

Increasing the compliance voltage of the CS580

Rev A6, March 2023

The CS580 provides low-noise $\pm 100\text{fA}$ to $\pm 100\text{mA}$ current with up to $\pm 50\text{V}$ compliance voltage. In some applications the user may need higher voltage on the load. This note describes a method to extend the compliance to 150V or 250V for applications requiring up to $\pm 25\text{ mA}$ (the current limit for the DC205 on the 100V range).

This method presents dangerous voltages on the triax outputs. The DC205 SAFETY INTERLOCK should be used to ensure safe operation prior to energizing.

Figure 1 shows a setup to increase the compliance voltage up to 150V . A DC205 Precision DC Voltage Source is used as a base biasing voltage whose LO terminal is connected to the load. On top of the DC205, the CS580 Return terminal is connected to the DC205 output HI terminal. The triax cable center wire connects to the load.

Make sure the CS580 is configured to Float, shown outlined in red. Set the CS580 compliance to $V_{\text{comp}} = 50\text{V}$. The DC205 should be set to 2-wire and Ground.

With the outputs of both instruments on, current flows as shown by the green path. The voltage at the red alligator (triax center conductor) is determined by the current and load, which for a resistive load is

$$V_o = I_{\text{out}} \times R_{\text{Load}}$$

V_o should be in the range $101\text{V} \pm V_{\text{comp}}$. When V_o is outside this range, the Compliance limit red LED will light up indicating an output error. The black alligator (triax inner shield) is controlled by the SHIELD setting: "Return" connects this to the current source return (the black Return terminal), while "Guard" sets it to a low-impedance copy of V_o (the red Guard terminal).

The CS580 modulation input remains available, as this input is always chassis-ground referenced, and optically coupled to the (floating) current source.

To achieve negative compliance voltage, the DC205 should be set to a negative voltage.

