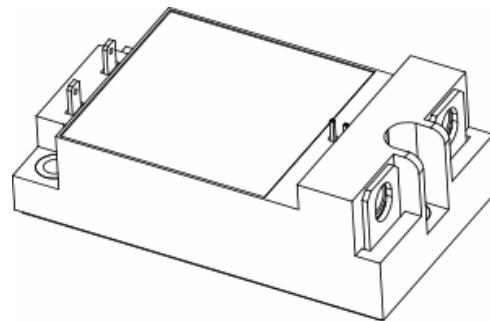


## 600V, 50A, Solid State DC Contactor

**Applications:**

- Main DC Bus Switch
- DC Motor Bus Switch
- Battery Disconnect
- Bus Discharge
- DC Contactor

**Description:**

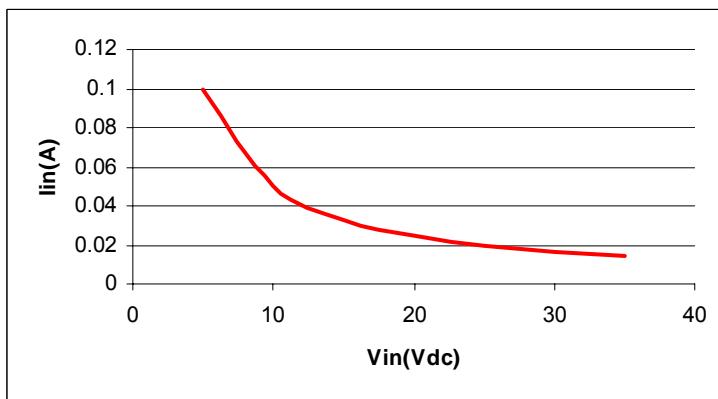
Sensitron has developed a small footprint High Voltage/High Current DC solid state Relay/Contactor. This device incorporates the latest state of the art technology to reduce the "on" state power losses and voltage drop to a minimum. The device is a true four terminal relay, not needing additional power sources for bias. This device uses robust magnetic coupling to achieve high isolation, reliability, and long life. Unlike opto-isolation techniques this device will not degrade with time. The input control lead will accept any voltage from 4.6V to 36VDC.

**Features:**

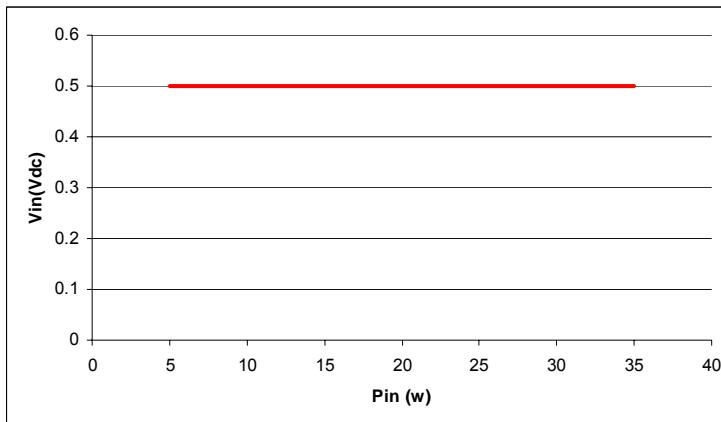
- 2000V Input to Output Isolation
- 600V Blocking, 50A Continues Current
- 400A Surge Capability
- -55 to 100 °C Operation
- Single wide range DC input signal 4.6V to 36V
- Low Power Control, .5W Typ.
- True Four Terminal Operation
- Low "on" state resistance .015 ohms
- Fast turn on/turn off, less than 1 us
- High Current Terminals
- Three Point Mounting Plate
- $T_{jc} \leq .33 \text{ } ^\circ\text{C/W}$
- 1.4" x 2.6" x .5"

