1S26 User Guide

Arc Fault Monitor +

Integrated Current Check Relay

relay monitoring systems pty ltd

Advanced Protection Devices

User Guide

Test Manual

1S26 User Guide

About This Manual

This User Guide covers all 1S26 relays manufactured from May 2006. Earlier relays do not necessarily incorporate all the features described. Our policy of continuous may means that extra features & functionality may have been added.

The 1S26 User Guide is designed as a generic document to describe the common operating parameters for all relays built on this platform. Some relay applications are described but for specific model information the individual “K” number Product / Test manuals should be consulted.

Contact Us

© Relay Monitoring Systems Pty Ltd 2006-2008
6 Anzed Court • Mulgrave 3170 • AUSTRALIA
Phone 61 3 9561 0266 • Fax 61 3 9561 0277
Email rms@rmspl.com.au • Web www.rmspl.com.au

To download a PDF version of this guide:
http://www.rmspl.com.au/userguide/1s26_user_guide.pdf

To download the model specific Test Manual:
http://www.rmspl.com.au/search.asp

How this guide is organised

This guide is divided into five parts:

Part 1 Overview

Part 2 Mechanical Configuration

Part 3 1S26 Technical Bulletin

1S30 Technical Bulletin

Part 4 Installation

Part 5 Maintenance

Part

1

Test Manual

This User Guide covers all 1S26 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 & is called a type number. The type number takes the form 1S26Kxx where the Kxx is the "K" or version number.

Refer to: www.rmspl.com.au/handbook/parta3.pdf
for a complete description of the RMS "K" number system.

Each 1S26 version has a specific Test Manual which provides details on the unique attributes of the relay. Each Test Manual includes the following information:

- Test Certificate
- Specific technical variations from the standard model if applicable
- Test & calibration record
- Wiring diagram

A Test Manual is provided with each relay shipped.

If you require a copy of the Test Manual for an RMS product the following options are available:

- Check the RMS web site at: www.rmspl.com.au/search.asp
- RMS CD catalogue select: List all Product/Test Manuals under Technical Library
- Contact RMS or a representative & request a hard copy or PDF by email.

Part

2

Mechanical Configuration

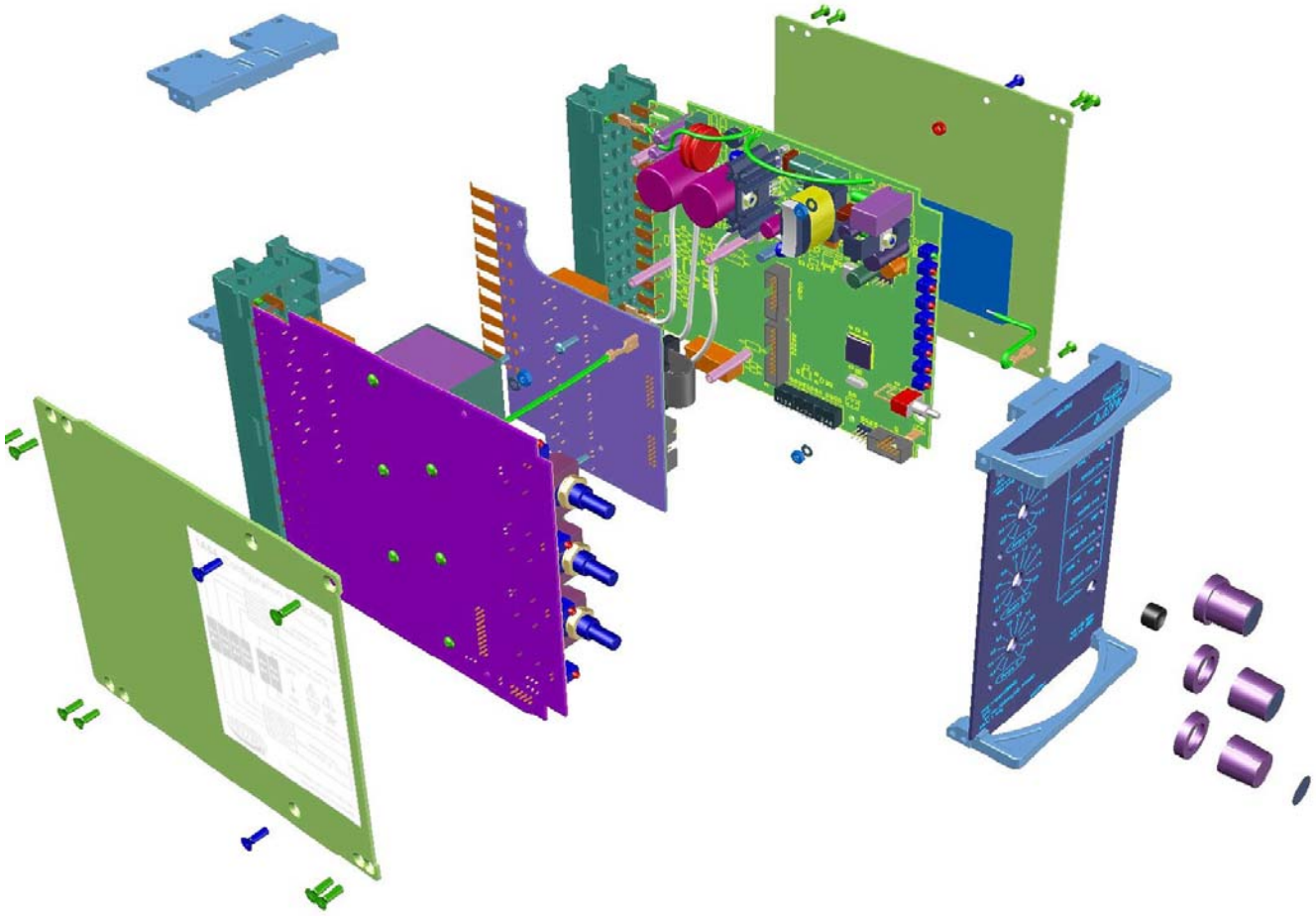
Great care has been taken to design a rugged, cost effective & flexible mechanical solution for the *MATRIX* range of RMS protection relays. The *MATRIX* range provides a compact draw out case solution with M4 screw terminals:

- 2M28 Size 2 with 28 terminals
- 4M28 Size 4 with 28 terminals
- 4M56 Size 4 with 56 terminals

Complete details & attributes for the M (MATRIX) cases & accessories may be found at:

http://www.rmspl.com.au/mseries.htm

The 1S26 is configured in a 2M28 case & the following photographs depict the general mechanical configuration. It should be noted that re-usable JIS plastic threading (PT type) screws are used to bind the draw out relay module.



1S26 relay assembly depicted in a 4M56 case

1S30 Arc Fault Sensor – Front & rear views

Part

3

Technical Bulletin

The detailed technical attributes, functional description & performance specifications for the 1S26 are described in the attached Technical Bulletin. For the most up to date version go to:

www.rmspl.com.au/handbook/1s26.htm

www.rmspl.com.au/handbook/1s30.htm

For any specific attributes of a particular version refer to the Test Manual for that type (K) number.

The order of precedence for technical information is as follows:

- Test Manual
- Technical Bulletin
- User Guide

Technical Bulletin **1S26**

Arc Fault Monitor + Integrated Current Check

Features

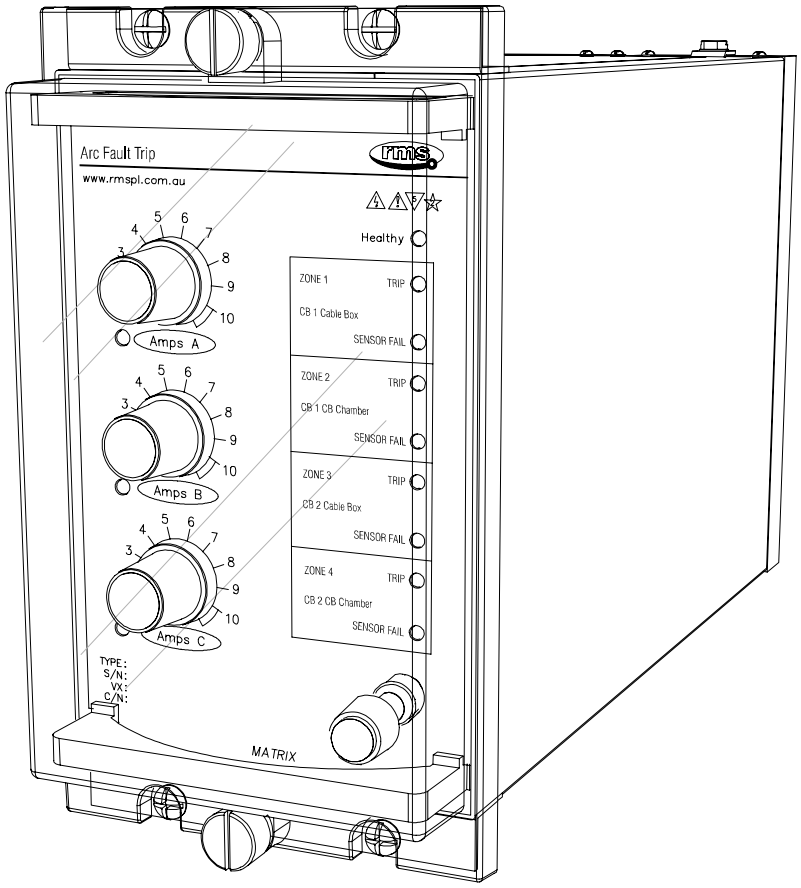
- Four independent high speed arc fault tripping zones
- 1 or 2 arc fault sensors per zone allowing up to 8 arc fault sensors per 1S26 module
- Blocking status input for each arc fault zone
- Trip indication LED for each arc fault zone
- Continuous arc sensor supervision with sensor fail LED for each zone
- Non volatile memory ensures last recorded alarm states are restored on power up
- Integrated 3 phase overcurrent check function
- 20 - 200% current setting range
- Optional 5-50% E/F input
- 1A or 5A nominal CT inputs
- Integrated CB check function
- 3 phase current check block status input
- Thirteen (13) high speed configurable tripping duty output contacts
- Zone segregated or common tripping output configuration
- Reset LED flags via front panel button or status input
- Self supervision watchdog with healthy LED & alarm contact

Application

The 1S26 Series relays provide high speed arc protection for applications on medium & high voltage BUS bars. An adjustable three pole AC current check stage is provided to ensure system security while maintaining high speed clearance of arc faults.

Up to eight (8) 1S30 Arc Detectors may be connected to each 1S26 relay.

The fast overcurrent reset characteristic allows the 1S26 to be employed for the CB fail protection function on the incoming feeder to the BUS being monitored. A 2T105 relay may be employed for the CB fail time delay.



1S26 depicted in a 4M56-S draw out case with custom alarm text engraving

ARC Fault Protection

Made in Australia

Arc fault protection is a relatively new technique employed for the fast clearance of arcing faults on BUS bars & within metal clad switchgear & associated cable boxes. The arc is detected using an optical sensor & the signal input to a protection device which also monitors the load current on the system. A trip signal can be achieved in less than 10ms using arc detection only or within 15ms when using the integrated instantaneous overcurrent check. This is considerably faster than a traditional IDMT overcurrent relay & provides additional protection from the onset of arcing faults with relatively low fault currents.

BUS PROTECTION

The 1S26 Arc Fault relay is designed for application on new or existing medium voltage BUS systems with up to two incoming lines. For new installation the high speed arc protection technique offers cost advantages over traditional high impedance differential schemes. For existing installations which may not have any BUS protection or using simple earth leakage protection it is relatively simple & cost effective to retrofit an arc protection scheme as dedicated protection CT's are not required.

FEEDER PROTECTION

For the outgoing feeders arguably the greatest risk of arc fault damage exists at the CB cable termination & in the CB chamber itself due to the slow clearance times of the IDMT feeder protection. The CB cable termination is particularly at risk to ingress of moisture & rodent damage. Application of arc protection in the feeder circuits can be achieved using spare sensors & trip contacts on the 1S26 or alternatively additional 1S20 & 1S25 relays may be employed for this purpose.

BUS Bar Applications

ARCING FAULTS

Arcing faults can occur as a result of insulation breakdown due to equipment age & / or poor maintenance.

The degree of damage caused by arcing depends principally on the duration of the arc. If an arc lasts only 100ms, the switchgear needs to be checked & the insulation resistance measured before power can be re-established. With a 200ms arc, the power supply will be interrupted; the BUS bars & switchgear must be checked; power is re-established only after minor repairs. In the event of a 500ms arc the supply is interrupted, metal parts of the BUS chamber & switchgear are destroyed & poisonous gases are emitted. A 1s arc destroys most of the installation & may cause a fire, injury to personnel & damage to property.

ARC PROTECTION OF BUS BARS

Figure 1 depicts how the 1S26 may also be applied for the protection of a bus bar with two incoming lines & multiple outgoing feeders. The number of sensors in the bus chamber is dictated by the switchgear design and the length of switchboard.

In most indoor metal clad switchgear the bus bar chamber is a continuous chamber between panels only broken into segregated sections at a bus section breaker & as such the strategic placement of one or two arc sensors in each bus bar chamber run is normally adequate. The 1S30 Arc Fault sensor is available with one or two detectors per unit to allow wider coverage.

