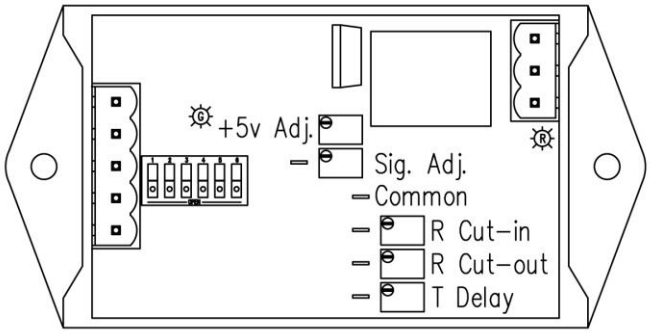
VOLTAGE SENSITIVE RELAY SELECT VRDC SEL

FEATURES

- **Operates on AC and DC power**
  - ➢**Terminal 1 - 24VAC**
  - ➢**Terminal 2 - 12 to 24VDC**
- **Dip switch selectable input ranges: 0-5VDC, 0-15VDC, 0-30VDC, 0-60VDC, and 0-20mA**
- **Dip switch selectable delay on energize make or delay on De-energize**
- **Time delay adjustable between 1 and 255 seconds**
- **One potentiometer to calibrate input ranges**



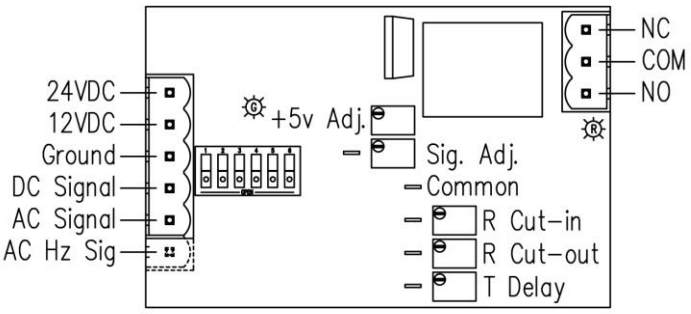
DESCRIPTION

The VRDC/SEL is an adjustable voltage relay for DC signal application. The VRDC /SEL is used in applications where a varying DC voltage signal is used to switch a relay, such as in generator control circuit, a low battery voltage load disconnect, etc. The cut-in voltage and cut-out voltage and time delay values are set using the corresponding multi-turn potentiometers and measuring the voltage on the respective test points. Set up instructions and voltage charts are found on page 4.

OPERATION

The VRDC/SEL has two power input terminals, TB1-1 is for 24VAC, TB1-2 is for 12 to 24VDC, TB1-3 is the power supply ground, both inputs use a half wave rectifier filter circuit to power the VRDC board. The VRDC has two LEDs the green indicates the VRDC is powered and the red indicated when the relay is energized. The VRDC/SEL's input is on terminal 4 and the inputs common shares terminal 3. The dip switch's position 1 selects whether the time delay is applied to the relay energizing or de-energizing. Positions 2 thru 6 select the input range and type, only one input switch is to be selected at a time. The input ranges are P2 = 0-20mA, P3 = 0-5VDC, P4 = 0-15VDC, P5 = 0-30VDC and P6 = 0-60VDC.

