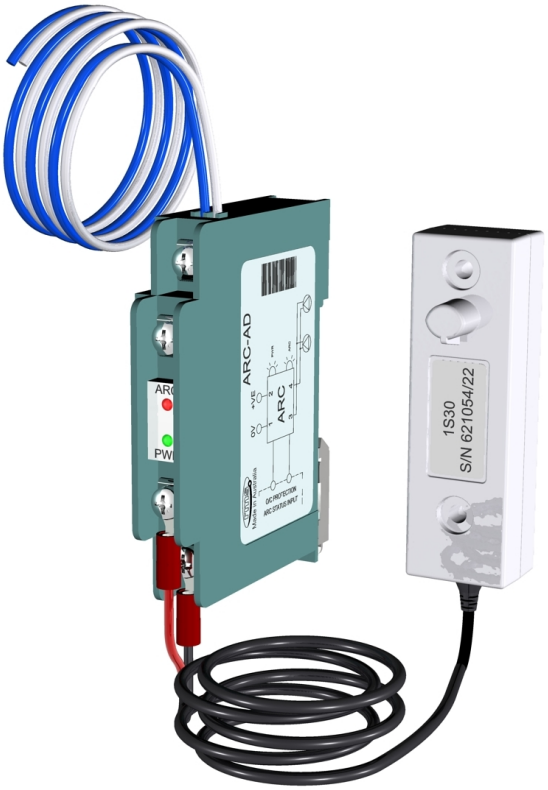
1S23 User Guide

Arc Fault Monitor

relay monitoring systems pty ltd

Advanced Protection Devices



User Guide

Visit *www.rmspl.com.au* for the latest product information.

1S23 User Guide

About This Manual

This User Guide covers all 1S23 relays manufactured from August 2012. 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 1S23 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.

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To download a PDF version of this guide:
http://www.rmspl.com.au/userguide/1s23_user_guide.pdf

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

Part

1

How this Guide is Organised

This guide is divided into five parts:

Part 1	Overview
Part 2	Documentation
Part 3	Application
Part 4	Installation Preliminaries
Part 5	Maintenance

Part 2

Documentation

Technical Bulletin

The detailed technical attributes, functional description & performance specifications for the 1S23 are described in the product Technical Bulletin. For the most up to date version go to:

www.rmspl.com.au/handbook/1s23.pdf

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

The order of precedence for product information is as follows:

- Product Test Manual (PTM)
- Technical Bulletin
- User Guide

User Guide

This User Guide covers all 1S23 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. This code takes the form 1S23Kxx where the Kxx is the "K" or version number. For a complete description of the RMS "K" number system refer to: *www.rmspl.com.au/handbook/parta3.pdf*

Product Test Manual

Each 1S23 version has a specific PTM which provides details on the unique attributes of the relay. Each PTM includes the following information:

- Specific technical variations from the standard model if applicable
- Wiring diagram

If you require a copy of the PTM 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 3

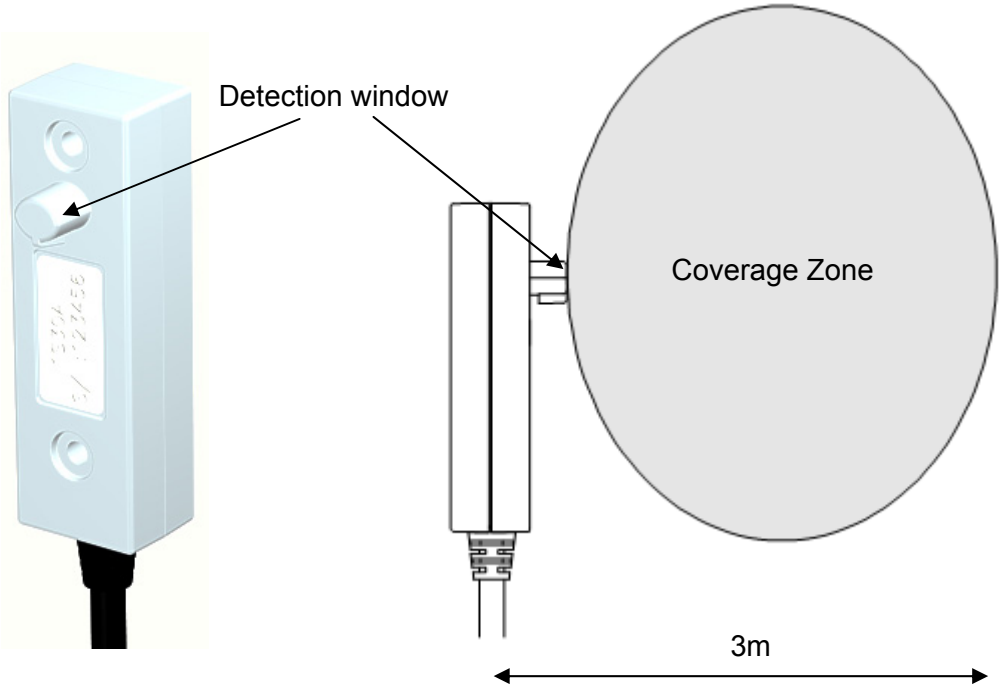
Application

Sensor Installation

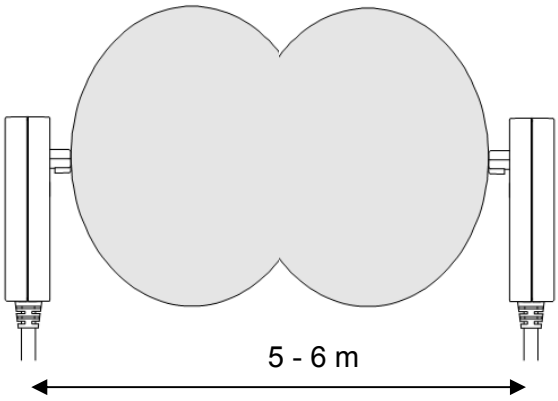
Sensor Spacing

The 1S30 sensor is available as a single detector or dual detector package.

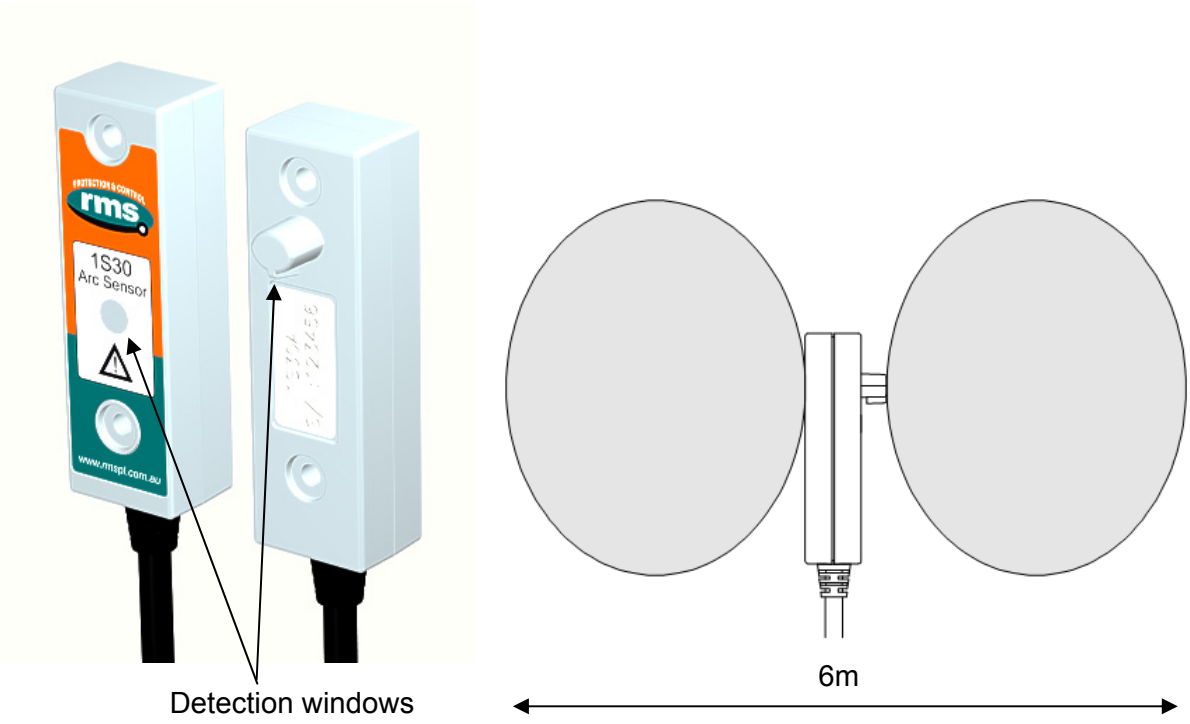
The 1S30A single detector version is depicted below showing the location of the detection window and the approximate coverage zone :