Some indoor metal clad switchgear may segregate the bus chamber of each panel from the next via insulated bus chamber side barriers per panel, if this is the case then each bus chamber per panel would need to be monitored by at least one arc sensor.

Isolating switches between BUS bar sections need also be considered & appropriate tripping zones created to ensure isolation of the faulted section.

In large enclosures the arc sensors should be placed at approximately 5m intervals. 1S30 arc sensors are also available with dual optical detectors to allow detection of arc in both directions.

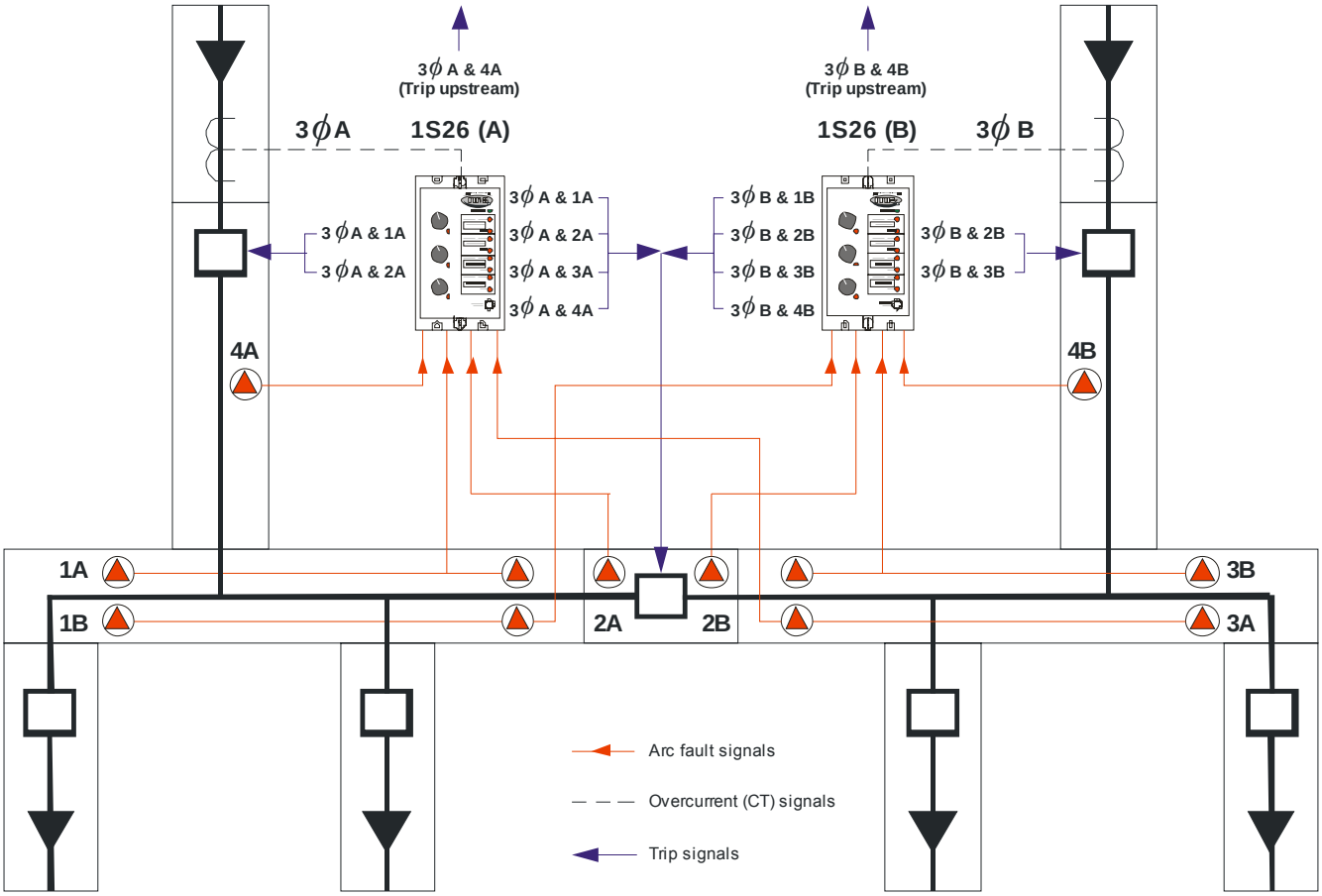


Figure 1: One to eight arc sensors located in the BUS chamber in up to four tripping zones

1S30 ARC FAULT SENSORS
Refer to the 1S30 Technical Bulletin for details.

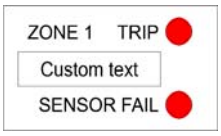
Figure 2: 1S30 Arc Fault Sensors
Through panel mounting detector version depicted at left
Front panel view of dual detector version depicted at right

ARC FAULT ELEMENT OPERATE TIME
The arc fault optical detection element is guaranteed to pick up in less than 5ms. Where arc fault only tripping is required the 1S20 or 1S25 arc fault monitoring relays should be employed. These relays provide a trip output contact operate time of less than 10ms.

OPERATION INDICATOR
Two (2) LED's are provided for each tripping zone to provide the following status indications:

Trip: Flashes for 2s on detection of arc fault in zone & then solid. Resets when front panel reset button pressed or voltage pulse applied to remote flag reset status input.

Fail: Flashes to indicate failure of 1S30 Arc Fault Sensor in zone.



ARC SENSOR FUNCTION
The 1S30 is an optical sensor that responds to the flash of light emitted during the incidence of an arcing fault. Onset of the light flash & detection by the 1S30 occurs in a few ms.

When an arc is detected, the resistance presented by the 1S30 drops to a level where the current flow increases to approximately 20mA. This increased current flow is instantaneously detected by the 1S26 & the arc trip logic picked up for that sensor zone. Refer to the 1S30 Technical Bulletin for further details.

ARC FAULT TRIPPING USING CURRENT CHECK
Fast operation of a tripping scheme usually results in reduced system security. The arc detection method can however, combine the 1S30 optical detection technique with a traditional overcurrent method to maximize system security particularly for BUS bar protection schemes. Both conditions must coexist for the trip condition to be met as depicted in figure 3.

1S26
Arc Fault Monitor with integrated O/C check

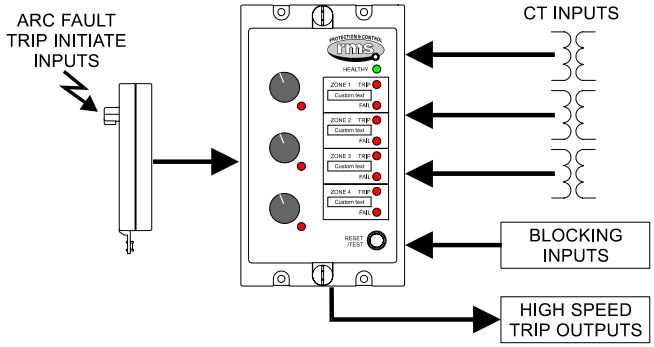


Figure 3:
Key components required to implement an Arc Fault Protection scheme with an overcurrent check stage

The application example depicted in figure 1 utilize this concept for enhanced system security in that both the 1S30 Arc Fault input AND the overcurrent must be picked up for a trip signal to be issued.

ARC DETECTION RESET TIME (Effect of multiple arc trips)
A delay of 2s is required to reset the 1S26 arc fault element after an initial arc sensor trip. Subsequent arc detection will cause the trip output contacts to re-operate.

ARC SENSOR CONTINUOUSLY PICKED UP
High ambient light levels may cause a 1S30 to be continuously picked up. This condition could occur for example if the CB cable box cover was left open in very high ambient light level conditions.

Damage to the 1S30 cable may cause the two internal wires to be shorted which would be interpreted by the 1S26 as an arc fault pick up.

If under either of the above conditions an over-current pick up occurred the 1S26 would output an arc fault trip operation.

To avoid possible mal operation due to this condition, the 1S26 is designed to automatically disable the arc fault tripping function if the 1S30 sensor is picked up for >10s.

The 1S26 alarm contact will be set & the front panel 'Sensor fail' LED will flash until the ambient light level problem is corrected to that arc fault zone. The 1S26 will then perform an arc sensor test function & automatically reset.

ARC SENSOR CIRCUIT SUPERVISION
The 1S30 Arc Sensor is the heart of the arc detection system & supervision of circuit continuity is critical for correct operation. To monitor the integrity of the wiring between the 1S30 arc sensor & 1S26 Arc Monitor, a continuous 2mA supervision current flows between the units. The 1S26 alarm contact will drop out after a 1s time delay if it fails to detect this current.

The failed zone will be indicated by the front panel 'Sensor fail' LED.

OPERATING LOGIC CONFIGURATION

Output trip contacts 1-9 will only operate if an overcurrent condition is coincident with an arc fault condition. This is known as Arc Fault & Overcurrent operating logic as depicted in figures 4 & 5.

Output contacts 10-13 may be configured to operate as arc fault elements & this is known as arc fault only operating logic for application where local current check is not possible such as in the incoming cable box or CT chamber. This is known as arc fault only operating logic & is depicted in figures 6 & 7.

Alternatively contacts 10-13 may be configured to operate on the overcurrent elements for application in a CB failure scheme. This is known as overcurrent only operating logic & is depicted in figures 8 & 9.

ARC ZONE BLOCKING INPUTS

Each arc fault zone input is qualified by an independent blocking status input.

OVERCURRENT BLOCKING INPUT

The overcurrent elements are qualified by a common blocking status input.

ARC FAULT & OVERCURRENT OPERATING LOGIC

The arc pick up logic signal is maintained for a period of 2s from the instant an arc is detected. The overcurrent pick up logic has an instantaneous (<15ms) reset characteristic.

Zone segregated tripping outputs

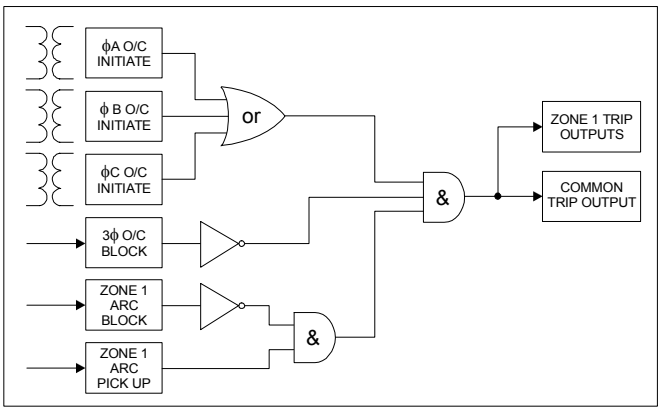


Figure 4:
Overcurrent on any phase & Arc Fault will trip contacts specified for that zone + the common arc fault contact.
Logic is repeated for each arc fault zone.
Configuration switch C1 set to ON
Configuration switch C2 set to ON

Any Arc Fault Zone tripping outputs

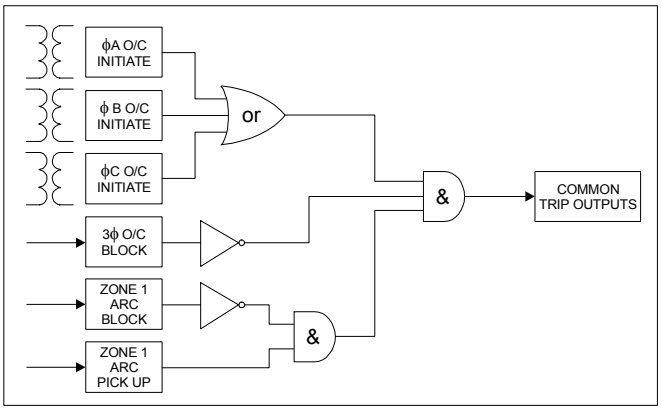


Figure 5:
Overcurrent on any phase &
Arc Fault on any zone will trip all contacts.
Logic is repeated for each arc fault zone.
Configuration switch C1 set to ON
Configuration switch C2 set to OFF

ARC ONLY OPERATING LOGIC

Zone segregated arc fault tripping outputs

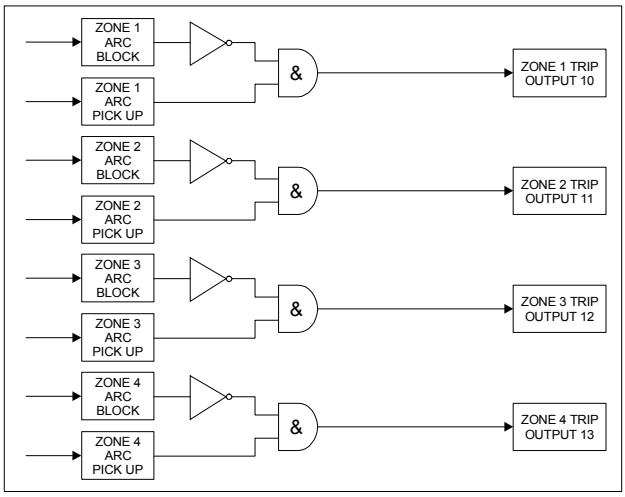


Figure 6:
Arc fault on zone 1 will trip contacts 10
Arc fault on zone 2 will trip contacts 11
Arc fault on zone 3 will trip contacts 12
Arc fault on zone 4 will trip contacts 13
Configuration switch C1 set to ON
Configuration switch C2 set to ON