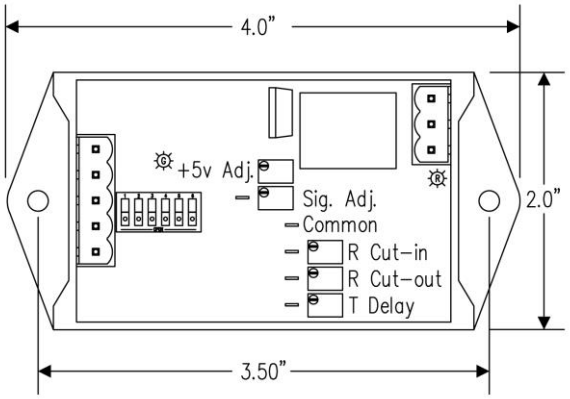
WIRING CONFIGURATION – TERMINAL BLOCK



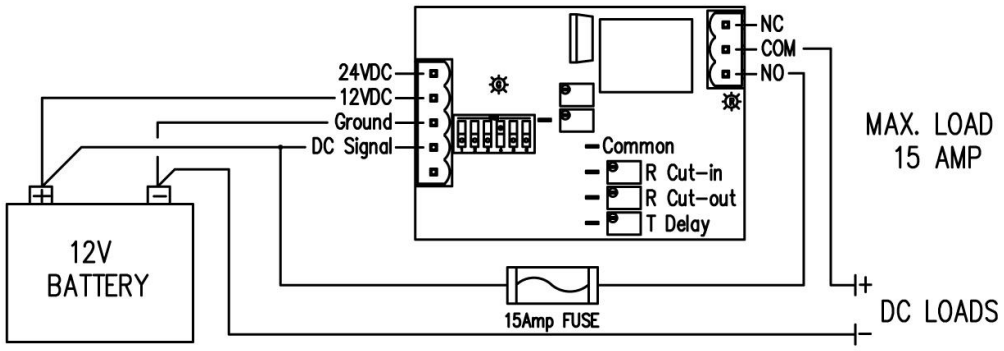
SPECIFICATIONS

Size & Weight:	3.8 x 2 x 1.4 inches, 3.2 oz.
Enclosure:	PVC plastic housing, epoxy potted
Mounting:	2 #8 1/2: wood or sheet metal screws (not supplied)
Power:	24VAC, 12 to 24VDC
Relay load capacity:	12 Amps @ 28VDC, SPDT 12 Amps @ 120VDC, SPDT
Input signals:	0-60VDC, selectable 4 voltage ranges & one mA range
Input Signals:	0 to 60VDC, 0 to 150VAC
Thresholds:	Cut in 0.25 to 5VDC @ Test Point (0-5, 15, 30, 60VDC) Cut-out 0.25 to 5vdc @ Test Point (0-5, 15, 30, 60VDC) 0.25VDC minimum differential
Time Delay:	1 to 255 seconds
Action:	Direct – Relay energizes on signal increase Reverse – Relay energizes on signal decrease
Signal Filtering:	>2Hz
Current Draw:	Relay not energized less than 7mA Relay energized less than 30mA
Indication LED's:	Green: indicated VRDC is powered Red: Relay is energized
Temperature:	-20 to 75°C
Relay Life:	100 million plus mechanical operations