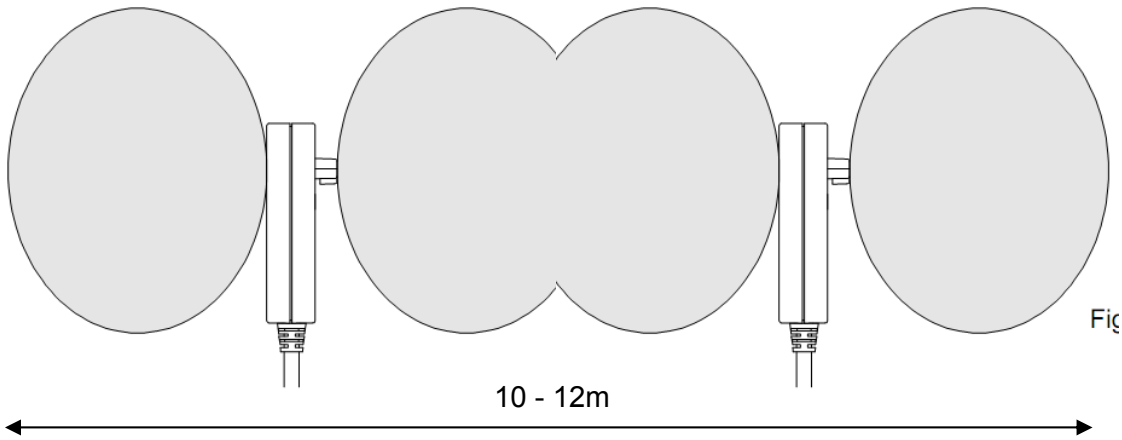
The recommended spacing for the 1S30A single detectors is approximately 5 - 6 m to ensure adequate detection overlap.



The 1S30B Dual detector version provides an additional detection window for dual zones of coverage as depicted below :

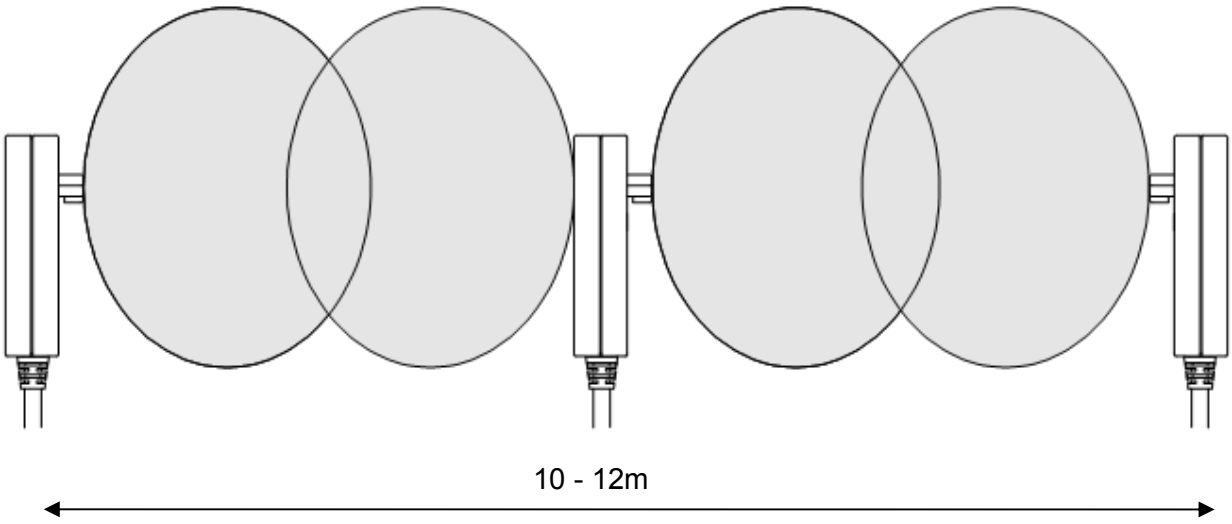


The recommended spacing for the 1S30B single detectors is approximately 5 - 6 m to ensure adequate detection overlap, this combination provides an overall coverage zone of approximately 10 - 12 m.



Fig

The 1S30A and 1S30B sensors may also be mixed to provide various coverage combinations, again spacings of approximately 5 - 6 m should be observed to ensure adequate detection overlap.



Sensor Placement

Sensors need to be mounted to provide full coverage of the switchgear cubicles to be protected. Where the protected zone is larger than the sensor coverage then the use of multiple sensors is required.

Precise positioning of the sensors is generally not required as the light caused by the arc is reflected from the walls.

Sensor Mounting

The 1S30 is suitable for flush panel mounting in a number of configurations, for further information on mounting arrangements and mounting hardware refer to the 1S30 Technical Bulletin.

Example Sensor Placement

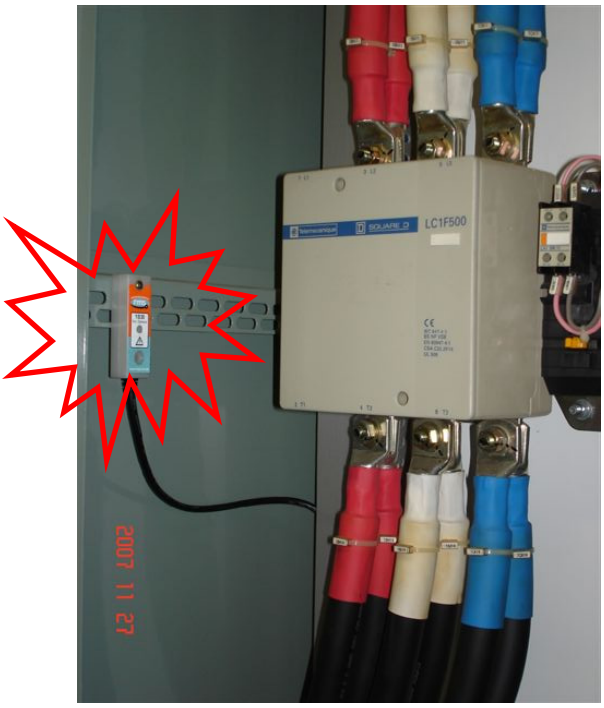
The following are some typical examples of sensor placement.

Sensor placement inside CB racking chamber

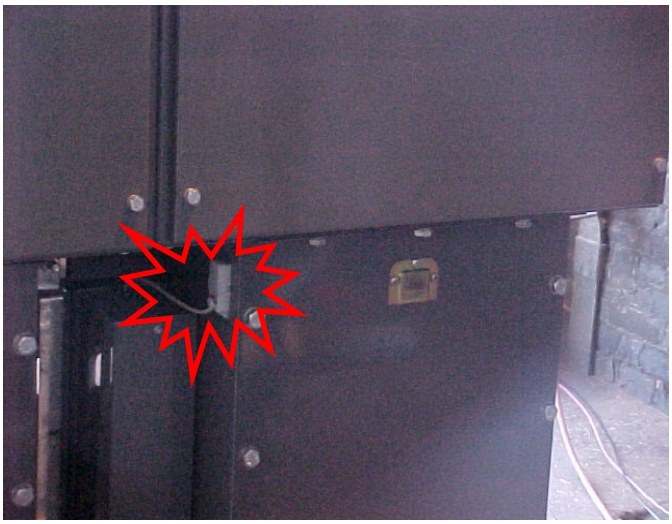
Sensor placement inside busbar chamber

Sensor placement inside cable termination chamber

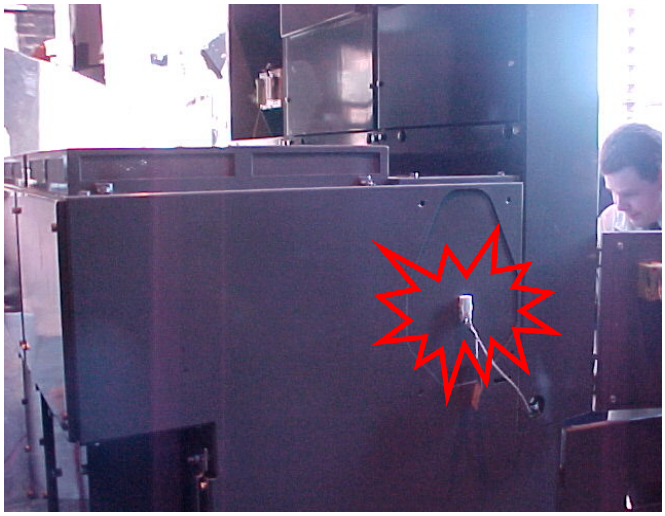
Sensor placement for switchgear Busbar coverage (External through Hole Detector)



Sensor placement near Low Voltage Contactor for a Variable Speed Drive



Sensor placement for Switchgear cable termination chamber (External through Hole Detector)