Any arc fault zone tripping outputs

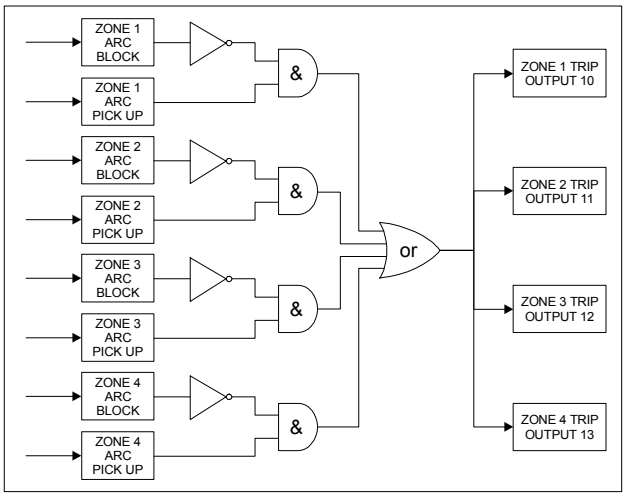


Figure 7:
Arc fault on any zone will trip contacts 10-13
Configuration switch C1 set to ON
Configuration switch C2 set to OFF

OVERCURRENT ONLY OPERATING LOGIC – CB Fail

Phase segregated tripping outputs

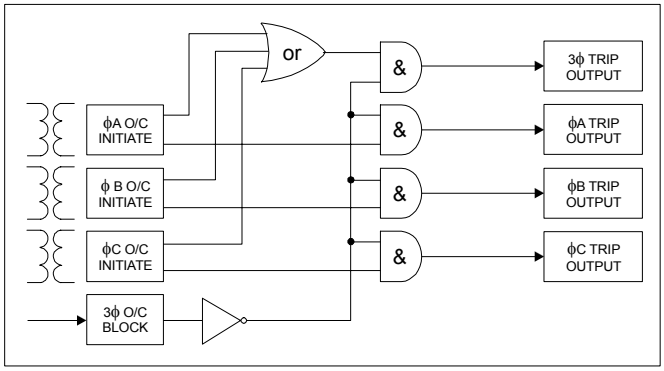


Figure 8:
Overcurrent on phase A will trip contact 10
Overcurrent on phase B will trip contact 11
Overcurrent on phase C will trip contact 12
Overcurrent on any phase will trip all contact 13
Configuration switch C1 set to OFF
Configuration switch C2 set to ON

3 Phase tripping outputs

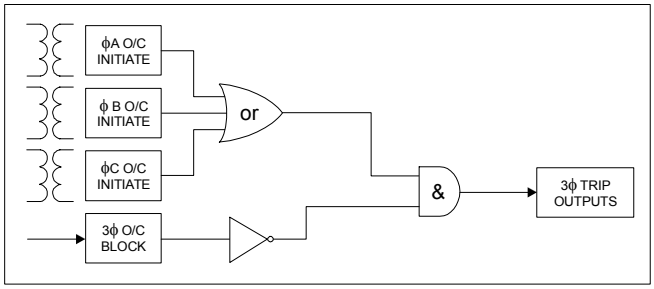


Figure 9:
Overcurrent on any phase will trip contacts 10-13.
Configuration switch C1 set to OFF
Configuration switch C2 set to OFF

CURRENT SETTING RANGE

Setting:	Continuously adjustable control per phase
20-200%	of nominal CT rating
5-50%	Optional earth fault input (Refer figure 12)
Repeatability:	± 2% of setting
Accuracy:	± 5% of maximum setting

DROPOUT PICKUP RATIO OF OVERCURRENT ELEMENT

85% setting:	PCB jumper J103 fitted left – Factory default
75% setting:	PCB jumper J103 fitted right as per figure 10.

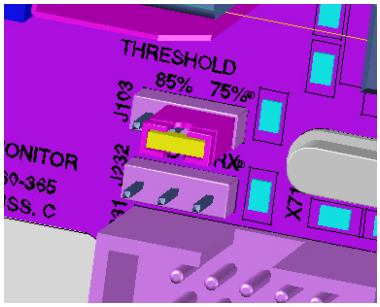


Figure 10:

To change the dropout / pickup ration remove the relay module from the case, locate the three pin jumper header position J103 & fit jumper for 75% or 85% dropout pickup ratio.

OPERATING TIME OF CURRENT ELEMENT

At 2 X O/C setting:	Logic pick up time less than 10ms Trip contacts configured for instantaneous overcurrent only operation will pick up in less than 15ms.
Reset time:	Logic drop out time less than 15ms Trip contacts configured for instantaneous overcurrent only operation will reset in less than 15ms when current drops from 2 X O/C setting to zero.

OPERATING TIME OF ARC FAULT DETECTION

Arc fault element: Logic pick up time less than 5ms

Arc fault trip contacts are guaranteed to pick up in less than 10ms including bounce. Typical operate time is 7ms.

Reset time: 2s

OPERATING TIME OF O/C & ARC FAULT ELEMENTS

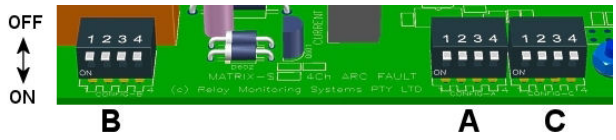
At 2 X O/C setting: Trip contacts pick up in less than 15ms

FRONT PANEL LED's

System supervision:	One green 'Healthy' LED
Overcurrent pick up:	One red LED per phase - self reset
Arc trip pick up:	One red LED per zone latching Off, flashing or on solid - latching
Sensor fail alarm:	One red LED per zone Off, flashing or solid - latching

CONFIGURATION SWITCHES

Three banks of configuration switches (A, B & C), each with four (4) independent piano type switches are accessible to the user by first withdrawing the relay module from the outer case.



CONFIGURATION SWITCH SETTING SUMMARY

The internal wiring label identifies the position of the following switch functions as follows:

Switch	ON	OFF
A1	Zone 1 Arc sensor fitted	Zone 1 Arc sensor not fitted
A2	Zone 2 Arc sensor fitted	Zone 2 Arc sensor not fitted
A3	Zone 3 Arc sensor fitted	Zone 3 Arc sensor not fitted
A4	Zone 4 Arc sensor fitted	Zone 4 Arc sensor not fitted

Switch	ON	OFF
B1	Zone 1 – 2 Arc sensors	Zone 1 – 1 Arc sensor
B2	Zone 2 – 2 Arc sensors	Zone 2 – 1 Arc sensor
B3	Zone 3 – 2 Arc sensors	Zone 3 – 1 Arc sensor
B4	Zone 4 – 2 Arc sensors	Zone 4 – 1 Arc sensor

Switch	ON	OFF
C1	Output contacts 10-13 Arc only logic	Output contacts 10-13 Overcurrent only logic
C2	Zone & phase segregated outputs	Any zone & 3 Phase outputs
C3	Apply volts to BLOCK	Remove volts to BLOCK
C4	DC only status inputs	AC/DC status inputs

Table 1

OUTPUT RELAY FUNCTION CONFIGURATION

The function of the output contacts is dependent on the position of configuration switches C1 & C2 as per Table 2.
Refer operating logic section for detailed functional description.

	Configuration Switch Positions			
	C1 ON		C1 OFF	
Relay	C2 ON	C2 OFF	C2 ON	C2 OFF
1	Zone 1 Arc AND any Ø O/C	Any Arc Fault Zone AND any Ø O/C	Zone 1 Arc AND any Ø O/C	Any Arc Fault Zone AND any Ø O/C
2				
3	Zone 2 Arc AND any Ø O/C		Zone 2 Arc & any Ø O/C	
4				
5	Zone 3 Arc AND any Ø O/C		Zone 3 Arc AND any Ø O/C	
6				
7	Zone 4 Arc AND any Ø O/C		Zone 4 Arc AND any Ø O/C	
8				
9	Any zone Arc AND any Ø O/C		Any zone Arc AND any Ø O/C	
10	Zone 1 Arc	Any Arc Fault Zone	ØA	Any O/C Phase
11	Zone 2 Arc		ØB	
12	Zone 3 Arc		ØC	
13	Zone 4 Arc		3Ø	

Table 2

Technical Data

AUXILIARY SUPPLY
A high efficiency switchmode power supply is incorporated which provides a low burden to the auxiliary supply.

Low range model:	20-70V DC
High range model:	40-300V DC & 40-275V AC

BURDENS

Quiescent:	Less than 4W at 110V DC
Maximum:	Less than 10W
Sensing circuits:	VA per phase all settings at 50Hz.

I amps	1A CT input	5A CT input
1	0.25	<0.01
5	6.3	0.18
10	25	0.72
20	100	2.9
25	-	4.5
30	-	6.5

CT INPUT THERMAL WITHSTAND (Per phase)

	1A CT	5A CT *
Continuous	3.5	25
4.5s	39	250
3s	75	450
2s	90	550
1s	120	800
0.5s	180	1,000

* M Series case terminals are limited to 400A for 1s.

ARC FAULT BLOCK STATUS INPUT DELAY

		AC Rejection Filter	
Initiate input	Minimum	ON	OFF
DC	P/U	<16ms	<4ms
	D/O	<4ms	<16ms
AC	P/U	N/A	<23ms
	D/O		<33ms

STATUS INPUT OPERATING VOLTAGE
An internal configuration switch is provided to select status input operation for DC only or AC/DC. This setting may be pre defined when ordering.

18 - 300V DC — Set Configuration Switch to **ON**
In this mode the universal status input will reject AC signals that may be induced on the control wiring. Suitable for high security applications where a DC battery supply is available.

18 - 300V DC & 18 – 275V AC — Set Configuration Switch to **OFF**
In this mode the universal status input is designed to operate on both AC & DC input voltages. Suitable for applications where an AC auxiliary voltage is available such as transformer or generator control panels.

STATUS INPUT OPERATING CURRENT
10mA P/U for 1ms then reducing to 1.5mA after 4ms.

RESET
Press the front reset button or pulse the reset status input.

OUTPUT CONTACTS
Refer logic diagrams & tables 1 & 2 for function configuration.

Arc & O/C:	4 x 2 N/O contacts
Common O/C & Arc:	1 N/O
O/C only or O/C & Arc:	4 x 1 C/O contacts
Fail alarm:	1 C/O contact for the power supply / CPU fail / arc fault sensor. Normally picked up & drops out to signal an alarm condition.

OUTPUT CONTACT RATINGS — IEC60255-0-2

Carry continuously	5A AC or DC	
Make & carry	0.5s 20A AC or DC	
L/R ≤ 40ms & V ≤ 300V	0.2s 30A AC or DC	
Break capacity I ≤ 5A & V ≤ 300V	AC resistive	1,250VA
	AC inductive	250VA @ PF ≤ 0.4
	DC resistive	75W
	DC inductive	30W @ L/R ≤ 40ms 50W @ L/R ≤ 10ms
Minimum number of operations		10^6 at maximum load
Minimum recommended load		0.5W limit 10mA / 5V

TRANSIENT OVERVOLTAGE — IEC60255-5

Between all terminals & earth	5kV 1.2/50us 0.5J
Between circuit groups: Status/Reset Inputs, CT, Auxiliary Supply, Sensor Inputs, Trip Outputs	5kV 1.2/50us 0.5J
Without damage or flashover	

INSULATION COORDINATION — IEC60255-5

Between all terminals & earth	2.0kV RMS for 1 minute
Between circuit groups: Status/Reset Inputs, CT, Auxiliary Supply, Sensor Inputs, Trip Outputs	2.0kV RMS for 1 minute
Across normally open contacts	1.0kV RMS for 1 minute

AUXILIARY SUPPLY — IEC60255-11

Allowable breaks / dips in supply	≤ 20ms
Collapse to zero from nominal voltage	

ELECTROSTATIC DISCHARGE — IEC60255-22-2 CLASS III

6kV contact discharge	Arc & O/C: No mal operation O/C only: ≤ 5% variation

FAST TRANSIENT — IEC60255-22-4

4kV, 5/50ns, 100KHz repetitive	Arc & O/C: No mal operation O/C only: ≤ 5% variation

