

### Introduction

This Tech Note explains how to implement the various controls, programming, and monitoring functions of the E Series precision high voltage power supply. The E Series has models from 1kV to 15kV in power levels from 0 to 4W maximum through 0 to 30W maximum. This series of power supplies has very low ripple, excellent linearity, and very stable temperature characteristics. The control and monitoring functions are available on a standard DB15 female connector. Please see the catalog datasheet for actual specifications; complete product datasheets can be found by visiting [www.ultravolt.com/products.htm](http://www.ultravolt.com/products.htm).

**Pin 1 – Reference Voltage:** A precision, low temperature coefficient +10.00V reference voltage is available on this pin. Please see the data sheet for accuracy and temperature characteristics.

**Pin 2 – Voltage Programming (-) and Pin 3 – Voltage Programming (+):** The E Series voltage programming input is a differential amplifier. A differential input allows the user to avoid voltage regulation problems associated with common grounding with the power input. Both programming inputs have an input impedance of 10M $\Omega$ , to ground. If the programming is left unconnected, the output voltage will be set to

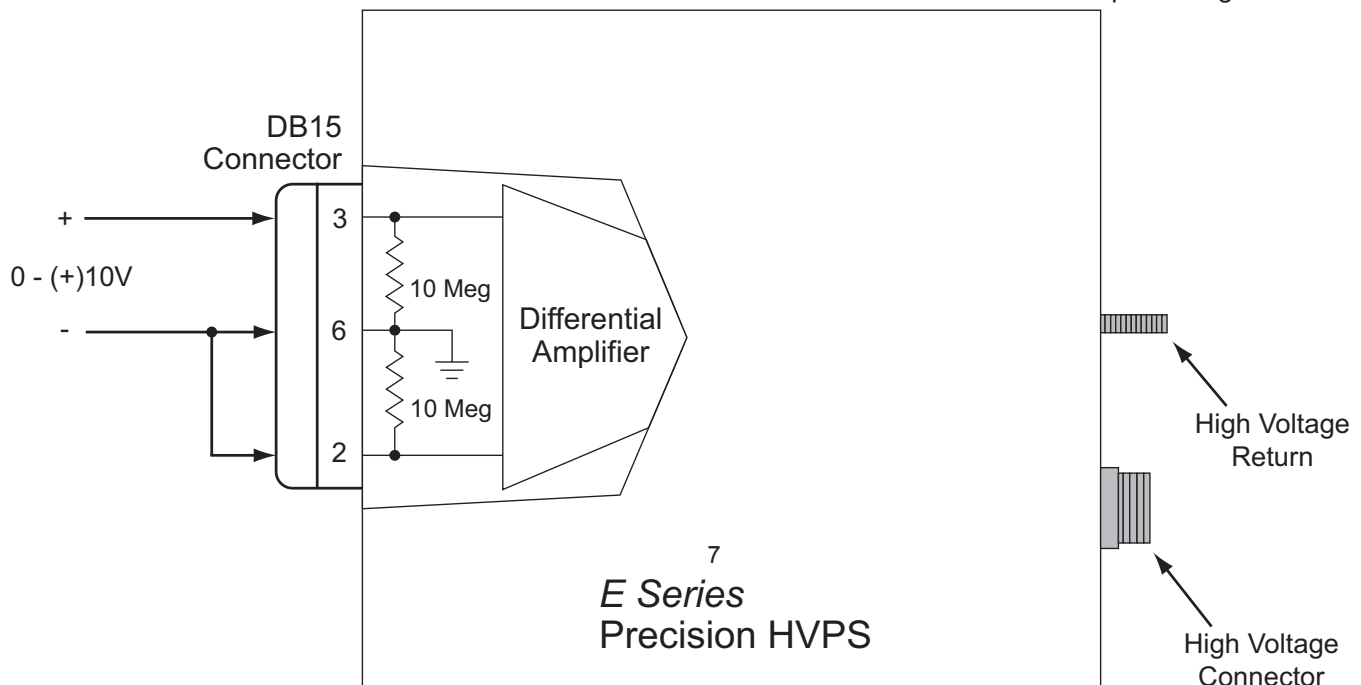
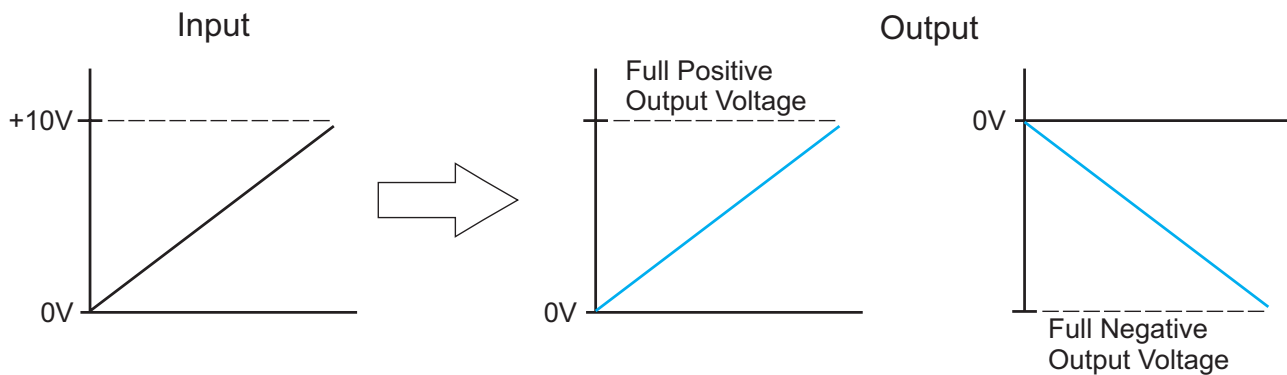


Figure 1. Typical Voltage Programming Configuration

zero. All models are scaled so 10.00V is 100% of rated output voltage. See Figure 1 for a typical circuit configuration.