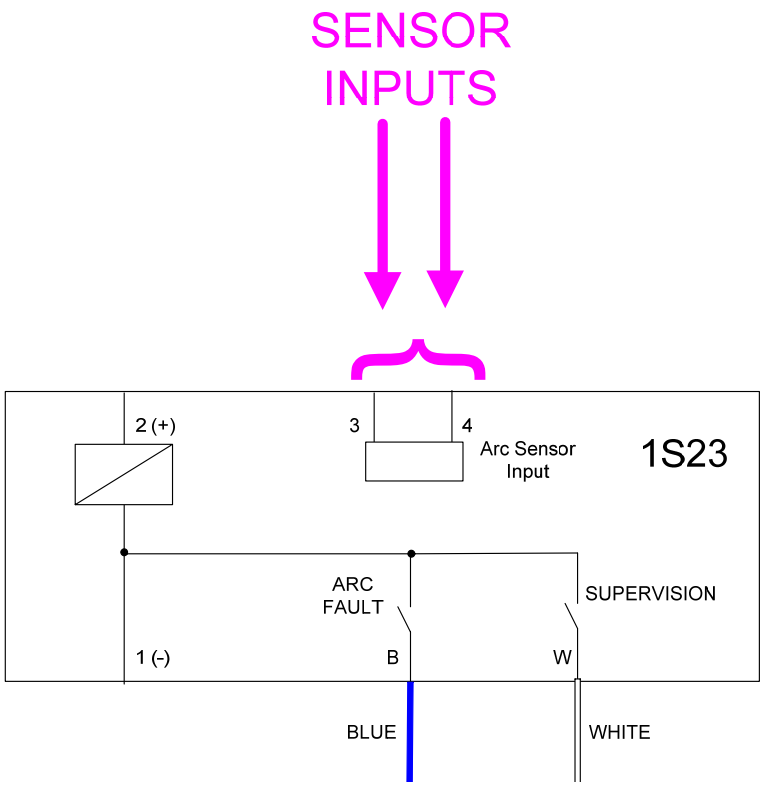


Sensor placement for end of Bus chamber (External through Hole Detector)

Sensor placement for Switchgear cable termination chamber (External through Hole Detector)

Scheme Wiring

1S23 Connection diagram



The above diagram shows the 1S23 connections including the Blue and White flying leads.

The 1S23 is ordered as either a single sensor or 2 sensor version.

Sensor connection is not polarity sensitive. On the 2 sensor version, the red wires and black wires of the ARC Fault Sensor should be paired and terminated on to the 1S23 Arc Sensor Input.

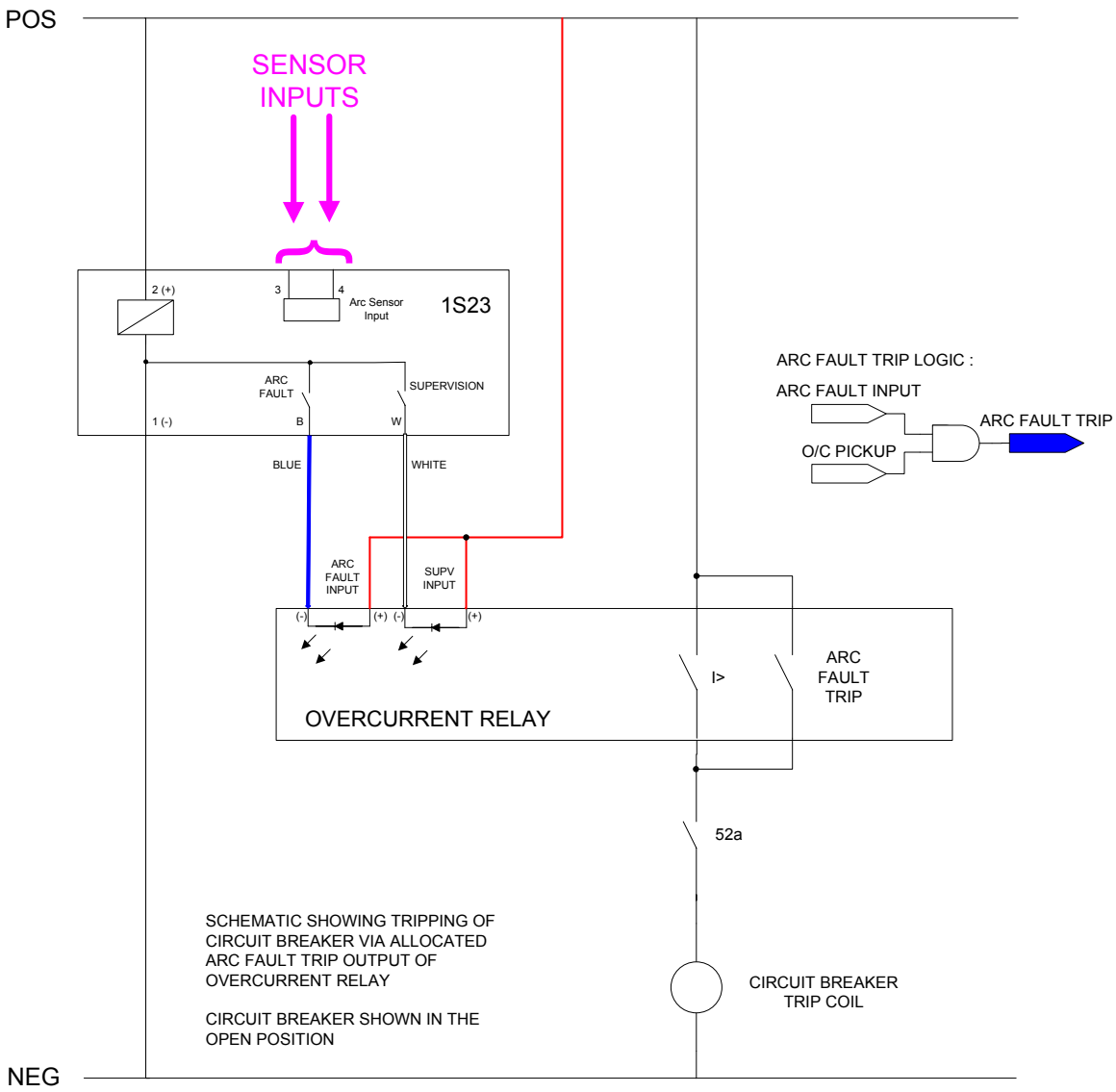
Note : The single sensor version and 2 sensor version must be used for their intended application otherwise a sensor fail condition will arise and correct ARC Trip operation cannot be guaranteed.

- A single sensor must be used with a single sensor version of the 1S23 (1S23A#).
- 2 Sensors must be used with a 2 sensor version of the 1S23 (1S23B#).

Note : The ARC FAULT and SUPERVISION outputs of the 1S23 employ switched negatives.

Example Schematic

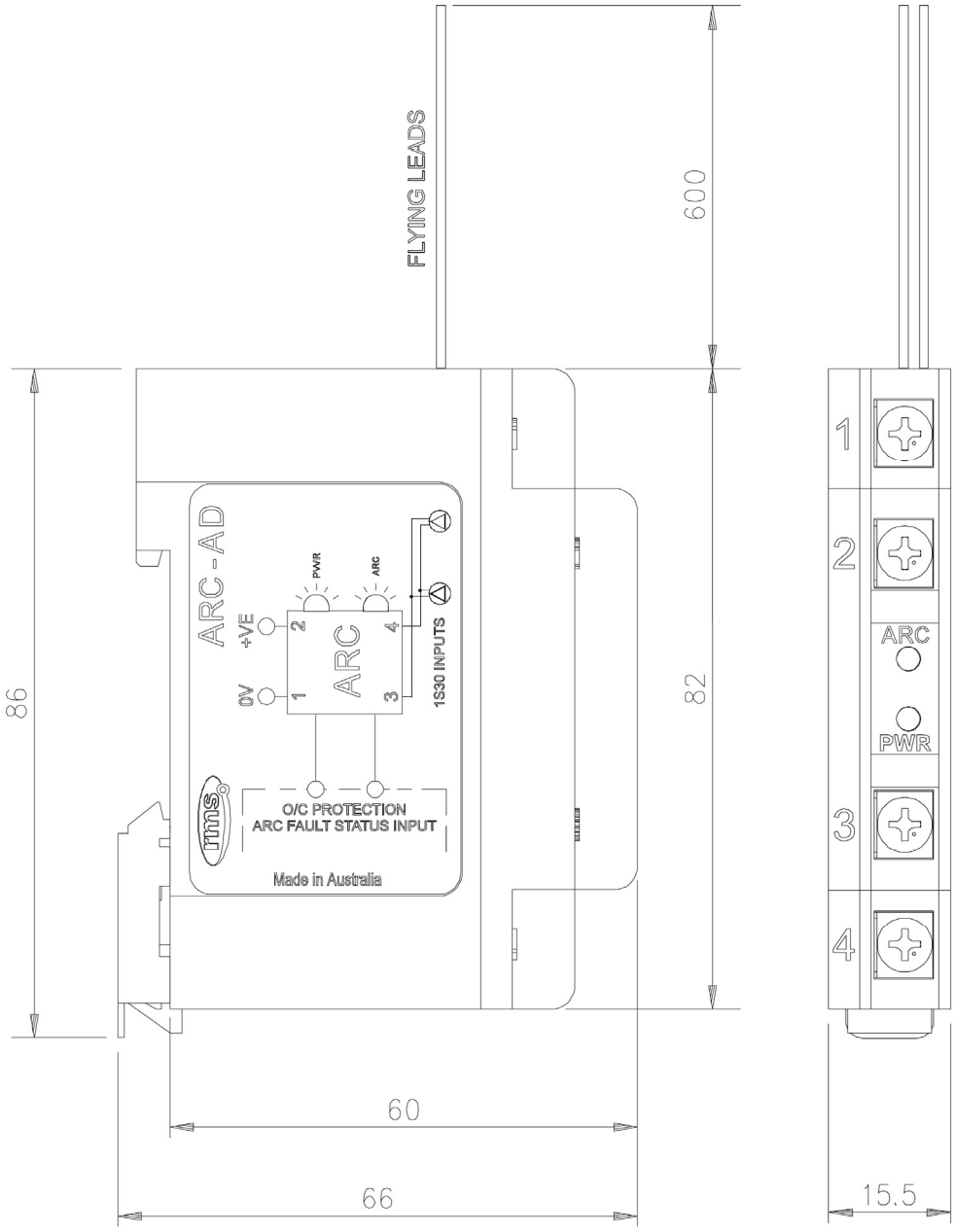
The following typical schematic shows how the 1S23 is wired to interface with an Overcurrent relay for circuit breaker tripping.