CONDUCTED RFI — IEC60255-22-6

10V, 0.15 to 80MHz	Arc & O/C: No mal operation O/C only: ≤ 5% variation

TEMPERATURE RANGE — IEC68-2-1/2

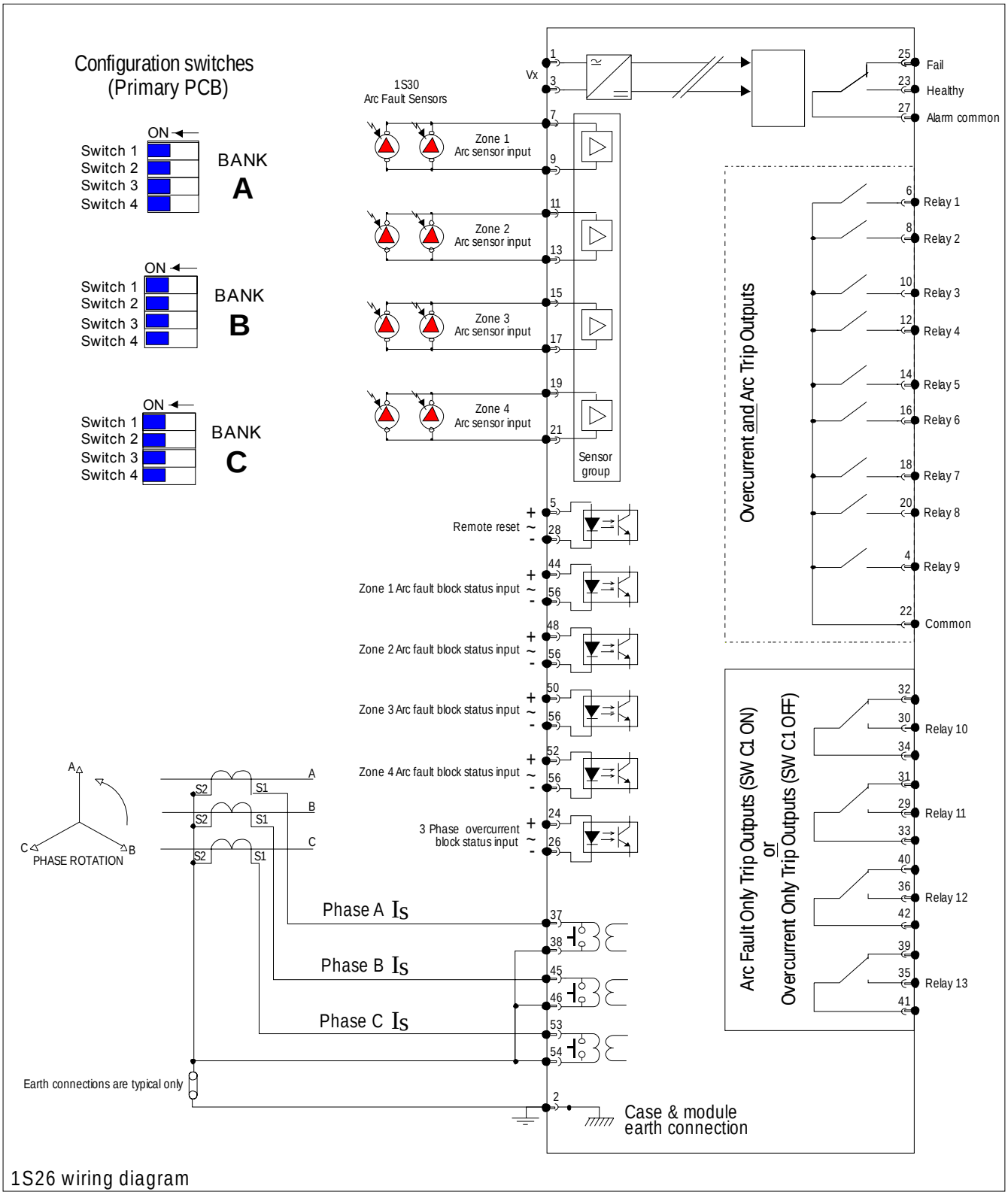
Operating:	-5 to +55°C
Storage:	-25 to +75°C

HUMIDITY — IEC68-2-78
40 °C & 95% RH non condensing

TERMINATION SCREWS

M4 Screws

An M4 screw kit is supplied as standard with each 1S26. Additional M4 screw kits may be purchased separately.



1S26 wiring diagram

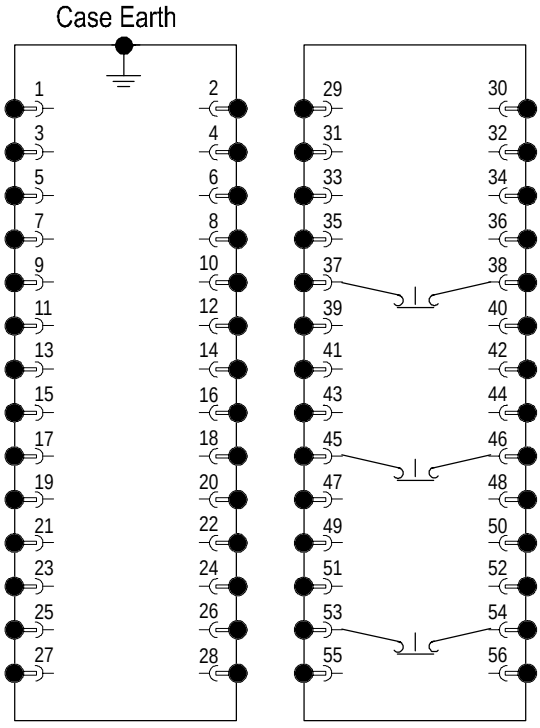
Figure 11: Wiring diagram for 1S26 four zone arc fault monitor - Relays shown in de-energized condition
Refer to figure 11 for two phase overcurrent + E/F configuration

Case Mounting

CASE
4M56-S draw out case

ACCESSORIES SUPPLIED WITH EACH RELAY

1 x M4 self threading mounting screw kit	P/N 290-406-151
2 x M4 terminal screw kit (28 per kit)	P/N 290-407-153



4M56 Case terminations (REAR VIEW)

Figure 10

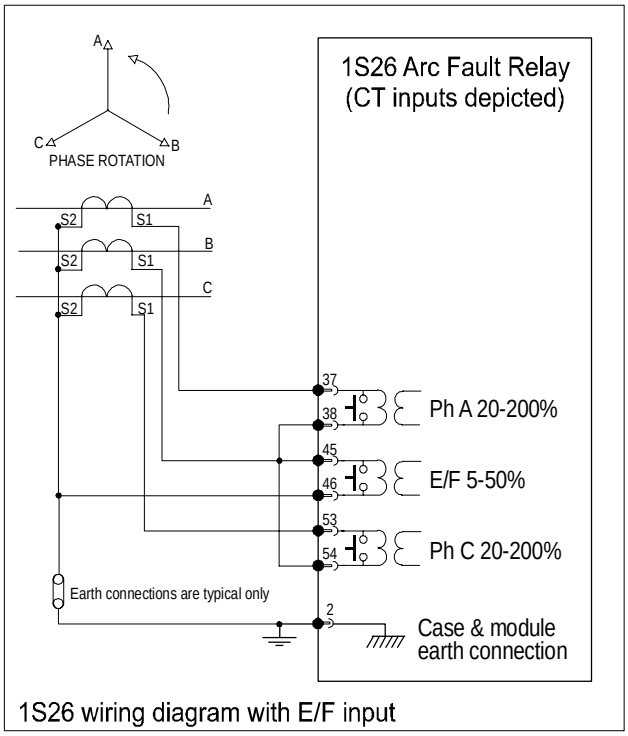


Figure 12: CT wiring configuration when using earth fault input

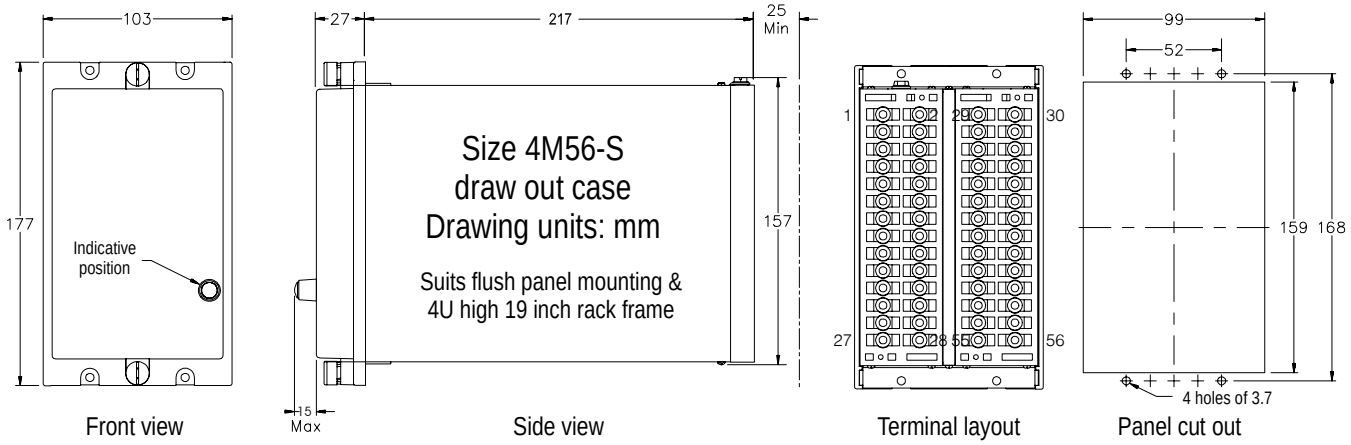


Figure 13: Case mounting details

Ordering Information

ALARM TEXT LABELS
The 1S26 front panel has provision for custom text to identify the sensor location for each arc fault tripping zone. The required text may be engraved on the front panel by the factory if specified at time of order. Alternatively the front panel may be removed for engraving by the user or contractor. The RMS web site provides an ACAD file for this purpose.

The front panel is fabricated from flexible plastic sheet with a white surface & black substrate to provide high contrast black text when engraved.

Removal of the front label is achieved by drawing out the 1S26 module from the outer case & pulling the label from the edges at the mid point between the top & bottom draw out handles. This will cause the label to bend & disengage from the top & bottom handle retention points. Once free from the 1S26 module the front label can be placed on an engraving table. Additional factory engraved labels may be sourced from RMS for later field installation.

While an engraved label provides the most permanent record other methods such as laser printed stick on labels or indelible marker pen may be satisfactorily employed.

CUSTOM ENGRAVED TEXT DEFINITION
Complete the following tables with one character per box. Refer to the front panel layout depicted in figure 13. Submit completed labeling information with the 1S26 product ordering code.

Maximum characters: 2 lines x 15 characters / tripping zone.
Maximum font size: 1 line x 10 characters / tripping zone.

Custom text will be left justified.

Zone 1

Zone 2

Zone 3

Zone 4

ORDER CODE
The order code determines the production build in the factory & cannot be changed in the field.

Generate the required order code as follows: e.g. 1S26-BAAA

General Type		Order Code			
		1	2	3	4
1S26	-				

1 AUXILIARY SUPPLY RANGE
A 20 - 70V DC
B 40 - 300V DC & 40 – 275V AC

2 CURRENT SETTING (% of nominal)
A 20-200% all phases
B 20-200% phase A & C + 5-50% E/F (In place of phase B)

3 CT RATING (Nominal)
A 1A
B 5A

4 CUSTOM ENGRAVED TEXT
A Not required No engraving - factory default
B Required Complete the custom text details at left

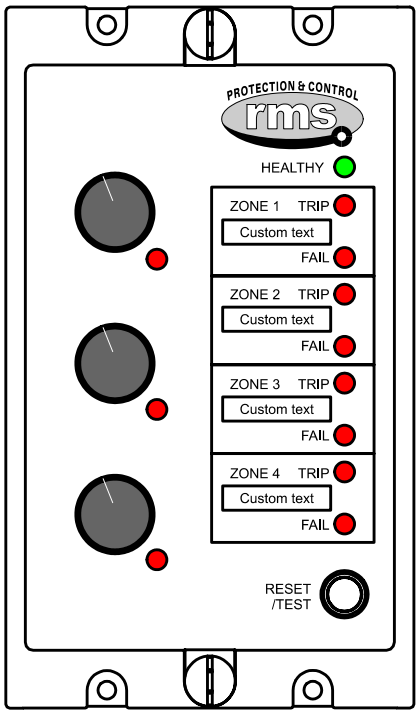


Figure 14: Alarm text position layout

Factory Configuration

CONFIGURATION CODE (Optional specification)
Refer to the wiring diagram for each 1S26 model for details on configuration switch setting.

The configuration code can be set in the field by withdrawing the relay module & following the instructions on the side plate label for setting the configuration switches.