**Input Control Specifications:**

Parameter	Description	MIN	TYP	MAX	Unit
$V_{control}$	DC Control Voltage Between pins 1 and 2	4.6		36	Volts
$I_{control}$	Input Current at control pins 1 and 2, $V_{in} = 4.6V$ to 36V	10	25	150	mA
$P_{control}$	Control Input Power Consumption		.5	.69	watt
Gain	$I_{out}/I_{in}$ , $V_{in}=12V$ $V_{in}=28V$		1200 2800		



**Fig. 1-Typical Input Current vs. Input Volt**



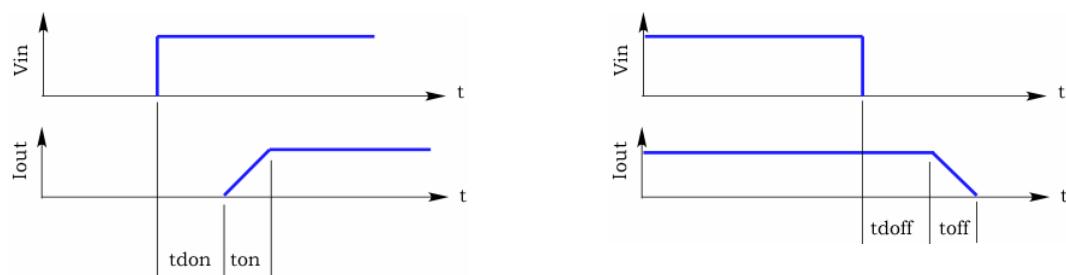
**Fig.2- Typical Control Input Power**

**Output Specifications:**

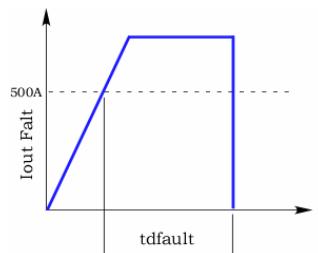
Parameter	Description	MIN	TYP	MAX	Unit
V <sub>out</sub>	Blocking Voltage Across Pins 3 and 4	0		600	Vdc
I <sub>leak</sub>	Output leakage Current at Vout=600V, T <sub>j</sub> =25 °C T <sub>j</sub> =150 °C			50 250	uAdc
I <sub>out</sub>	“Contact” Current	0		50	Adc
I <sub>surge</sub>	Output Surge Current Capability		400		Apeak
R <sub>on</sub>	“Contact Resistance” Iout=50A, T <sub>j</sub> =25 °C T <sub>j</sub> =150 °C			.02 .05	Ohm
V <sub>drop</sub>	Voltage drop at Iout=50A			.75	Vdc
C <sub>out</sub>	Capacitance, VDS=100 V, f=1 MHz		1000		pF
I <sub>latch</sub>	Over Current latch, at 25 °C		400		A(peak)
E <sub>as</sub>	Avalanche energy, single pulse			1950	mJ
V <sub>sd</sub>	Reverse Diode forward voltage, Iout=44 A, T <sub>j</sub> =25 °C		.9	1.2	Vdc
t <sub>rr</sub>	Reverse recovery time		600		ns

**Switching Characteristics:**

Parameter	Description	MIN	TYP	MAX	Unit
$t_{on}$	“Contact” turn on time		.4	1	us
$t_{off}$	“Contact” turn off time		.4	1	us
$t_{don}$	Delay from input command to contact on		1.5		ms
$t_{doff}$	Delay from input command to contact off		.5		ms
$t_{dlatch}$	Delay to latch after detection of Over Current		50		us
$F_{switch}$	Repetitive on to off switching frequency		600		Hz

