

Product Management – Coal Mining Industry

Notification IN00016 Rev1 July 2023

VSDguard, ELV-PRO and ELV-PRO RV: Latching trip contacts in AC control circuits

OVERVIEW

It has been identified that - in a limited set of circumstances - an internal filter used on the trip contacts of Ampcontrol's VSDguard and ELV-PRO relays can allow a current to persist when the trip relay contacts open, causing latching of the interposing relay (i.e. failure to open).

ITEMS AFFECTED

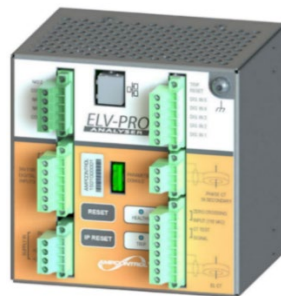
VSDguard – 162129

All serial numbers

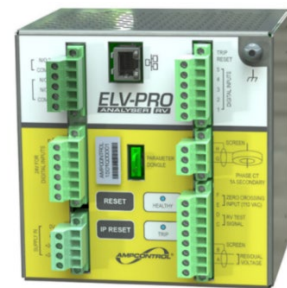


ELV-PRO – 176426

All serial numbers less than 2308000000



ELV-PRO RV – 199326



ISSUE

Refer to Figure 1.

When used with a 110 VAC control supply, the internal transient suppression filter (RC combination, $22\Omega + 100\text{nF}$) across the trip contact terminals can allow up to 4.5mA of current to be sustained after the trip contacts open. This current is sufficient for OEM interposing relays with low VA ratings to hold in.

The possibility of latching is dependent on the relay coil impedance and relay's magnetic circuit, and so no specific holding current can be nominated for all installations.

Note that when a DC control supply is used (e.g. 24 VDC) then no issue is encountered as the capacitor blocks DC current.

DISCLAIMER

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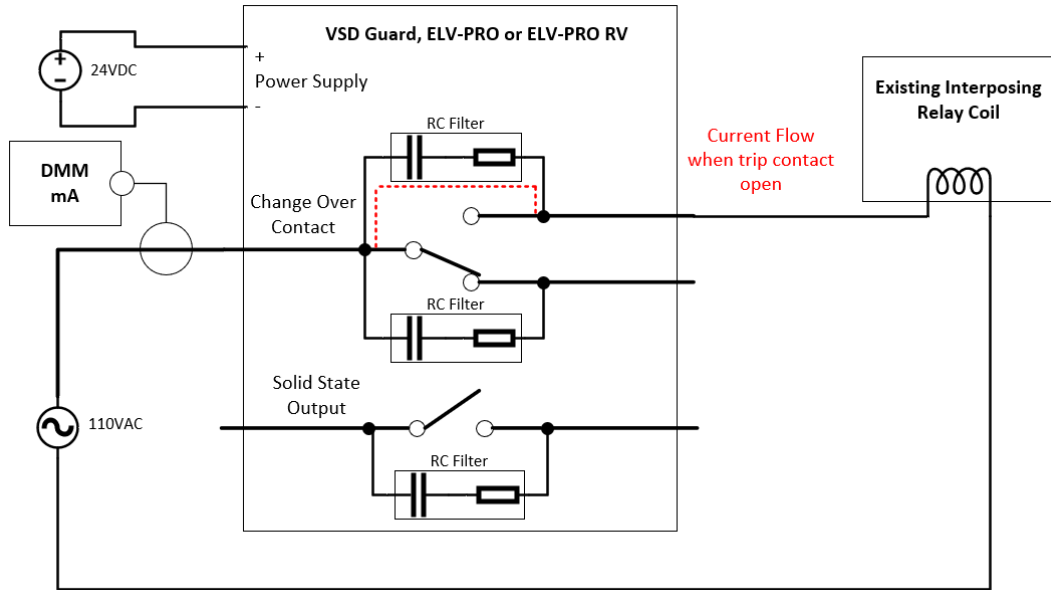


Figure 1: Open Contact Filter Current Path at 110 VAC.

