

# Using the DC Power Supply

This section will explain how to use the dual-output benchtop DC power supply. The supply has two variable outputs, channels one and two, as well as a third *fixed* 5 V output. The control panel of the power supply is shown in Figure 1, note that each output has its own set of controls.

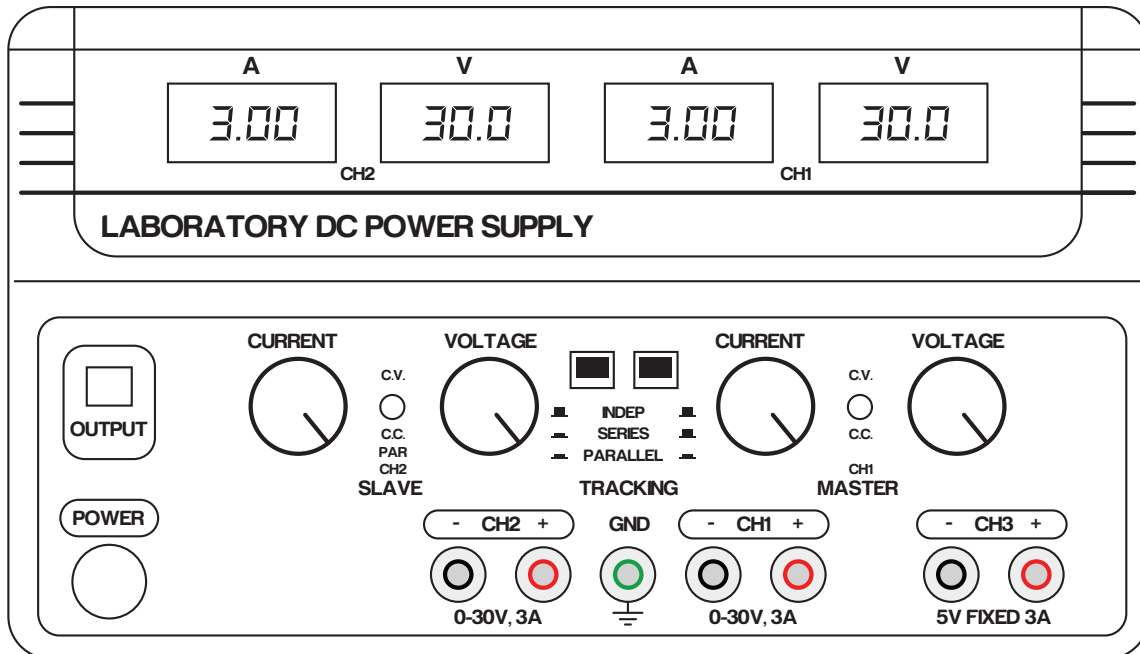


Figure 1: The control panel of the benchtop power supply.

To set the output voltage of one of the channels, turn the corresponding 'VOLTAGE' knob and watch the voltage readout (indicated in Figure 2) until it settles on the desired voltage. Along with this, you also need to set the maximum current by increasing the 'CURRENT' knob. If too much demand is placed on the power supply, and you attempt to draw more current than what is set by the current limit knob, the supply enters *constant current mode*, and the CC indicator LED will come on.

The current limit feature is useful if you need to prevent a load from being supplied with too much current, however this will not be a concern in the labs, so set the limit as high you need it to be.

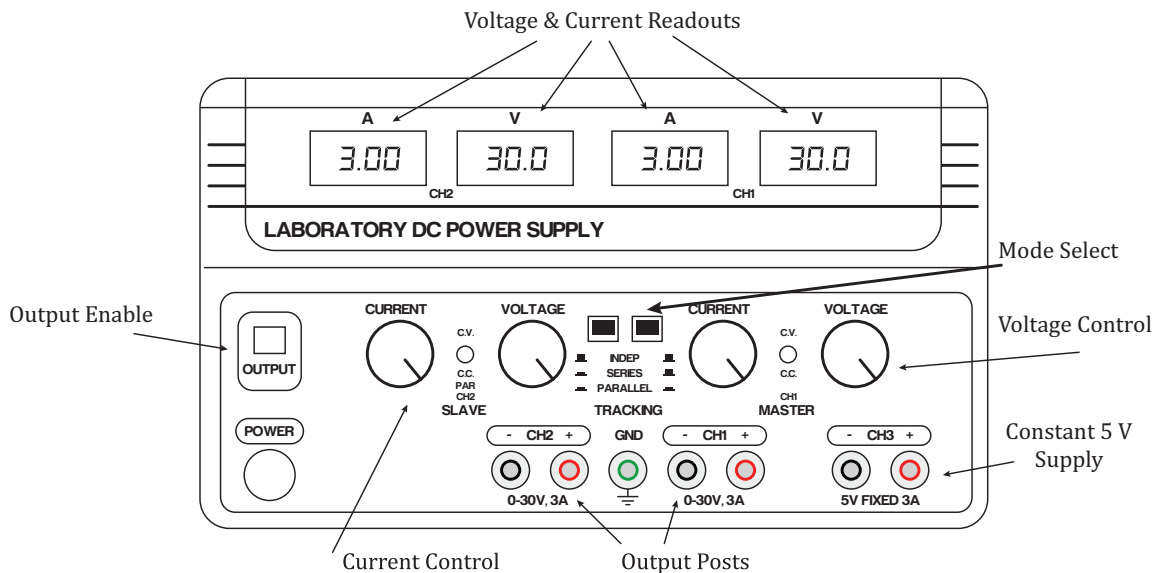


Figure 2: The control panel of the power supply with the important controls labelled.