The configuration code may be specified at time of order so that the relay will be shipped from the factory pre-set to meet customer pre-determined operating requirements.

e.g. CONFIG A - 0101

If a configuration code is not specified the factory default will be set as indicated below:

CONFIG A - 1111
CONFIG B - 1111
CONFIG C - 1111

Specify Factory Configuration		Configuration Switches			
		A1	A2	A3	A4
CONFIG A	-				

A1-4 ZONE 1 - 4 SENSOR INPUTS

1	ON	Arc sensor(s) connected	(Default)
0	OFF	No sensor connected	

Specify Factory Configuration		Configuration Switches			
		B1	B2	B3	B4
CONFIG B	-				

B1-4 ZONE 1 - 4 SECOND SENSOR

1	ON	Second sensor connected	(Default)
0	OFF	Single sensor only	

Specify Factory Configuration		Configuration Switches			
		C1	C2	C3	C4
CONFIG C	-				

C1 OUTPUT CONTACTS FUNCTION

1	ON	Output contacts 10-13 Arc only logic	(Default)
0	OFF	Output contacts 10-13 O/C only logic	

C2 OUTPUT CONTACTS GROUPING

1	ON	Zone & phase segregated output tripping	(Default)
0	OFF	Any arc zone & 3 phase output tripping	

C3 ARC FAULT INITIATE INPUT FUNCTION

1	ON	Apply volts to BLOCK arc detection	(Default)
0	OFF	Remove volts to BLOCK arc detection	

C4 STATUS INPUT AC REJECTION

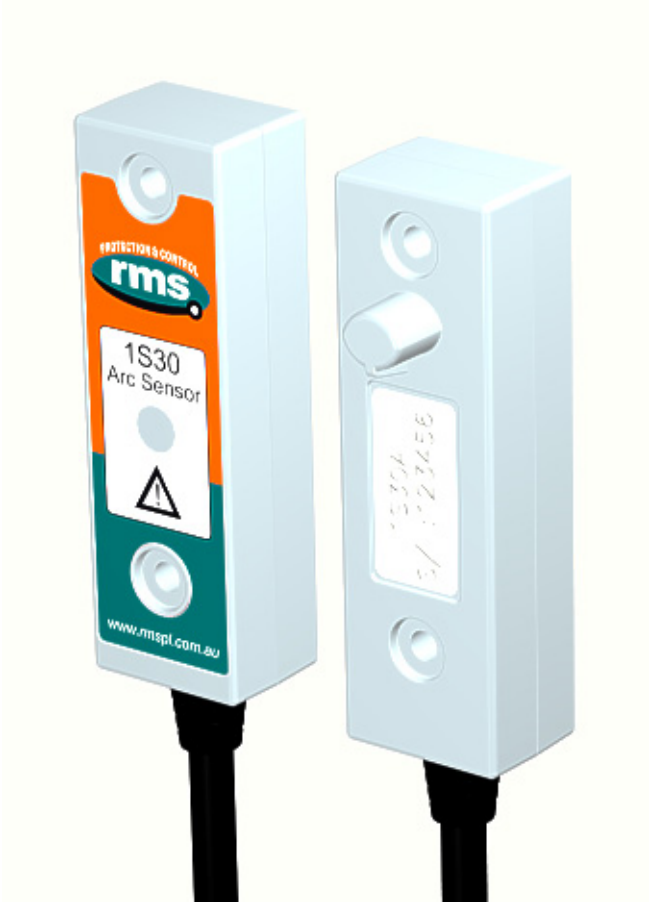
1	ON	DC operation only - AC rejection ON	(Default)
0	OFF	AC / DC operation - AC rejection OFF	

Technical Bulletin

1S30
Optical Arc Fault Sensor

Features

- Compact rugged design
- One or two optical detectors
- High speed arc detection
- Heavy duty 6m termination cable
- Optional 20m & screened cables
- Simple flush panel mounting outside or inside switchgear compartment
- Integrated sensor circuit supervision
- Very low sensitivity to ambient light levels to avoid nuisance tripping even in direct sunlight
- Sealed module for harsh environments
- Optional metal reinforced mounting shield



1S30 Arc Fault Sensors

Through panel mounting detector View depicted at left

Front panel view of dual detector version depicted at right

Application

Arc fault protection is a relatively new technique employed for the fast clearance of arcing faults on BUS bars & within metal clad switchgear & associated cable boxes. The arc is detected using an optical sensor & the signal input to a protection device which also monitors the load current on the system. A trip signal can be achieved in less than 10ms using arc detection.

RMS manufactures a protection class arc fault optical sensor & monitoring system suitable for both low & medium voltage switchgear and BUS bar applications.

1S20 3 sensor, 2 zone Arc Fault Monitor

1S25 8 sensor, 4 zone Arc Fault Monitor

1S26 1S25 with integrated current check

1S30 Optical Arc Fault Sensor

While the high intensity flash caused by an electrical arc will be reflected within the metal clad switchgear, it is recommended that one or more sensors be mounted in each enclosed switchgear compartment.

For BUS bar protection applications multiple sensors are required to achieve adequate coverage along the length of the BUS. A sensor version with two optical detectors “looking” in opposite directions is available for this purpose (Refer figure 3 for generic layout).

Description

Made in Australia

The 1S30 is an optical sensor that responds to the flash of light emitted during the incidence of an arcing fault. Onset of the light flash & detection by the 1S30 occurs in a few ms.

Each arc fault sensor consists of one or two silicon PIN photo diode light detectors mounted on a circuit board together with the associated detection circuit (Figures 1 & 2). The detector monitors a wide space angle. A broad spectral response in the visible region is provided as depicted in figure 5.

Sensitivity of the arc sensor has been set to a low level to reduce the possibility of mal operation under high ambient lighting conditions. This is made possible due the high intensity of light emitted under arc fault conditions. Additional security can be incorporated by way of a current check stage as described in the 1S20 Arc Fault Monitor Technical Bulletin.

In stand by mode the 1S30 sensor presents a high resistance to the 12V DC control signal provided by the 1S20, 1S25 or 1S26 Arc Fault Monitors. This allows a small circulating current to flow for continuous supervision of the 1S30 connection circuit. When an arc is detected, the resistance presented by the 1S30 drops to a level where the current flow increases to approximately 20mA. This increased current flow is instantaneously detected by the Arc Fault Monitor & its trip output contacts closed. Refer to the 1S20 Arc Fault Monitor Technical Bulletin for further details.

Detector Characteristics

SINGLE DETECTOR PACKAGE

Figure 1 depicts the 1S30 with a single optical detector. Note the window where the active part of the detector is positioned to. This permits convenient mounting on the outside of the panel with the detector window protruding a hole in the panel.

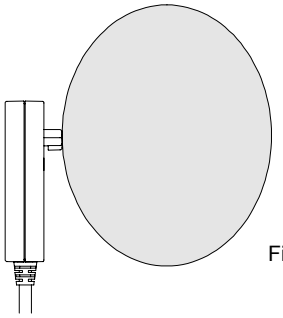


Figure 1:

DUAL DETECTOR PACKAGE

Figure 2 depicts the 1S30 with dual optical detectors. The two optical detectors face in opposite directions to provide arc detection coverage in both directions. This version is particularly useful when mounted in a BUS chamber or barrier between adjacent switchgear chambers. The main benefits are reduced cost compared to two separate sensors & use of only one input channel on the 1S20 Arc Fault Monitor.

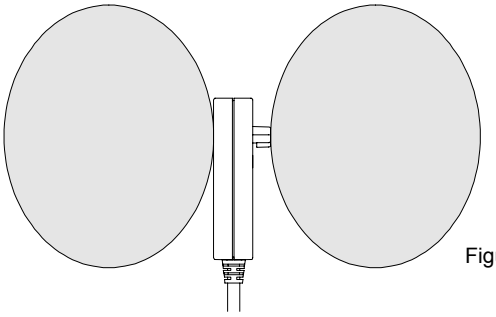


Figure 2:

DETECTOR RANGE

A detection range along the 100% relative sensitivity curve shown in figure 3 is approximately 3m. Single detector versions therefore need to be placed at a maximum spacing of 5-6m. The dual detector versions may be placed at a maximum spacing of 8-10m to provide adequate detection overlap. In switchgear the light caused by the arc is reflected from the walls & therefore, the mounting of the sensor is not critical.

While the high intensity flash caused by an electrical arc will be reflected within the metal clad switchgear, it is recommended that one or more sensors be mounted in each enclosed switchgear compartment.

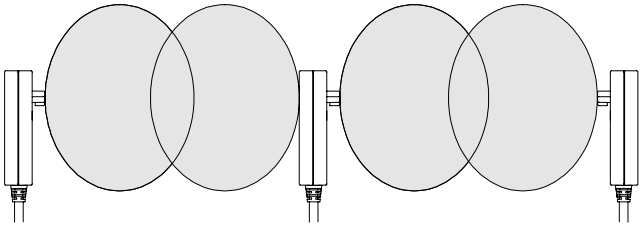


Figure 3:

OPTICAL SENSITIVITY

~10,000 Lux* for white light at normal incidence to the detector window(s) as depicted in figure 4:

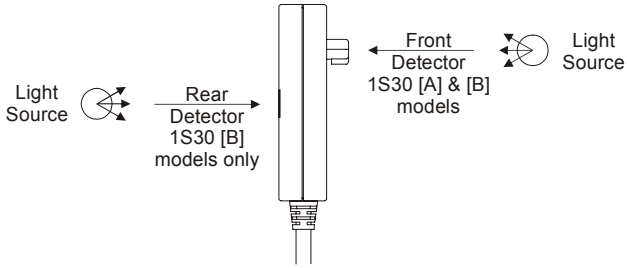


Figure 4:

For the 1S30-A single detector version the front detector only is fitted. In this configuration the 1S30-A will be insensitive to white light incident on the rear surface of the case up to a level of 200,000 Lux.

As the illuminace of diffuse ambient sunlight falls in the range 5,000 to 10,000 Lux, this will not normally be sufficient to trigger the 1S30 sensor. The luminous intensity from the sun at noon at the equator however is ~100,000 Lux which will be sufficient to trigger the 1S30 sensor so measures should be made to avoid this situation.

Direct sunlight incident on the rear of the 1S30-A model sensor will not cause it to pick up. This attribute provides a significant safety margin to avoid nuisance tripping when the option of mounting the sensor externally on switchgear as depicted in figure 6 is employed.

DETECTOR DIRECTIONAL CHARACTERISTICS

Detector sensitivity falls to ~40% of the nominal level at inclination angles up to 70 degrees from the normal for white light.

DETECTOR SPECTRAL RESPONSE

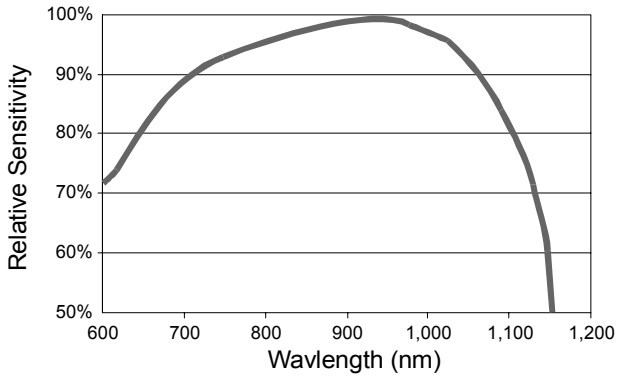


Figure 5:
Arc detector spectral response

* Due to the relatively high sensitivity of the detector to IR wavelengths the type of light source employed for sensitivity testing will have a major effect on the results obtained. Sensitivity testing should therefore be conducted using a 50-75W halogen lamp with an integrated aluminum reflector.

Mounting Options

FLUSH PANEL MOUNTING

The 1S30 is suitable for flush panel mounting in a number of configurations.

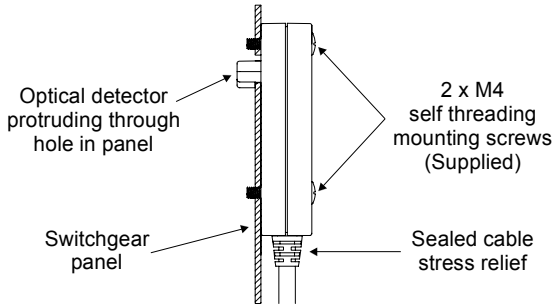


Figure 6:
1S30 shown mounted on the outside of a switchgear panel
Detector oriented to 'look' through a hole into the switchgear

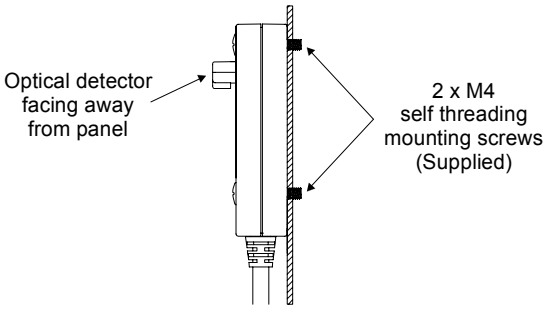


Figure 7:
1S30 shown mounted on the inside of a switchgear panel
Detector oriented to 'look' out into the switchgear compartment

FLUSH MOUNT REINFORCING PLATE

When mounting the 1S30 on the outside of a switchgear cubicle as depicted in figure 6, the hole required in the panel may degrade the short circuit rating. If this is considered to be an issue then a reinforcing plate may be fitted over the 1S30 as depicted below.

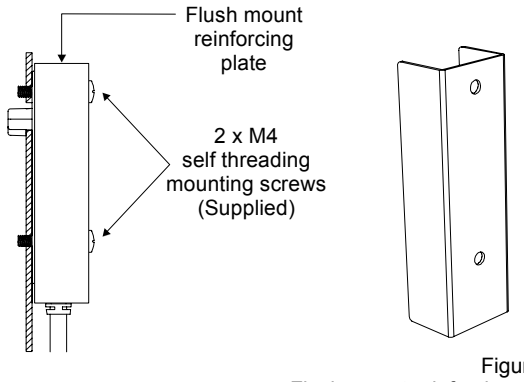


Figure 8:
Flush mount reinforcing plate
1.2mm zinc plated mild steel

DUAL DETECTOR VERSION

The dual detector version can be panel mounted to monitor two adjacent switchgear compartments simultaneously. This feature can be used to reduce the total cost for sensors or to increase the monitoring coverage for each 1S20 Arc Fault Monitor unit.

