

High Voltage DC Power Supplies

– Short overview on power supplies & functions –

Our laboratory assembled high voltage DC supplies are available as a current source with a defined short circuit current, or as a voltage source with a defined voltage at the rated operating current.

The advantage of the current source is realized in the charging of capacitors used for high-energy storage single event discharges intended for rail guns and other electro kinetic and EMP devices. Even at the time the charging cycle starts the current is controlled and remains relatively constant through the charging cycle. The source can also be short circuited where the current is still in a controlled mode. The charge voltage $(v_t) = f(t) \times I$ all divided by C. This is a linear relationship and does not require the power wasting series resistance used for voltage sources. The disadvantage is that there is a tendency for the voltage to soar above the design ratings. Operation requires preventative measures such as monitoring the charge voltage or an electronic trigger that shuts the sources off when the desired charging voltage is reached.

The advantage of the voltage source approach is the property of maintaining a constant voltage value within the design limits required as current (load) is being drawn. This is an advantage for electric- field charging when used for accelerators, ion beams, isotope enrichment, particle beams, potential generators etc. The disadvantage is that current is not controlled and overloads can damage the circuitry. Charging capacitors now require a power robbing series resistance to control the current. Charging is exponential. Our HVOLTV high power series utilize a bit of both worlds being voltage and current sources by user selection.

Capacitor chargers can also be used as current power supplies (but they are not that functional as voltage sources).

Power control by duty cycle control is accomplished while maintaining a constant voltage across the load. The voltage waveform is now chopped up into square wave sections with a ratio of on to off times. Simple integration determines the current amount while allowing full value voltage pulses hitting the *load at reduced time.*

Optional designs are available at your preferred voltage and current values – please contact us with your requirements.