ARC Fault Interface Module 1S23

High speed arc fault protection for metal clad air Insulated switchgear utilizing optical sensors.

- Less than 2ms arc detection and tripping time
- Makes any relay arc fault protection ready
- Compact DIN rail mounting
- Made in Australia

Figure 1 1S23 Module depicted with 1S30 Sensor

Features

- High speed sensing and operation
- Designed to interface with protection relay status inputs
- Continuous arc fault sensor supervision
- Arc fault pick up and supervision healthy indication
- Simple wiring and DIN rail mounting
- Compact, simple, rugged and economic design
- 24, 32, 48, 110, 125, 220, 240 and 250V DC auxiliary supply versions

Description

Working in conjunction with a third party protection relay the 1S23 adds Arc Fault coverage to a protection scheme.

The 1S23 monitors either one or two 1S30 optical sensors to detect the presence of an arcing fault within Metal Clad air insulated switchgear.

Housed in a compact din rail mounted package the 1S23 provides M4 screw terminals for connection of 1S30 optical sensors and an auxiliary voltage supply.

The 1S23 provides an Arc Fault trip output and also continuously supervises the optical sensor to ensure maximum availability of the Arc Fault Protection scheme.

The interface wiring to the protection relay status inputs is provided by 2m colour coded flying leads, the blue lead provides the Arc Fault Trip output and the white lead is for the Supervision Status output.

Refer to the 1S30 Technical Bulletin for details on the arc fault sensor.

Application

Utilised in either new installations or as a simple retrofit in existing installations, the 1S23 is interfaced with the binary inputs of existing protection relays that serve to trip a Circuit Breaker.

Arc Fault protection schemes may be implemented on an Arc only basis, or alternatively a Current Check may be employed where additional security is warranted.

A current checked scheme may be implemented by making use of available protection relay logic and a fast acting instantaneous overcurrent element.

A protection relay with the following attributes is desirable to implement a scheme:

Attribute	Parameter
Programmable relay logic	AND gates
High speed status input	<5ms pick up
High speed current check element	<15ms at 2 x setting
Programmable front panel indication	Arc Trip indication
	Supervision Status

Some typical application examples are shown on the Application page together with an Example Schematic.

For further Application information refer to the 1S23 User Guide.

Figure 2 1S23 front indications

Two Part System

The 1S23 based ARC Fault Protection system works as a two part system comprising of 1S30 Arc Fault sensors that are monitored by the 1S23 module. The 1S23 is available in either one sensor or two sensor versions.

For complete details of the 1S30 Optical Sensor refer to the 1S30 Technical Bulletin.

Front Panel Layout and LED Indications

Figure 2 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.

The green PWR LED is continuously illuminated to indicate presence of the auxiliary supply and normal operation including supervision of the 1S30 sensor(s).

The red ARC LED is illuminated when an optical signal above the detection threshold is present. The red ARC LED will self reset when the optical signal falls below the detection threshold after a minimum dwell time of 2s.

Trip Output Circuit Operation

A dedicated non isolated trip output is provided to connect to a protection relay status input as shown in the Example Schematic.

Upon detection of light intensity greater than the pick-up threshold a solid state switch connects the negative rail to the relay status input.

The trip output pulse is a fixed duration of 100ms ± 10ms.

System Supervision

A CPU software watchdog monitors the system and in the event of an abnormal condition will automatically perform a soft restart.

Should the restart not clear the abnormal condition the system will revert to a safe mode with outputs disabled. This will cause the self supervision healthy output to open and extinguish the green PWR LED.

Arc Sensor Supervision

The circuit continuity of the 1S30 sensor is monitored by the 1S23 via a 2mA supervision current in the sensor cables. The supervision healthy signal is output to the protection relay status input if the supervision current continues to flow.

The supervision healthy signal is removed after a 1s time delay if the supervision current signal is lost and the front PWR LED will flash until the condition is corrected.

Arc Sensor Continuously Picked Up

High ambient light levels may cause a 1S30 to be continuously picked up.

To avoid possible maloperation due to this condition, the ARC module is designed to automatically disable the arc fault tripping function if the 1S30 sensor is picked up for more than 500ms. The ARC module will then disable the healthy supervision signal and the front PWR LED will flash until the ambient light level problem is corrected.