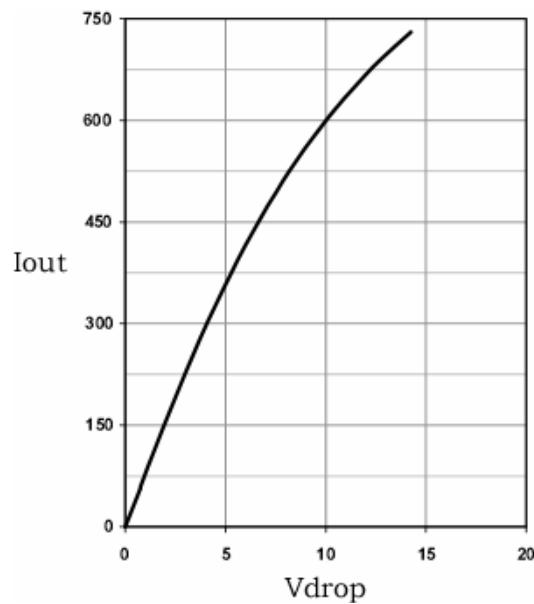


**Fig. 3, Input vs. Output Timing**

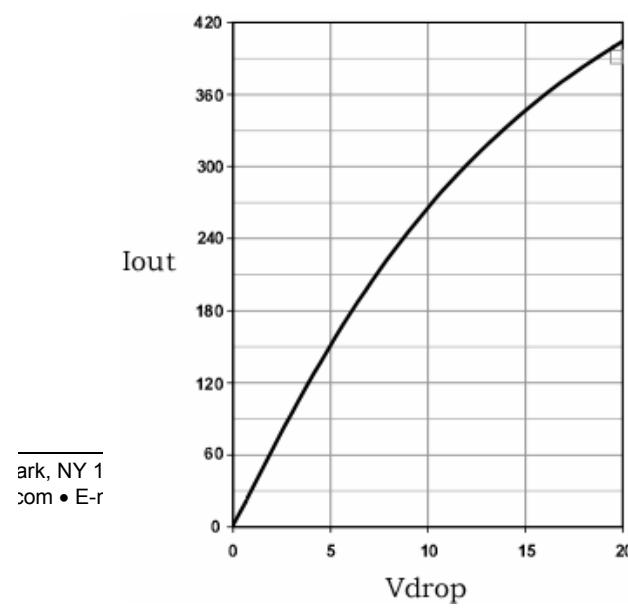


**Fig.4 – Over Current Fault Shut Down**

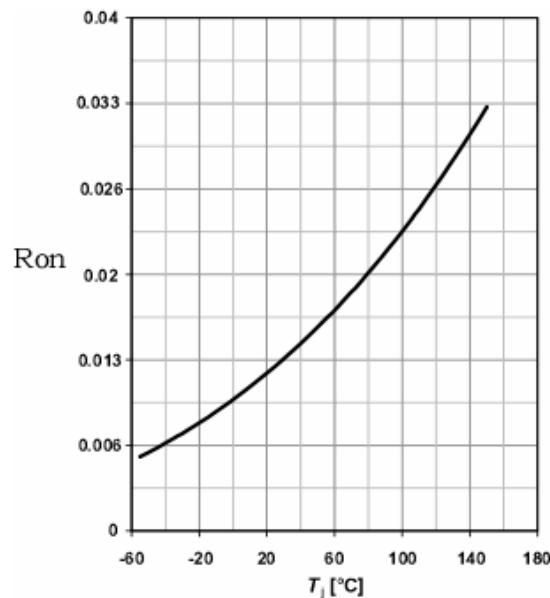
**Typical Vdrop vs. Current @ $T_j=25^\circ C$   
@ $T_j=150^\circ C$**



