ELC Earth Leakage Relay

MDA.2102. QMD 91 6986XU

1. Description

The Ampcontrol ELC Earth Leakage Relay is electronic in design and is based on microprocessor technology. The Relay uses a toroid to measure earth fault current. A definite time operating characteristic is provided with adjustable trip sensitivity and time delay. When a fault occurs and the trip level and time delay is exceeded the relay's trip function is activated and operates the trip contacts, connected in the system control circuit.

A ten-segment LED bar graph indicates the % of leakage level being detected. This reading can be remotely displayed using the Ampcontrol ELCM Monitoring Module. LED indication assists in troubleshooting.

Power is supplied from a separate transformer, which has the capability of supplying a maximum of five relays.

2. Features

- Plug compatible with ELB earth leakage relay (See Note 5, Over-page).
- Microprocessor based for high stability and accuracy.
- Adjustable trip level and time delay settings.
- Fail safe or non-fail safe on loss of supply.
- Bar graph to monitor leakage level.
- Maximum leakage since last trip stored in memory.
- AC or DC Supply operation.
- Functions normally for a period of two seconds during extreme power dip or power loss.
- Mines Department Approved

3. Application

To ensure maximum protection the earth leakage system should be used in conjunction with the other protection systems covered by AS2081. The collective systems are designed to limit touch and step potentials

The ELC Earth Leakage Protection Relay is Mines Department Approved for use in mining operations. The relay is also suitable for industry where equipment or system earth leakage protection is required. The relay is not suitable for personal protection, i.e. users of portable drills, grinders etc, which require trip levels of 20-30 mA, with instantaneous operation. (Refer AS3190).

The ELC Relay is designed and approved to AS2081.3-1988 for use on fault-limited systems. Relays used on unlimited systems require a protection module connected across the terminals of the toroid. A fuse protects the relay from damage on unlimited faults. A blown fuse or open circuited toroid will trip the relay and provide LED indication of the trip (See Part Number List for replacement fuse part number).

3.1 Methods of Earth Leakage Protection

There are two methods of protection used. They are the Core Balance and Series Neutral earth leakage protection systems.

Core Balance:

With this method the three phases are passed symmetrically through the toroid. If there is no earth fault, the vector sum of the currents in a three phase supply is zero. If current from any phase flows to earth the system becomes unbalanced. The toroid produces an output, which trips the relay.

Series Neutral

With this method the neutral connection of the supply transformer is passed through the toroid. An earth fault on any of the phase conductors causes an earth current which returns, through the toroid, to the star point of the transformer.

A test current is injected through the window of the toroid to test the operation of the relay. See typical circuit (Over-page). To reset the relay an external normally open contact is required. The reset button is also used to access the memory of the processor to view the maximum level of leakage since the last trip. A section of the bar graph will slow flash (2Hz) indicating the peak level while, the reset button is held closed and will continue to flash for 1 second after the reset button is released.

3.2 Toroids

A range of standard high performance toroids is available. Window sizes range from 60 mm to 112 mm. Toroids provide maximum trip levels of 500 mA, 750 mA and 1 A for system voltages up to 4 kV and trip levels of 1.45 A and 2.5 A for systems greater than 4 kV. Contact Ampcontrol for a range of split toroids and the availability of non-standard toroids where there is not a requirement to comply with AS2081.3.1988

3.2.1 To Prevent Nuisance Tripping

1. Ensure cables are symmetrically placed through the toroid.
2. Do not install the toroid adjacent or close to transformers or cables carrying high currents. Rectangular bus bars should not pass through the toroid on balanced systems.
3. Shield leads from the toroid to the relay. **Earth at the relay end only.**
4. Where high currents are experienced even during starting, use high performance toroids.

3.3 Mode of Operation

The relay can be operated in fail-safe or non-fail safe modes of operation.

Fail Safe Mode:

This mode is the preferred method, where the relay drops out on fault or loss of power. Power to the relay is from the line side of the isolating device or from an independent supply. To select this mode bridge the base terminals 17 to 20.

Non-Fail Safe Mode:

In this mode of operation the relay picks up on fault. This method should only be used when the supply to the relay is only available from the load side of the isolating device. To select this mode the bridge between terminals 17 to 20 is not required.

