



Reyrolle
Protection
Devices

7XG3130 – ReyArc30

Optical Arc Fault Sensor

Energy Management

SIEMENS

7XG3130 - RA30

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 cable 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
- Metal reinforced mounting shield comes as standard

Application

Arc fault protection is a technique employed for the fast clearance of arcing faults on busbars & 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.

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

Description

The RA30(ReyArc30) 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 RA30 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.

In standby mode the RA30 sensor presents a high resistance to the 12V DC control signal provided by the Arc Fault Monitor. This allows a small circulating current to flow for continuous supervision of the RA30 connection circuit. When an arc is detected, the resistance presented by the RA30 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 RA20 Arc Fault Monitor Catalogue sheet for further details.

Single detector package

Figure 1 depicts the RA30 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 through a hole in the panel.

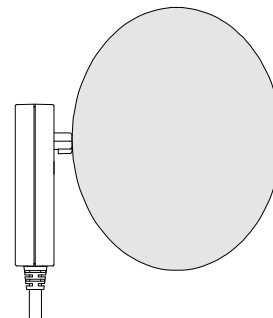


Figure 1:

Detector Characteristics

Dual detector package

Figure 2 depicts the RA30 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 RA20 Arc Fault Monitor.

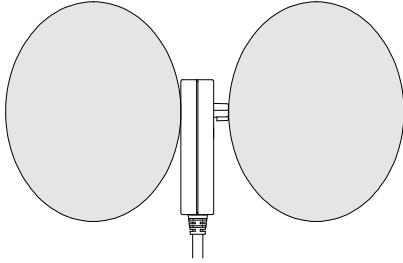


Figure 2:

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.

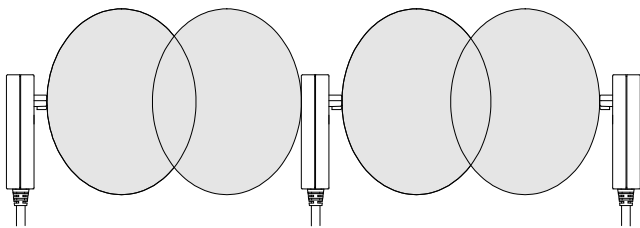


Figure 3:

Optical sensitivity

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

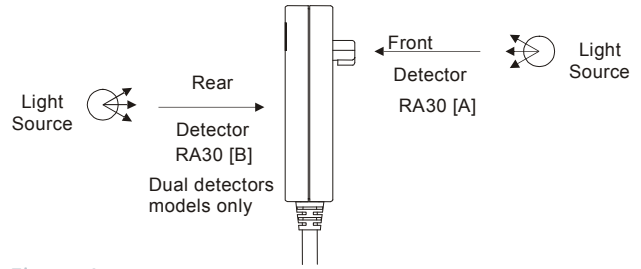


Figure 4:

For the RA30 single detector version the front detector only is fitted. In this configuration the RA30 will be insensitive to white light incident on the rear surface of the case up to a level of 200,000 Lux.

As the illuminance of diffuse ambient sunlight falls in the range 5,000 to 10,000 Lux, this will not normally be sufficient to trigger the RA30 sensor. The luminous intensity from the sun at noon at the equator however is ~100,000 Lux which will be sufficient to trigger the RA30 sensor so measures should be made to avoid this situation.

Direct sunlight incident on the rear of the RA30 single sensor model 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

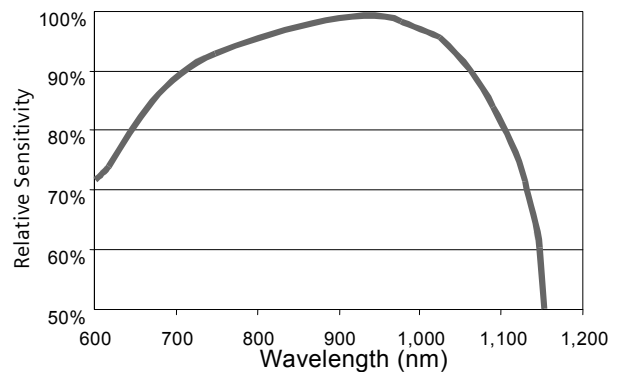


Figure 5: Arc detector spectral response

* 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 RA30 is suitable for flush panel mounting in a number of configurations.