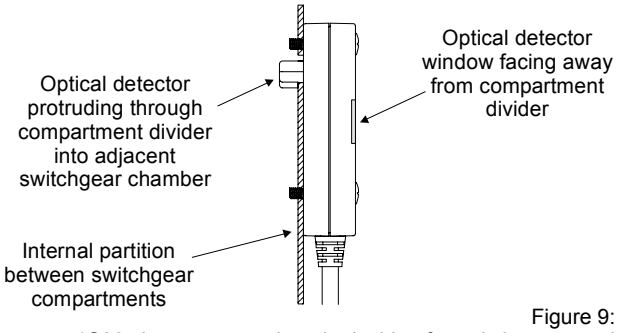


Figure 9:
1S30 shown mounted on the inside of a switchgear panel
This configuration combines the functions described in Figures 6 & 7 with the application of a single dual detector arc fault sensor

PANEL MOUNT CUT OUT DETAIL

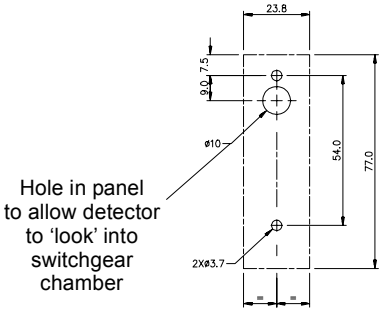


Figure 10:
Flush mounting detail

RIGHT ANGLE MOUNTING OFF A SURFACE

A right angle mounting bracket may be fabricated using the panel cut out detail in figure 10. Single & dual detector models may be mounted in this manner as depicted below.

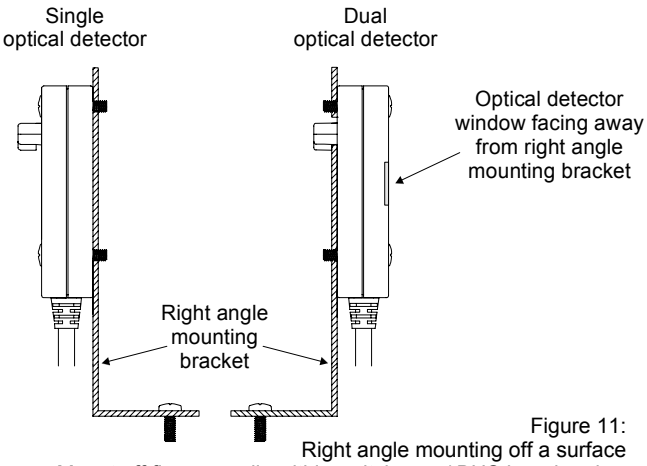


Figure 11:
Right angle mounting off a surface
Mount off floor or walls within switchgear / BUS bar chamber

ARC FAULT PROTECTION SCHEME

Refer to the 1S20 Technical Bulletin for further details.

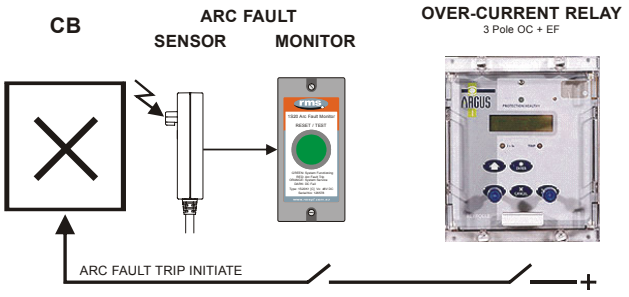


Figure 12:
Key components required to implement an Arc Fault Protection scheme with an overcurrent check stage to enhance system security

ARC PROTECTION SCHEME OPERATE TIME

The total time required for detection of the arc flash to closure of the 1S20 Arc Fault Monitor trip contacts is less than 10ms including bounce. Typical operate time is 7 to 8ms.

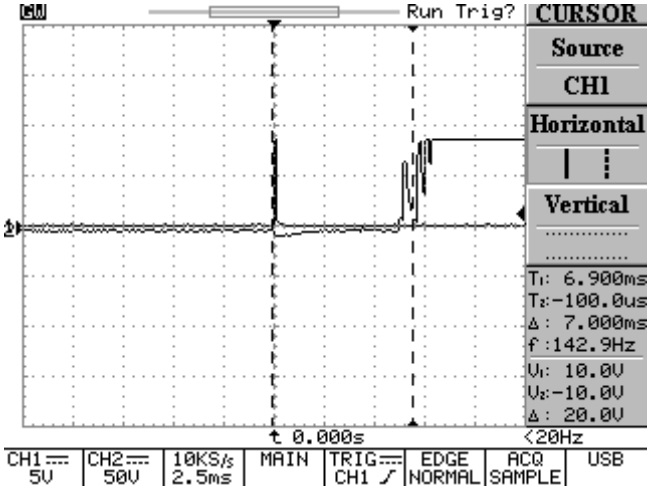


Figure 13:
CRO trace showing nominal operation time of the trip contacts at 7ms. First contact touch at 6.25ms and fully closed by 7.25ms. Operation in <10ms is considered acceptable as current check relay operate time is ~15ms.

MINIMUM ARC DURATION

The minimum arc "flash" duration required to guarantee operation of the Arc Fault Monitors output contacts is 1.25ms.

AUXILIARY SUPPLY

Voltage from 1S20 Arc Fault Monitor: 12V DC
Power consumption: ≤2.5mA

CASING

Rugged moulded construction to IP51.

TEMPERATURE RANGE

Operating: -5 to +55°C
Storage: -25 to +75°C

SENSOR CONNECTIONS

The 1S30 is supplied with a 6m two core connection cable as standard. Two core multi strand wire (2x16/0.2mm), is supplied stripped & pre tinned at the 1S20 connection end. The standard 6m cable may be cut down to the desired length & crimp ring lugs fitted for termination to the 1S20, 1S25 or 1S26 Arc Fault Monitors.

The 1S30 connections are not polarity sensitive. Reversal of the wires on the arc monitor terminals has no effect on the performance of the 1S30 or arc detection system.

The cable is factory fitted to the 1S30 Arc Fault Sensor using a stress relief molding to provide a sealed & durable connection interface. The cable employs thick inner & outer insulation layers to avoid damage during installation.

For connection over longer distances shielded cable is recommended. For distances over 20m, 24/0.2 mm cable should be employed.

ADDITIONAL 1S30 CABLE LENGTH

Screened arc sensor cables may be increased by wiring additional series twisted pair SCREENED cable provided it does not exceed 5 ohms and 30nF loop impedance.

ARC SENSOR SHIELD WIRE EARTH CONNECTION

The arc sensor shield wire(s) should be connected to ground as detailed in figures 14 to 16.

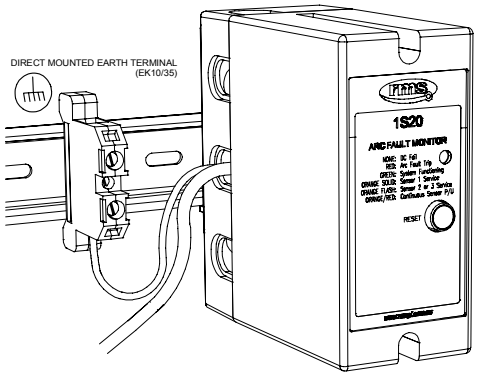


Figure 14: 1S20 DIN rail mount earth connection detail

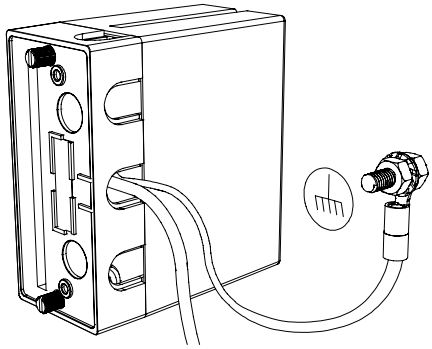


Figure 15: 1S20 panel mount earth connection detail

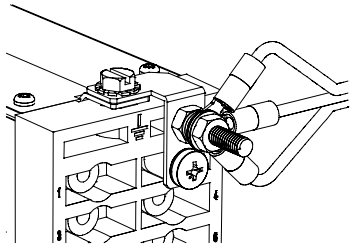


Figure 16: M Series case type earth connection detail

Ordering Information

The following accessories are available separately:

220 100 500 1S30 Flush mount reinforcing plate

Generate the required ordering code as follows: e.g. 1S30-A

1S30 | **1** | **2** | |

1 DETECTORS

A Single through hole panel detector
B Dual detectors

2 SPECIFY OPTIONS (Only if required)

F Flush mount reinforcing plate required
S 6m shielded cable required
L 20m shielded cable required

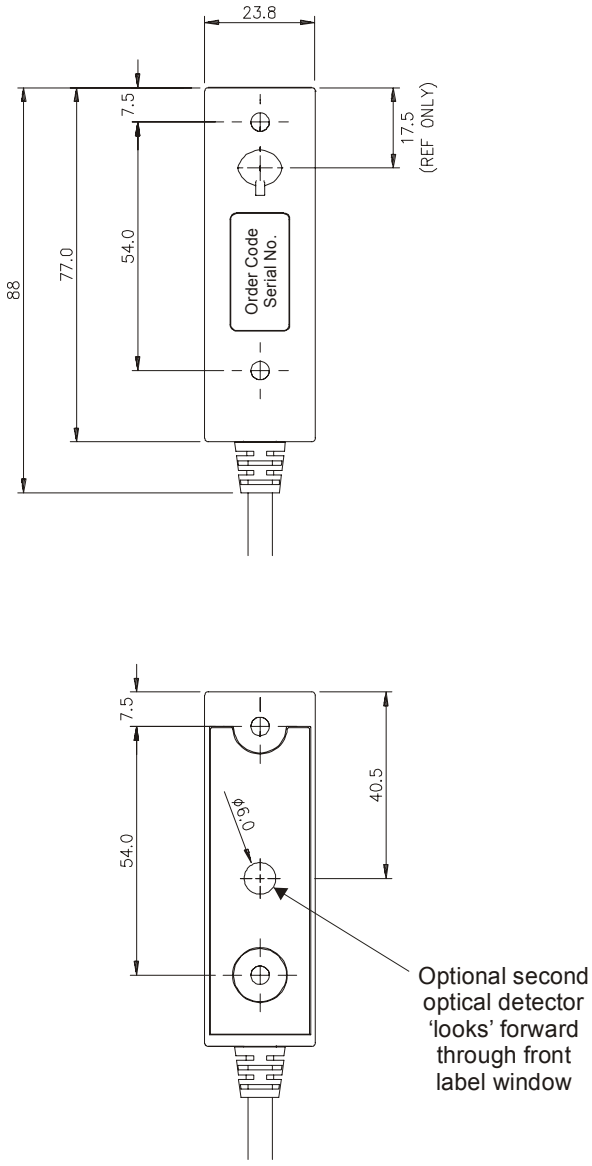


Figure 17: 1S30 Arc Fault Sensor dimensions

Part

4

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 yourself.
6. Store or transport the module in a conductive bag.

If you are making measurements on the internal electronic circuitry of an 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.

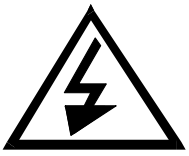
The information in the Safety Section of the product documentation is intended to ensure that products are properly installed and handled in order to maintain them in a safe condition. It is assumed that everyone who will be associated with the equipment will be familiar with the contents of the Safety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

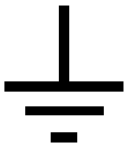
Caution: refer to product information

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 shipping documentation pouch.
Address label on top of carton.

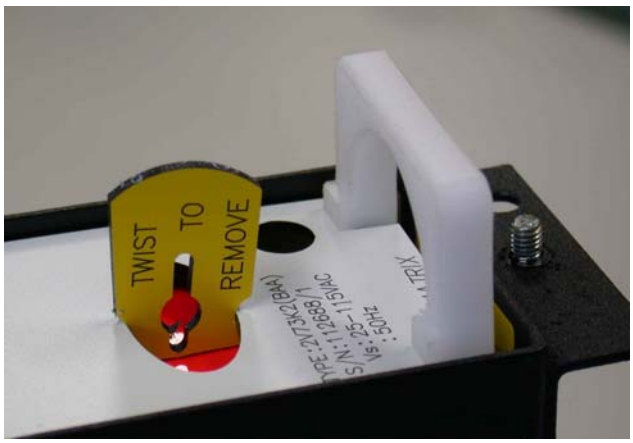
Inner packing carton showing front label detailing the customer name, order number, relay part number & description, the relay job number & packing date.
(Size 2 inner packing carton depicted)

Unpacking (Continued)

Inner packing carton with lid open showing protective foam insert.

CD depicted supplied with digital relay models or upon request at time of order.

