

ARC FAULT PROTECTION

The cause, effect, problem and solution to detection of internal arcs in metal clad switchgear.

Metal clad switchgear employed in industrial and utility power distribution have experienced several incidents when an internal arc was not contained or vented appropriately. These incidences pose a serious safety hazard to personnel, and the damage to the switchgear can be excessive, resulting in long restoration times.

CAUSE

Electrical arc short circuits in metal clad switchgear may occur for many different reasons.

- defective or ageing insulating materials
- poor bus or cable connections
- poor maintenance
- human error
- ingress of moisture, dust or vermin
- abnormal service conditions

Accident experience has shown that failure usually occurs at, or shortly after, operation of the switchgear. Investigations show that the majority of faults occur in the switchgear cable box compartment.

EFFECT

An arc is developed within milliseconds and leads to the discharge of enormous amounts of energy. The energy discharged in the arc is directly proportional to the square of the short circuit current and the time the arc takes to develop, i.e. energy $\sim I^2t$.

The damage resulting from an arc short circuit depends on the arcing current and the time. Of the two parameters only the time can be influenced, i.e. reduce the total time required to detect the arc and stop the current flow.

- <50 ms arc duration – Personnel and equipment may sustain little or no injury or damage.
- 100 ms arc duration – Personnel and equipment can be at risk.
- >500 ms arc duration – Catastrophic damage to equipment and injury to personnel are likely.

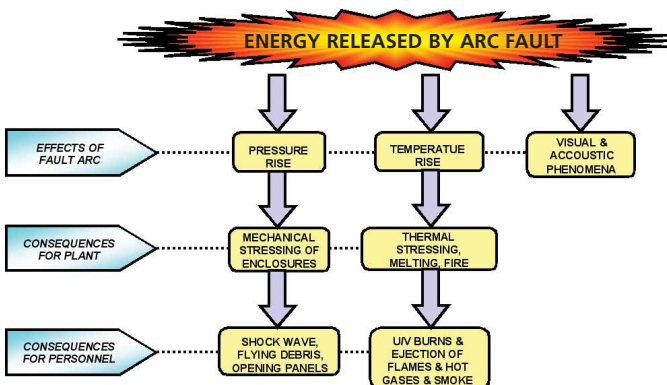


100ms arc duration



500ms arc duration

A high energy arc fault causes a rise in the temperature of the surrounding air and rapid rise in pressure inside the enclosure. Conventional switchgear is not designed to withstand this high pressure, which can also force the doors to blow open, ancillary equipment to become airborne missiles and hot gases, flames and burning metals to escape.



PROBLEM

Speed is essential to minimize the destructive effects and personal hazards when an arc short circuit occurs in electrical equipment. But in many cases conventional type of overcurrent relaying is not able to isolate arc short circuits quickly enough to avoid the damage to switchgear. Time delays due to protection coordination and high impedance type faults, cause prolonged operation times for the conventional type of relaying.

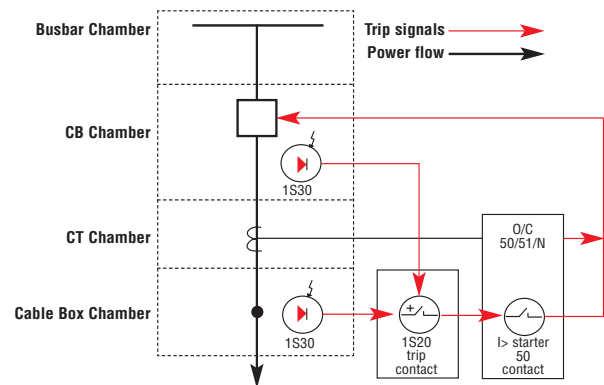
By the time the current has risen to a level high enough to operate the protective relay and the circuit breaker has opened, destructive arcing and short-circuit forces may have destroyed switchgear and, in extreme cases, injured or killed operators working nearby.

SOLUTION

Relay Monitoring Systems has recognized the hazards of arcing accidents and has developed a relay which complements your existing overcurrent protection relay while significantly reducing the damage resulting from an arcing accident. The RMS 1S20 uses optical sensors to detect arcing at its earliest stages and initiate the trip before normal relay operation. Using the RMS 1S20 in combination with today's modern circuit breakers, the total disconnection time can be reduced to less than 50 ms.

INSTALLATION

The RMS 1S20 & 1S30 are easily installed in all types of old and new indoor metal clad switchgear. The Arc Fault Monitor relay 1S20 is installed on the switchgear panel adjacent to your standard overcurrent protection relay. The 1S20 is specifically designed for simple retrofit to existing panels and requires only a single 30mm mounting hole to be drilled. The 1S30 optical arc sensors are fitted in the cable termination box and optionally in the CB chamber again via single 10mm mounting holes.