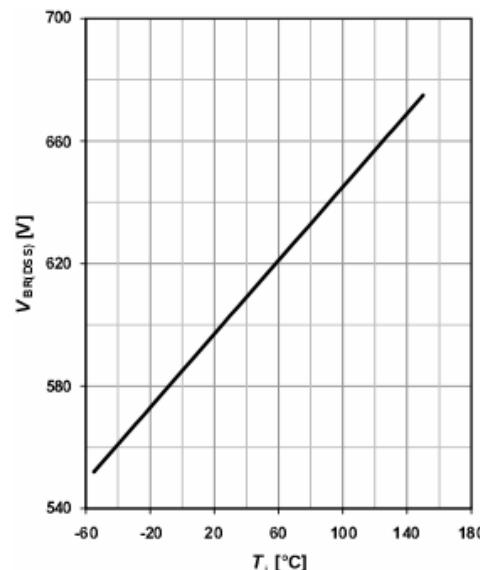
**Typical Vdrop vs. Current**



**Typical Ron vs. Temp**



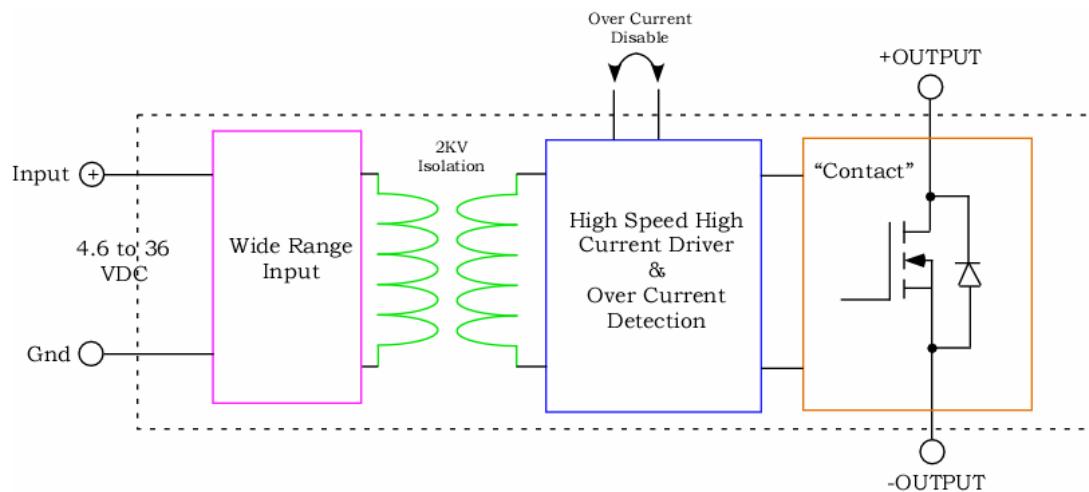
**Blocking Voltage vs. Temp**



### Environmental

Parameter	Description	MIN	TYP	MAX	Unit
Top	Operating Temperature (base Plate)	-55		100	°C
T <sub>stor</sub>	Storage Temperature	-55		125	°C
Isolation	Input to Output	2000			VDC
Isolation	Input or Output to Case	2000			VDC
R <sub>θJC</sub>	Thermal Resistance		.25	.33	°C /W