The ARC FAULT and SUPERVISION outputs of the 1S23 employ switched negatives and must be applied to isolated digital inputs.

The digital inputs interfacing with the 1S23 must not have a common negative with any other digital input.

Terminal Layout and Module Dimensions



The module is designed for 35mm Din Rail Mounting.

The flying leads comprise of 2 x 600mm 0.75 sq. mm cores.

Refer to the 1S23 Technical Bulletin for complete installation details.

Over Current Relay Configuration

Over Current Relay Configuration

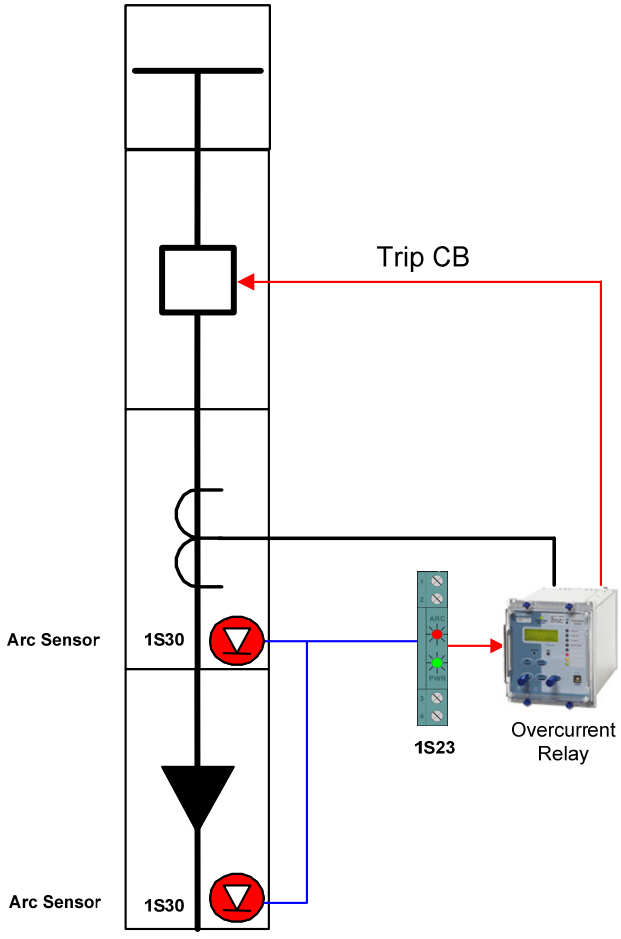
The 1S23 ARC Module outputs are designed for connection to dedicated binary status inputs on a protection relay. The 1S23 outputs are not suitable for direct tripping applications of auxiliary relays or circuit breaker coils.

The 1S23 ARC Module does not require configuration or setting.

The following section provides an example of the Over Current Relay Configuration to accept a ARC Trip and Supervision inputs from a 1S23 Arc Fault Module.

Application Example

Arc fault protection is to be applied to a Feeder switchboard panel to provide coverage of the Current Transformer and Cable termination chambers as shown in the diagram below.



The design criteria for this application example are itemised below :

1. The Current Transformer and Cable termination chambers are to be covered in a common zone by 2 separate Arc fault sensors connected to a single 1S23 Arc Fault Module.
2. The ARC Fault Trip shall be interlocked with a fast current check element in the overcurrent relay using configurable logic within the overcurrent relay.
3. The ARC Trip output from the 1S23 shall be wired to an allocated isolated input of the Overcurrent Relay for CB Tripping and ARC Fault Trip Alarm purposes.
4. The SUPERVISION output from the 1S23 shall be wired to an allocated isolated input of the Overcurrent Relay for ARC Sensor Alarm purposes.
5. The Overcurrent Relay shall have outputs allocated for
    a. CB Trip
    b. ARC Fault Trip Alarm
    c. SUPERVISION Fail Alarm (For Supervision Fail condition)

For the purposes of this example a Reyrolle Argus M relay shall be employed to demonstrate how to interface an Overcurrent relay with a 1S23 Arc Fault Module.

Equally any protection relay capable of providing a fast overcurrent protection element and configurable logic may be utilised.

Reyrolle Argus M Configuration

In this application the following allocations are adopted :

Input Allocation

Input Function	Binary Input
1S23 ARC Trip	Input 1
1S23 SUPERVISION Fail	Input 2 (Input is to be Inverted to indicate Fail condition)

Output Allocation

Output Function	Binary Output
ARC Fault Trip Output	Output 2
1S23 SUPERVISION ALARM	Output 3
ARC Fault Trip Alarm	Output 4

Quick Logic Equation Allocation

Quick Logic Equation Function	Quick Logic Equation
ARC Fault Input and Current Check Interlock (ARC Fault Trip logic)	E1

Virtual Allocation

Virtual Function	Virtual
50-1 Current Check	V1

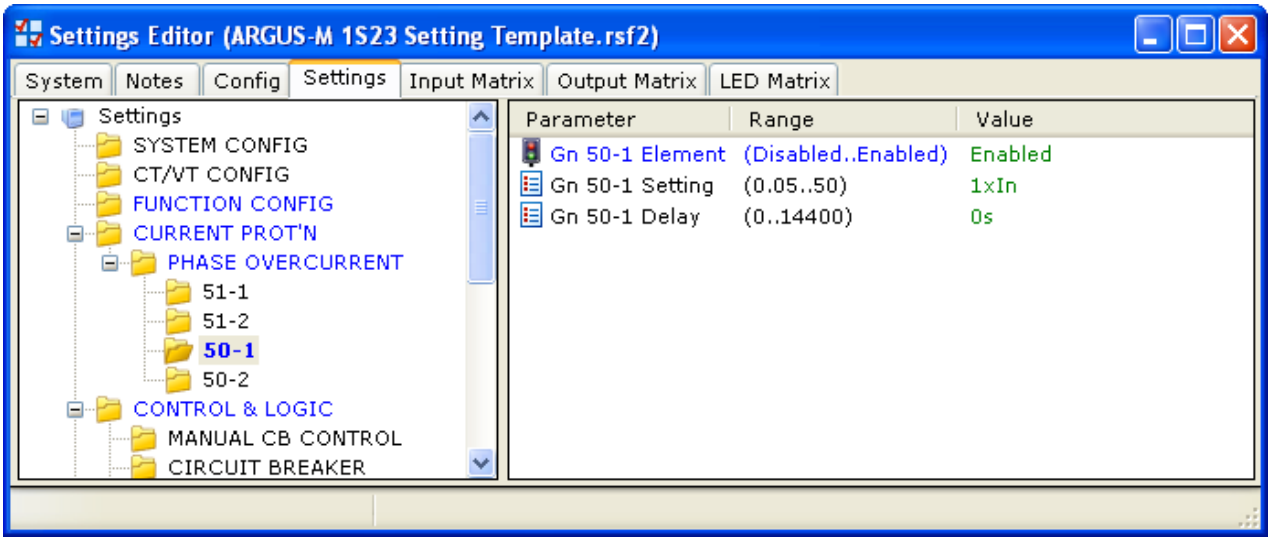
LED Allocation

LED Function	LED
ARC Fault Trip Output	L1
1S23 SUPERVISION Fail	L2
1S23 ARC Trip	L3

