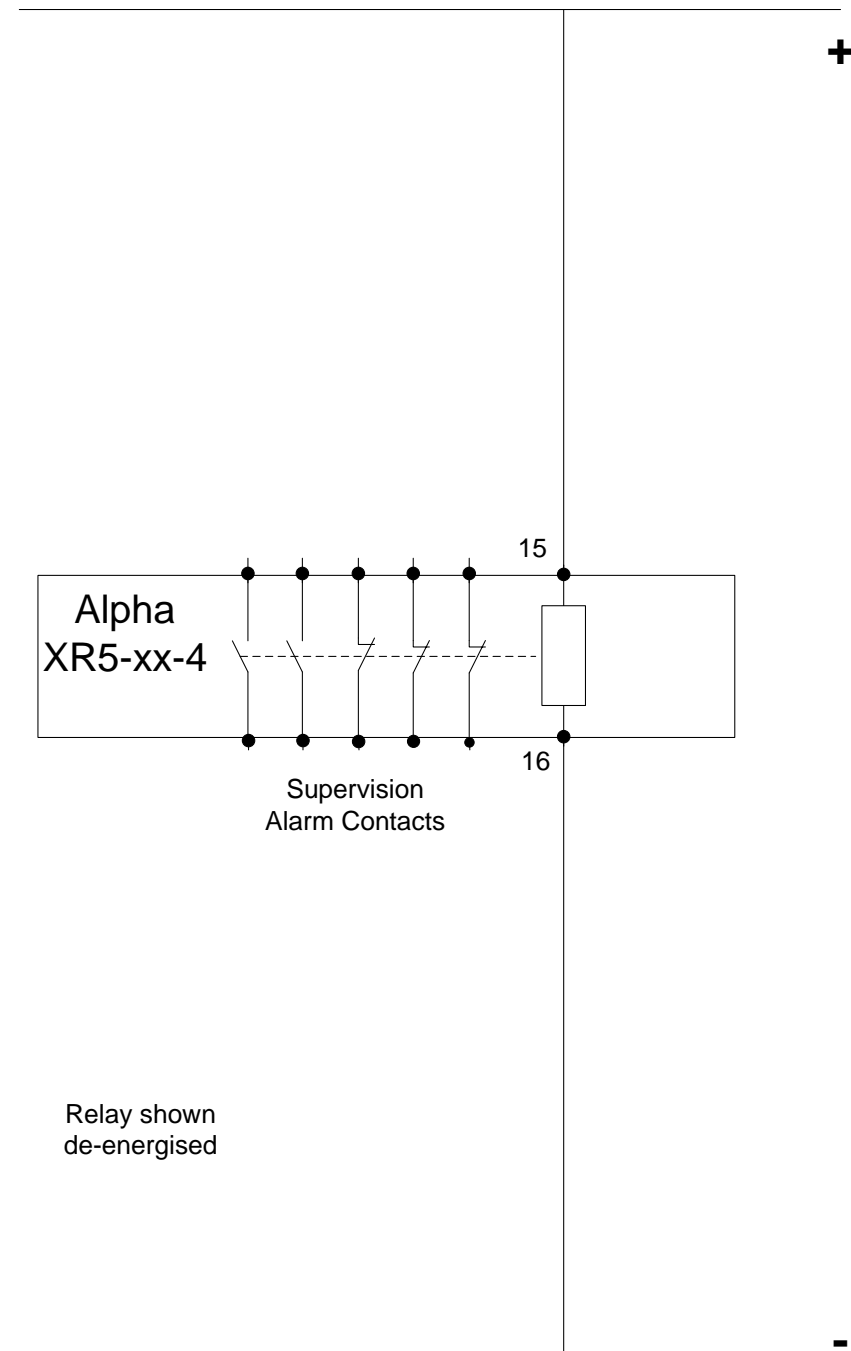
M: Make 

B: Break 

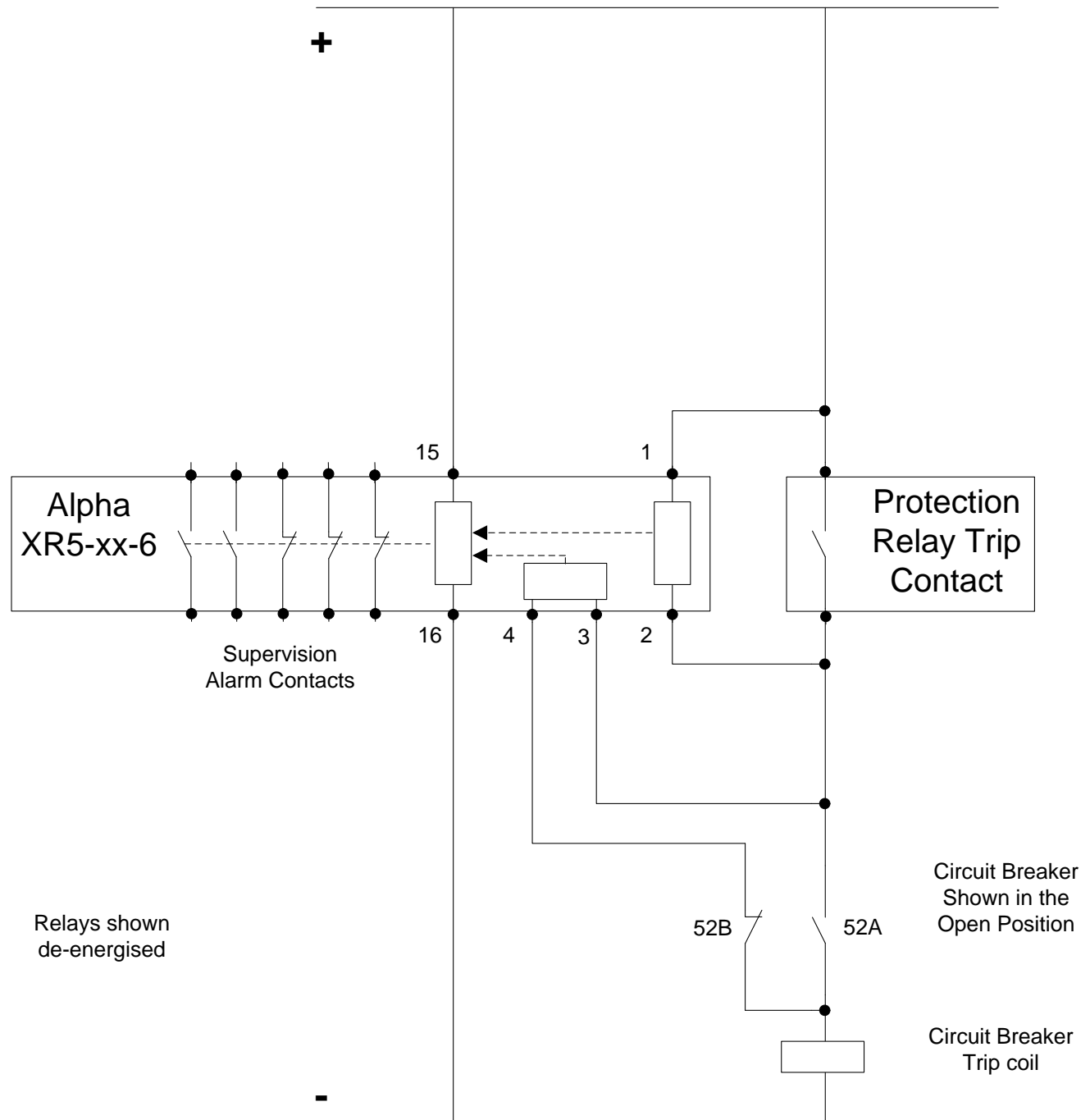
## Example Schematic – XR5-xx-1 Trip Relay Coil Supervision Application