BENEFITS

Whether caused by human error, a faulty device or bad insulation, arc faults expose your switchgear and other equipment to severe pressure and heat, not to mention the risk of danger to human life. Simply put, the RMS 1S20 Arc Fault Monitor Relay is a secure investment in your future competitiveness in more ways than one.

- Safety of personnel
- Reduced damage inside the cubicles
- Reduced downtime
- Reduced repair and reconstruction costs
- Improve productivity
- Increase profits
- Integrate with your existing overcurrent protection relays

For further information please contact Relay Monitoring Systems:
www.rmspl.com.au

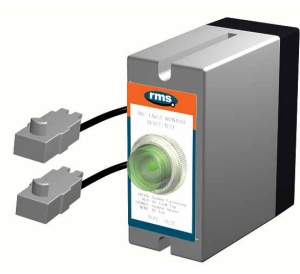
Overcurrent Protection



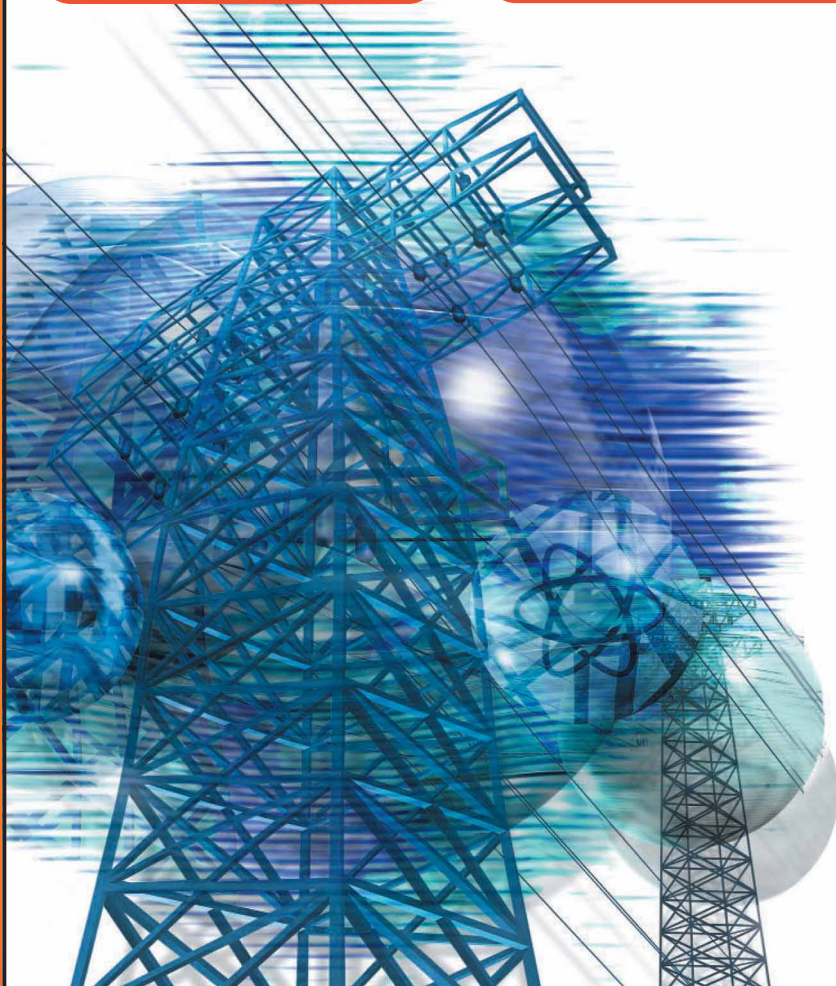
REYROLLE DELTA
Feeder Management Relay



REYROLLE ARGUS
Overcurrent Relay



RMS 1S20 & 1S30
Arc Fault Monitor & Sensor



- rms.** DELTA range of feeder manager relays provide integrated protection, control, monitoring and communication with a full graphic LCD display for circuit mimic diagram, analogue data and local controls
- rms.** DELTA LITE features as per Delta range with standard 2x20 character LCD display with up to 72 inputs and outputs
- rms.** ARGUS now comes with Modbus protocol
ARGUS 1 SLIM low cost non-directional
ARGUS 1 non-directional
ARGUS 2 directional
ARGUS 4 non-directional with auto-reclose
ARGUS 6 directional with auto-reclose
- rms.** 1S20 arc fault monitor relay, ideal for retrofit applications to metalclad switchgear for cable box arc detection
Allows easy integration with existing overcurrent feeder protection
- rms.** 1S30 optical sensor for detection of arc flash at the speed of light
- rms.** Other associated overcurrent products
2C137 sensitive earth fault relay
2C63, 2C64, 2C80 circuit breaker fail relays

leading the way in overcurrent protection solutions

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