### Block Diagram:



## Pin Assignments:

**Input** – Apply a positive voltage to this pin with respect to pin Gnd to “close” the contacts.

**Gnd** – This is the return pin for the Input control voltage.

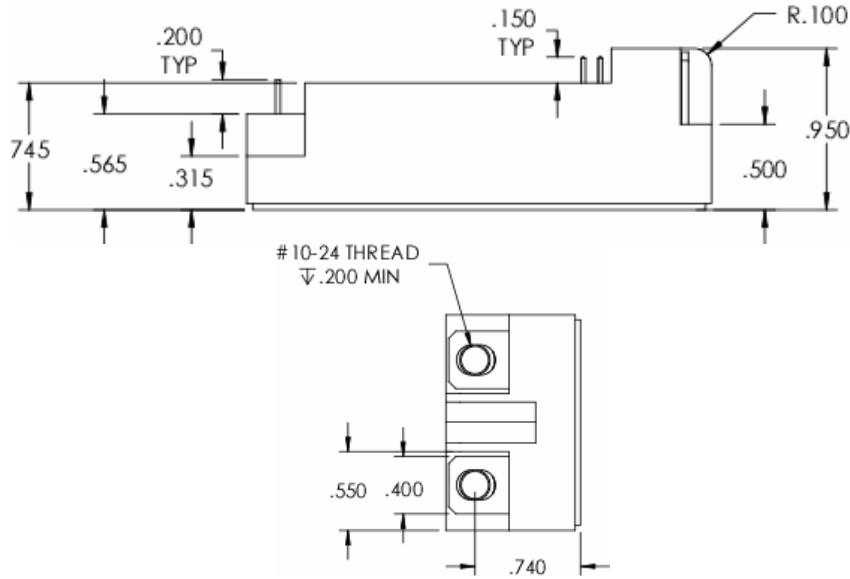
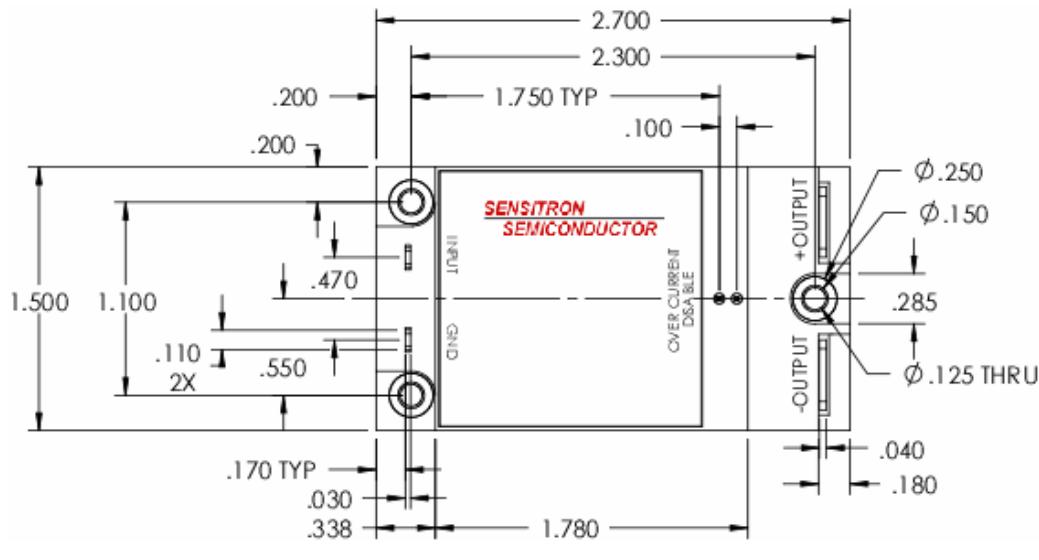
**+OUTPUT** – This is the positive terminal of the “contact”.

**-OUTPUT** – this is the return terminal for the +OUTPUT pin.

### Note:

1. Input pins and output pins are isolated up to 2000VDC
2. The device may be damaged if the input polarity is reversed.
3. The “contact” is uni-polar, a voltage reversal will result in current flow in the internal diode.