NOTE	**This mode of operation should only be used when there is not a requirement to comply with AS2081.3.1988.**

4. Specifications

Relay Supply Volts:

AC 24-40 V RMS, DC 30-58 V, 3VA

Trip Sensitivity:

90 mA to 495 mA in 45 mA increments

Time Delay:

50 ms to 500 ms in 50 ms increments

Relay Contacts:

Three changeover contacts - Rated at 3 A 250 V, 100 VA maximum

Remote Monitoring:

Pulse Width Modulated Output, terminals 18 and 19

Enclosure:

The relay is housed in a 20 pin plastic enclosure. Bases to suit can be either front or back connected. Back-connected bases have 2BA terminal screws. Front connected bases have tunnel terminals.

LED Indication:

Toroid fault or blown fuse
Fail safe mode
Non fail-safe mode
Relay tripped
ELC healthy
Dead Man Timer Fail - Indicates relay fault.

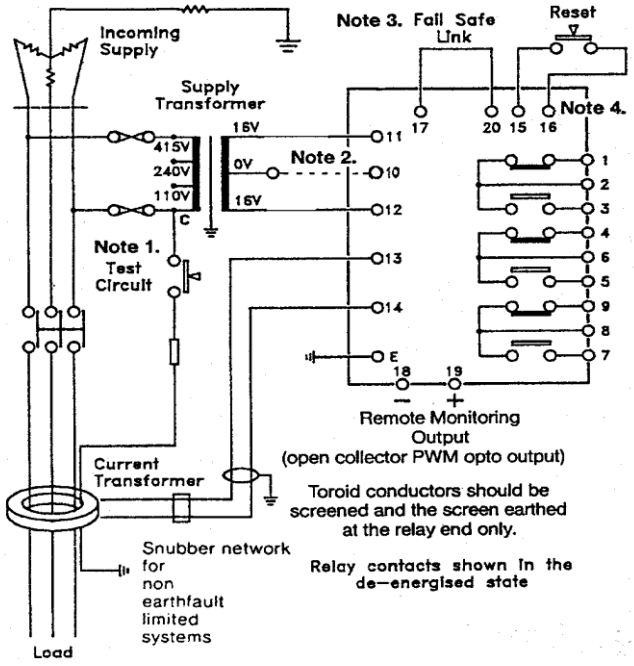
Dimensions:

ELC Relay with back connected base:	120 H x 110 W x 130 D mm
ELC Relay with front connected base:	190 H x 110 W x 130 D mm
20618 Transformer:	75 H x 75 W x 65 D mm

5 Equipment List

101565	ELC Earth Leakage Relay
101181	FCK Front Connected Base
101678	Back Connected Base
101659	Type 20618 Transformer. Primary 415-240-110 volts Secondary 16-0-16 volts, 30 VA
101739	Protection Shunt for ELC
116437	Protection Shunt for ELB
106883	ELCM Remote Monitoring Module
101767	100 ohm 50 Watt Resistor
101584	200 ohm 50 Watt Resistor
116146	400 ohm 50 Watt Resistor
101707	M205 x 20 mm 1 A Slow Blow Fuse

Typical Wiring Diagram (Fail Safe Mode):



Notes:

1. Test resistor ratings for 500 mA Trip:
   110 V supply - 100 ohm 50 Watt
   240 V supply - 200 ohm 50 Watt
   415 V supply - 400 ohm 50 watt
2. This connection will exist on bases wired for ELB relays. It is not required for the ELC model. (Except where the ELC may be replaced by an ELB)
3. Remove for non-fail safe operation.
4. It is recommended a twisted pair be used for wiring between reset button and terminals 15 & 16.
5. Direct replacement with ELB is not possible where 415 V control voltage is used.

AMPCONTROL ELECTRONICS
Ampcontrol CSM Pty Ltd ABN 35 000 770 141
7 Billbrooke Close CAMERON PARK NSW 2285
Phone: (02) 4903 4800
Fax: (02) 4903 4888
E-mail: electronicsorders@ampcontrolgroup.com
Web site: www.ampcontrolgroup.com