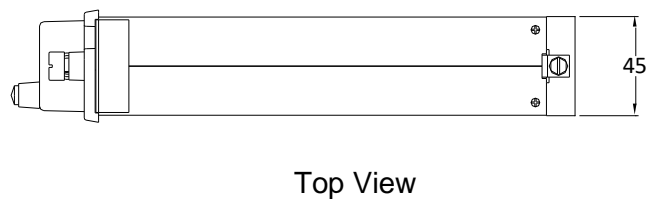
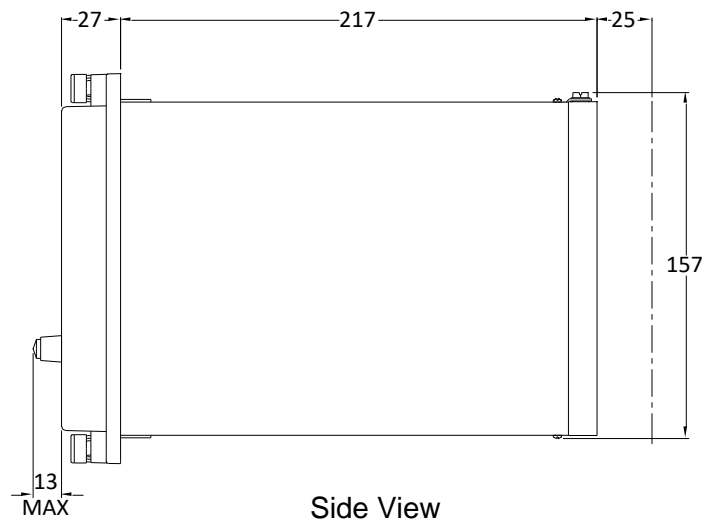
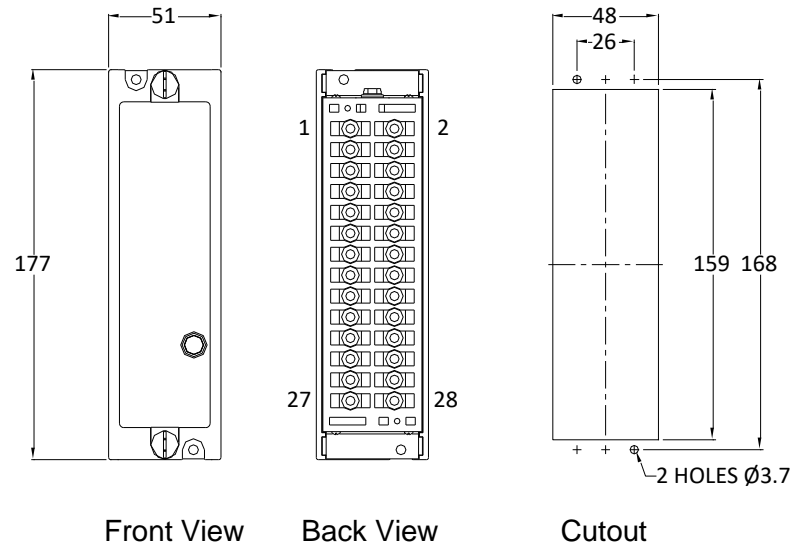
### Example Schematic – XR5-xx-4 Trip Supply Supervision Application