PHYSICAL CONFIGURATION

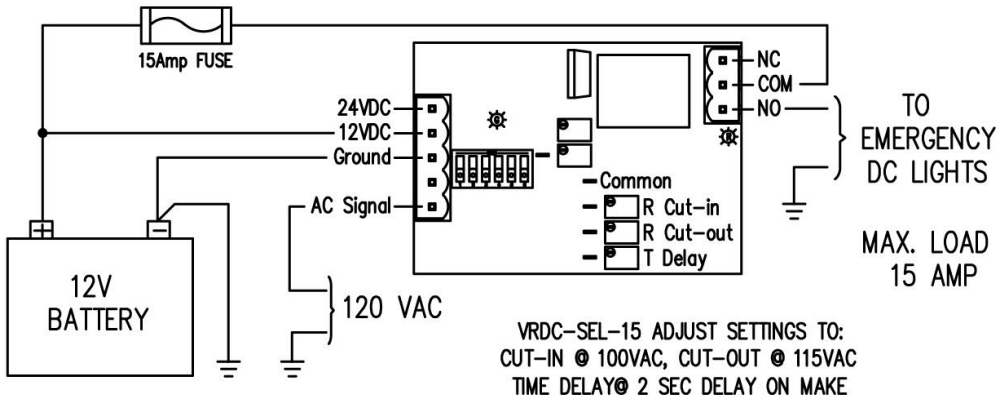


APPLICATION 1 - DC LOAD DISCONNECT



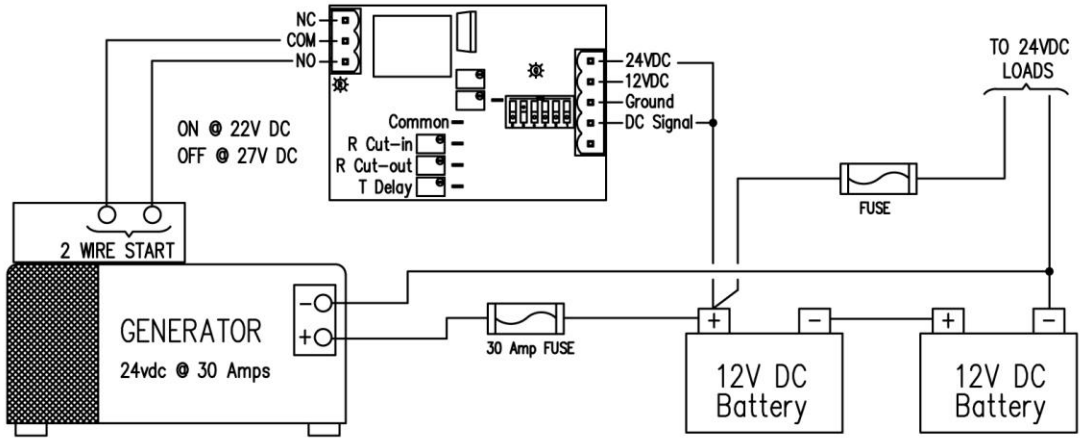
The VRDC SEL is configured to either energize of de-energized, disconnection the load from the battery preventing further battery discharge. By using the time delay one can ensure that changing load does not cause premature disconnection of the load. (See dip switch definition for switch selection based on voltage).

APPLICATION 2 – DC EMERGENCY LIGHTS CONTROL BY AC UTILITY POWER



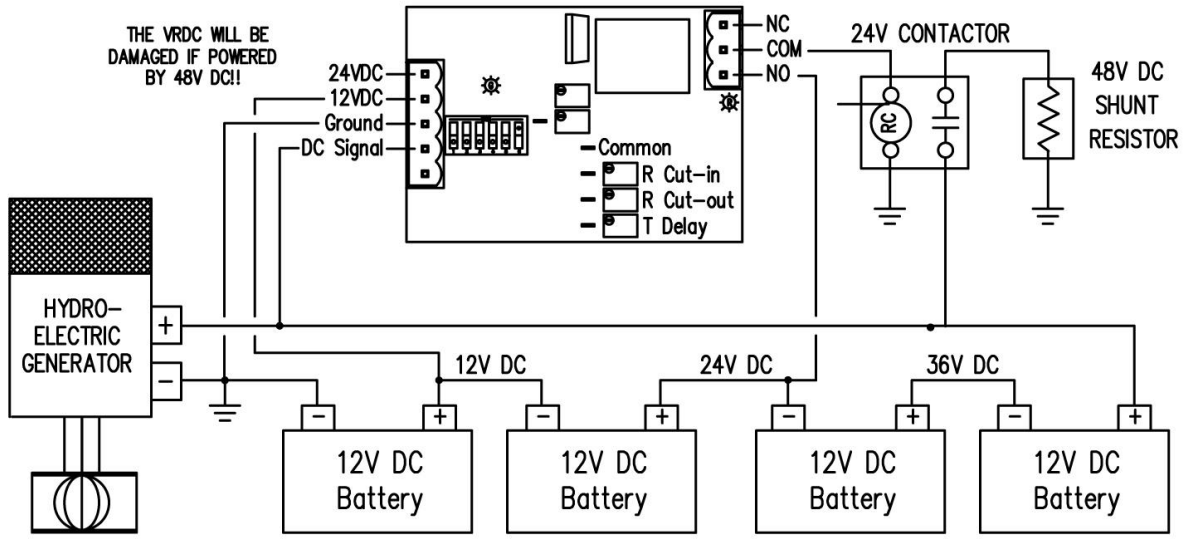
The VRDC/SEL is configured to monitor the AC utility power, when AC power is lost, it energizes its relay turning on the emergency DC lighting. When utility power is restored it turns off the emergency lights. (See dip switch definition for switch selection based on battery/ battery bank voltage).

