

**STP-DRVA-RC-050 REGENERATION CLAMP**

(FOR USE WITH 24–80 VDC POWERED STEPPER AND SERVO DRIVES)



**DESCRIPTION**

As with most stepper and servo systems, a clamp circuit is required to limit increased power supply bus voltage when the motor is decelerating under load. This is commonly referred to as “regeneration,” which is what happens when DC motors are driven by their load. During regeneration the DC motor can produce enough voltage to actually exceed the input power supply voltage. More sophisticated stepper and servo drives deal with this by channeling the increased motor voltage back to the source power supply. If the voltage is not clamped to a safe level the amplifier can be damaged or destroyed.

For this reason AutomationDirect offers a “Regen Clamp” module for our stepper/servo drive products. With this module one or more stepper/servo drives can be protected from “Over Voltage” conditions by placing the clamp module between the power supply and the drive. The clamp tracks the input power supply and will operate from 24 to 80 volts. No adjustments are needed.

The Regen Clamp is designed to handle a wide range of conditions. The voltage input matches the needs of the SureStep stepper drives and SureServo servo drives by providing 24 to 80 VDC capabilities. External power resistors, such as STP-DRVA-BR-100, can be added for even greater continuous power requirements. The modules are small and compact to minimize impact on the system design. More than one stepper/servo drive can be connected to the clamp module, with the potential to handle an entire multi-axis system.

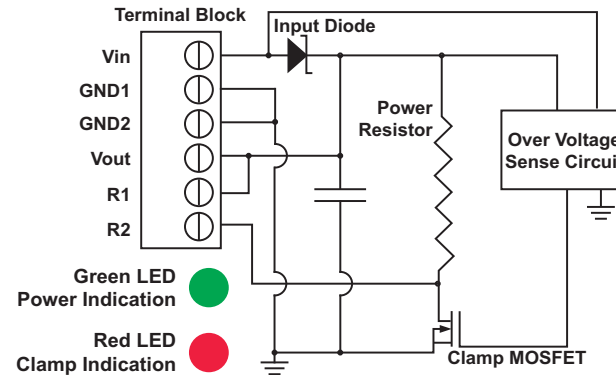
**FEATURES**

The STP-DRVA-RC-050 Regen Clamp is mounted on a heat sink and has a 50 watt power resistor for more continuous current handling.

Sure Step™ Regen Clamp Specifications	
Part Number	STP-DRVA-RC-050
Voltage Range	24 to 80 VDC, no user adjustments
Peak Power	800W
Continuous Power	50W
Connection	6-pin screw terminal block accepts 12–18 AWG wire
Indicators	Green LED: Indicates power supply voltage is present. Red LED: Indicates that the clamp is operating. (This is typically a very short time, since it is only on while the stepper/servo is decelerating.)
Protection	The power supply is internally connected to an “Input Diode” that protects it from higher regeneration voltages. The diode protects the system from connecting the power supply in reverse. If the clamp were to fail, the diode would continue to protect the power supply from over-voltage.
Agency Approvals	RoHS

**CIRCUIT DIAGRAM**

The regeneration circuit is designed to provide a wide range of voltage clamping operation with a simple and reliable design. The block diagram gives a simplified view of the circuit design showing the major parts.



**TERMINAL BLOCK**

A 6-connection terminal block provides easy connection access to the clamp. The terminals are designed for wire sizes from 12–28 AWG.

**INPUT DIODE**

The input diode provides over-voltage and reverse-voltage protection. If the input power supply is connected in reverse, this diode will prevent failure. During over-voltage conditions the diode blocks the higher regeneration voltage from feeding into the input power supply. The input is designed to handle 20 amps continuous with peaks greater than 100 amps.

**INTERNAL POWER RESISTOR**

For moderate power operation, this may be all that is required for safe operation. This resistor is designed to “sink” up to 8 amps when using an 80 volt power supply, but only 2.5 amps when using a 24 volt supply.

Larger power resistors can be added to the circuit by connecting between the “R1” and the “R2” terminals (STP-DRVA-BR-100).

**FILTER CAPACITOR**

A large capacitor is added across the voltage output to smooth out operation and allow the “clamp” to work at a low switching frequency.

**OVER-VOLTAGE SENSE CIRCUIT**

This part of the clamp senses when an over-voltage occurs. The clamp will turn on when the “V<sub>out</sub>” exceeds the “V<sub>in</sub>” by approximately 1.2 volts. The clamp turns off when “V<sub>out</sub>” drops to about 1 volt below “V<sub>in</sub>”.

**CLAMP MOSFET**

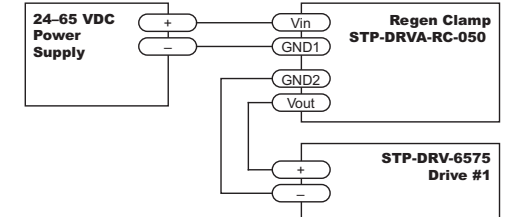
At the heart of the circuit is a power MOSFET designed for 20-amp continuous operation

**INDICATOR LEDs**

A green LED is used to indicate power supply input, and a red LED is used to indicate when the clamp is on.

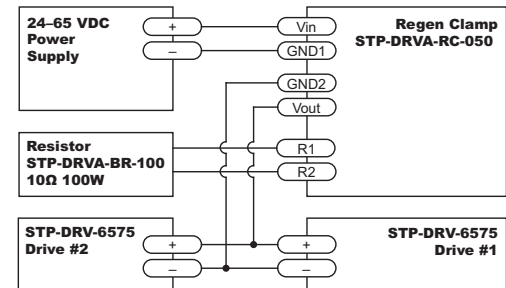
**EXAMPLE 1**

A single stepper or servo drive is connected to the Regen Clamp module. This design will work in most cases where the load is primarily “Frictional,” as opposed to “Inertial.”



**EXAMPLE 2**

Two stepper or servo drives are connected to the Regen Clamp module. This design will work in cases where the load has significant “Inertial” content.



STP-DRVA-RC-050 REGENERATION CLAMP

***DIMENSIONS***

STP-DRVA-RC-050

Dimensions = in[mm]

