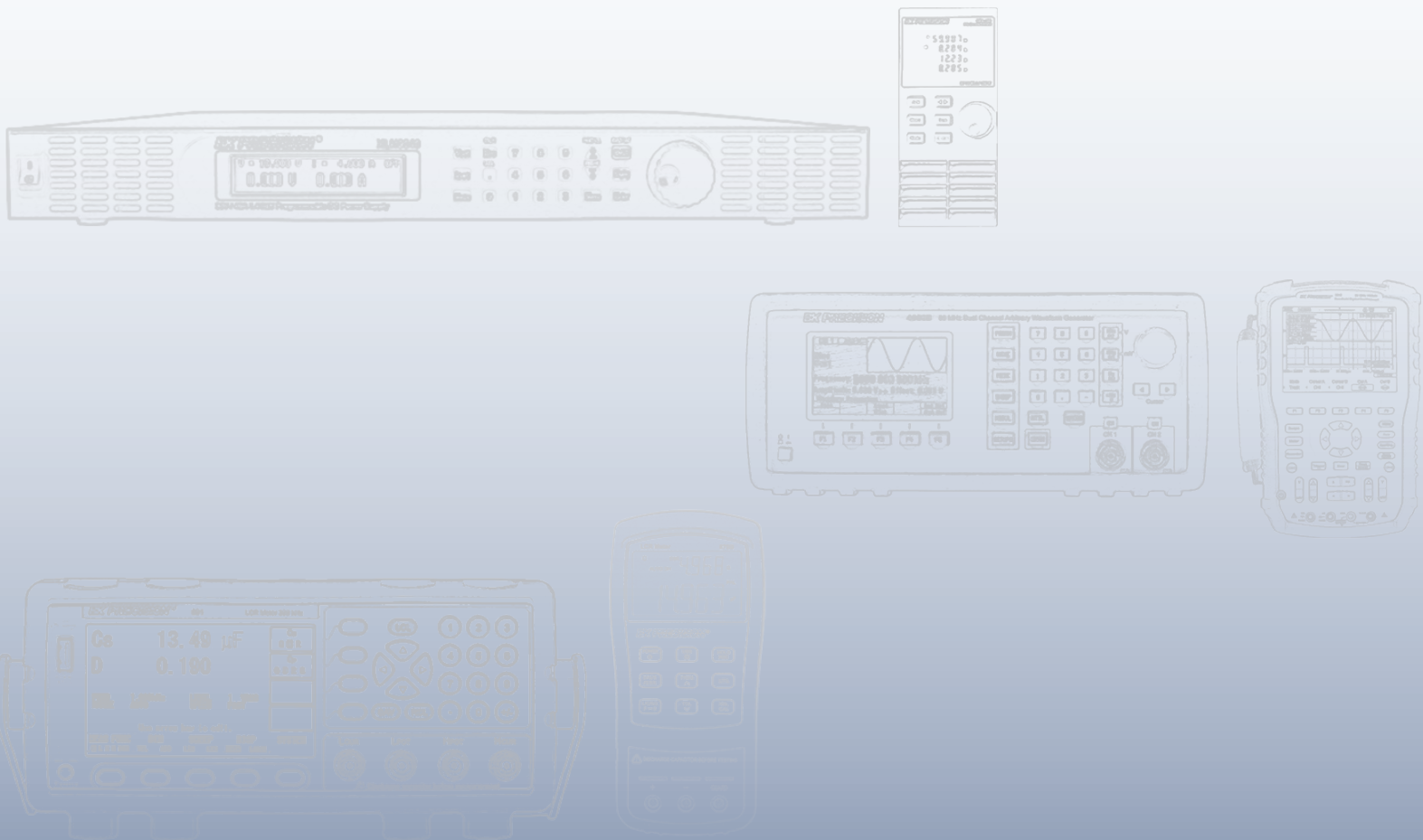


Application Brief

Two Useful DC Electronic Load Configurations



Background

This Application Brief describes two commonly used control methods that can be used with programmable DC electronic loads.

In the first example we will demonstrate how to control the current through the device under test (DUT).

In the second example, we will describe how to configure a DC electronic load to control the voltage drop across the device under test. Both examples are compatible with the loads monitoring and protection features.

These applications are also useful if our power supply is a DC battery.

Limitations

Before continuing ensure you will not exceed the maximum ratings of the DC load. The maximum voltage, current, and power ratings for the 8500B are shown on the front panel next to the model number.



Ohm's Law ($V=IR$) must always be balanced therefore the resistance of the total load will determine the maximum current allowed.

When placing the DC load in series with the power supply verify the correct polarity. The positive terminal of the power supply should be connected to the positive terminal of the DC load.

Example 1. Controlling Current Flowing through a DUT

If a power supply outputting 5 V is operating in CV mode, and we have a DUT resistance of 10 Ω the maximum current that can be drawn from that power supply is:

$$V=IR,$$

$$V=5 \text{ V}$$

$$R=10 \text{ } \Omega$$

$$I= 0.5 \text{ A}$$

Therefore, in this example, the max current allowed would be 0.5 A.

Set up Instructions

1. Place the DC load in series with the DUT as shown in Figure 1 below.
2. Power on the DC Load and set it to Constant Current (CC) mode.
3. The current display on the DC Load will show current in the loop. The current setting in the DC Load can be adjusted to any value, as long as it stays below 0.5 A.