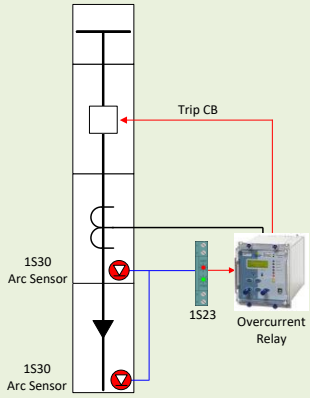
System Supervision and Sensor Supervision Output Circuit Operation

A dedicated non isolated sensor supervision output is provided to connect to a protection relay status input as shown in the Example Schematic.

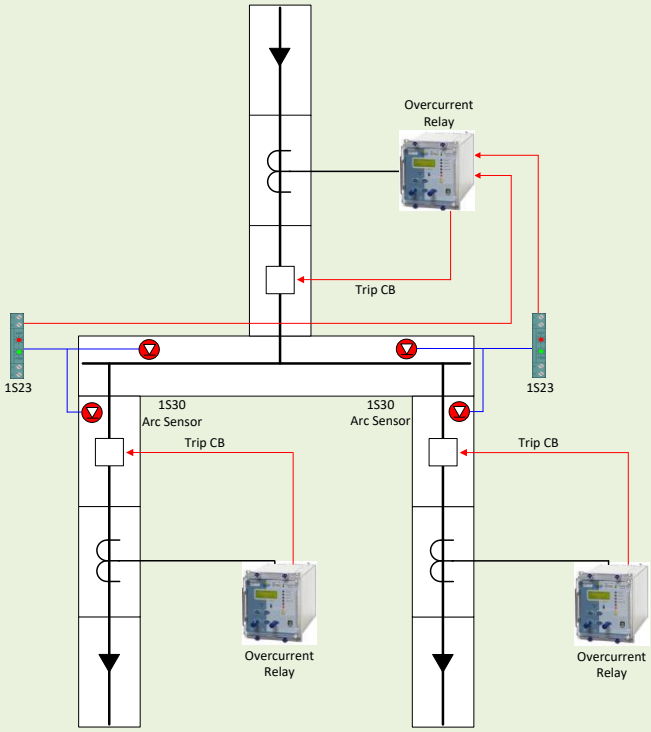
For a system or sensor supervision healthy state a solid state switch connects the negative rail to the relay status input.

For complete details of the Module indications refer to the 1S23 Userguide.

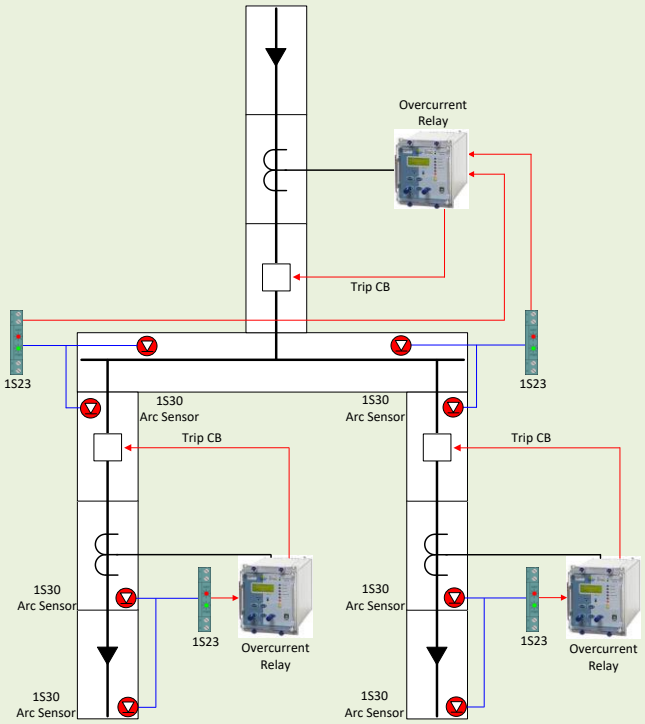
Cable Box and CT Chamber Protection



Circuit Breaker and Bus Chamber Protection



Circuit Breaker, Bus Chamber, Cable Box and CT Chamber Protection



Auxiliary Supply

Nominal Voltage Ratings	24 / 32 / 48 / 110 / 125 / 220 / 240 / 250V dc
Operating Range	±20% of Nominal Rating
Power Consumption Monitoring mode Maximum	 < 0.75W at 110V dc < 1.5W for 2s at 110V dc