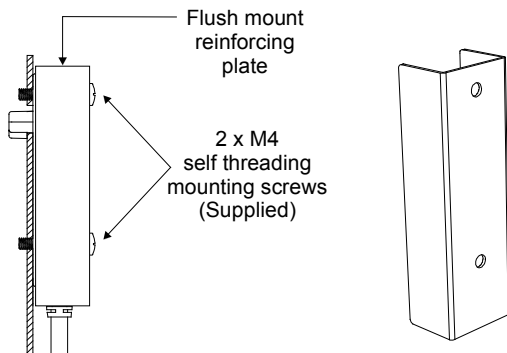


Figure 6: RA30 shown mounted on the outside of a switchgear panel. Detector oriented to 'look' through a hole into the switchgear.

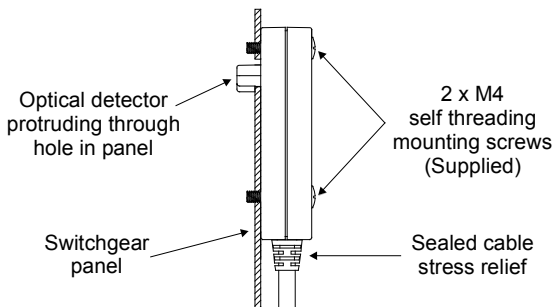


Figure 7: RA30 shown mounted on the inside of a switchgear panel. Detector oriented to 'look' out into the switchgear compartment.

Flush mounting reinforcing plate

When mounting the RA30 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 RA30 as depicted below. The Reinforcing plate comes as standard with the RA30.

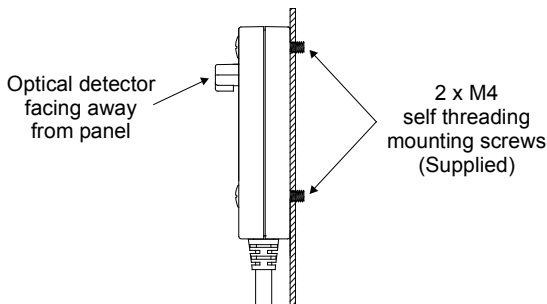


Figure 8: Flush mount reinforcing plate
1.2mm zinc plated mild steel

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 RA20 Arc Fault Monitor unit.

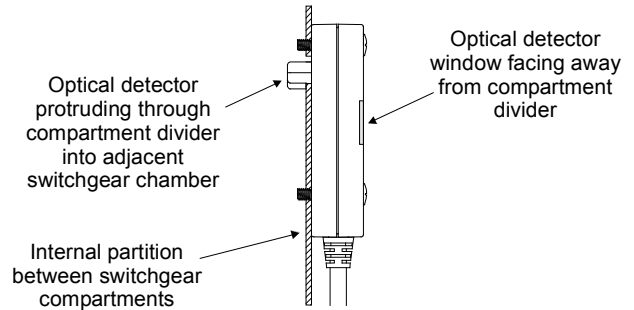


Figure 9: RA30 shown mounted on the inside of a switchgear panel. This configuration combines the functions described in Figures 6 & 7 with the application of a single dual detector arc fault sensor.

Panel mount cut out detail

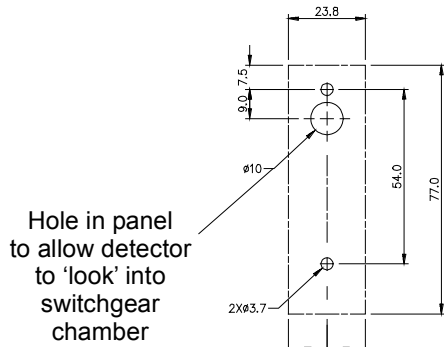


Figure 10: Flush mounting detail

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.