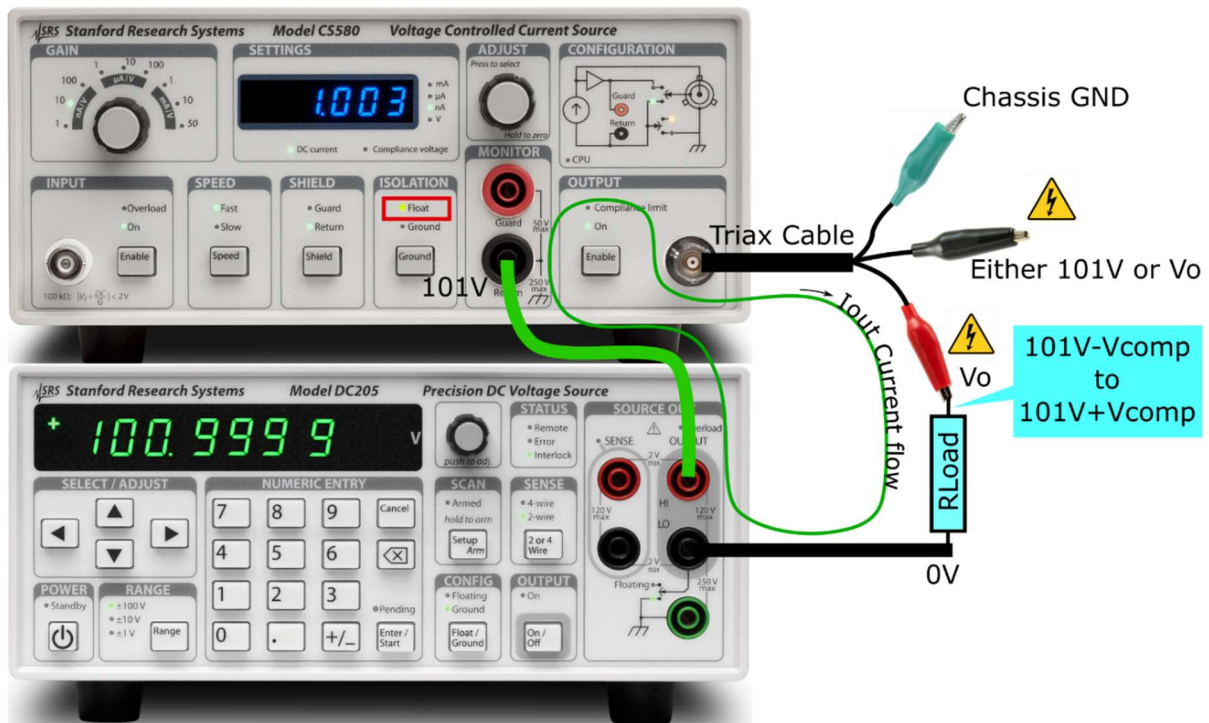


Fig.1 Use a DC205 to increase CS580 compliance voltage to 150V



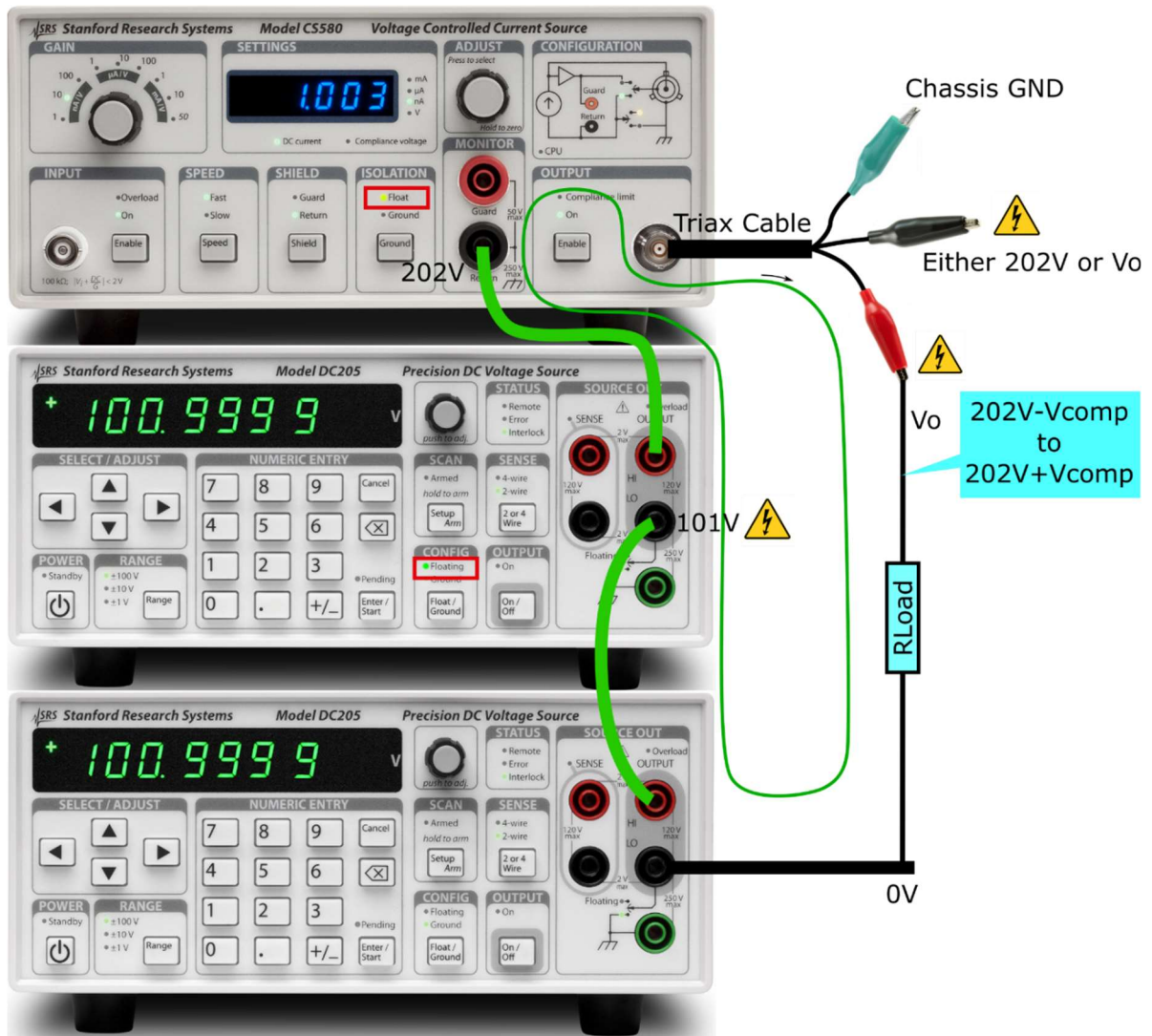


Fig. 2 Use two DC205 to increase CS580 compliance voltage to 250V

Fig.2 shows two DC205 precision voltage sources being used to extend the CS580 compliance voltage up to 250V. The CS580 and the upper DC205 must be configured as Float, as shown in red boxes; the lower DC205 should be

set to Ground. The DC205 voltage settings can be any voltage.

Do not concatenate more than two DC205 voltage sources because each instrument has a maximum floating voltage of $\pm 250V$.