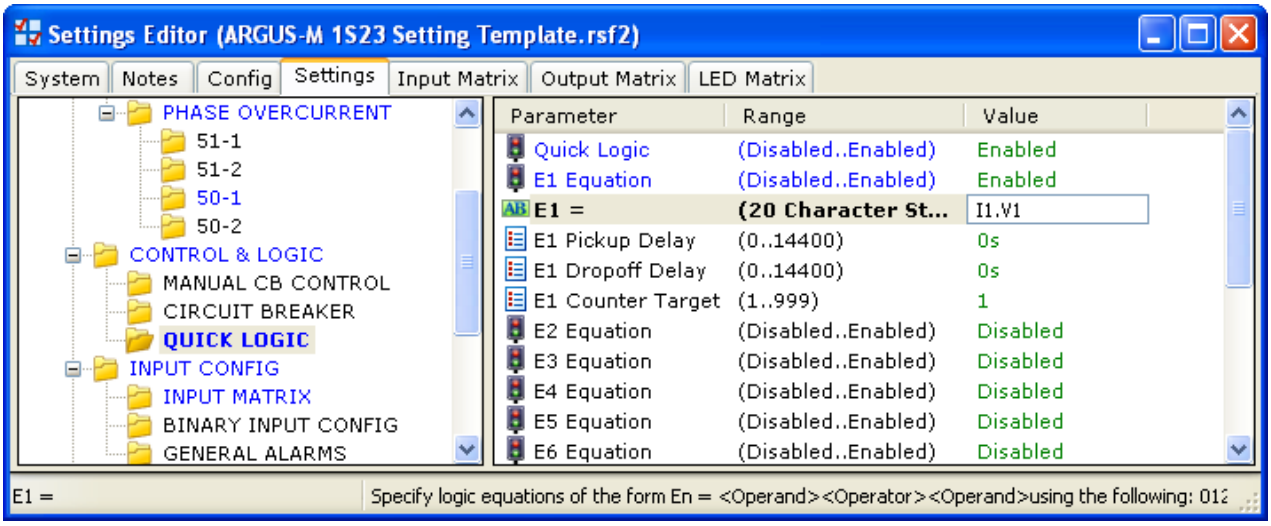
Using Reydisp Evolution and the above allocation information we create a setting configuration according to the following screen shots :

Settings Tab

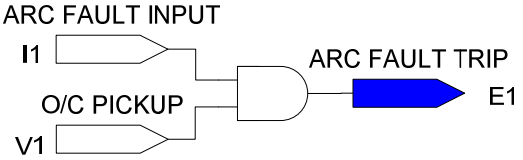
Here the 50-1 Phase Instantaneous Protection Element has been enabled.



Quick Logic Equation E1 provides the Current Check interlock for the ARC Fault Input (I1.V1)



ARC FAULT TRIP LOGIC :

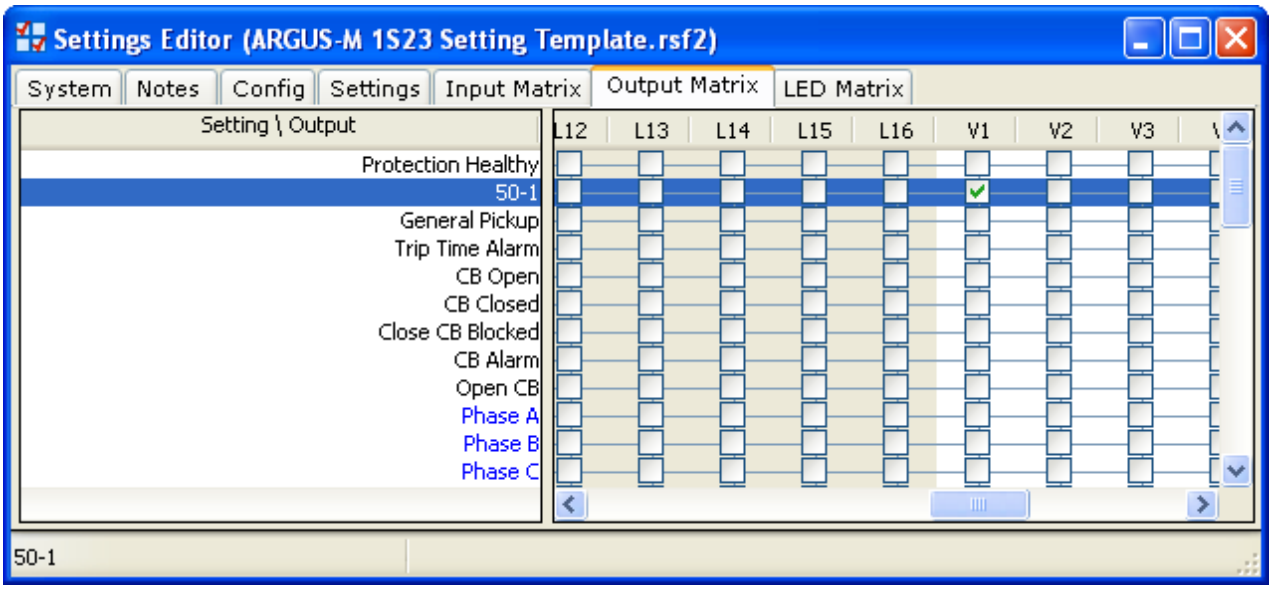


Quick Logic :
E1 = I1.V1

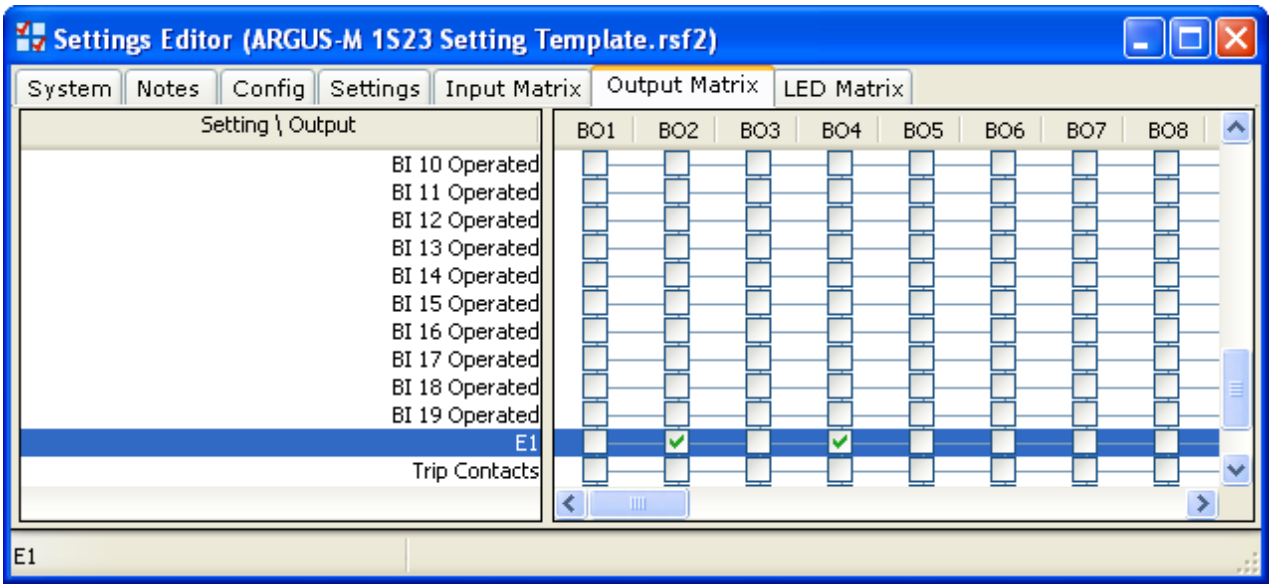
Output Matrix Allocations :
E1 => B02 (ARC Fault Trip)
E1 => B04 (ARC Fault Trip Alarm)

Output Matrix

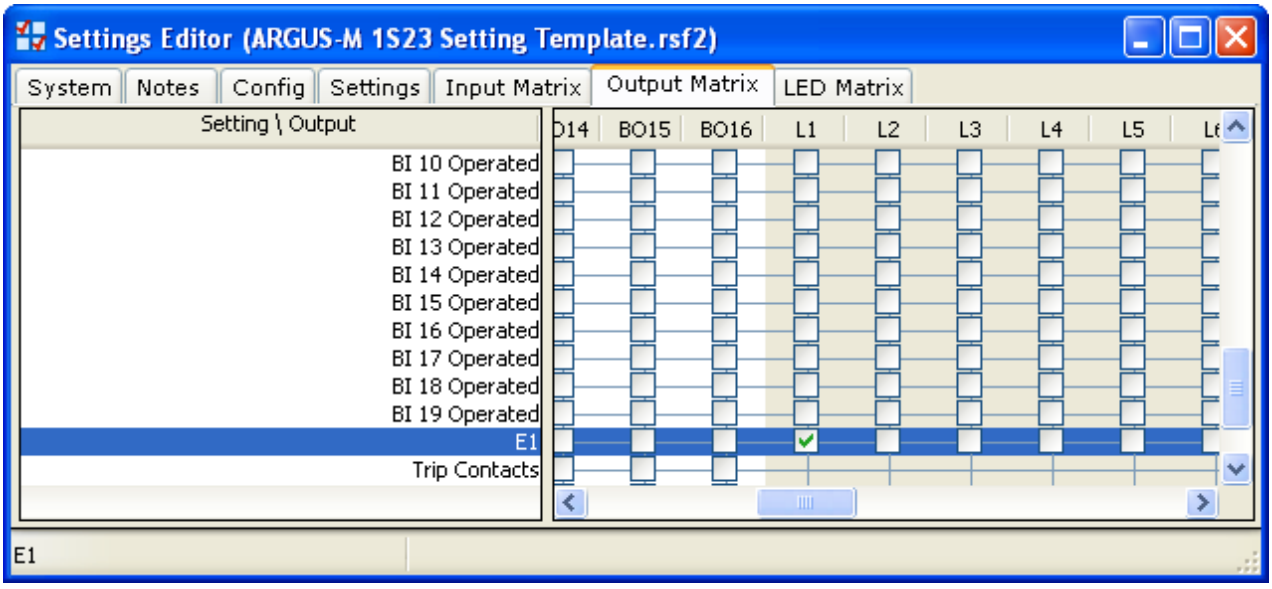
The 50-1 Element is assigned to V1 for our current check logic.



