

ECM Earth Continuity Relay

(Formerly ECB)

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Description

The ECM Earth Continuity Relay has been designed to monitor the earth continuity of trailing and reeling cables supplying power to mobile machines on an earth fault limited system where there is not a requirement to comply with AS2081.2.

The method used is called pilot earth loop or earth continuity monitoring, where an additional core (the pilot core) is included with the power and earth cores in the trailing or reeling cables which supply power to the machines. The ECM Relay monitors the positive half wave of a low voltage applied between the pilot and earth of the cable and by measuring the height of the positive half wave cycle it determines the resistance of the earth pilot loop.

The maximum allowable loop resistance can be set from 15 to 45 ohms by the setting of the DIP switches which are accessible by removing the front cover.

The ECM Earth Continuity Relay performs the following functions:

- Ensures that there is an earth return path from the machine back to the substation and/or distribution box.
- Provides an interlock circuit to ensure that if the pilot-earth continuity circuit is broken or short-circuited then the machine is isolated or cannot be energised.
- Ensures that by the time the pilot pin makes contact, when a plug is inserted into a receptacle, the phase pins are adequately engaged.

The relay is housed in a DIN rail mount enclosure with four LED indicators.

The ECM Relay can be supplied from 19-70VAC 50/60Hz, 19-90 VDC or 70-140V AC 50/60Hz, 90-190VDC supplies. (Specify voltage when placing an order).

Features:

- Electronic design
- DIN rail or foot mount
- Selectable trip level
- AC or DC Supply operation
- LED indication to aid fault finding

Application:

The ECM Relay is normally installed in a substation or a distribution box to provide earth continuity protection.

The relay can also as be used for remote operation of the main contactor, located in the substation or distribution box, by connecting an on/off switch in the pilot circuit.



Earth Continuity Protection.

The ECM Relay continually monitors the earth continuity of a mining trailing cable. To protect against a short circuit of the pilot conductor to earth a diode is connected in the machine at the furthestmost point of the pilot earth connection (see Typical Circuit, Over Page). This ensures detection of a pilot to earth fault. Alternatively a Pilot Termination Unit (PTB) can be used. The PTB Unit contains a diode with a gas discharge tube to prevent damage to the diode due to switching spikes.

Provided the loop resistance is less than the selected loop resistance and the resistance between pilot and earth is greater than 600 ohms the relay energises. When this occurs; the normally open and changeover contacts change state.

The relay de-energises when the loop resistance of the pilot and earth exceeds the preset loop resistance or the resistance between the conductors is less than 500 ohms.

The time delays on pick up and drop out prevent nuisance tripping due to electrical noise or dirty slip rings on cable reeling applications.

LED Indication

POWER: The LED is illuminated when power is applied to the relay.

RELAY IN: When the loop resistance is less than the selected loop resistance the LED on the front of the module will be illuminated. This indicates a healthy pilot/earth circuit

OPEN CCT: The LED is illuminated to indicate a trip condition, due to the pilot/earth loop resistance exceeding the upper limit of the selected loop resistance.

SHORT CCT: The LED is illuminated to indicate a trip condition, due to leakage of less than 500 ohms between pilot and earth.

A faulty terminating diode could also cause the OPEN CCT or SHORT CCT conditions.

Specifications

Supply Volts:

19-70VAC 50/60Hz, 19-90VDC
 70-140VAC 50/60Hz, 90-190VDC
 Power consumption 4 VA approximately



Supply input terminals are not polarity conscious for DC supply.

Earth Continuity Protection:

Selectable at 15, 25, 35 and 45 ohms – Hysteresis 3 ohms
 Shunt Leakage Trip if < 500 ohms – Hysteresis 100 ohms

DIP Switch Settings:

Loop Ω	ON	OFF
15 ohms	5, 6	1, 2, 3, 4
25 ohms	3, 4	1, 2, 5, 6
35 ohms	1, 2	3, 4, 5, 6
45 ohms	Nil	1, 2, 3, 4, 5

Time Delay:

On detection of a healthy circuit: 800 ms
 Drop out due to an open circuit: 400 ms
 Drop out due to a short circuit: 400 ms

Relay Contacts:

1 N/O and 1 C/O Contact. Rated at 5A 240 VAC, 5A 30 VDC

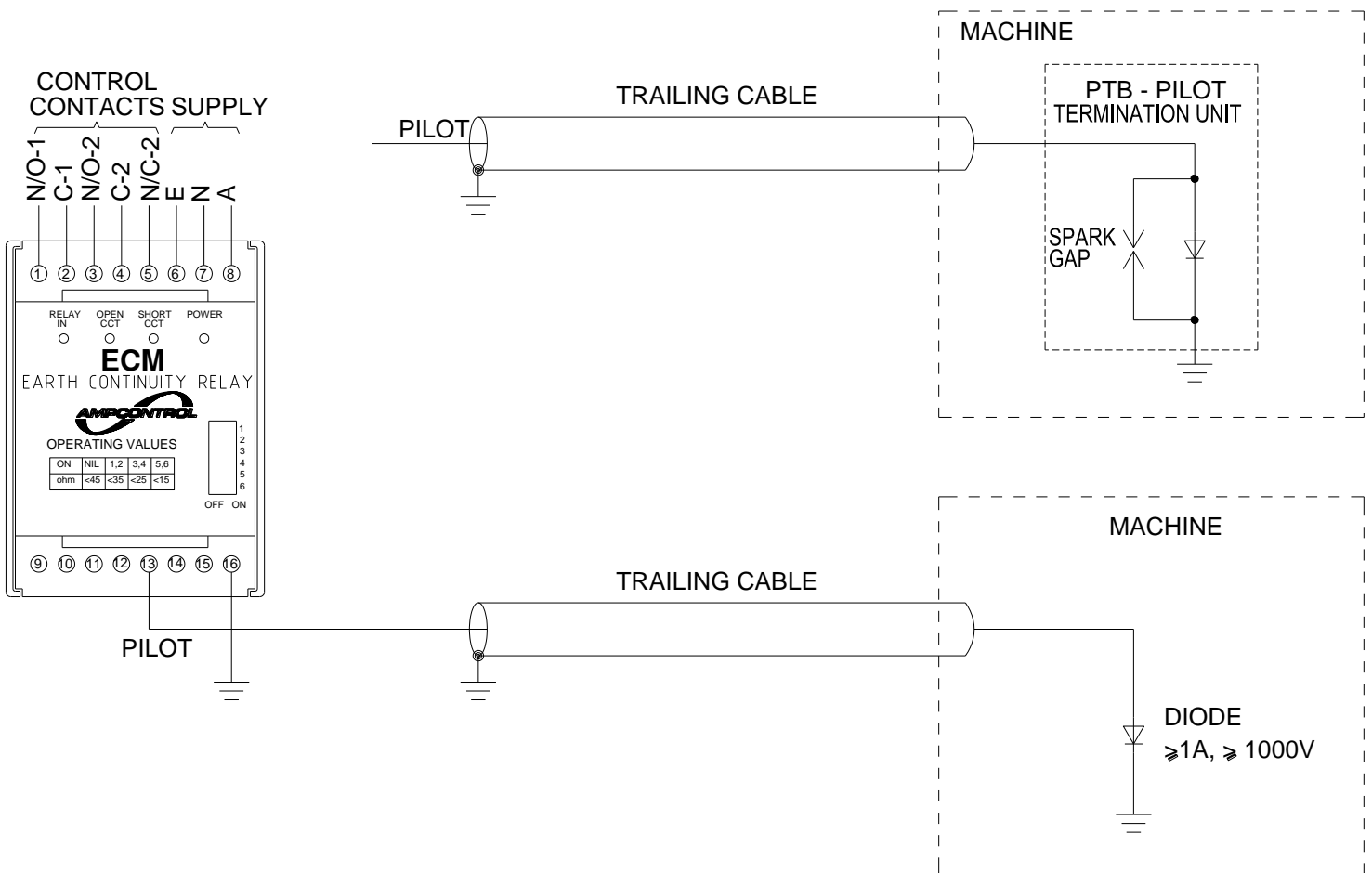
Dimensions:

ECB-R (75 H x 55 W x 110 D) mm
 PTB (75 H x 22.5 W x 100D) mm

Equipment List

101914 ECM Earth Continuity Relay 19-70 VAC, 19-90 VDC
 106230 ECM Earth Continuity Relay 70-140 VAC, 90-190VDC
 115119 PTB Pilot Termination Unit

Typical Circuit - For use on Earth Fault Limited Systems with Symmetrical Cables



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