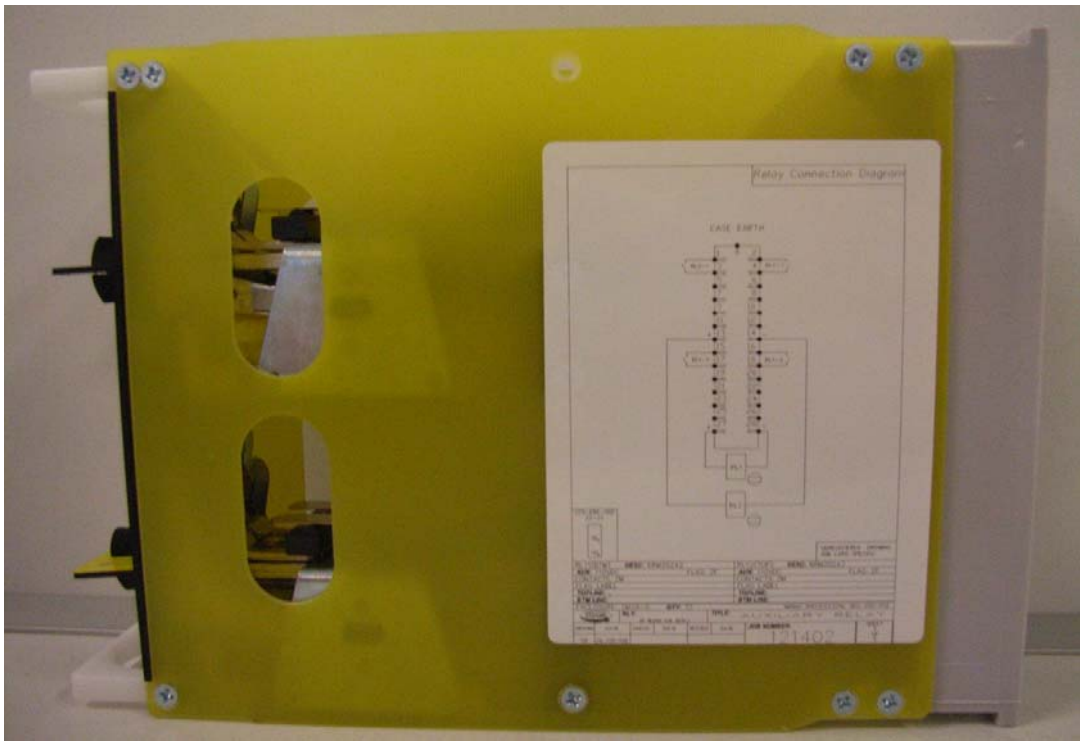
Inner packing carton with protective foam insert removed showing relay location.



Where mechanical flags are fitted the yellow transit wedge must be removed before operation using a gentle twisting action. The wedge should be stored with the original packaging material.

Relay Module Side Label Depicting Product Details

Relay Module Side Label Depicting Wiring Diagram (6R MATRIX relays only)



Accessories Supplied With Each Relay

Self threading M4 mounting screws

M4 terminal screws with captured lock washers

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 ay into the relay; in damp conditions the carton and packing may become impregnated with moisture and the de-humidifying agent will lose is 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 al 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.

Relay Dimensions & Other Mounting Accessories

Refer drawing in Technical Bulletin. Relevant Auto Cad files & details on other accessories such as 19 inch sub rack frames, semi projection mount kits & stud terminal kits may be down loaded from:

http://www.rmspl.com.au/mseries.htm

Mounting the 1S30 Arc Fault Sensors

The arc sensor is a light sensitive element, which is activated by strong light. The light sensitivity of the arc sensor is approximately 8000 LUX. Arc sensors should be mounted in the switch-gear cubicles, in such a way that the light sensitive part covers the protected area as completely as possible.

The sensitivity of the sensor is nearly equal over the front side. In switchgear, however, the light caused by an arc is reflected from the walls, therefore, the mounting position of the sensor is not critical.

Mount the sensors in the switchgear cubicles in such a way that the detecting surface covers the space to be supervised as completely as possible. The sight must be free between the sensor and the supervised area.

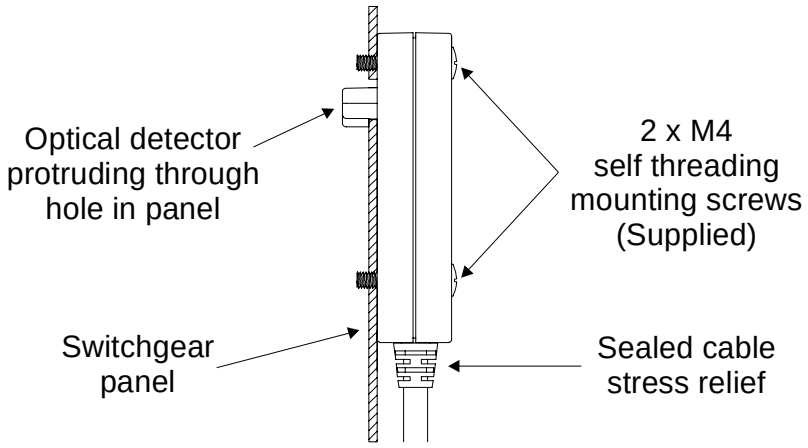
Refer to the 1S30 Technical Bulletin for details on mounting the various types of 1S30 Arc Fault Sensors.

NOTE!

The arc sensor must not be exposed to direct sunlight or any other strong light.

Do not mount the arc sensor directly under a light source.

The arc sensor can be mounted from the outside on partition wall of the switchgear. The active part of the sensor is mounted in a 10mm hole, to the area in the switchgear that should be protected, and fastened with a 4mm self-tapping screw.

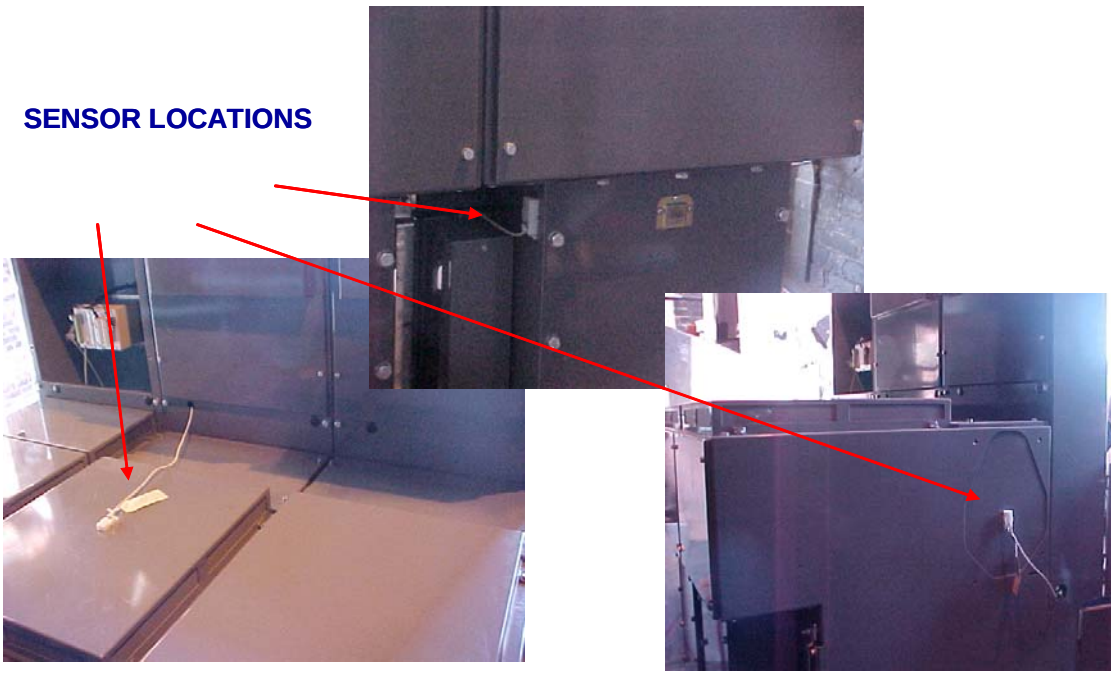


1S30 shown mounted on the outside of a switchgear panel
Detector oriented to 'look' through a 10mm diameter hole into the switchgear
Refer to panel cut out drawing in 1S30 Technical Bulletin for details.

The arc sensor can alternatively be mounted completely in the protected area with the help of a Z-shaped or L-shaped mounting plate. In open spaces, such as the bus bar section, arc sensors should be mounted a maximum of four meters apart.

In open spaces (e.g. bus bar sections) there should be an arc sensor approximately every 5 meters. Due to the wide detection range of the sensors and the light reflection inside the switchgear, the mounting position is not very critical.

SENSOR LOCATIONS



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.

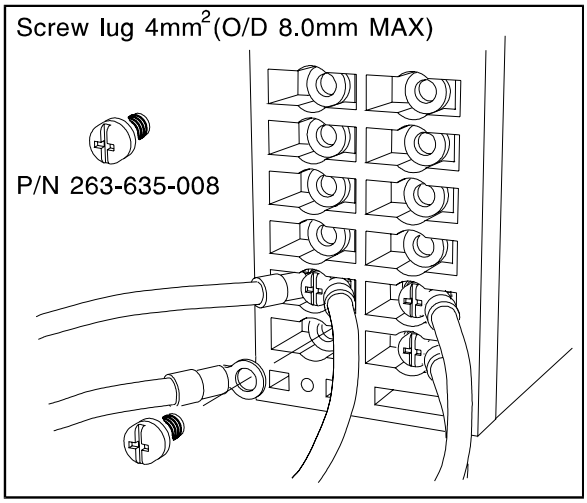
Voltage and current connections should be made using insulated crimp terminations to ensure that terminal block insulation requirements are maintained for safety. To ensure that wires are correctly terminated, the correct crimp terminal and tool for the wire size should be used.

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 2.5mm^2, 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)



Current Transformer Circuits

Do not open the secondary circuit of a live CT since the high voltage produced may be lethal to personnel and could damage insulation.

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.

Electrical Adjustments

Pieces of equipment which require direct physical adjustments to their operating mechanism to change current or voltage settings, should have the electrical power removed before making the change, to avoid any risk of electric shock.

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.

Insertion & Withdrawal of Heavy Current Test Plugs

When using a heavy current test plug, CT shorting links must be in place before insertion or removal, to avoid potentially lethal voltages.

Commissioning Preliminaries

Carefully examine the module and case to ser 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.

Carefully remove any elastic bands/packing fitting for transportation purposes.

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

Particular attention should be paid to the correct wiring and value of any external resistors indicated on the wiring diagram/relay rating information.

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.

If a test block system is to be employed, the connections should be checked to the scheme diagram, particularly that the supply connections are to the 'live' side of the test block.

Earthing

Ensure that the case earthing connection above the rear terminal block, is used to connect the relay to a local earth bar.

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 SECONDAY 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 switches

With the relay removed from its case, check electrically that the CT shorting switch is closed.

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.

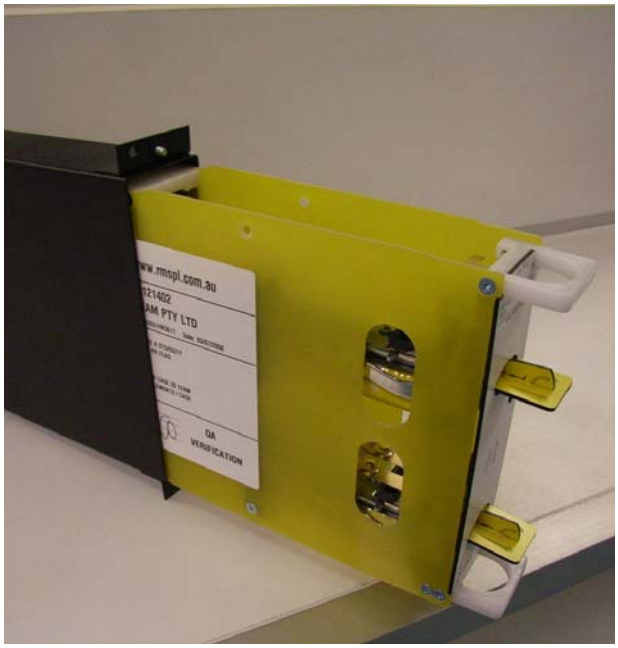
Relay Module

Isolate the relay, remove the front cover & carefully withdraw the relay module from the case.

Care must be taken to avoid subjecting the relay element to static discharge which may damage or degrade sensitive electronic components.

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

Inspect the VT & CT stages for degradation of insulation on the terminal wiring & transformer windings.



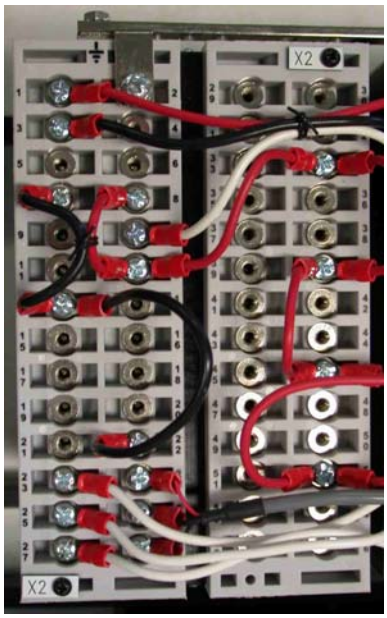
Remove cover by unscrewing black thumb screws & withdraw the relay module from the case.

Relay Case

Inspect the outer terminals checking insulation integrity & tightness.

Inspect inside the case and use a blower to remove dust.

Inspect the inner terminals for worn, distorted or tarnished contacts and if necessary clean the contacts using a brush dipped in a suitable substance.



Case outer terminals


Case inner terminals


Module plug in terminals

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
- Fault Setting Tests by Secondary Injection
- Tests using Load Current
- Check the continuity of the neutral CT loop with a bell test set or an ohmmeter

Speed of Operation Performance Testing

The high speed of operation of the arc fault detection method is an essential characteristic of this protection technique. Testing the operating performance of the 1S20 Arc Fault Monitor & 1S30 Arc Fault Sensors may be carried out using the as follows:

STEP ONE

Connect up the 1S20 and 1S30 as per the standard wiring diagram.

