TECHNICAL

DATA SHEET

OMA V3

EARTH FAULT LOCKOUT/LOSS OF VACUUM PROTECTION RELAY

[Ex ib] ia I IECEx ITA 08.0003X

Description

The OMA Earth Fault Lockout/Loss of Vacuum Relay has been designed and tested to AS/NZS 2081.4:2002 to monitor a power outlet of a power distribution centre and/or Distribution Control Box (DCB). The OMA Relay has an Ex ia un-powered component approval and an Ex [ib] system approval.

In a typical installation, a power outlet in the DCB supplies power through a trailing and/or reeling cable to mining machines. When the outlet is de-energised (contactor open), the relay performs two functions:

1. *Earth Fault Lockout (EFLO) Protection*: Continuously monitors the connected cable for a fault between each phase and earth.
2. *Loss of Vacuum (LOV) Protection*: Monitors the outlet for a loss of vacuum condition of the main contactor.

In order for the OMA to perform these protection functions, it must be connected to the three phases of the outlet through an Ampcontrol Cable Connection Module Type A (CCMA). The CCMA is a resistive isolation device that interfaces the power conductors to the OMA Relay. The CCMA is available in 1100V, 415V and 110V models, it is important that the correct CCMA model is used for the installation. The power conductors must **not** be connected directly to the OMA Relay.

Features

- Earth Fault Lockout Outlet Protection
- Loss of Vacuum / Frozen Contactor Protection
- DIN Rail or panel mount polycarbonate enclosure
- LED indication for status
- Functions normally for a period of two (2) seconds during extreme power dip or power loss.
- Certified as Intrinsic Safe
- Tested to AS/NZS 2081.4:2002
- Designed for 110V, 415V and 1100V system voltages (CCMA model dependent)

Earth Fault Lockout (EFLO) Protection

The EFLO protection function of the OMA relay prevents the outlet contactor from being closed onto an earth fault. Whilst the outlet is de-energised (contactor open), the OMA will continuously test the resistance of the outlet's three phase conductors to earth by applying an intrinsically safe signal. If the insulation resistance value falls below the allowable threshold (see specifications) the OMA will initiate an EFLO trip.

When an EFLO trip occurs, the OMA will de-energise the EFLO output relay (fail to safety), thereby inhibiting an outlet start sequence. In addition to this, the EFLO Trip indication relay will energise and the "EFLO Relay In" LED (LED 2) will turn off. The EFLO Trip relay is for indication purposes only. The EFLO relay & EFLO trip relay get energised in opposite logic to each other. That is, in healthy state EFLO relay is energised & EFLO Trip relay remains de-energised, and only gets energised while there is EFLO trip.

When the fault has been rectified the relay can be reset by momentarily connecting the two terminals labelled 'EFLO RESET'. An external pushbutton on the DCB control panel would normally be used.

The OMA relay will energise with the EFLO protection in a tripped state. After 5 seconds the trip can be reset if no EFLO fault exists.

EFLO Test Circuit

The OMA's EFLO protection can be tested by simulating an earth fault when the outlet is de-energised. An earth fault can be simulated by momentarily connecting resistors between the OMA's CCMA inputs and earth (see typical connection diagram).

The values of the three resistors are dependent upon the system voltage. Ampcontrol offers a range of Earth Fault Test Modules (EFTM) for installation (see specifications for part numbers). Alternatively, the resistors can be installed individually. Refer to the below table for resistor values:

System Voltage	Earth Fault Test Resistor Value	Power Requirements	Quantity Required
1100V	68kΩ	1W	3
415V	27kΩ	1W	3
110V	6.8kΩ	1W	3

Loss of Vacuum / Frozen Contactor Protection

The second protection function of the OMA relay is the Loss of Vacuum / Frozen Contactor protection function. This function continually measures the voltage between each phase and earth. When a request is made for the contactor to open, the OMA will wait a period of 5-25 seconds (depending upon the time setting) before applying the tripping parameters. This adjustable time delay is to allow the 'Back EMF' voltages generated by some motors to disperse. At the end of this time delay, if the voltage between any phase and earth exceeds 5-9% of the nominal system voltage (see specifications), the OMA will initiate a LOV trip by de-energising the LOV output contacts (fail to safety).

