Output Considerations

Overvoltage Protection

MDI DC-DC Converters have protection against any control loop malfunction that results in an output overvoltage.

All Converters have an internal housekeeping voltage that operates the input side circuitry after the converter starts up. This housekeeping voltage is proportional to the output voltage. The exact proportion varies slightly from model type to model type.

If a control loop malfunction causes an excessive overvoltage, the "burp" circuit described in the previous section is activated. The converter shuts off and automatically restarts.

The trip point of the overvoltage protection is typically 33% above nominal. This trip point, which is not a precise value, is sufficiently high to prevent nuisance tripping.

It is important to note that the overvoltage protection circuit cannot monitor the output voltage, only the output voltage as reflected to the auxiliary transformer winding. Therefore, if an externally applied voltage causes the output overvoltage to excced acceptable limits, the converter can neither sense this overvoltage nor limit it.

Secondly, the overvoltage set point is not precise. Therefore, if tighter tolerances are needed, other more precise circuits outside the converter must be used.

High Precision Output OVP Circuit

The Schematic in figure 1 shows a typical suggested external circuit for a precise output OVP function.

In this example, the output overvoltage trip point is set at 5.5 VDC. Output voltage is divided by resistors R1 and R2 and feeds the input of a TL431 shunt regulator IC. In this circuit, the TL431 is used as a combination 2.5 VDC voltage reference and comparator. Resistor R3 limits the peak current into the optocoupler diode. Resistor R4 allows bias current for the TL431 without flowing through the optocoupler diode. Capacitor C is optional, and can provide a time delay before actuation.

In operations, when the voltage at the R1-R2 divider exceeds 2.5 VDC, the opto coupler conducts, causing the converter to inhibit. This causes the output voltage to fall. The inhibit is automatically removed when the output voltage drops.

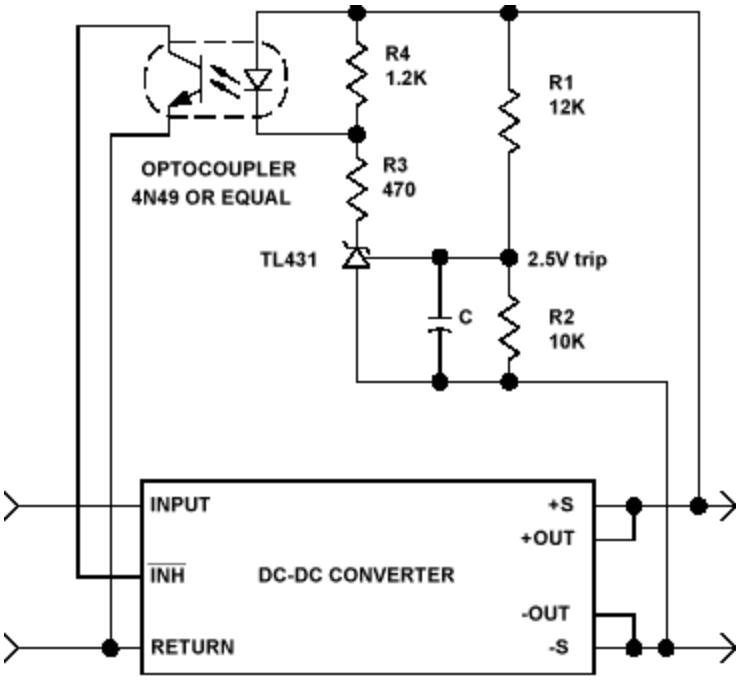

Figure 1
Typical Circuit for
Precise OVP Circuit
Set for 5.5VDC

Figure 2 shows a variation of figure 1, which can be used when the output trip voltage is low. A low voltage shunt regulator (TLV-431) is used because it has a 1.22 VDC reference voltage. A PNP transistor is used to buffer and invert the TLV-431 output. This allows a trip voltage of less than 2 VDC, or greater, depending on resistor divider values.

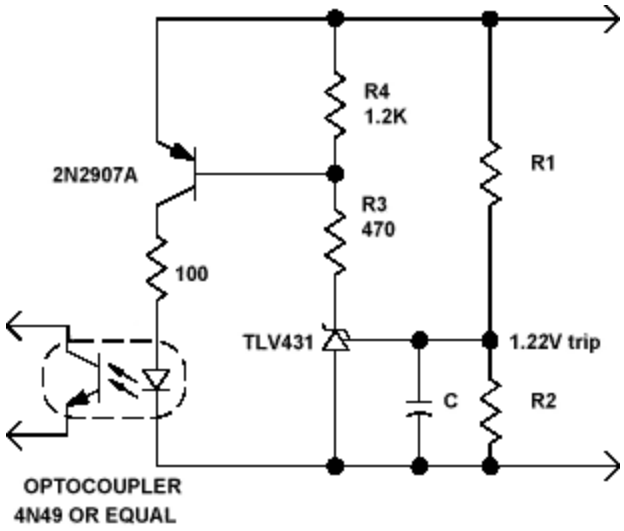

Figure 2
Typical Circuit for
Low Voltage Outputs

Figure 3 shows yet another version, used for higher voltage outputs, such as ± 15 VDC. In this circuit, the TL431 and opto coupler are fed from the common ground, reducing voltage stress on the TL431. However, the sensing is from the positive to negative terminals for greatest accuracy.

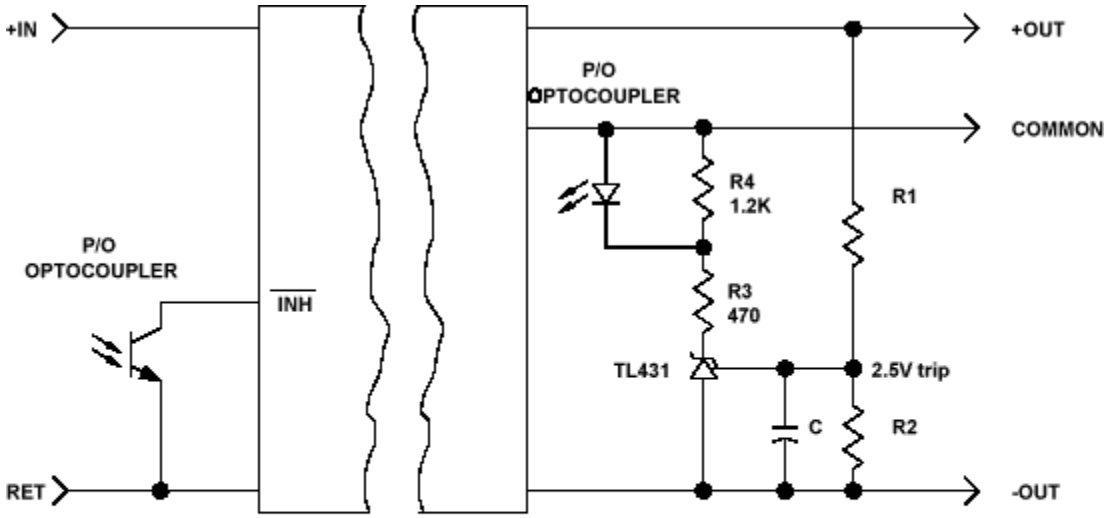

Figure 3
Typical Circuit for
Dual Outputs
±5VDC and Above