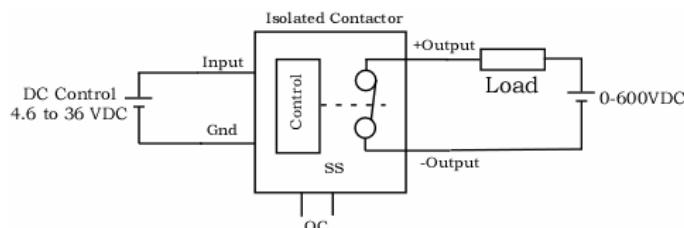
## **Mechanical Outline:**



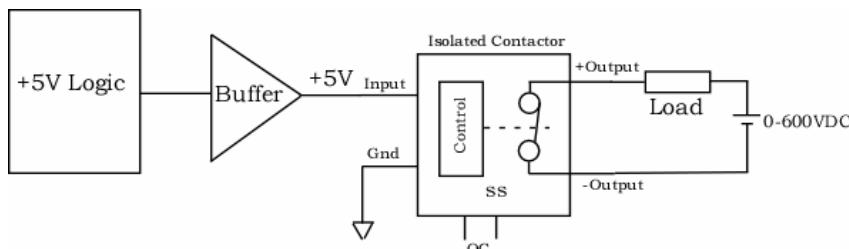
**Application Notes:**

*A. Input Bias*

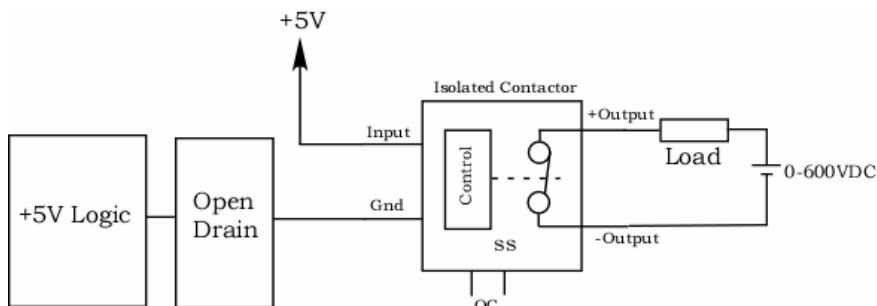
The SSR050D060 will be energized and the "Contact" will be closed, when a positive potential of 4.6VDC to 36VDC is applied between Input and Gnd. The input power consumption will be constant through out the control voltage range therefore the contactor will draw more current at lower control voltages.



**DC Supply**



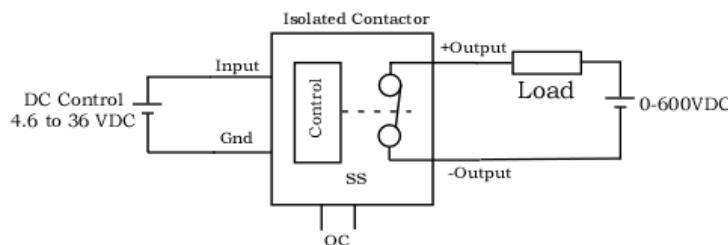
**TTL with Buffer**



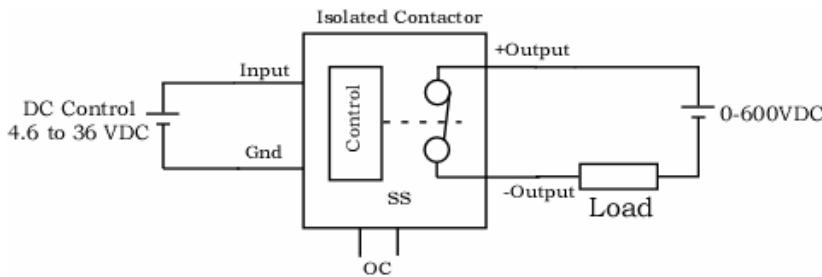
**Input Driven from TTL with Open Drain Driver**

*B. Output Load Connection*

The output circuit is completely floating therefore the Load can be connected to either output terminal.