**Pin 4 – Voltage Monitor:** The voltage monitor has the same scale factor as the voltage programming signal. 0 to +10V indicates 0 to 100% of rated voltage. The voltage monitor signal is derived internally from the voltage feedback and is buffered to provide low output impedance.

**Pin 5 – Voltage Mode Indicator:** An open drain configuration indicates when the power supply is in voltage regulation. The indicator is an active low and will appear as an open circuit when the power supply is in current control or in a disabled state. A pull up resistor can be used to create a logic signal, or the pin can be used to ground an LED to provide an illuminated indicator showing the operating control mode. See Figure 2 for usage suggestions.

**Pin 6 and 15 – Signal Ground:** The signal ground and power ground are common inside the power supply. This pin should be used as reference for all control and monitoring signals. If input power current is allowed to flow through this pin, offsets can occur that will degrade voltage regulation and monitoring accuracy. *A note on grounding: the stud next to the HV output connector should be used as the load return.*

**Pin 7 and 8 – Input Power:** The input power to all E Series HVPS is +23VDC to +30VDC, +24VDC nominal.

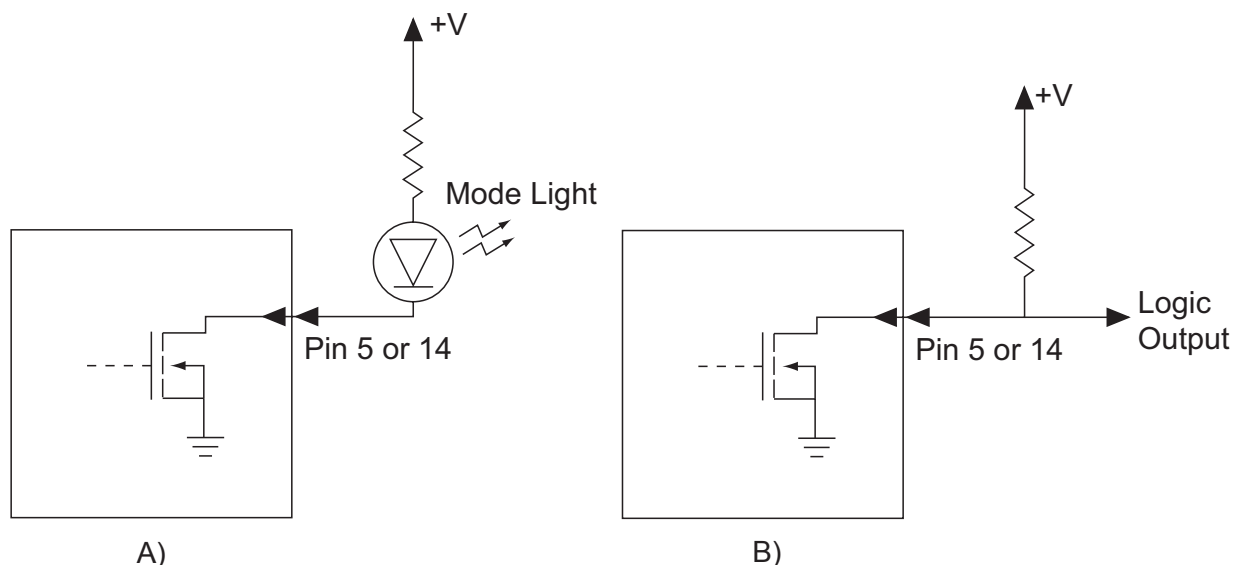
**Pin 9 and 10 – Power Ground:** Use these pins for the input power return. Do not allow input power return current to flow through the Signal Ground connections.

**Pin 11 – Enable:** A logic high between 2.5V and 15V will enable the power supply a logic low between 0V and 1V or an open circuit will disable the power supply. The input impedance is 100kΩ; a resistor to ground will disable the power supply when the pin is left open.

**Pin 12 – Current Monitor:** The current monitor has the same scale factor as the current programming signal. 0 to +10V indicates 0 to 100% of rated current. The current monitor signal is derived internally from the current feedback and is buffered to provide low output impedance.

**Pin 13 – Current Programming:** A 0V to +10V signal will program the power supply for 0 to 100% rated output current. The input impedance for this control pin is 10MΩ; a resistor to ground will program the power supply for zero output current if this pin is left open.

**Pin 14 – Current Mode Indicator:** An open drain configuration indicates when the power supply is in



**Figure 2. Typical Mode Indicator**

current regulation. The indicator is an active low and will appear as an open circuit when the power supply is in voltage control or in a disabled state. A pull up resistor can be used to create a logic signal, or the pin can be used to ground an LED to provide an illuminated indicator showing the operating control mode. See Figure 2 for usage suggestions.

## **LEDs**

There are two LEDs located just to the left of the DB15 Connector on the front panel. The green POWER ON LED illuminates when power is applied to the E Series. The yellow HIGH VOLTAGE ON LED illuminates when the unit is enabled.

## **High Voltage Connections**

Connect the high voltage load to the High Voltage Connector and the High Voltage Return stud. Do NOT connect the High Voltage Return stud to the signal ground at pin 6. The High Voltage Return stud and the signal ground are connected internally to avoid ground loops.