Electrical Distributors

Isoloc 315 RM
Operating procedure

Approval page

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Background

The Isoloc 315 RM is used in the single-phase configuration. This is ideal to protect the supply voltage in Hospital applications to a Theatre, Hi-Care, ICU or Recovery area and in Industrial applications, the control voltage supply in Substations or various Control Voltage Transformers.

The Isoloc 315 RM is designed to avoid an automatic trip-out of the monitored area on the occurrence of the first earth fault on the electrical system. Instead, a reliable warning is given at an adjustable threshold of insulation failure. The area is, however, able to continue to operate (No downtime) until a shutdown of the process can be planned, and the earth fault rectified. The system also ensures that the earth fault current is kept to a minimum.

Should, however a second earth fault occur at the same time on another phase, the automatic trip-out (earth fault relay or over current) of one or more faulty circuits is inevitable.

The Isoloc 315 RM is to be used with a single-phase isolation transformer, the 230/230 Volt secondary winding is provided with a centre tap connection (2 x 115V).

The Isoloc 315 RM insulation monitor is connected to the centre tap of single phase secondary isolation transformer winding) and the system earth point.
The insulation resistance between all the conductors and apparatus connected to the isolated supply and system earth forms one arm of a Wheatstone bridge arrangement, the bridge being incorporated in the Isoloc 315 RM unit.

Current limiting inductance is incorporated in this arm of the bridge. The protective inductance ('L' – Fig 1, Page 5) limits the earth fault current to between 1 and 4 mA (depending on value of inductance chosen (Alarm Setting) and system voltage). Thus affording a large measure of protection to persons using electrical apparatus and to the apparatus itself in the event of a short circuit to earth on one phase (Hospital 1 mA (SANS 10142), Industries 4 mA). The measuring bridge supplied from an internal stabilised D.C. source, thus providing constant voltage to the measuring circuit irrespective of supply voltage fluctuations.

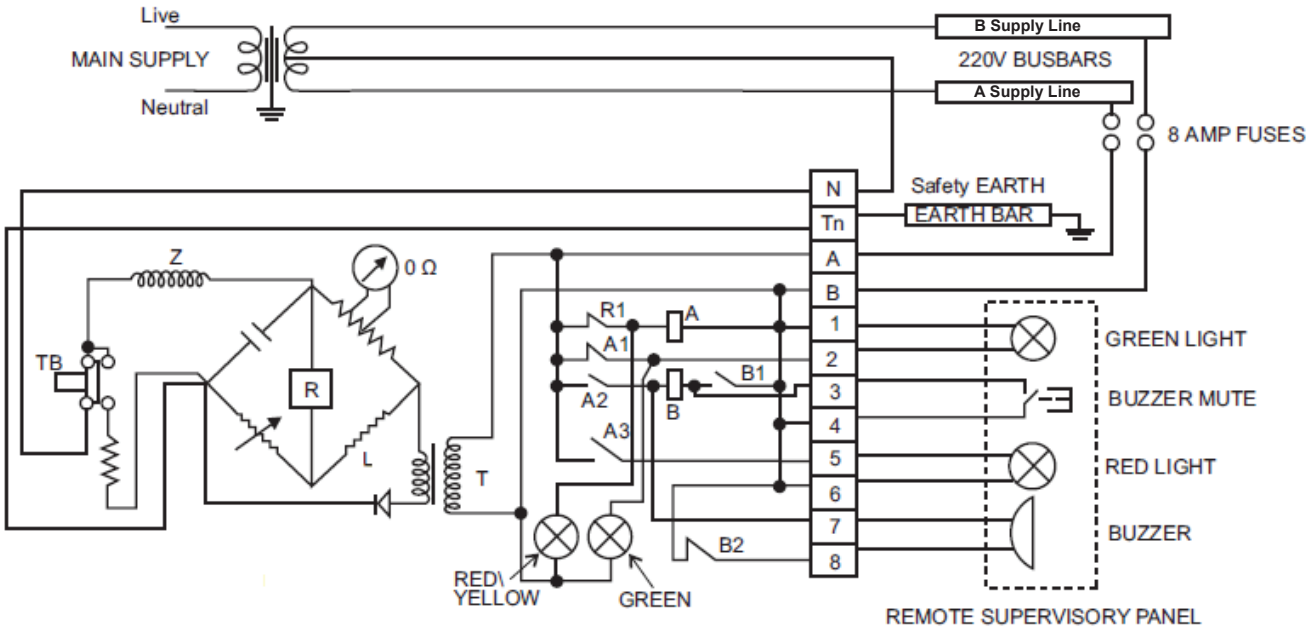

Fig 1 – Isoloc 315 RM Wiring Diagram

A calibrated variable resistor connected in another arm of the bridge provides a means of adjusting the threshold level of operation of the alarm.
A relay 'R' connection across the centre point of the bridge detects the point of balance and includes a temperature compensated transistorised trigger circuit which gives positive and precise operation even in the presence of vibrations.