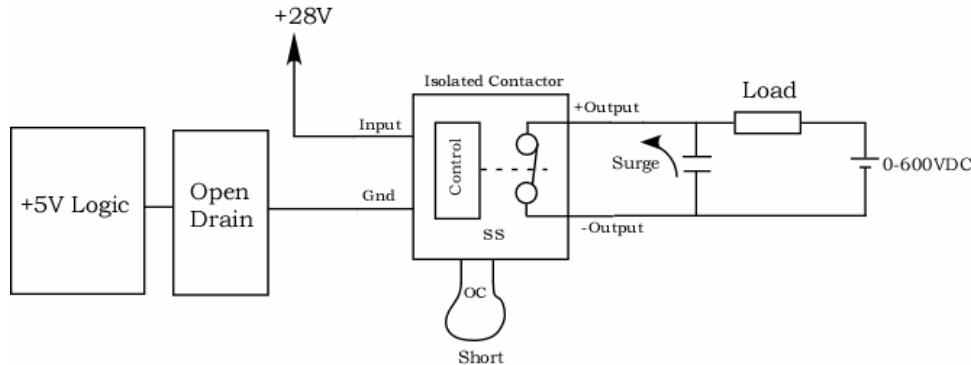
**Load connected to +Output Terminal**



**Load Connected to -Output Terminal**

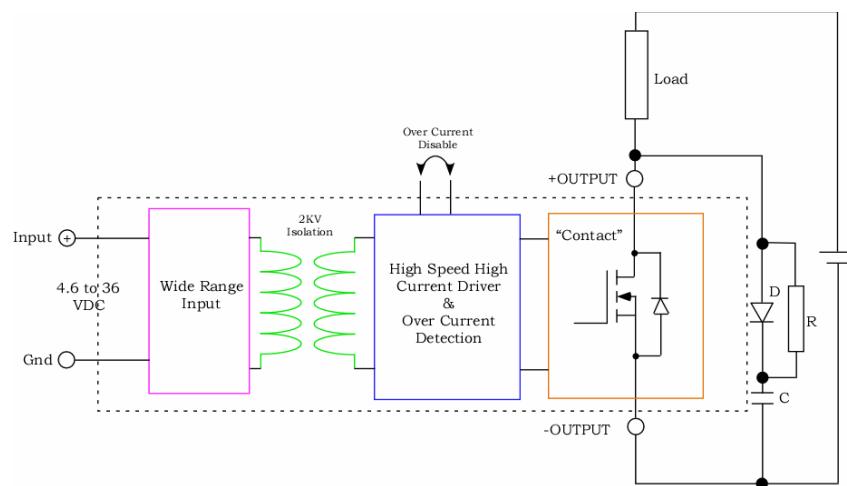
*C. Over Current Disable*

The SSR050D060 contains an Over Current latch which disables (opens) the contact whenever a large current in excess of 400A is detected. The latch can only be reset by removing and re-applying the input control power. In noisy environments and in applications where high surge currents are encountered, the latch may be triggered prematurely. In these applications the latch circuit can be disabled by placing a short circuit between the over current disable terminals.



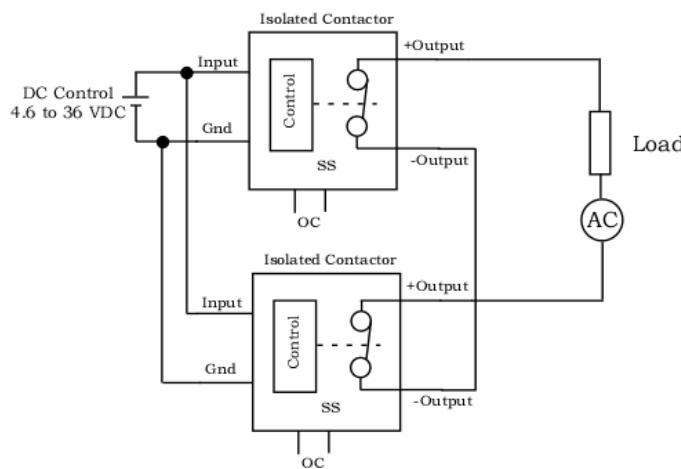
*D. Contact Protection*

The user must insure that the peak voltage rating of the SSR050D060 is not exceeded. The SSRXXDXXX family of devices switch at extremely fast speeds, therefore extra care must be taken to suppress voltage transients that are generated when interrupting high currents. Sensitron strongly advises the user to use a snubber network similar in design to the one shown below. This is an energy absorbing snubber that transfers the energy from any parasitic line inductance into the capacitor and then is dissipated through the resistor. The capacitor should be sized so that the captured energy does not charge the capacitor beyond the contacts rated voltage.



*E. AC Operation*

The contactor can be used for AC loads if two devices are connected "back to back".



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