Outputs

Type	Solid State Polarised Switches (Switching negative rail)
Arc Fault Detection Operate Time	< 1ms
Fixed Arc Trip Output Pulse Duration	110ms ± 10ms
Supervision Output	Self resetting
Arc Trip Output Rating: Open circuit voltage Maximum current 24, 32 & 48V models 110 & 125V models 220, 240 & 250V models	 125% of nominal 3.1A 1.6A 0.75A
Supervision Output Rating Open circuit voltage Maximum current All models	 125% of nominal 70mA for 60ms 30mA continuous

Allowable Auxiliary Supply Interruptions / Dips

Standard	IEC 60255-11
Allowable Duration of Voltage Dip to 0 % of nominal	20ms
Allowable AC ripple	15%

Insulation

Standard	IEC 60255-5
Any Terminal and Earth	2.0kV ac rms for 1min
	5.0kV 1.2/50us 0.5J
Between Independent Circuits	2.0kV ac rms for 1min
	5.0kV 1.2/50us 0.5J

High Frequency Disturbance

Standard	IEC 60255-22-1 Class 3	
Type	Level	Variation
Common (Longitudinal)	2.5kV	≤5%
Differential (Transverse)	1.0kV	≤5%

Electrostatic Discharge

Standard	IEC 60255-22-2 Class 3	
Type	Level	Variation
Contact Discharge	8.0kV	≤5%

Fast Transients

Standard	IEC 60255-22-4 Class A	
Type	Level	Variation
5/50ns 100kHz	4.0kV	≤5%

Surge Immunity

Standard	IEC 60255-22-5	
Type	Level	Variation
Between all Terminals and Earth	4.0kV	≤10%
Between any Two Independent Circuits	2.0kV	

Conducted Radio Frequency Interference

Standard	IEC 60255-22-6	
Type	Level	Variation
0.15 to 80MHz	10V	≤5%

Radiated Immunity

Standard	IEC 60255-22-3 Class III	
Type	Level	Variation
80MHz to 2,760MHz	10V/m	≤5%

Temperature

Standard	IEC 60068-2-1/2
Operating Range	-10 to +55 degrees Celsius
Storage Range	-25 to +70 degrees Celsius

Humidity

Standard	IEC 680068-2-78
Operating Range	40 degrees Celsius and 93% RH non condensing

IP Rating

Standard	IEC 60529
Installed	IP3x

Vibration - Sinusoidal

Standard	IEC 60255-21-1 Class I	
Vibration Response	0.5gn	≤5%
Vibration Endurance	1.0gn	≤5%

Shock and Bump

Standard	IEC 60255-21-2 Class I	
Shock Response	5gn, 11ms	≤5%
Shock Withstand	15gn, 11ms	≤5%
Bump Test	10gn, 16ms	≤5%