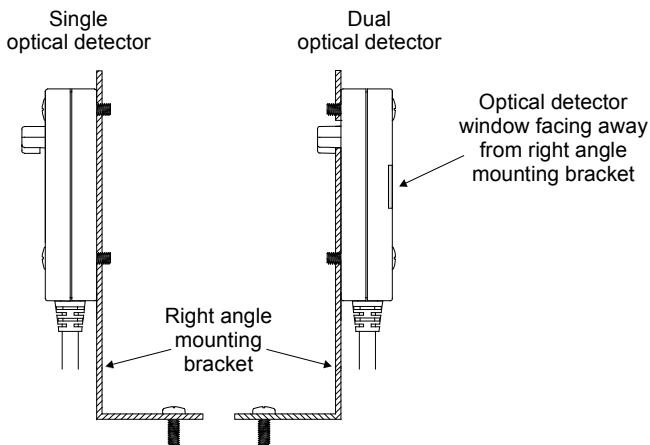


Figure 11: Right angle mounting off a surface mount off floor or walls within switchgear / busbar chamber

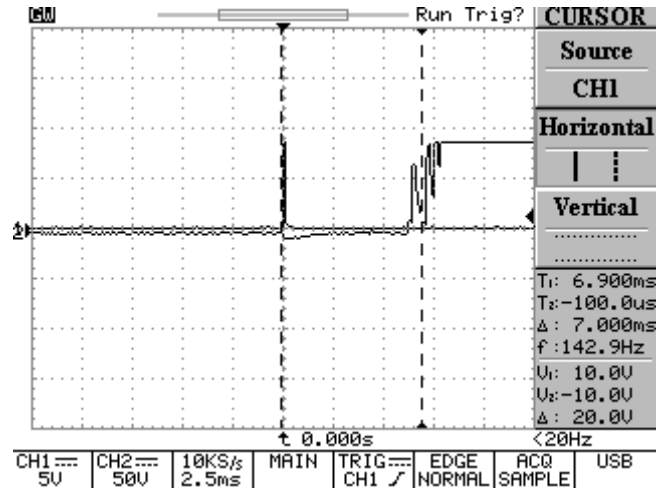
Technical Data

Arc fault protection scheme

Refer to the ReyArc20/23/24 Technical Catalogue sheets for further details.

Arc protection scheme operate time

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



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 ~25ms.

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 RA20 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 RA30 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 RA20 connection end. The standard 6m cable may be cut down to the desired length & crimp ring lugs fitted for termination.

The RA30 connections are not polarity sensitive. Reversal of the wires on the arc monitor terminals has no effect on the performance of the RA30 or arc detection system.

The cable is factory fitted to the RA30 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 RA30 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.

