

EL3 Earth Leakage Relay

1. Description

The Ampcontrol EL3 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, operating 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 (5) relays.

2. Features

- Plug compatible with ELB earth leakage relay (See Note 5, page 2).
- 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 (2) seconds during extreme power dip or power loss.

3. Application

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

The EL3 Earth Leakage Protection Relay has not been tested to AS2081.3.1988 for use in mining. The relay is suitable for industry and other applications 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 20-30mA, with instantaneous operation. (Refer AS3190).

The EL3 Relay is designed 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 Equipment 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 page 2. 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 60mm to 112mm. Toroids provide maximum trip levels of 500mA, 750mA and 1A for system voltages up to 4kV and trip levels of 1.45A and 2.5A for systems greater than 4kV. Contact Ampcontrol for the range of split toroids and the availability of non-standard toroids.

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.
5. Ensure DC resistance from relay through the toroid is less than 5 ohms.

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 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.

4. Specifications

Relay Supply Volts:

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

Trip Sensitivity:

90mA to 495mA in 45mA increments

Time Delay:

300ms to 3000ms (max) in ten steps

Relay Contacts:

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

EL3 healthy

Dead Man Timer Fail - Indicates relay fault.

Dimensions:

EL3 Relay with back connected base:

120 H x 110 W x 130 D mm

EL3 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

E00952 Back Connected Base

E00876 Type 20618 Transformer.

Primary 415-240-110 volts

Secondary 16-0-16 volts, 30VA

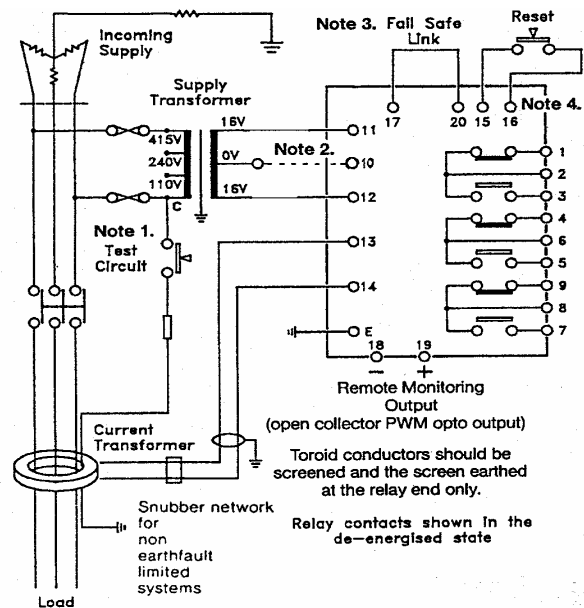
E01390 Protection Shunt for ELC

E04844 EL3 Earth Leakage Relay

E03607 ELCM Remote Monitoring Module

E08578 M205 x 20mm 1A Slow Blow Fuse

Typical Wiring Diagram (Fail Safe Mode)



Notes:

1. Test resistor ratings for 500mA Trip:
110V supply - 100 ohm 50 Watt
240V supply - 200 ohm 50 Watt
415V supply - 400 ohm 50 watt
2. This connection will exist on bases wired for ELB relays. It is not required for the EL3 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.