TESTED APPLICATION

Several 110 VAC OEM relay coils have been bench tested to determine the occurrence of latching under the mechanism described. The test observations are given in Table 1.

Interposing Brand / Type	Coil Rating	Testing Outcome	Observation
Sprecher + Schuh CSS7	8 VA	Pass	No Latch Identified
Evolis UV Coil	4.5 VA	Pass	No Latch Identified
Finder 55 Series (55.34) (With / Without Suppressor)	1.5 VA	Pass	No Latch Identified
Finder 56 Series (56.32)	1.5 VA	Latched	Approx 1 in 5 instances
Omron LYN	0.9-1.1 VA	Latched	Approx 1/10 to 1/20 instances

Table 1: Sample relay coil test observations

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RECOMMENDED ACTIONS

It is recommended that all installations involving the affected products be reviewed to assess the possibility of the fault scenario described above occurring in practice.

1. The vulnerability of an individual installation can be assessed via the routine Earth Leakage (EL) test function. See Figure 2. Repeated operation of the EL test will verify that the relay contacts open as intended, or whether they have a vulnerability to stay closed. Multiple operations are recommended to give a statistical reliability.

Note that during testing, the physical opening of the interposing circuit should be verified: PLC indication feedback alone does not provide adequate test coverage.

For systems that integrate PLC feedback of both the relay trip status and contactor state, the failure to open can be detected by implementing comparison logic as an additional control.

2. If an installation uses one of the relays listed in Table 1 then guidance can be taken from the results shown there.

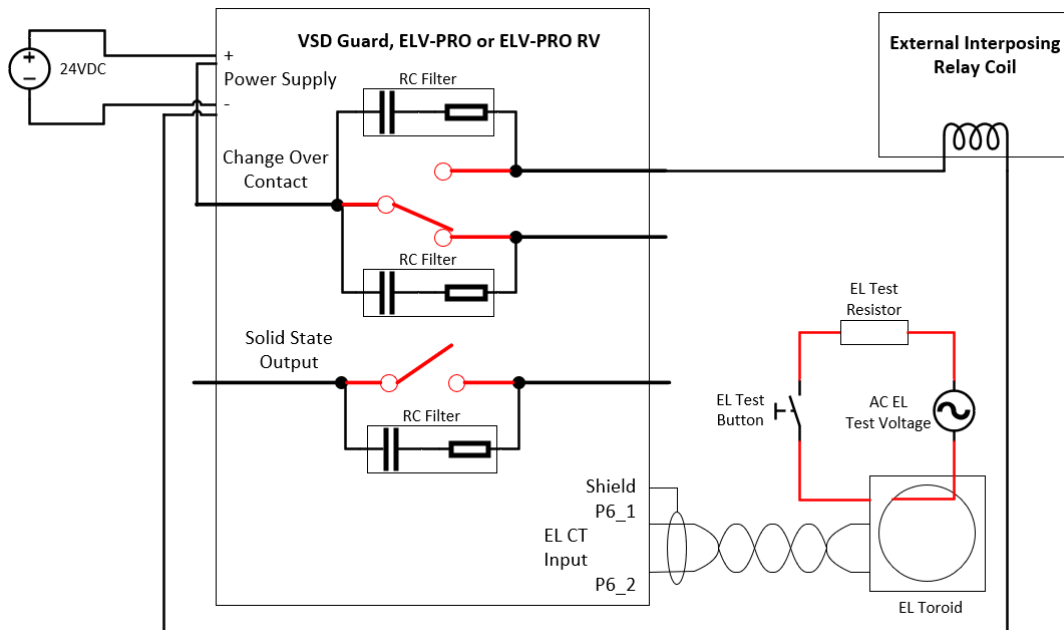


Figure 2: Use of the EL test function to assess vulnerability of the installation.