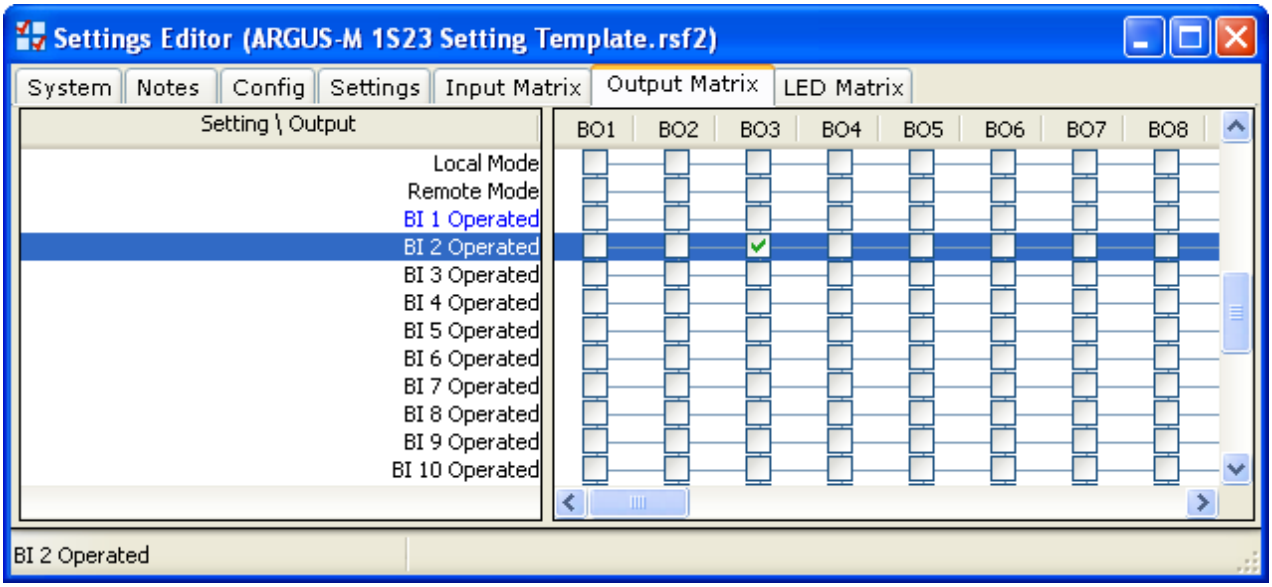
The Quick Logic Equation E1 (ARC Fault Trip incorporating Current Check Interlock logic) is assigned to BO2 (CB Trip output) and BO4 (ARC Fault Trip Alarm).



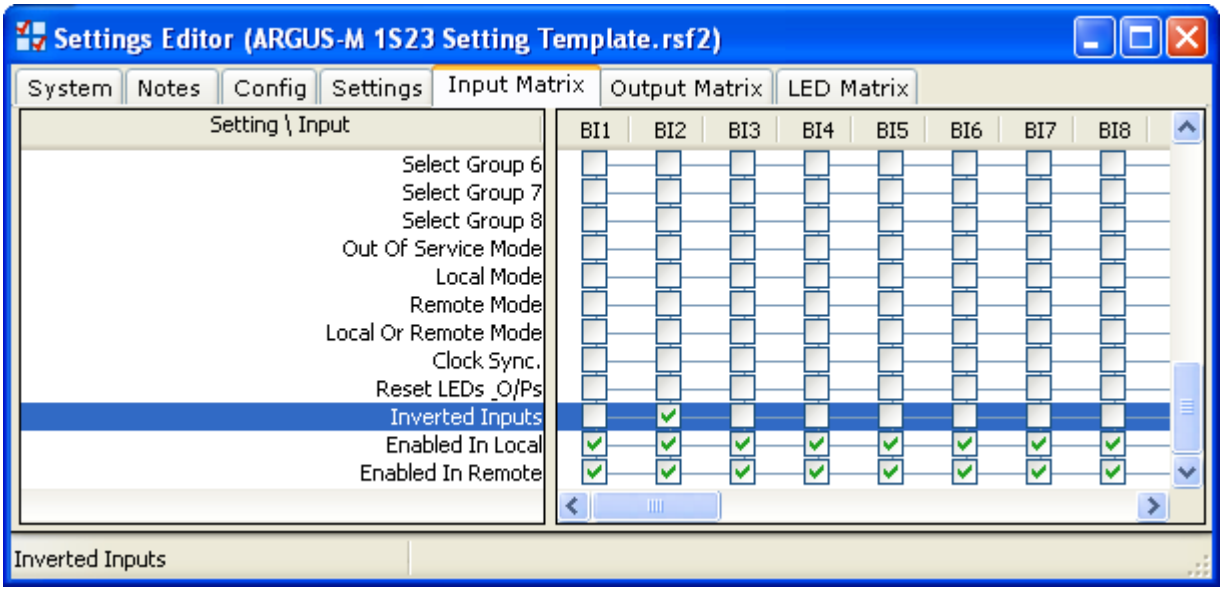
Quick Logic Equation E1 (ARC Fault Trip incorporating Current Check Interlock logic) is also assigned to LED1 for ARC Fault Trip LED Indication purposes on the relay.



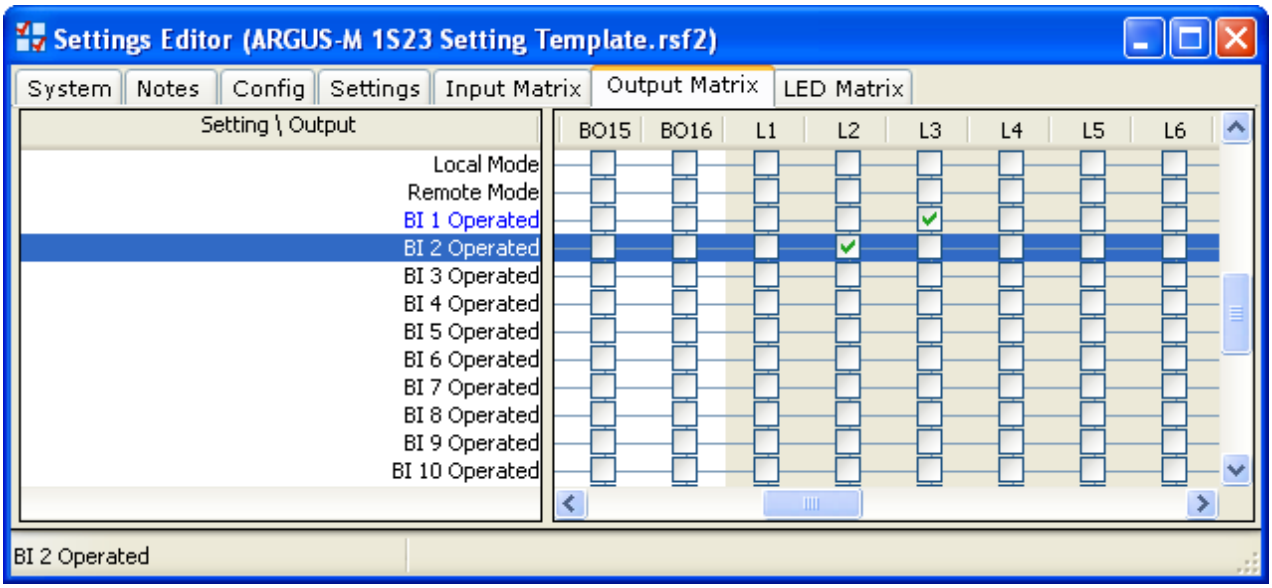
BI2 which is allocated for 1S23 SUPERVISION Fail is assigned to BO3 to provide the 1S23 SUPERVISION ALARM output.



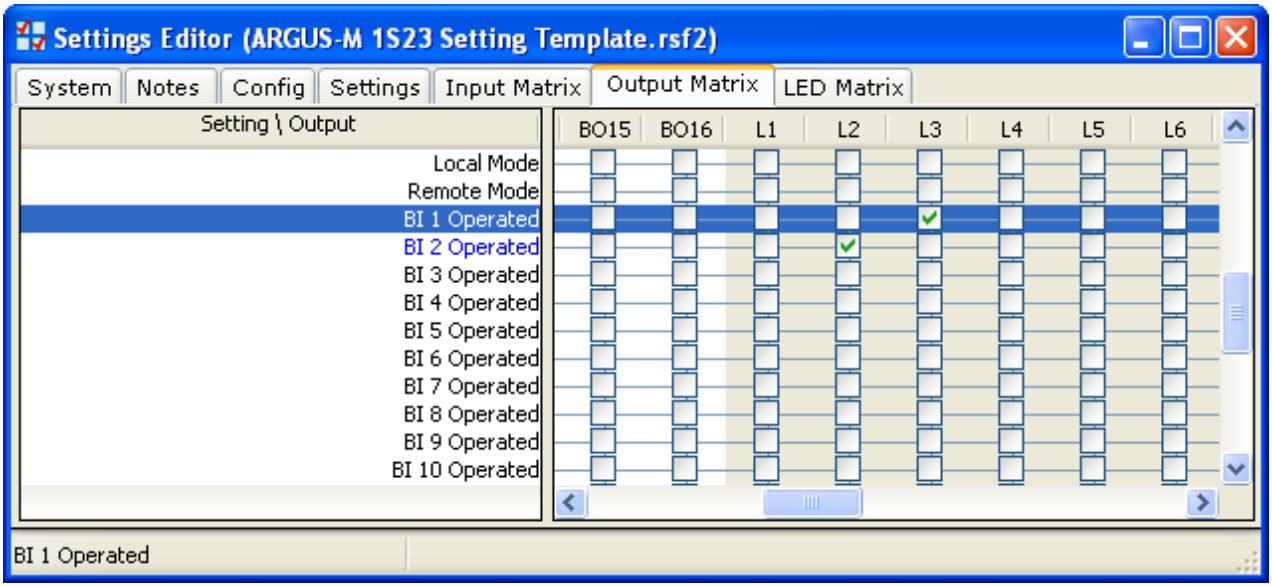
BI2 is inverted to cater for the removal of voltage to indicate the 1S23 SUPERVISION Fail condition.