This circuit is arranged so that relay 'R' is normally energised in the no fault condition and thus provides a "fail to safety" characteristic. During normal operation without any earth fault, the bridge is out of balance.

In the case of an earth fault on any part of the monitored electrical system (Theatre, Ward, welding area etc) where the insulation resistance is reduced to a value equal to or less than pre-set value, the calibration threshold level control relay 'R' drops out to initiate the alarm system. In addition, a graduated ohmmeter provides a continuous indication of the state of the insulation resistance to earth.

Special protective devices in the interest of overall safety and reliability are incorporated as standard, for example; earth faults on DC side of a rectifier energised from any isolate supply are detected and the DC current limited.

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Isoloc Monitor

The Isoloc Monitor comprises of the following:

- Alarm Set Threshold dial
- Isolation Resistance Ω meter
- Alarm Light indicator, System Healthy indicator
- Test Button

Alarm Set Threshold Dial

This dial is set during the initial installation and commissioning of the hospital area to be monitored. This setting should not be readjusted after the initial calibration. The threshold adjust should be set to the required level specified by the hospital, which is normally 4,5kΩ to 5kΩ. For industrial use, Engineer specification or 1kΩ.

Setting the Alarm threshold to 5 kΩ will trigger quicker alarms than setting it to 1kΩ. When the alarm threshold level is reached, the Alarm will sound.

If the monitored area has been expanded or altered in any way, all equipment must be retested including the old area. This setting sets the level of nuisance tripping to be ignored such as the plugging in of old type TV's and radio equipment in hospitals, or welding and motor start-ups in industrial applications.

Isolation Resistance Ω Meter

This is the insulation level indicator. On the occurrence of an earth fault and depending on the resistance (level) of the earth fault, this insulation indicator meter needle will move from infinity (left) to zero (right). The needle in ideal condition should be on the infinity side (no earth faults). When an area is in use, small earth currents might occur due to insulation breakthrough. This will be indicated by the needle moving from infinity to a high resistance indication. This indicates equipment that need to be attended to.

Monitoring the insulation level over a period of time, one will soon learn the behavior of the monitored area while in full operation. The level indicator should not move but as equipment starts and stops, the needle may move slightly. If there are big needle movements, identify which equipment is responsible for this. This equipment should be inspected or replaced by a serviceable one. During this behavior, note that the Isoloc is limiting the fault current.

Power & Alarm Light Indicator

The Green light is the Power On light indicating the Isoloc has power.
The Amber alarm light will light up the moment the Alarm set threshold is reached or exceeded. This Alarm light is a silent indicator. The Isoloc will also toggle different relay outputs that can be wired to remote supervisory panels. For example: A Siren, Flashing light, Control room or maintenance room indication. There is also a silence input to silence the Alarm/Buzzer output when activated. The Alarm will go silent but the Amber alarm light will remain on during the ongoing fault.
If the Alarm light comes on, an Earth fault exists and the Isoloc is limiting the current to the minimum current. This earth fault needs to be cleared as soon as possible.
The Isolation resistance meter will show an indication lower than infinity. The higher the earth fault is, the closer the meter needle will indicate to 0. (Thus indicating the level of earth fault.)

The Earth Fault

For Hospitals: The earth fault current will be limited by the ISOLOC to 1mA (Newer RM models) and to 4mA (Older M models). RM models comply to SANS 10142 regulations.

For Industrial: The earth fault current will be limited by the ISOLOC to 4mA (Depending on applied voltage).

An Insolation Resistance meter indicating zero is a dead short to earth on one of the supply lines (A&B). This needs immediate attention. An inspection should be done to identify the most recently used equipment. This equipment will most probably be the cause of the earth fault.

Test Button

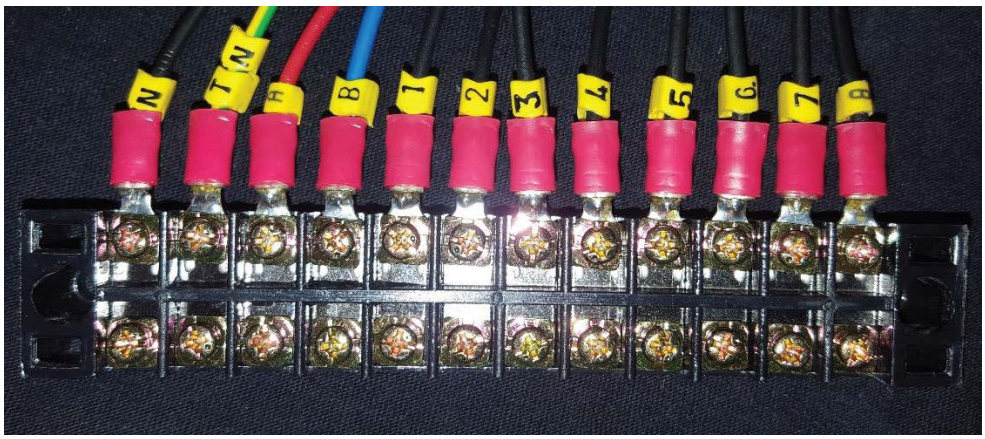
The Test button tests the operational functions of the relay. The test function does not affect the constant operation of the ISOLOC.
To test the Isoloc;