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SUGGESTED SOLUTIONS

There are several approaches that can be followed if rectification is needed:

1. Change out the low VA rated relay coil for a higher VA rated relay coil such as those listed in the first **two rows** of Table 1. See Figure 3.
2. Change out the 110 VAC control supply for a DC control supply such as 24 VDC. See Figure 4. The DC current will be blocked by the capacitor in the transient suppression filter regardless of which relay is used.
3. Introduce a new DC interposing relay so isolate the existing AC circuit from the relay contacts. See Figure 5. Note however that this approach will increase tripping times due to the sequential relay logic. The increased tripping time increases the touch potential hazard due to extended exposure times.
4. Return the affected Ampcontrol product to Ampcontrol for removal of the Transient Suppression filter components. Note that this will become a standard repair procedure into the future.

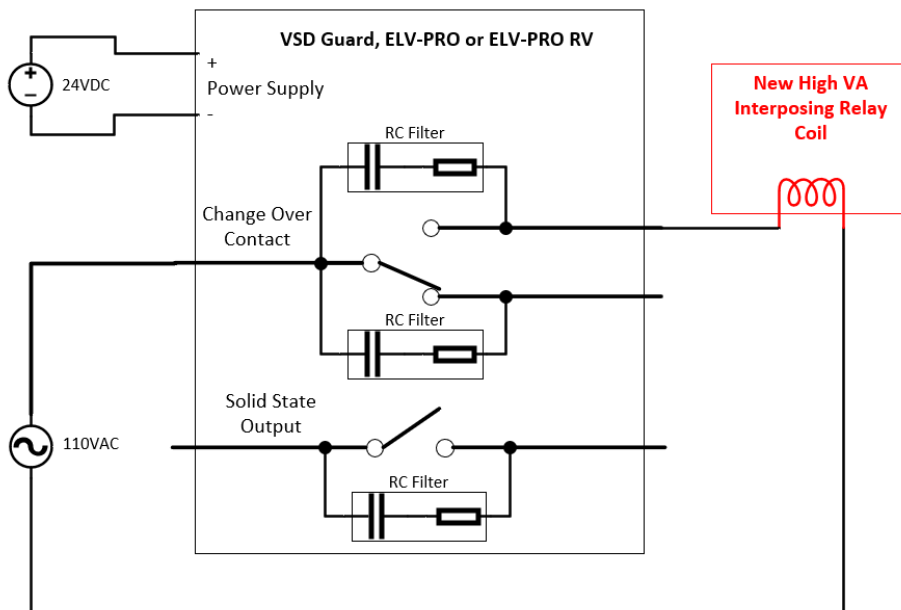


Figure 3: Use of higher VA rated relay coil circumvent vulnerability.

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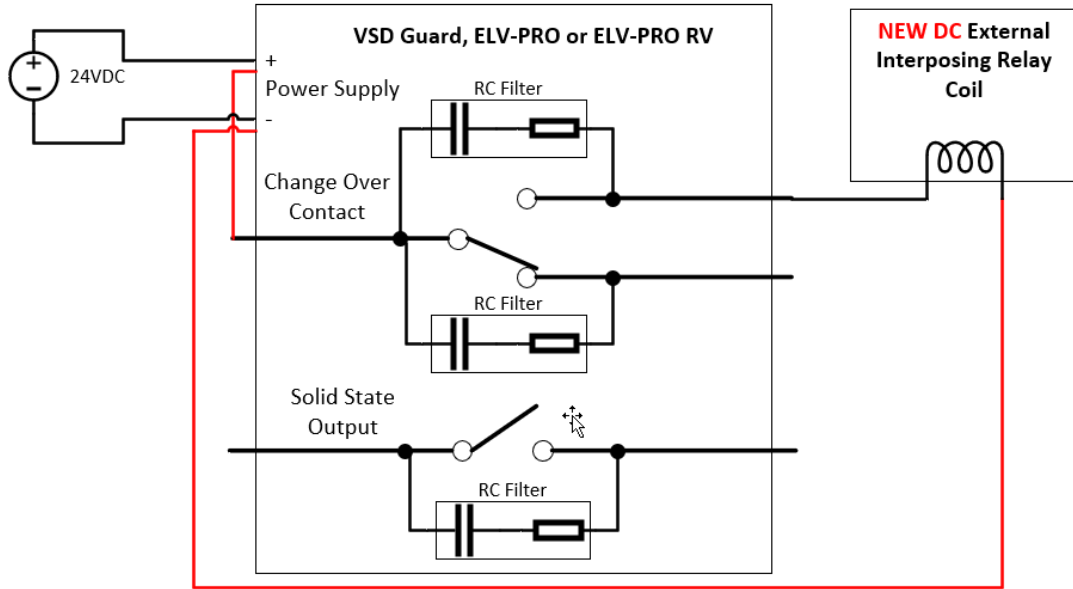