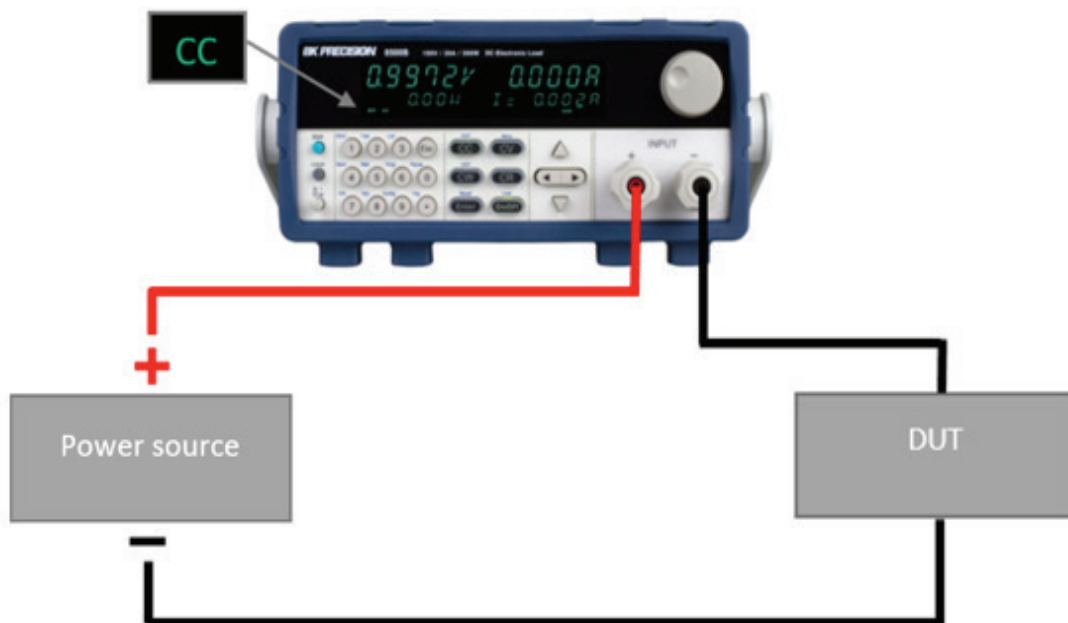


Figure 1: 8500B DC Electronic Load in CC mode

Example 2. Controlling Voltage Drop Across a DUT

If the same power supply is outputting 5 V and is operating in CC mode with a DUT resistance of 10 Ω . The max current in that loop would be 0.5 A as previously shown.

Set up Instructions

1. Place the DC load in series with the DUT as shown in Figure 2 below.
2. Power on the DC Load and set it to Constant Current (CV) mode.
3. Determine the required voltage across the DUT. For example, if our application required 2.3 V across the DUT, then the DC load should be set to 2.7 V. Any voltage below 5 V can be set in the DC Load, but this will restrict the amount of current according to Ohm's law $V=IR$.

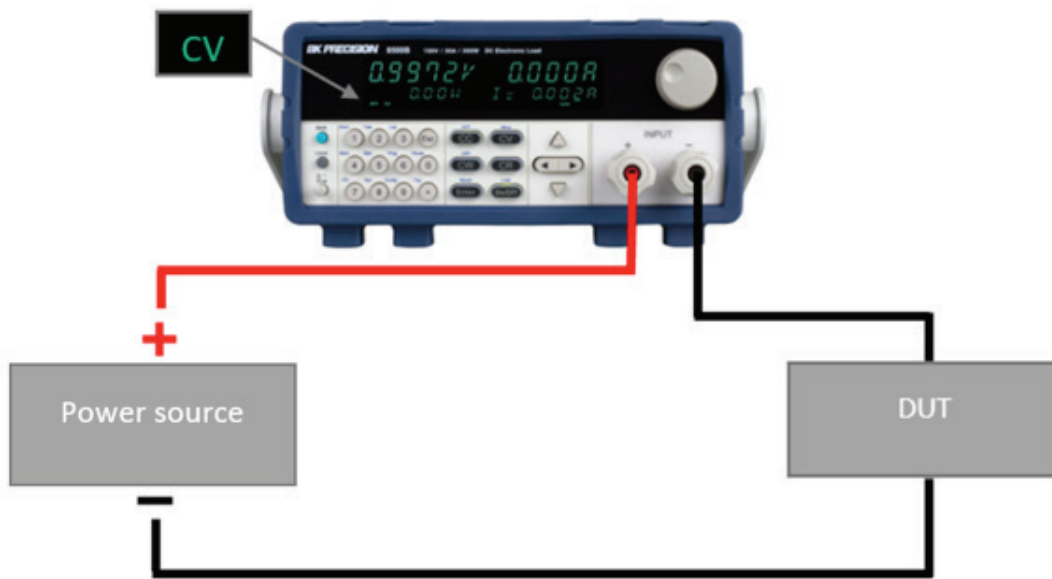


Figure 2: 8500B DC Electronic load in CV mode

Conclusions

In the first case, the current will be controlled by the DC Load in CC mode as long as it is a value below the current limit of the power supply. The voltage across the DUT will be determined by this current and the resistance of the DUT.

In the second case, the voltage across the DUT will be controlled by the DC load in CV mode. The current will be determined by the voltage across the DUT and the resistance of the DUT. In this case, the DC load is just controlling the Voltage.

A special case is when the DUT is changing resistance (i.e. a coil increasing resistance with temperature). If we keep the DC load in CV mode, and the DUT starts increasing its resistance, and you can expect to see the following three things:

- **Voltage will stay constant**
- **Resistance will increase**
- **Current will decrease to balance out $V=IR$. This is expected because the load is in CV mode which implies that only the voltage is kept constant.**