Press the test button and keep it pressed down during the whole test sequence.
Observe that the needle of the Isolation resistance meter moves up from the left to the right hand side. As it moves closer to zero, the alarm light will come on once the threshold set point is reached/passed. The threshold can be adjusted while the button is pressed.
During testing and normal operation, the alarm will sound and the responsible person will need to press the silence button to silence the Alarm.

Isoloc in Single Phase protection scheme (Industrial)

The Isoloc, in Single Phase modular configuration (industrial) or 315 insulation monitor and earth fault current limiter, when used in conjunction with an isolated supply provides the most advanced form of protection against electric shock due to earth leakage currents. Used on LV Control circuit supplies (Control Voltage of 110V or 220V) in substations.
The mode of operation is the same as the free standing and panel mounted industrial Isolocs – to give an alarm on the first earth fault detected. The Isoloc is connected to a single phase isolation transformer with a center tap winding (Centre tap single phase transformer with output of 2 x 110V=220V or 2 x 63.5V=110V) The output should be able to supply the total load required for all control supplies to be protected.

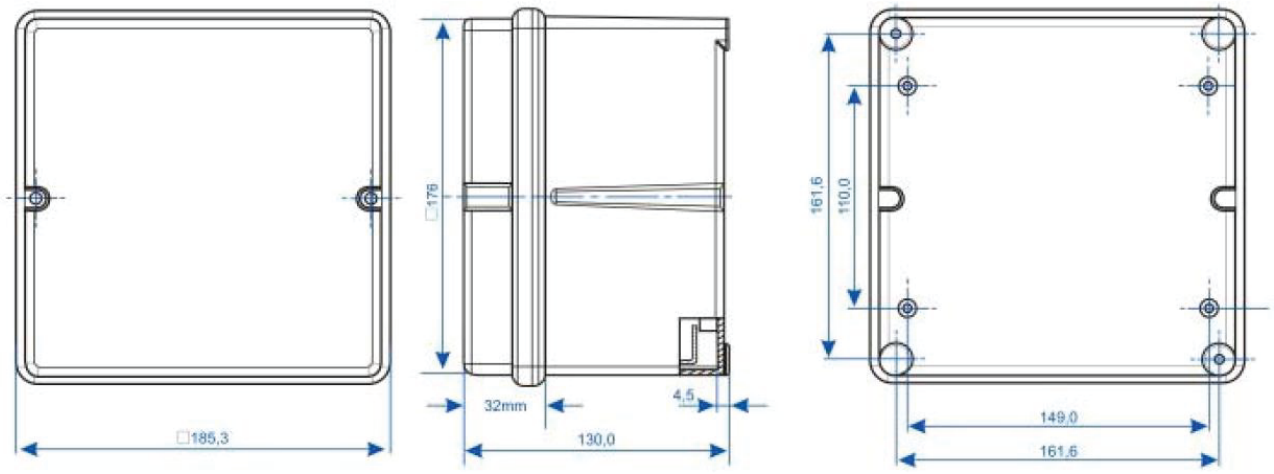
Terminal and Output relays (315 RM)



As per Fig 1, a terminal is provided for connectivity for a remote supervisory panel (Terminals 1-8).

Troubleshooting

During a Test	Possible Cause	Action
The Alarm light does not come on but the needle moves	The Alarm light might be faulty, was in constant fault and blew	The Light needs to be replaced or PCB faulty
The Alarm light does not come on but the needle moves	The Alarm light is operational, The controller board is faulty	The Monitor needs to be repaired upgraded or replaced
The Alarm light comes on but the needle does not move	The insulation resistance meter may be faulty	The Monitor needs to be repaired or upgraded
A chattering sound can be heard	The controller board is faulty	The Monitor needs to be repaired, upgraded or replaced
No Indication on Light or Insulation meter	The controller board is faulty	The Monitor needs to be repaired or replaced
The Isoloc is in permanent fault	There is an earth fault on the system	Clear the fault
The Isoloc is in permanent fault	If there is no fault, the controller board is faulty	The Monitor needs to be repaired or replaced



Technical Support

For any technical support on the Isoloc:

Contact Strike Technologies at	012 - 804 – 9550	during	normal working hours
Or contact André Jordaan on	082 – 432 - 6692	or	012 -804 -4907
Or contact Bruce King on	084 – 576 - 9904	or	012 -804 -4921

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