Dimensions

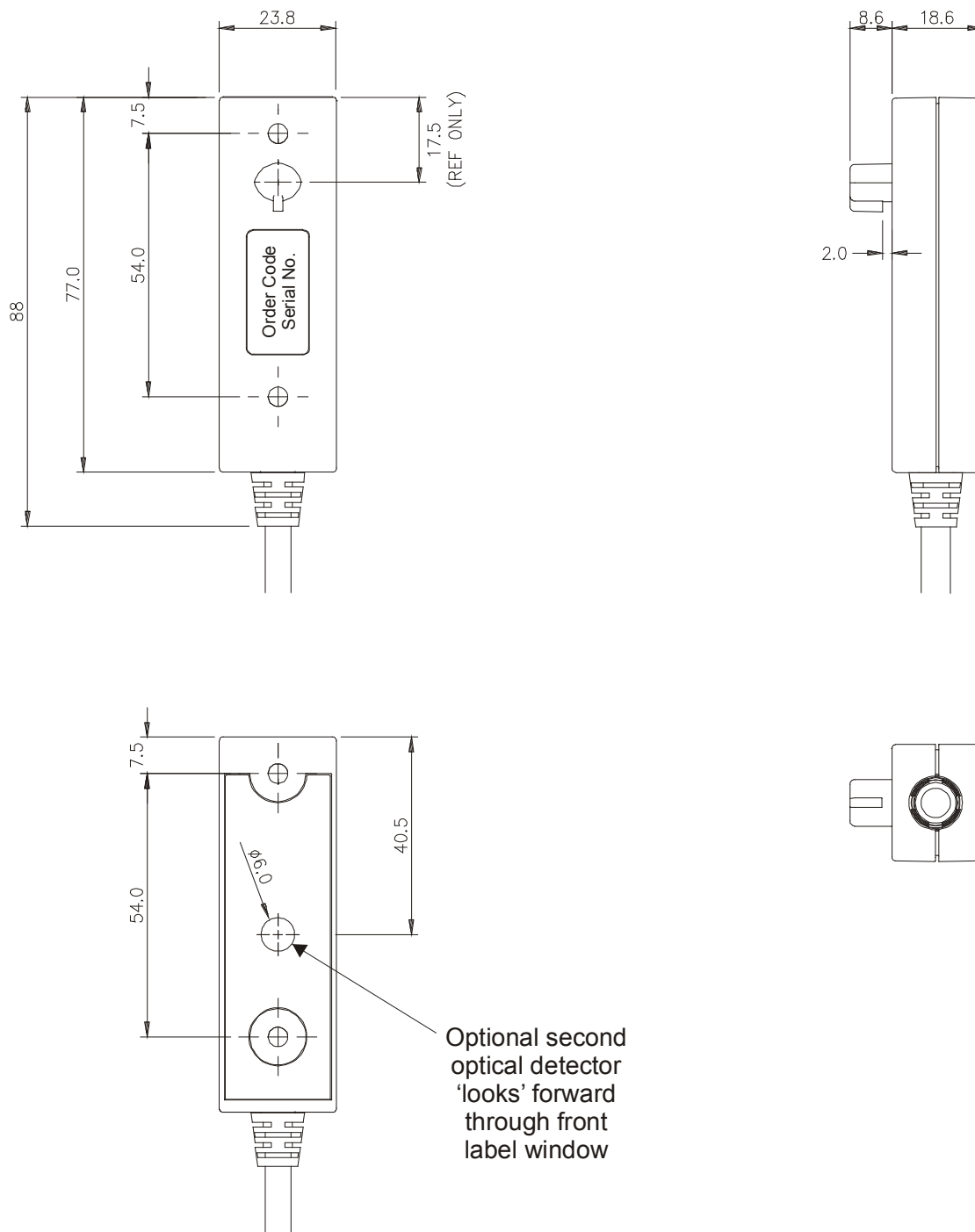


Figure 16: RA30 Arc fault Sensor dimensions

Ordering Information

Product description	Variants	Order No.
Reyarc – Arc Fault Protection Components	<u>Category</u> Arc Protection <u>Device</u> RA30 Arc Sensor <u>Arc Detectors</u> Single detector (Through Hole) Dual detector <u>Cabling</u> 6m unshielded 6m shielded 20m shielded <u>Reinforcing plate (single sensors only)</u> Required Not Required	7 X G 3 1 3 0 - □ □ 0 0 - 0 A A 0 ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ 3 1 3 0 1 2 A B A B C

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Siemens Protection Devices Limited
P.O. Box 8
North Farm Road
Hebburn
Tyne & Wear
NE31 1TZ
United Kingdom
Phone: +44 (0)191 401 7901
Fax: +44 (0)191 401 5575
E-mail: marketing.spdl.gb@siemens.com

EMEA-C10068-00-76GB

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For enquires please contact our Customer Support Center
Phone: +49 180/524 8437 (24hrs)
Fax: +49 180/524 24 71
E-mail: support.ic@siemens.com
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