Seismic

Standard	IEC 60255-21-3 Class I	
Seismic Response	1gn	≤5%

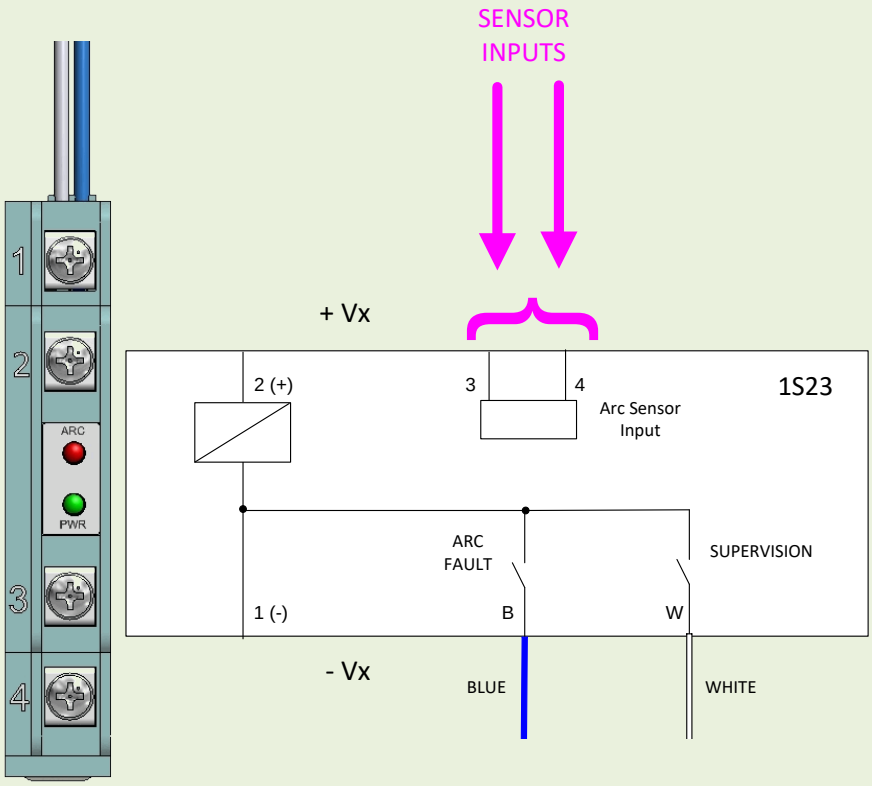
Mechanical Classification

Durability	$>10^6$ operations at no load

1S23 Module Connection and Wiring Diagram

Blue Lead :
Arc Fault Trip Output - Negative

White Lead :
Supervision status output - Negative

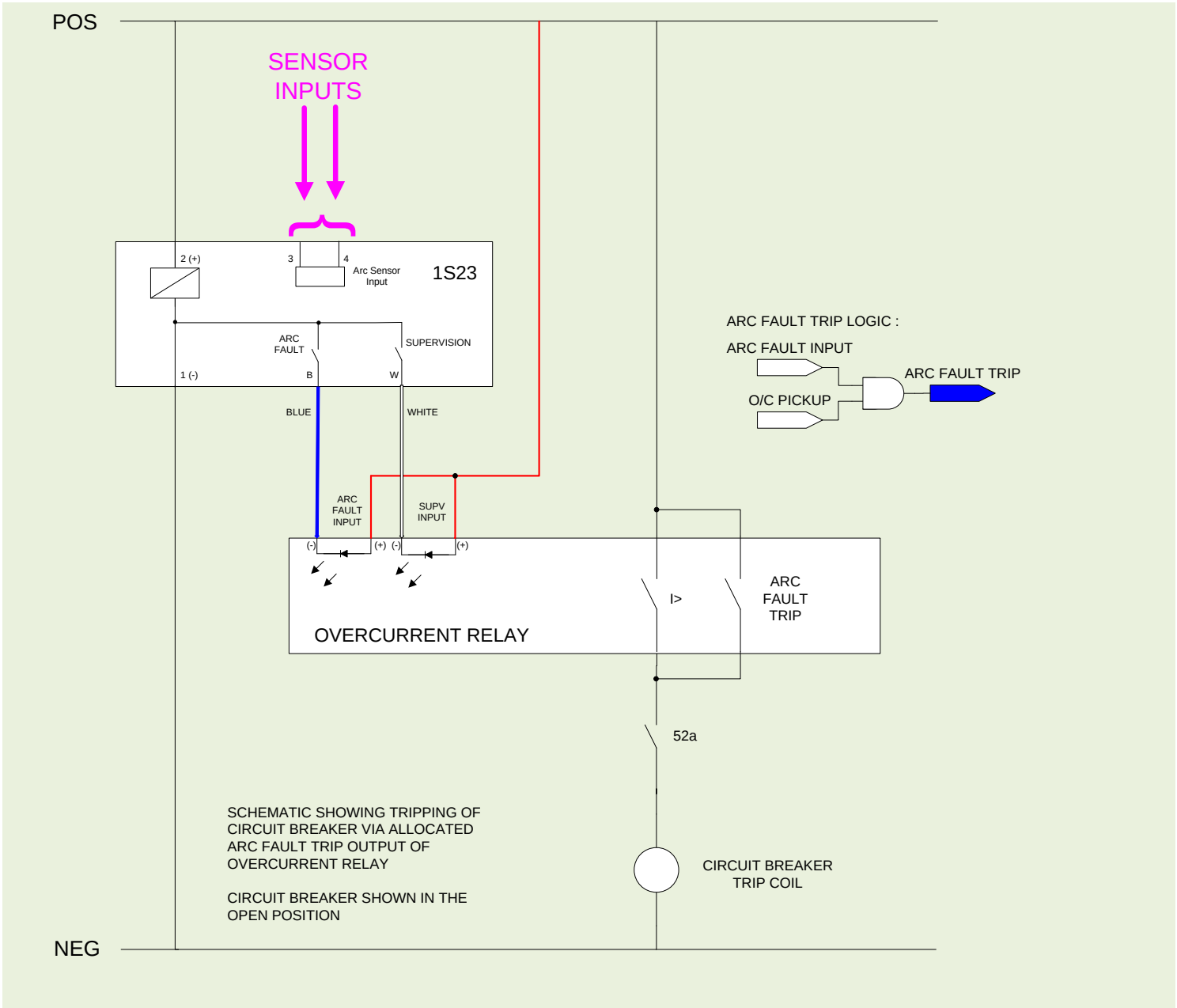


1S30 Connections are Non polarized

M4 screw terminals are suitable for heavy duty ring lugs

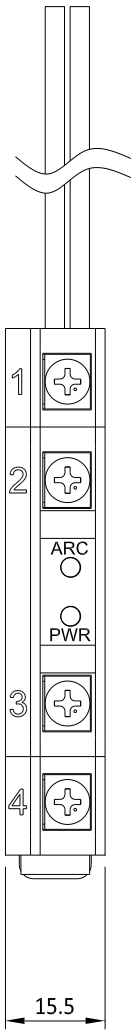
Relay shown in the de-energised condition

