

Application note

What are transient events/signals, and how do we protect our test devices against them?

Applies to

Fluke Biomedical Electrical Safety Analyzers

Background

Under certain test conditions, transient signals will be present on relay contacts internal to the electrical safety analyzer. If the voltage present on these contacts is high enough, arcing can occur during relay switching events. Arcing across relays during switching leads to welded contacts, build-up of debris and early relay failure.

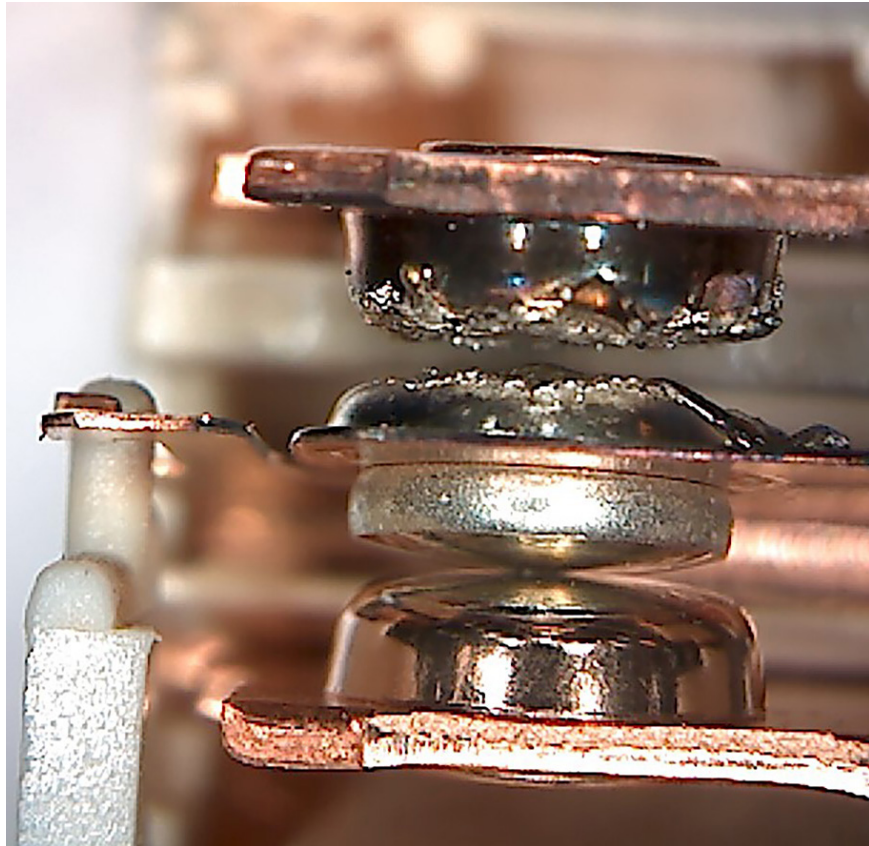
Transient voltages can damage relays when present during switching, delays between switching allow these voltages to dissipate and thus can help prevent arcing. The prevention of arcing across relay contacts extends the life of the relays and their surrounding circuits.

Solution

All Fluke Biomedical ESAs have a Polarity Switching Delay setting that allows these transient signals to dissipate before the relays switch position. Increasing the Polarity Switching Delay in test scenarios where transients are likely to occur can prevent accelerated wear and early failures.

Main Ideas

1. What are transient events/signals?
2. What test environments are likely to have transient potential?
3. What can transient signals do to relays?
4. How can relay damage due to transients be avoided/prevented?
5. How is the Polarity Switching Delay set on Fluke Biomedical ESAs (ESA620, ESA615, ESA614, ESA612, ESA609)?



Relay damage due to a transient event.

1. What are transient events/signals?

In the context of this document, a transient signal is one which has a sudden spike in amplitude. This can occur within a circuit in the form of a voltage or current based signal. These transient signals can be damaging to hardware due to the high amplitude which often exceeds component specifications.

2. What test environments are likely to have transient potential?

Transient signals occur with a sudden change in a circuit. These sudden changes include powering on/off a device, switching in/out circuits and changing the measurement type of a device. In the case of using an ESA, scenarios that often produce transient signals are turning on/off or switching the polarity of the equipment outlet. The impact of these signals may be increased when testing equipment with highly capacitive or inductive power supplies.

3. What can transient signals do to relays?

Having transient signals present during relay switching can cause arcing across relay contacts. This can corrode relay contacts and create debris buildup which leads to degraded performance. Arcing can also weld contacts together which prevents the relay from switching. Overall arcing can shorten the lifespan of relays and should be avoided to prevent early device failures.

4. How can relay damage due to transients be avoided/prevented?

The only way to prevent relay damage due to arcing by transient signals is to ensure they don't occur during relay switching. This can be done by introducing delays to allow the transient signal to dissipate and having a protective component in the circuit. All Fluke ESA's (except the ESA609) have components as well as a user configurable delay to protect the internal relays. The **Polarity Switching Delay** should be increased from the default value of 1 second on the ESA when being used in higher voltage regions or testing equipment with power sources that are highly capacitive or inductive. Examples of such devices are:

- Ultrasound
- Dialysis
- Portable X-ray machines

5. How is the Polarity Switching Delay set on Fluke Biomedical ESAs (ESA620, ESA615, ESA614, ESA612, ESA609)?

ESA 620	<ol style="list-style-type: none"> 1. Power on device 2. Press the SETUP button 3. Press "Instrument" (F1) 4. Press "Polarity Delay" (F3) 5. Use the up/down arrows to navigate to a desired polarity delay 6. Press "Polarity Delay" (F3)
ESA 615/614	<ol style="list-style-type: none"> 1. Power on device 2. Press the SETUP button 3. Use the down arrow button to get to the "Polarity Delay" field 4. Press ENTER 5. Use the up/down arrows to navigate to a desired polarity delay 6. Press ENTER
ESA 612	<ol style="list-style-type: none"> 1. Power on device 2. Press the SETUP button 3. Press "More" (F4) 4. Press "Instrument" (F2) 5. Press "Polarity Delay" (F3) 6. Use the up/down arrows to navigate to a desired polarity delay 7. Press "Polarity Delay" (F3)
ESA 609	The ESA609 does not have a means of changing the polarity delay.

Fluke Biomedical

We empower our everyday heroes to focus only on protecting lives.

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