The OMA relay monitors the desired state of the outlet's main contactor via the 'AUX CONT' voltage free input contact that is intended to be wired into an auxiliary contact of the main contactor's interposing relay (see wiring diagram). Closing the 'AUX CONT' input inhibits the trip function.

When power is applied to the OMA Relay the loss of vacuum relay energises provided there is no latched trip stored.

If a LOV trip occurs, it is electronically latched using a long life 3V lithium battery. The battery life of the internal battery exceeds the recommended service period of 4 years. Operating the pushbutton located on the facia of the relay will reset this LOV trip. The reset can be performed with the relay powered up or down.

When a LOV trip condition occurs; the "LOV Trip" LED (LED 4) will flash at a rate of approximately one pulse per second. If the supply power to the relay is removed when a trip has occurred, the LED will continue flashing. The intensity of the light pulse will dim when the battery is near its discharged state.

If the OMA battery becomes fully discharged, the LOV relay will not automatically energise when the relay is powered up.

Conditions of Safe Use, Repair & Maintenance

It is a condition of safe use that the OMA Earth Fault Lockout/Loss of Vacuum Relay be installed in a non-hazardous area or within a suitably certified Group I Flameproof enclosure with an IP rating not less than IP53. If the apparatus is exposed to a hazardous area all external power has to be removed.

This relay is not to be dismantled, assembled or repaired in a hazardous area, nor is the battery to be removed/installed. Consult the IECEx Certificate of conformity IECEx ITA 08.0003X for full details of condition of safe use, this can be downloaded from the IECEx website www.iecex.com

The battery is not user replaceable. Return the OMA Relay to Ampcontrol for battery replacement with approved type.

Any transformer used to power the apparatus shall comply with the appropriate requirements of AS/NZS 3108.

Fail to Safety

To comply with AS/NZS2081.1: 2002, the voltage free output contacts are to be wired in such a manner that if the supply to the OMA Relay is lost, the installation causes the power to be removed from the outlet.

For improved safety connect at least two earth wires to the OMA Relay (adjacent to the CCMA terminals). They should be run separately and not looped at the relay terminals.

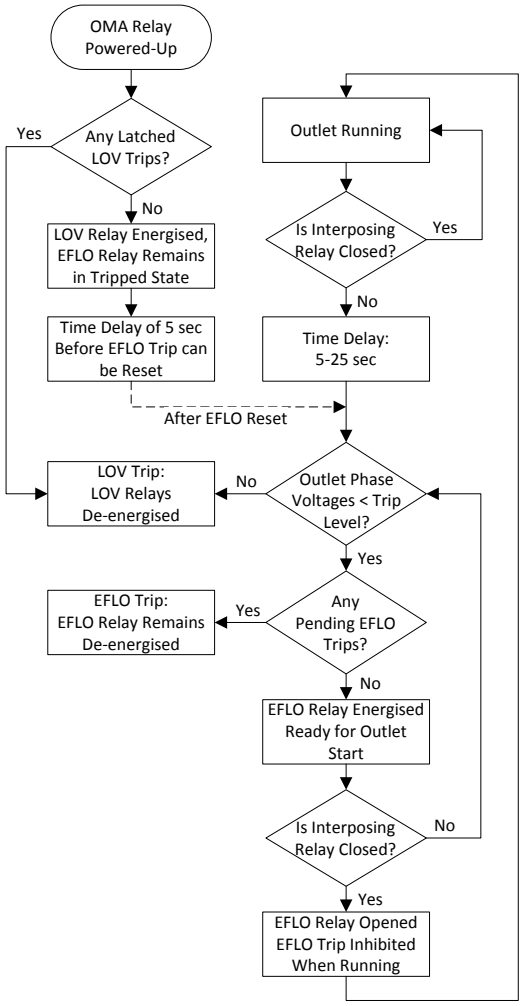
Operating Logic

The operating logic of the OMA relay is explained in this flow chart.

When the OMA relay is energised, it checks that there is not a latched LOV trip. If there are none, then the LOV relays are energised. The OMA is energised with the EFLO relay in the tripped state; this trip can be reset 5 seconds after energisation.