Interfacing a 1S23 to an Overcurrent Relay

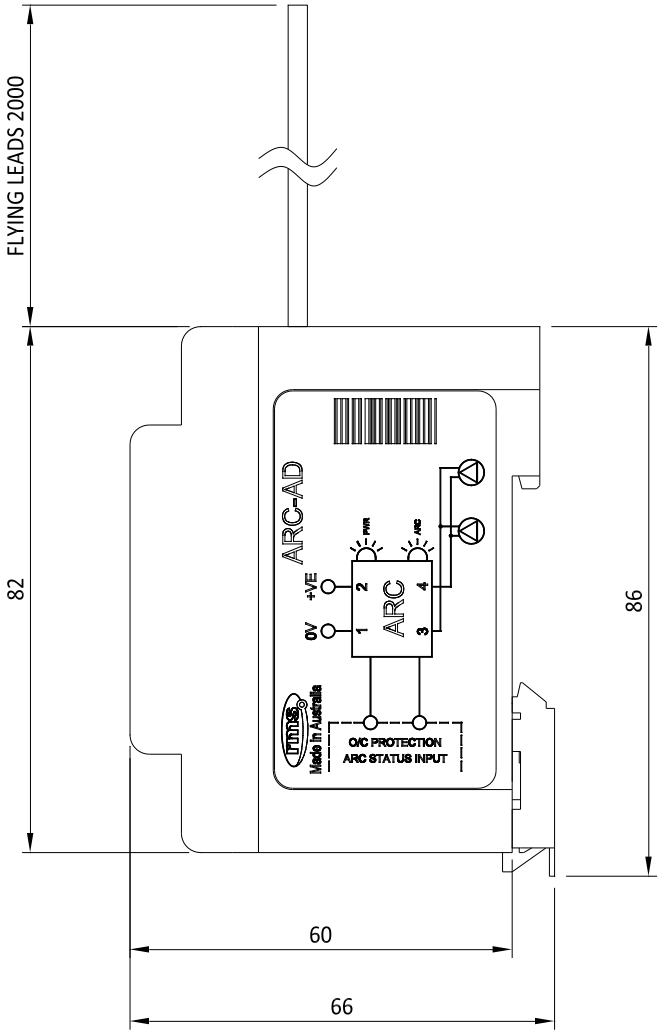


Front View

Suitable for mounting on 35mm Top Hat Din Rail



Side View



1S23 Order Code

1S23 -			
Optical Sensor Interface	A		Single 1S30 sensor input
	B		Dual 1S30 sensor inputs
Auxiliary Supply		A	24V DC
		B	32V DC
		C	48V DC
		D	110V DC
		E	125V DC
		F	220V DC
		G	240V DC
		H	250V DC

Refer to the 1S30 Technical Bulletin for ordering information on the 1S30 arc fault sensor.

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