### Example Schematic – XR5-xx-6 Trip Circuit Supervision Application



## Terminal Layout and Relay Dimensions



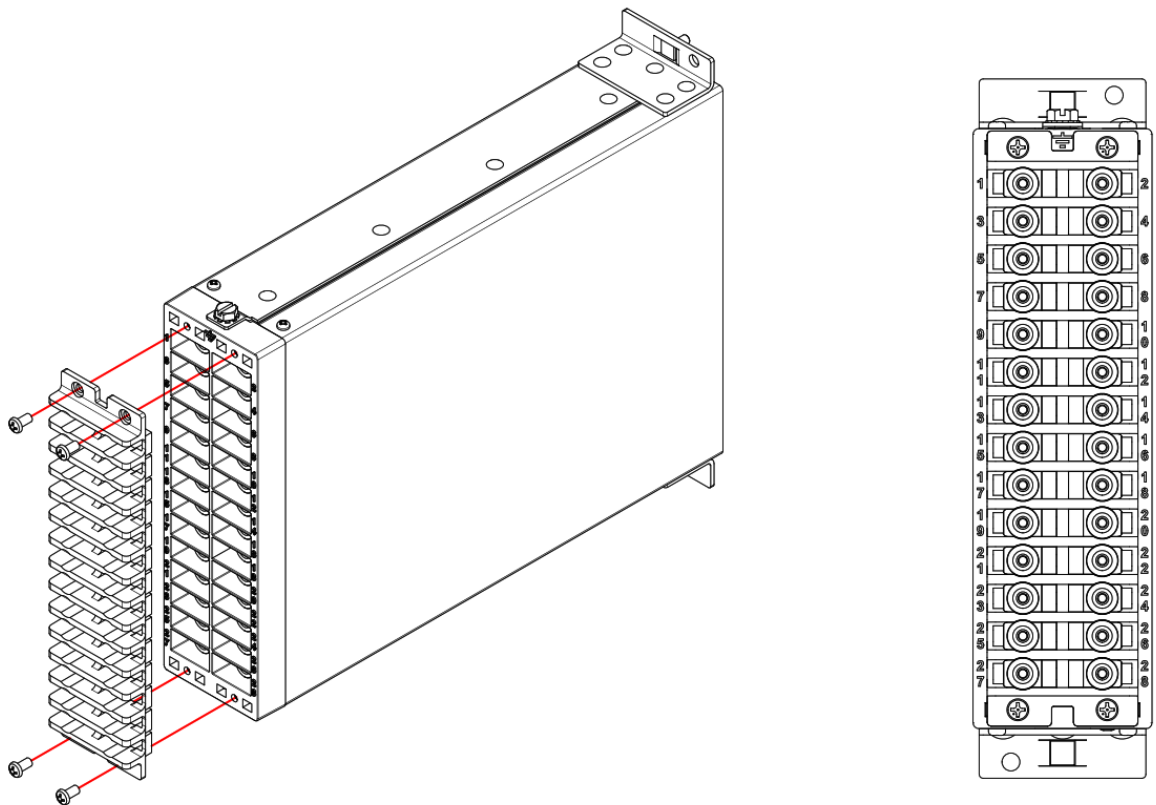
The relay module is designed for rack or panel mounting.

## IP2X Terminal Covers

The relay may be ordered with IP2X terminal covers to provide IP2X protection of the case terminals.

Alternatively separate IP2X terminal cover kits are available to provide IP2X protection of the case terminals.

The covers are fitted to the terminal block prior to cable termination.



2M28-S Case with IP2X cover

## Alpha XR Indications

### Front Layout

The figure below depicts the indications, controls and the reset push buttons on the front of the relay of a fully optioned model.

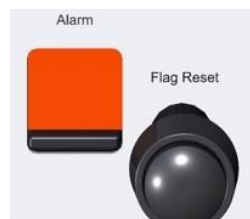


### Optional Supervision Healthy P/U LED



The Supervision Healthy Led illuminates when the supply voltage and the supervised circuit are healthy.

### Hand Reset Flag and Flag Reset Push Button



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.

## 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 Alpha XR relay wiring.

### Preliminary Checks (All Variants)

Item	Description	Complete
1	Confirm all necessary primary equipment isolations	
2	Confirm all necessary secondary equipment isolations (including trip outputs)	
3	Check panel installation of the Alpha XR relay	
4	Check the Alpha XR is wired to the protection design schematic	
5	<p>With the relay element withdrawn from the case check for any evidence of transit damage and confirm free and easy movement of the armature assembly. Note care should be taken to avoid touching the adjusted contacts.</p> 	

Item	Description	Complete
6	<p>The armature assembly may be manually operated using the grub screw adjustment window as depicted.</p>   <p>Confirm that fitted mechanical flag drops when the armature is manually released.</p>	

Item	Description	Complete
7	In the de-energised state confirm the normally open and normally closed contact states against the relevant relay connection diagram using a suitable continuity tester	
8	Manually operate the relay contacts and confirm the contact state change against the relevant relay connection diagram using a suitable continuity tester	