The power supply can be operated in three different modes, and each mode changes the way both channels behave. You can change the mode by using the two mode select switches indicated in figure 2.

### Independent Mode

In independent mode, the two supply channels are operated completely independently.

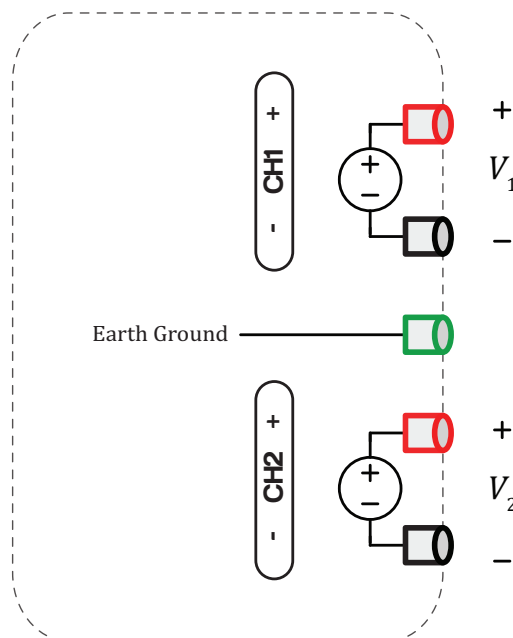


Figure 3: Simplified diagram of the power supply acting in independent mode.

Figure 3 shows how the supply voltages are taken at the output posts.  $V_1$  and  $V_2$  can be set from 0 to 30 V independently. Adjusting the current knob for either channel sets the current limit for that channel alone.

Also shown in Figure 3 is the green GND earth connection, which is physically isolated from the positive and negative output posts. This ground is connected to the metal case of the power supply, and to the building earth. The circuits you build should not require the use of this terminal.

### Series Mode

When in series mode, the positive (red) terminal of channel two is connected to the negative (black) terminal of channel one, shown in Figure 4. In this mode, the voltage setting for channel two (the slave) will mimic the setting for channel one (the master). This means that the voltage  $V_1$  appears on both channels, creating a *virtual ground* in the middle. The voltage at the positive terminal of channel one will be at  $V_1$  V, whilst the voltage at the negative terminal of channel two is  $-V_1$  V.

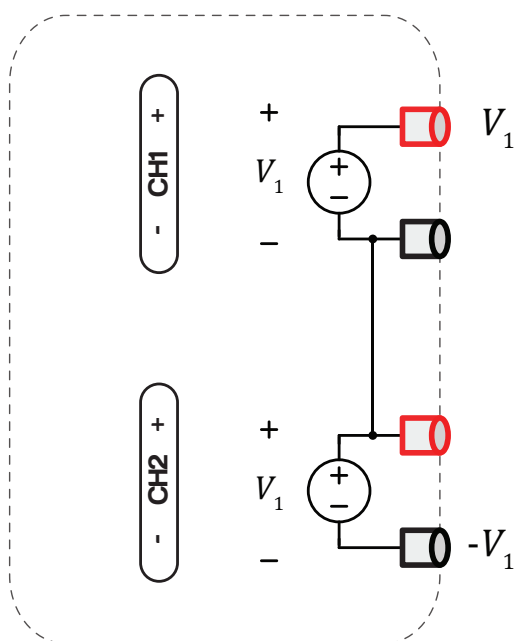


Figure 4: Simplified diagram of the power supply whilst acting in series mode. Earth GND has been omitted.

Series mode is useful when you need to power an op-amp with both positive and negative supplies, and also provide the circuit with a ground (0 V). The overall output current will be limited by the **lowest** set current knob.

### Parallel Mode

While in parallel mode, both positive terminals, and both negative terminals, are connected together. This allows you to supply twice the maximum current to your circuit, for a total of 6 amps of current.

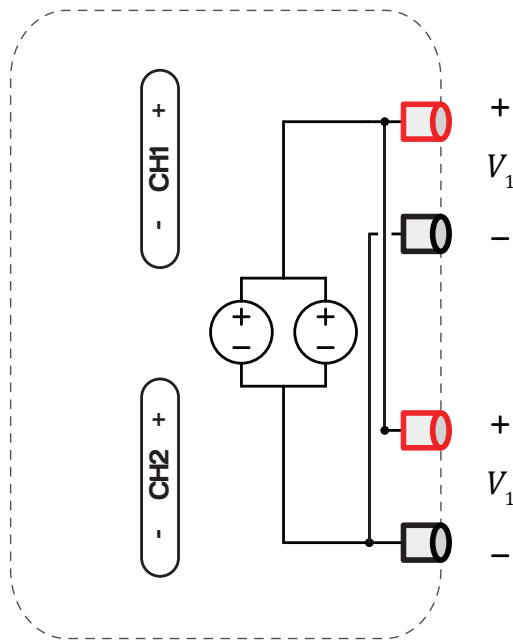


Figure 5: Simplified diagram of the power supply when it is acting in parallel mode. Earth GND has been omitted.

### Summary

Table 1 contains a helpful summary of the power supply modes, and which controls are applicable for each mode.

Table 1: Summary of the different power supply modes.

Mode	Voltage Settings	Current Limiting	Channel Connections
Independent	Both voltage knobs set the output voltages for both channels independently.	Both current limiting knobs set the current limit for both channels independently.	The channels are not connected together.
Series	The voltage knob for channel one sets the voltage for both channels.	The current limit is set at the lower of the two current limiting knobs.	The channels are linked in series, providing a bipolar supply.
Parallel	The voltage knob for channel one sets the voltage for both channels.	The current limit is set by the channel one current knob.	The channels are connected together in parallel, allowing you to supply larger currents.