Activate the 1S30 sensor using a camera flash gun positioned directly in front of the sensor window and check that the 1S30 trip LED activates. The optical output power of the flash gun will determine how close it must be positioned. A flash gun with sufficient white light intensity and duration must be employed. >20,000 Lux and 2ms is recommended.

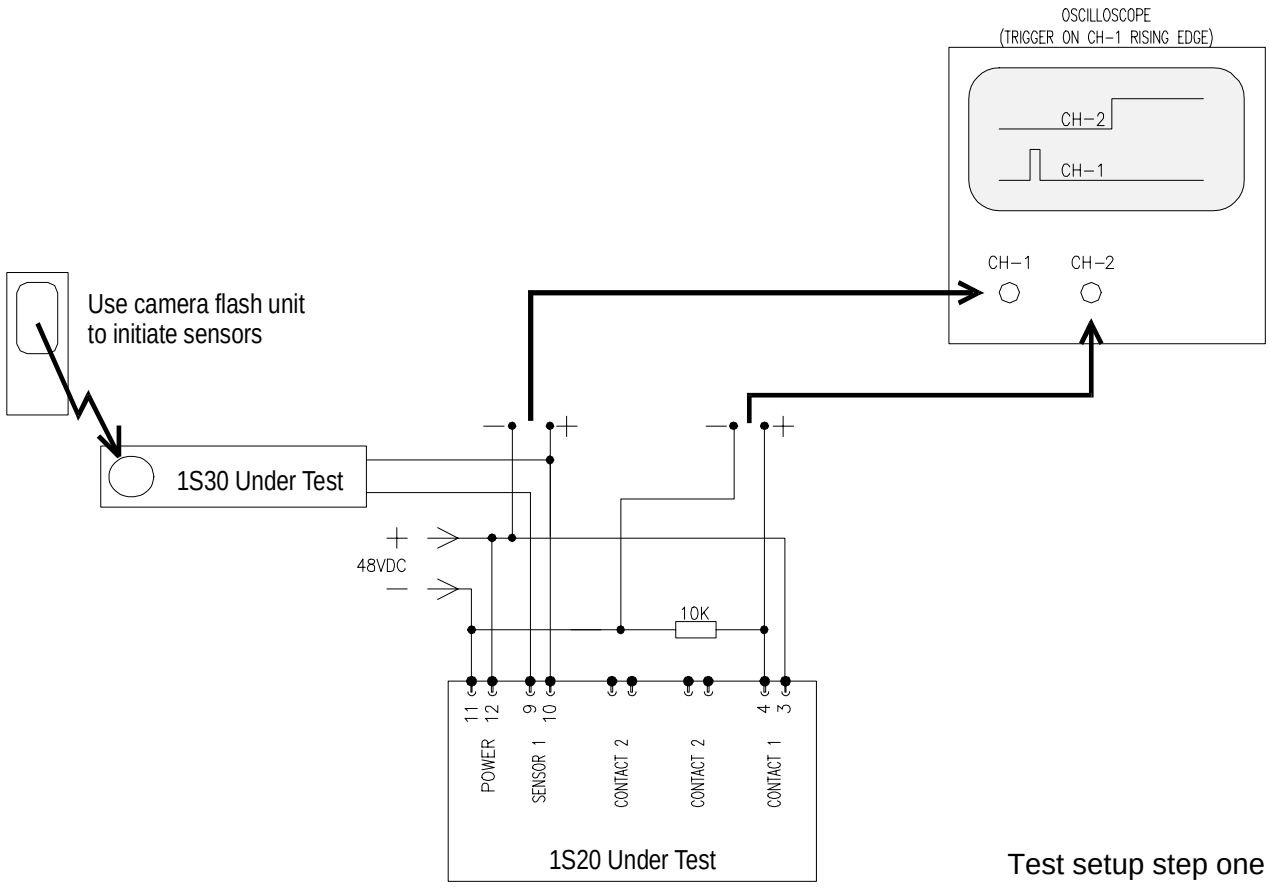
STEP TWO

Connect up the 1S20, 1S30 with a dropping resistor & storage CRO as per the test diagram.

Activate the 1S30 sensor using a camera flash gun positioned directly in front of the sensor window and check that the 1S30 trip LED activates.

The operating pulse generated by the 1S30 output should trigger the storage CRO. Using the CRO time base measure the time taken for the 1S20 output contact to operate.

Repeat this test for each output contact and sensor input combination.

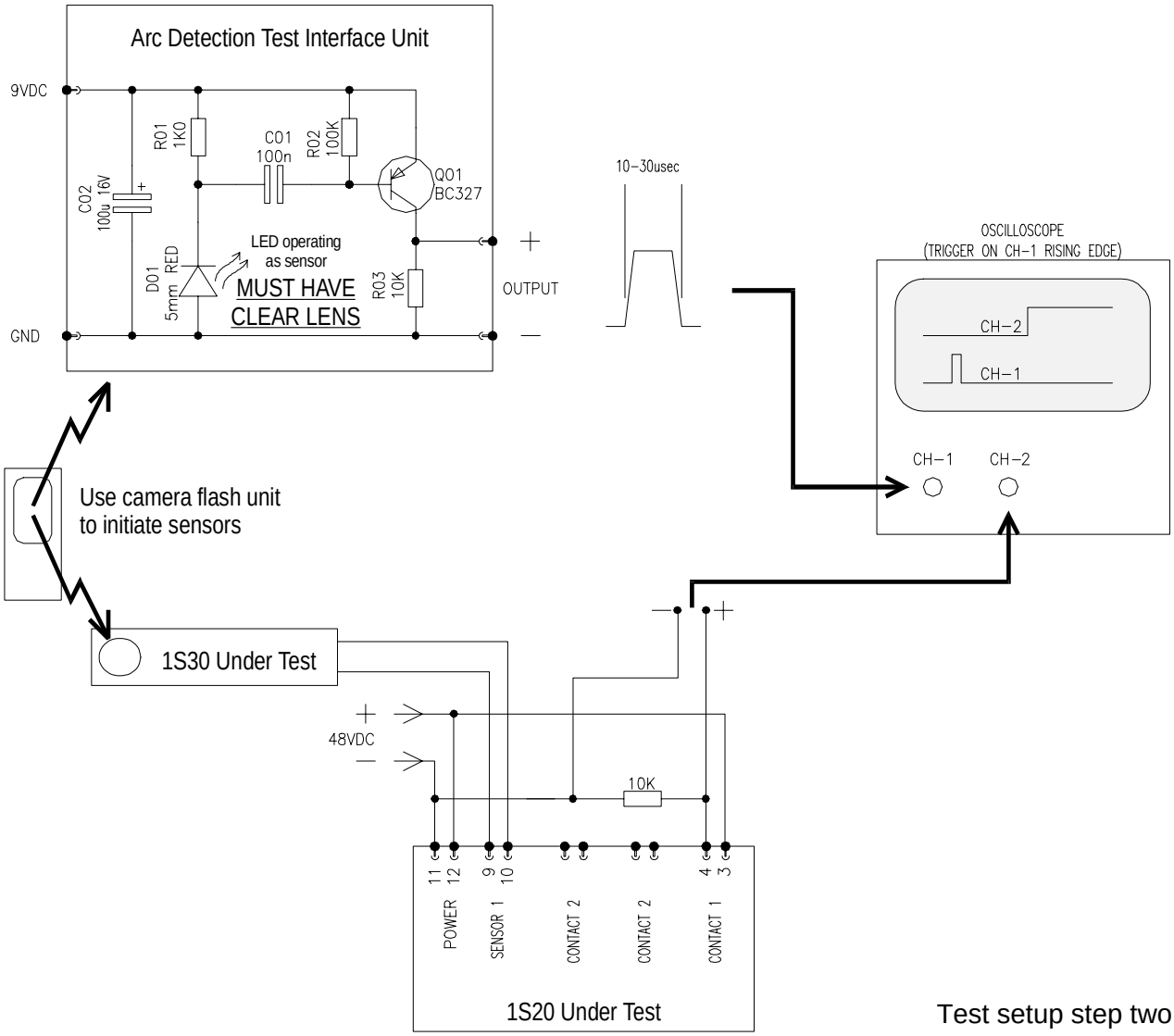


Test setup step one

STEP THREE

The test described in step two is used to prove the operating performance of the 1S20 Arc Fault Monitor. To check the performance of the complete system the 1S30 performance must also be checked.

Make up an Arc Detection Interface Unit (ADI) and connect up to the 1S20, 1S30 with a dropping resistor & storage CRO as per the test diagram.

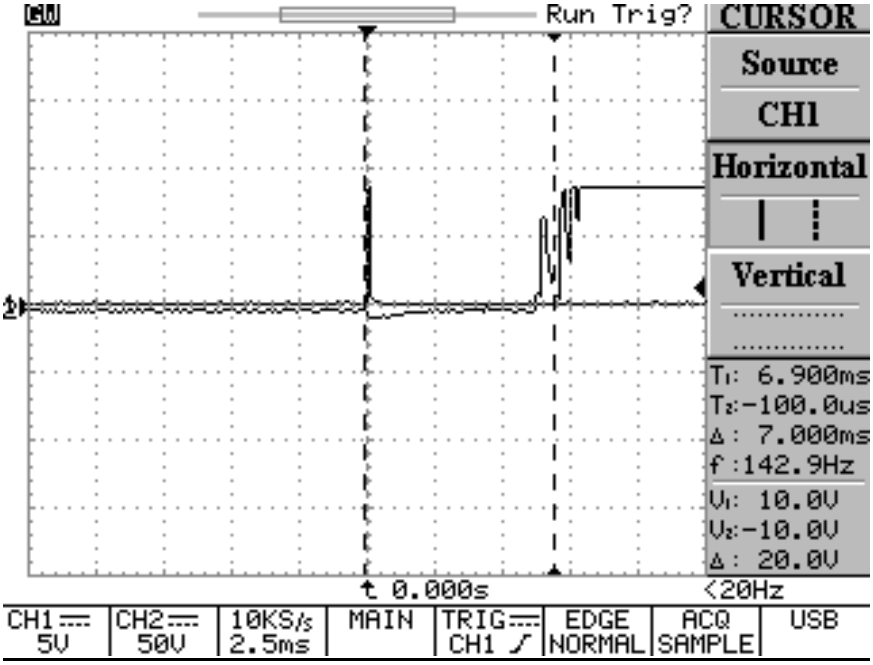


Test setup step two

Activate the 1S30 sensor and ADI using a camera flash gun positioned directly in front of the sensor window and check that the 1S30 trip LED activates. The 10-30us wide pulse generated by the ADI should trigger the storage CRO. Using the CRO time base measure the time taken for the 1S20 output contact to operate.

Repeat this test for each output contact and sensor input combination to verify the speed of operation of the complete arc fault protection system.

OPERATE SPEED RESULTS



CRO trace showing nominal operation time of the trip contacts at 7ms. First contact touch at 6.25ms and fully closed by 7.25ms. Operation in <10ms is considered acceptable as current check relay operate time is ~15ms.

FAULT DIAGNOSIS

Step Two	Step Three	Comments
Pass	Pass	System operational.
Pass	Fail	Suspect 1S30 Sensor – Repeat test with another 1S30..
Fail	Fail	Suspect 1S20 Arc Fault Monitor – Repeat test with another 1S30.

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:

Australian Content

Unless otherwise stated the product(s) quoted are manufactured by RMS at our production facility in Melbourne Australia. Approximately 60% of our sales volume is derived from equipment manufactured in house with a local content close to 80%. Imported components such as semi-conductors are sourced from local suppliers & preference is given for reasonable stock holding to support our build requirements.

Quality Assurance

RMS holds NCSI (NATA Certification Services International), registration number 6869 for the certification of a quality assurance system to AS/NZS ISO9001-2008. Quality plans for all products involve 100% inspection and testing carried out before despatch. Further details on specific test plans, quality policy & procedures may be found in section A4 of the RMS product catalogue.

Product Packaging

Protection relays are supplied in secure individual packing cardboard boxes with moulded styrene inserts suitable for recycling. Each product & packing box is labeled with the product part number, customer name & order details.

Design References

The products & components produced by RMS are based on many years of field experience since Relays Pty Ltd was formed in 1955. A large population of equipment is in service throughout Australia, New Zealand, South Africa & South East Asia attesting to this fact. Specific product & customer reference sites may be provided on application.

Product Warranty

All utility grade protection & auxiliary relay products, unless otherwise stated, are warranted for a period of 24 months from shipment for materials & labour on a return to factory basis. Repair of products damaged through poor application or circumstances outside the product ratings will be carried out at the customer's expense.

Standard Conditions of Sale

Unless otherwise agreed RMS Standard Terms & Conditions (QF 907) shall apply to all sales. These are available on request or from our web site.

Relay Monitoring Systems Pty Ltd

6 Anzed Court, Mulgrave, Victoria 3170, AUSTRALIA

Tel: +61 3 8544 1200 Fax: +61 3 8544 1201 Email: rms@rmspl.com.au Web: www.rmspl.com.au