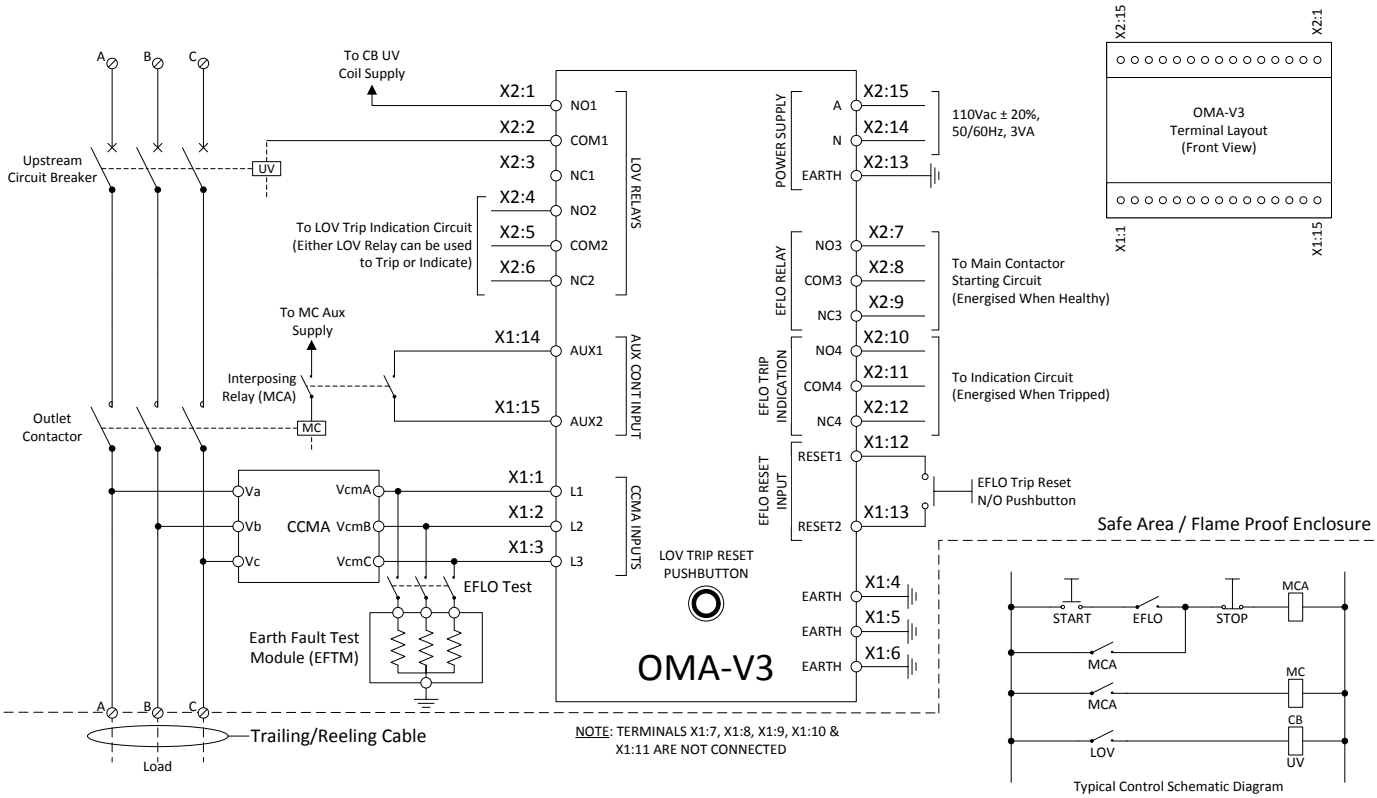
The OMA relay will then continually monitor the de-energised outlet for EFLO and LOV trips. When the interposing relay input into the OMA relay is closed, the OMA will open the EFLO relay. EFLO and LOV trips are inhibited while the outlet is running.

When the interposing relay opens, the OMA relay will delay for 5-25 seconds (depending on the user setting) for any 'Back EMF' voltages to disperse. When this delay has expired, the OMA will compare the measured outlet voltage to the LOV tripping threshold. If the outlet voltage exceeds this threshold, a LOV trip will be initiated. If the OMA does not trip on LOV, and there is no pending earth fault lockout condition, the EFLO relay will energise.