BI2 which is allocated for 1S23 SUPERVISION Fail is also assigned to LED2 for LED Indication purposes on the relay.



BI1 which is allocated for 1S23 ARC Trip is also assigned to LED3 for LED Indication purposes on the relay.



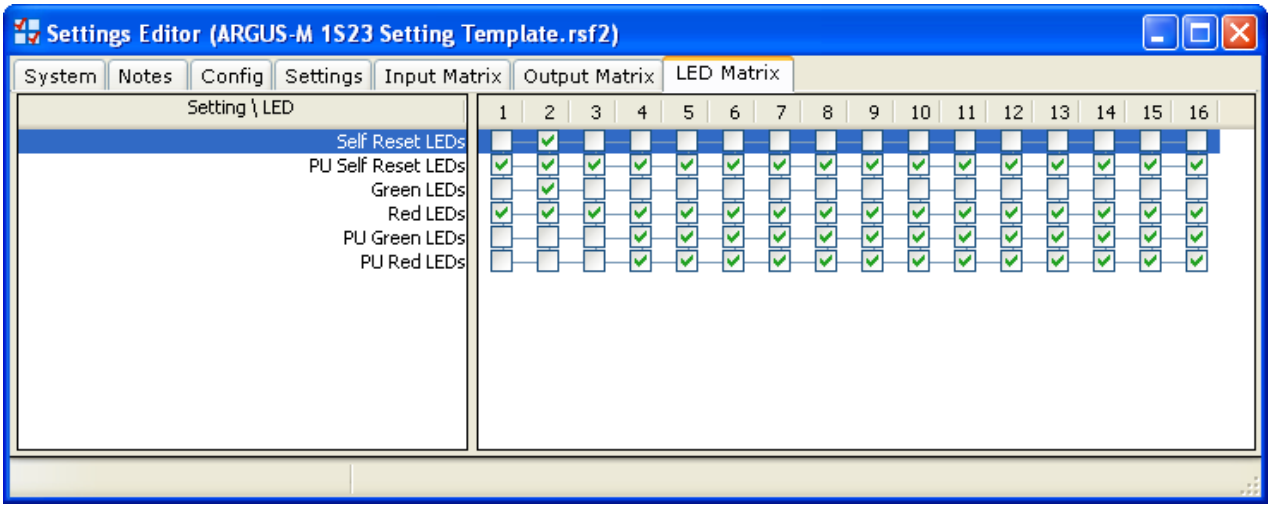
LED Matrix

The LED Matrix defines the colour and latching or self resetting behaviour of the LEDs.

LED 1 : ARC Fault Trip : Red LED and latched

LED 2 : 1S23 SUPERVISION : Orange LED and self resetting

LED 3 : 1S23 ARC Trip : Red LED and latched (Indication of 1S23 Output Operation)

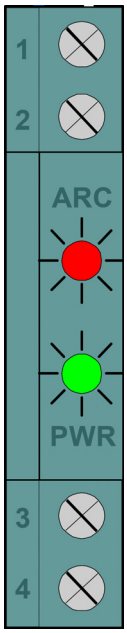


Module Indications

Front Module Layout

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

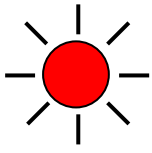
The Front of the module provides LED indication of Auxiliary supply and Arc Fault Pickup.



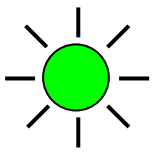
Initial Power Up and Model Confirmation

When the 1S23 is powered up both LEDs will flash a fixed number of times depending on the version of the 1S23 installed.

Power up test



Single Sensor version : Both LEDs flash 3 times



Two Sensor version : Both LEDs flash 4 times

System Healthy

The Green PWR LED illuminates solid when the module self checking completes successfully.

System healthy  Green solid

The Supervision output will conduct to indicate System/Supervision Healthy.

Power Supply or CPU Fail

An error in the module self checking routine will be indicated by a flashing Green PWR LED.

System Fail  Green LED Extinguished

The Supervision output will be non conducting to indicate a module fault.

Arc Fault Pickup

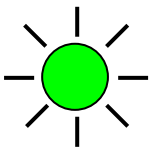
Upon detection of an ARC fault the RED Arc fault pickup LED will illuminate for approximately 2 secs then reset.

Arc Fault Pickup  Red solid

Sensor FAIL Indications

The sensor input is equipped with sensor supervision and Sensor Fail Indication. The sensor supervision checks the integrity of the wiring (for short circuit or open circuit) between the 1S30 sensor and the 1S23 monitor.

Detection of either short circuit or open circuit conditions will cause the Green PWR LED to flash.

Sensor Fail  Green flashing

The Supervision output will be non conducting to indicate sensor fail conditions.

The Sensor FAIL indications will self reset upon the failure condition being removed.

Summary of Indications

All Indications including additional trouble shooting error indications are tabulated below :

Module Type	Red Led	Green Led	Trip Output	Supervision Output	Condition	Notes
1 or 2 Sensor Module	Led Extinguished	Led on solid	Non conducting	Conducting	System Healthy and no Arc Fault Pickup	
	Led on for 2 sec	Led on solid	Conducting for 100 msec	Conducting	Arc Fault Pickup	
	Led Extinguished	Led Extinguished	Non conducting	Non conducting	Power Supply Fail	
	Led Extinguished	Led Extinguished	Non conducting	Non conducting	Module Self Checking Failure	
	Led on for 2 sec	Led Extinguished for 2 sec	Non conducting for 2 sec[1]	Non conducting for 2 sec	Trip Output current limit exceeded	Scheme needs checking for correct application or a wiring fault
	Led Extinguished	Led repeat flash pattern (3 x 300ms illuminations and then 700ms Extinguished)	Non conducting	Non conducting	Supervision Output current limit exceeded	Scheme needs checking for correct application or a wiring fault Reset only possible by cycling power off then on
	Led on solid	Led repeat flash pattern (300ms illuminations)	Conducting for 100 msec and then Non conducting (further Trip outputs are inhibited)	Non conducting	Sensor continuously picked up	Reset when continuous pick up removed

[1] May exhibit transient operation prior to Trip Output current limit circuitry operating.

Module Type	Red Led	Green Led	Trip Output	Supervision Output	Condition	Notes
Single Sensor Module	 Led flashes 3 times	 Led flashes 3 times	Non conducting	Non conducting	Power Up Test for Single Sensor Module	
	Led Extinguished	 Led repeat flash pattern (300ms illuminations)	Non conducting	Non conducting	1 Sensor connected and sensor open or short circuited	
	Led Extinguished	Led on solid	Non conducting	Conducting	2 Sensors connected 1 Sensor open circuited	**Sensor Fault condition is not indicated!** **This version of 1S23 only works correctly with one sensor connected only.**
	Led Extinguished	 Led repeat flash pattern (300ms illuminations)	Non conducting	Non conducting	2 Sensors connected 1 of 2 Sensors short circuited	**This version of 1S23 only works correctly with one sensor connected only**
	Led Extinguished	 Led repeat flash pattern (300ms illuminations)	Non conducting	Non conducting	2 Sensors connected and both Sensors open or short circuited	**This version of 1S23 only works correctly with one sensor connected only**

Module Type	Red Led	Green Led	Trip Output	Supervision Output	Condition	Notes
Two Sensor Module	 Led flashes 4 times	 Led flashes 4 times	Non conducting	Non conducting	Power Up Test for Two Sensor Module	
	 Led Extinguished	 Led repeat flash pattern (300ms illuminations)	Non conducting	Non conducting	1 Sensor connected and open circuited	**This version of 1S23 only works correctly with two sensors connected only.**
	 Led Extinguished	 Led repeat flash pattern (300ms illuminations)	Non conducting	Non conducting	2 Sensors connected and 1 or both open circuited	
	 Led Extinguished	 Led repeat flash pattern (300ms illuminations)	Non conducting	Non conducting	1 Sensor connected and short circuited	**This version of 1S23 only works correctly with two sensors connected only.**
	 Led Extinguished	 Led repeat flash pattern (300ms illuminations)	Non conducting	Non conducting	2 Sensors connected and short circuited	

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.

