Safety Interlock

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NI DC Power Supplies and SMU Help

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The *safety interlock* feature is designed to prevent users from coming in contact with hazardous voltage generated by the SMU in systems that implement protective barriers with controlled user access points. The safety interlock provides a means by which the outputs of the SMU device can be automatically placed in a safe state regardless of the programmed state of the device.

Caution Hazardous voltage of up to the maximum voltage of the device may appear at the output terminals if the safety interlock terminal is closed. Open the safety interlock terminal when the output connections are accessible. With the safety interlock terminal open the output voltage level/limit is limited to ±40 VDC, and protection will be triggered if the voltage measured between the device HI and LO terminals exceeds ±(42 V_{pk} ±0.4 V).

Caution Do not apply voltage to the safety interlock connector inputs. The safety interlock connector is designed to accept passive normally open contact closure connections only.

If the voltage level or limit is set to a value greater than ±40 VDC when the safety interlock terminal is open, NI-DCPower generates an error and the device output shuts down. The device will also shut down and generate an error if the measured voltage at the device terminals exceeds ±42 V_{pk} (typical) ±0.4 V while the safety interlock terminal is open. If there is a step in a sequence where the voltage level or limit is greater than ±40 VDC while the safety interlock is open, the driver will not output the requested voltage and will keep the last valid sequence point on the output. The measurement monitoring circuit has been designed so that it will trip at ±(42 V_{pk} ±0.4 V) when the safety interlock terminal is open. This allows normal operation up to ±40 VDC without allowing voltages >42.4 V_{pk} with the safety interlock open.

To operate above ±40 VDC, connect the safety interlock terminal to a limit switch of a test fixture or shielding box. The system should provide a contact closure between the safety interlock terminal and the GND terminal of the safety interlock connector. The contact closure should be open when the user's test fixture or shielding box allows user touch access to any conductors that carry hazardous voltage. Use of two normally open switches wired in series is recommended to prevent a single switch failure from compromising the safety interlock protection.

Note The user should be aware of any other sources ≥40 VDC or capacitance that could remain charged at hazardous voltages in the system and take the appropriate safety precautions. The safety interlock feature of this device does not provide operator protection from these sources of hazardous voltage in the system.

To clear a safety interlock error condition, first identify and fix the cause of the error and then use the niDCPower Reset (../../nidcpowerviref/nidcpower_reset/) VI or the `niDCPower_Reset` (../../nidcpowercref/cvinidcpower_reset/) function.

To determine programmatically whether the safety interlock is open or closed, use the Interlock Input Open (../../dcpowerpropref/pnidcpower_interlockinputopen/) property or the `NIDCPOWER_ATTR_INTERLOCK_INPUT_OPEN` (../../nidcpowercref/nidcpower_attr_interlock_input_open/) attribute.

The following table presents information about the safety interlock state as it relates to available output and Voltage status indicator behavior.

Safety Interlock State	Available Output	Voltage Status Indicator
Open	±40 VDC Setpoint ±42 V_{pk} (nominal) Measured output voltage	Green
Closed (Safety interlock terminals of the safety interlock connector are shorted to the GND terminal of the safety interlock connector)	Maximum voltage for the device	Amber
Open and device is programmed to output >40 VDC or output connected to external source >42 V_{pk}	Output relay opened, device disconnected	Red
Open or Closed, Output disconnect relays open	Output disconnected	Off

Support for Safety Interlock

The following NI-DCPower devices include a safety interlock:

- PXIe-4135