Typical Connection Diagram

Note: It is recommended that the wiring of the reset pushbutton, interposing relay contact and the CCMA cable groups be twisted or shielded to avoid induced disturbance. In addition to this, these cables must not be run in parallel with high power cables.



SPECIFICATIONS

Supply	
Voltage	110Vac ± 20%, 50/60Hz
Power Consumption	3VA
User Settings	
Delay Timer	Determines the length of the time that the OMA will wait for 'Back EMF' voltages to disperse before comparing the measured outlet voltage to the LOV tripping threshold. The time delay is adjusted using the potentiometer beneath the facia of the relay. The time can be adjusted between 5-25 seconds.
DIP Switches	In order for the OMA to operate correctly, the system voltage must be set using the DIP switches located beneath the facia of the relay. NOTE: The CCMA used with the must match the system voltage selected on the OMA.

System Voltage	SW1	SW2	SW3	SW4
1100V	OFF	OFF	OFF	OFF
415V & 240V	ON	OFF	OFF	OFF
110V	ON	ON	OFF	OFF

Inputs & Pushbuttons	
LOV Reset Pushbutton	Resets Loss of Vacuum trips. Located on the fascia of the OMA.
CCMA Inputs	The L1, L2 & L3 inputs of the OMA relay are for the connection of the CCMA cable connection module. Ensure the CCMA model is the correct voltage type.
EFLO Reset Inputs	The EFLO Reset inputs are intended to be wired to an externally mounted N/O pushbutton. Close this input to reset EFLO trips.
Contactor Auxiliary	An auxiliary contact of the outlet contactor's interposing relay is to be wired into this input of the OMA. The OMA relay uses this input to determine what state the outlet's contactor should be in.
Relay Output Contacts	
Contacts	1 x CO for Earth Fault Lockout Protection (energised when healthy) 1 x CO for Earth Fault Lockout Trip Indication (energised when tripped) 2 x CO for Loss of Vacuum Protection (energised when healthy)
Ratings	Resistive Load: 132Vac / 30Vdc, 5A max. Inductive Load: 500VA / 90W (COS Φ = 0.4, L/R = 7ms)
LED Outputs	
Power LED	Solid Green: Relay supply power is healthy
EFLO Relay In	Solid Green: Earth Fault Lockout relay is energised (healthy)
LOV Relay In	Solid Green: Loss of Vacuum relay is energised (healthy)
LOV Trip	Flashing Red: Loss of Vacuum trip (latching)

Trip and Reset Parameters				
System Voltage	EFLO Trip Threshold	EFLO Reset Threshold	LOV Trip Threshold	LOV Reset Threshold
1100V	< 12.1kΩ	> 30k ohm	38V	< 28V
415V	< 4.6kΩ	> 12k ohm	16V	< 12V
110V	< 1.21kΩ	> 4.3k ohm	5.8V	< 4.4V

Mechanical & Environment		
Dimensions	OMA	100W x 75H x 110D mm
	1000V CCMA	80W x 190H x 80D mm
	415V & 110V CCMA	90W x 140H x 70D mm
Mounting Arrangement	OMA	DIN Rail Mounted
	1000V CCMA	4x Ø8mm Holes with 80mm x 170mm Centres
	415V & 110V CCMA	4x Ø8mm Holes with 70mm x 120mm Centres
IP Rating	IP20	
Operating Temperature	0 to 40°C	
Ordering Part Numbers		
110097	OMA V3 Earth Fault/Loss of Vacuum Relay	
171735	CCMA Cable Connecting Module 1000V	
171734	CCMA Cable Connecting Module 415V	
171733	CCMA Cable Connecting Module 110V	
121167	Earth Fault Test Module (EFTM) 110V	
121168	Earth Fault Test Module (EFTM) 415V	
121169	Earth Fault Test Module (EFTM) 1100V	
Service & Disposal		
Service	Return to Ampcontrol every 4 years for overhaul.	
Disposal	To ensure that the unit is disposed correctly, return to Ampcontrol at end of life.	
Find Out More		
For more information on this product, contact Ampcontrol Customer Service on +61 1300 267 373 or *customerservice@ampcontrolgroup.com* or visit the Ampcontrol website: www.ampcontrolgroup.com		