ARC Trip Verification

ARC Trip Verification will require a flash source to initiate sensor operation.

A high powered photographic flash is the most convenient means of initiating positive sensor operation.

Note that mobile phone or small compact camera flashes may not have sufficient power to cause sensor operation.

The RMS '1S23 Arc Flash Timing Test Guide' outlines a suggested test setup to provide a flash source and determine ARC Trip times. The '1S23 Arc Flash Timing Test Guide' is available on the RMS website :

www.rmspl.com.au/userguide/1s23 arc_flash_timing_test_guide.pdf

Site Commissioning Verification Checklist

Observe all site specific standard safety procedures.

The following tests are undertaken following the completion of all 1S23 ARC Module and Overcurrent Relay scheme wiring and the wiring of all 1S30 sensors.

System Power Up

Item	Description	Complete
1	Confirm all necessary primary equipment isolations	
2	Confirm all necessary secondary equipment isolations (including trip outputs)	
3	Check fitment of 1S30 optical sensors and cable condition	
4	Check panel installation of the 1S23 ARC Module	
5	Check the 1S23 is wired to the protection design schematic	
6	Confirm 1S23 SUPERVISION output is non conducting by confirming that the associated Overcurrent relay 1S23 SUPERVISION input becomes de-asserted (alternatively using a voltmeter check the voltage across the White Supervision Flying lead and Terminal 1 of the 1S23 is ≈+Pos supply voltage)	
7	Confirm that the correct number of sensors are connected to the module according to the order code.	
8	Apply correct Auxiliary voltage to power up the 1S23 Observe the LED indication upon power up and confirm the module version corresponds to the module order code : Single Sensor version : Red and Green LED flash 3 times Two Sensor version : Red and Green LED flash 4 times The Green PWR LED will then illuminate solid green to indicate System Healthy	
9	Confirm 1S23 SUPERVISION output is conducting by confirming that the associated Overcurrent relay 1S23 SUPERVISION input becomes asserted (alternatively using a voltmeter check the voltage across the White Supervision Flying lead and Terminal 1 of the 1S23 is ≈ 0V (< 0.5V)	
10	Confirm that the Green PWR LED indicates no sensor fail conditions (Refer Sensor Failure Trouble shooting if sensor failure is indicated)	
11	Confirm that no ARC fault trips are indicated	

SUPERVISION Output Verification

Item	Description	Complete
1	In turn disconnect each sensor from the associated 1S23 sensor input	
2	Confirm that the Green PWR LED flashes and the SUPERVISION output becomes non conducting by confirming that the associated Overcurrent relay 1S23 SUPERVISION input becomes de-asserted (alternatively using a voltmeter check the voltage across the White Supervision Flying lead and Terminal 1 of the 1S23 is ≈+Pos supply voltage)	
3	Reconnect all sensors back to the associated 1S23 sensor input	
4	Confirm that the Green PWR LED returns to solid illumination and the 1S23 SUPERVISION output is conducting by confirming that the associated Overcurrent relay 1S23 SUPERVISION input becomes asserted (alternatively using a voltmeter check the voltage across the White Supervision Flying lead and Terminal 1 of the 1S23 is ≈ 0V (< 0.5V)	
5	Place a short across the 1S23 sensor input	
6	Confirm that the Green PWR LED flashes and the 1S23 SUPERVISION output becomes non conducting by confirming that the associated Overcurrent relay 1S23 SUPERVISION input becomes de-asserted (alternatively using a voltmeter check the voltage across the White Supervision Flying lead and Terminal 1 of the 1S23 is ≈+Pos supply voltage)	
7	Remove the short from the 1S23 sensor input	
8	Confirm that the Green PWR LED returns to solid illumination and the 1S23 SUPERVISION output is conducting by confirming that the associated Overcurrent relay 1S23 SUPERVISION input becomes asserted (alternatively using a voltmeter check the voltage across the White Supervision Flying lead and Terminal 1 of the 1S23 is ≈ 0V (< 0.5V)	

Arc Trip Testing

Item	Description	Complete
1	Initiate the operation of each sensor by the use of a suitably powered camera flash * If a current check interlock is employed in your ARC Fault protection scheme ensure that current is injected into the associated Overcurrent relay to cause operation of the current check element at the same time the sensor is flashed	
2	Check for correct operation of the RED 1S23 ARC fault output LED (2 sec illumination and then self reset)	
3	Confirm operation of the 1S23 ARC fault output is conducting by confirming that the associated Overcurrent relay 1S23 Arc Fault input becomes asserted and then drops out following the 1S23 Arc Fault Output dwell time of approx 100 ms (monitor the operation of the 1S23 output using a Relay test system such as a Doble to monitor that the voltage across the Blue ARC Fault Flying lead and Terminal 1 of the 1S23)	
4	Confirm operation of the Overcurrent relay ARC Fault Trip Output (For CB tripping)	

Refer also to the RMS '1S23 Arc Flash Timing Test Guide' for a suggested test setup to provide a flash source and determine ARC Trip times. The '1S23 Arc Flash Timing Test Guide' is available on the RMS website :

www.rmspl.com.au/userguide/1s23 arc_flash_timing_test_guide.pdf

ARC Sensor Supervision Trouble Shooting

Item	Description	Complete
1	If there is a SUPERVISION indication re-check the 1S30 wiring integrity	
2	Check that the correct number of sensors are wired to the arc sensor inputs according to the ARC Module order code	
3	Check for high ambient lighting conditions for all the sensors	

Make use of the summary of indications to aid in troubleshooting.

ARC Trip Trouble Shooting

If an arc trip occurs without an ARC being present this indicates either:

- a very high ambient light condition is triggering a sensor

or

- short circuit wiring of a 1S30 sensor

In both cases if the condition persists the Supervision output will operate after a 0.5 sec delay.

Item	Description	Complete
1	Check the 1S30 wiring integrity of the sensors	
2	Check for high ambient lighting conditions for all the sensors	

Make use of the summary of indications to aid in troubleshooting.

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.

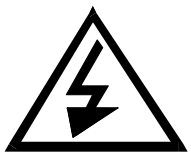
The information in the Safety Section of the product documentation is intended to ensure that products are properly installed and handled in order to maintain them in a safe condition. It is assumed that everyone who will be associated with the equipment will be familiar with the contents of the Safety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

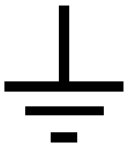
Caution: refer to product information

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.



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

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.

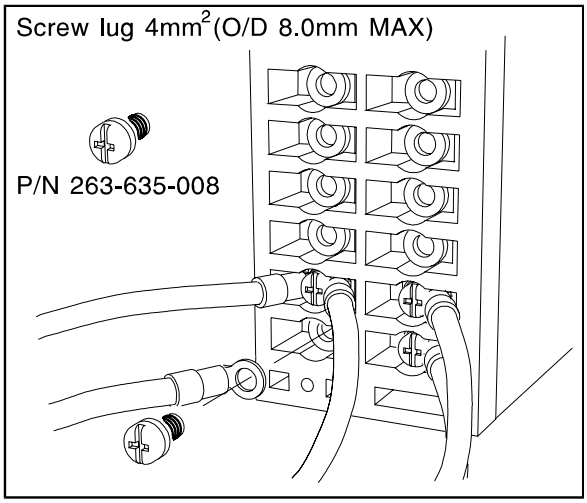
Voltage and current connections should be made using insulated crimp terminations to ensure that terminal block insulation requirements are maintained for safety. To ensure that wires are correctly terminated, the correct crimp terminal and tool for the wire size should be used.

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.

Part

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Maintenance

Mechanical Inspection

Relay Assembly

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

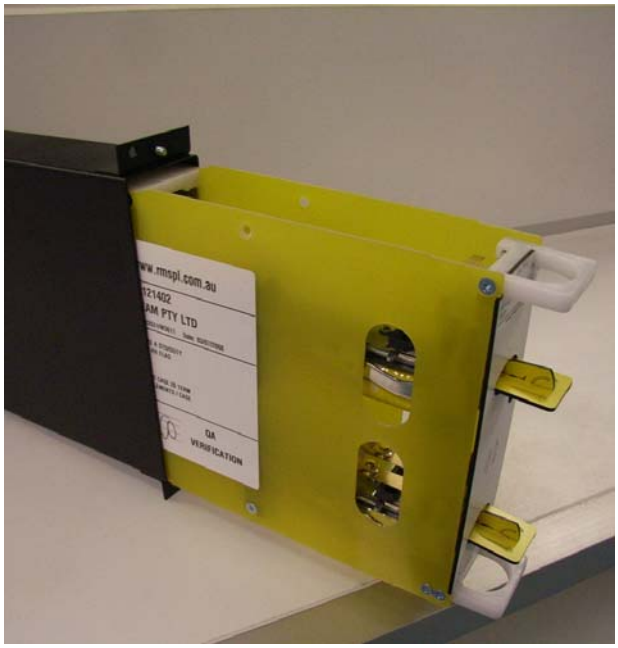
Relay Module

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.

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, The Middle East & 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

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