#### Operational Checks (XR5-xx-1 Trip Relay Coil Supervision Relay)

Item	Description	Complete
1	Insert the relay module into the case and ensure the XR5 relay is picked up in the healthy supervision circuit and following a hand reset that the mechanical flag is in the reset position	
2	Simulate a DC supply failure by removing isolating links or disconnecting the positive supply to terminal 15 of the XR5, confirm that the Alarm contacts change state and the indicating flag drops	
3	Restore the DC supply connections and ensure the XR5 relay is picked up and following a hand reset that the mechanical flag is in the reset position	
4	Simulate a DC supply failure by removing isolating links or disconnecting the negative supply to terminal 16, confirm that the XR5 Alarm contacts change state and the indicating flag drops	
5	Restore the DC supply connections and ensure the XR5 relay is picked up and following a hand reset that the mechanical flag is in the reset position	
6	Simulate the operation of the supervised tripping relay and confirm that the XR5 relay remains picked up and there is no change in the Alarm contact state and the mechanical flag remains in the reset position	
7	Simulate the failure of the supervised tripping relay coil by removing the positive isolating link to the tripping relay coil or disconnecting the positive terminal to the tripping relay, confirm that the XR5 Alarm contacts change state and the indicating flag drops	
8	Restore the relay connections and ensure the XR5 relay is picked up and following a hand reset that the mechanical flag is in the reset position	
9	Simulate the failure of the supervised tripping relay coil by removing the negative isolating link to the tripping relay coil or disconnecting the negative terminal to the tripping relay, confirm that the XR5 Alarm contacts change state and the indicating flag drops	
10	Restore the relay connections and ensure the XR5 relay is picked up and following a hand reset that the mechanical flag is in the reset position	

### Operational Checks (XR5-xx-4 Trip Supply Supervision Relay)

Item	Description	Complete
1	Insert the relay module into the case and ensure the XR5 relay is picked up in the healthy supervision circuit and following a hand reset that the mechanical flag is in the reset position	
2	Simulate a DC supply failure by removing isolating links or disconnecting the positive supply to terminal 15 of the XR5, confirm that the Alarm contacts change state and the indicating flag drops	
3	Restore the DC supply connections and ensure the XR5 relay is picked up and following a hand reset that the mechanical flag is in the reset position	
4	Simulate a DC supply failure by removing isolating links or disconnecting the negative supply to terminal 16, confirm that the XR5 Alarm contacts change state and the indicating flag drops	
5	Restore the DC supply connections and ensure the XR5 relay is picked up and following a hand reset that the mechanical flag is in the reset position	

### Operational Checks (XR5-xx-6 Trip Circuit Supervision Relay)

Item	Description	Complete
1	Insert the relay module into the case and ensure the XR5 relay is picked up in the healthy supervision circuit and following a hand reset that the mechanical flag is in the reset position	
2	Simulate a DC supply failure by removing isolating links or disconnecting the positive supply to terminal 15 of the XR5, confirm that the Alarm contacts change state and the indicating flag drops	
3	Restore the DC supply connections and ensure the XR5 relay is picked up and following a hand reset that the mechanical flag is in the reset position	
4	Simulate a DC supply failure by removing isolating links or disconnecting the negative supply to terminal 16, confirm that the XR5 Alarm contacts change state and the indicating flag drops	
5	Restore the DC supply connections and ensure the XR5 relay is picked up and following a hand reset that the mechanical flag is in the reset position	
6	Simulate the operation of the protection trip contacts and confirm that the XR5 relay remains picked up and there is no change in the Alarm contact state and the mechanical flag 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 mechanical flag remains in the reset position	

Item	Description	Complete
8	Simulate the failure of the trip circuit by removing the positive isolating link of the trip circuit, confirm that the XR5 Alarm contacts change state and the indicating flag drops	
9	Restore the trip circuit and ensure the XR5 relay is picked up and following a hand reset that the mechanical flag is in the reset position	
10	Simulate the failure of the trip circuit by removing the negative isolating link of the trip circuit, confirm that the XR5 Alarm contacts change state and the indicating flag drops	
11	Restore the trip circuit connections and ensure the XR5 relay is picked up and following a hand reset that the mechanical flag is in the reset position	
12	Simulate the failure of the trip circuit wiring between the protection trip contact to the circuit breaker trip coil by disconnecting the wiring at the trip contact, confirm that the XR5 Alarm contacts change state and the indicating flag drops	
13	Restore the trip circuit connections and ensure the XR5 relay is picked up and following a hand reset that the mechanical flag is in the reset position	