Figure 4: Use of DC control supply to circumvent vulnerability.

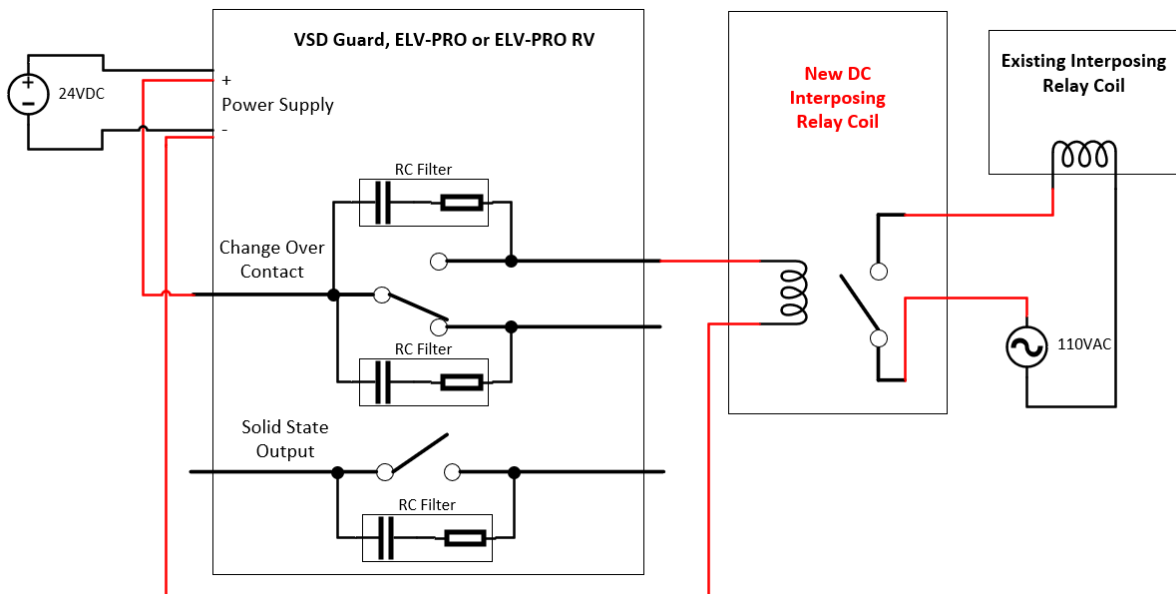


Figure 5: Use of new DC interposing relay to circumvent vulnerability. Note extended trip time.

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Industry Notification

Product Alert

IDENTIFICATION OF AFFECTED PRODUCTS

All relays with serial numbers less than 2308000000 (2023 August) will have transient suppression filters installed on the output contacts.

Any relay modified will have a HW label applied next to the trip contacts to identify this modification has been implemented.

All relays with serial number 2308000000 or higher will not contain the internal transient suppression filters. This allows customers the freedom to select and utilise an external snubber filter network appropriate for their application.

FIND OUT MORE

For more information on this Notification, contact Ampcontrol Customer Service on +61 1300 267 373 or customerservice@ampcontrolgroup.com

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