APPLICATION 3 GENERATOR CONTROL – BATTERY CHARGING



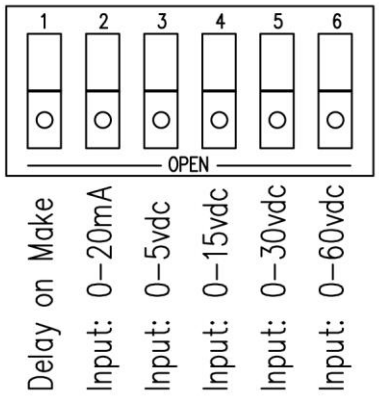
The VRDC SEL is configured to monitor the battery bank voltage and when voltage drops below your minimum voltage point, it energizes its relay, to start a 2 wire generator. It shuts down the generator when the desired battery voltage is achieved. The time delay prevents the generator from starting on a temporary battery voltage drop. (See dip switch definition for switch selection based on battery bank voltage).

APPLICATION 4 – 24/48VDC EXCESSIVE HYDRO POWER SHUNT CONTROL



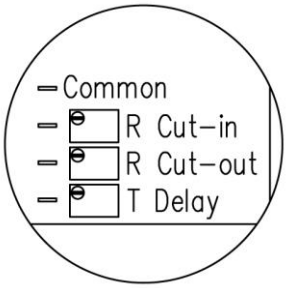
The VRDC/SEL monitors the battery voltage and activates a higher amperage contactor to shunt the excessive power being generated thru a load shunt to prevent on over voltage condition to occur with the battery bank. The VRDC/SEL can be powered by either 12 or 24vdc from the battery bank even though it is sensing a higher voltage level. (See dip switch definition for switch selection based on battery bank voltage)

DIP SWITCH DEFINITIONS



Switch 1: Selects time delay to be applied to either on energize or de-energize of relay.
Open: delay on de-energize
Closed: delay on energize
Switch 2: Selects 0-20mA input range
Switch 3: Selects 0-5VDC input range
Switch 4: Selects 0-15VDC input range.
Switch 5 Selects 0-30VDC input range.
Switch 6 Selects 0-60VDC input range.

ADJUSTMENT FORMULAS

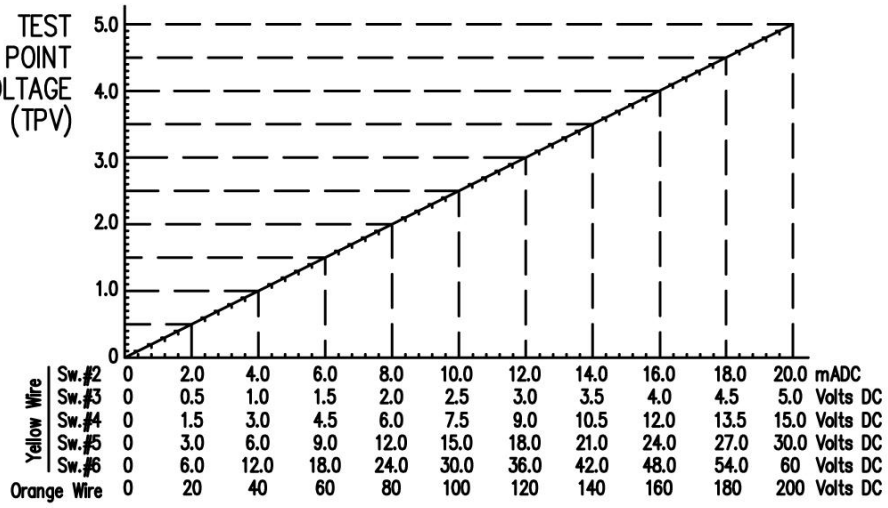


0-20mA input - TPv = mA tp X 0.250
0-5VDC input - TPv = Vtp X 1.0
0-15VDC input - TPv = Vtp X 0.333
0-30VDC input - TPv = Vtp X 0.1667
0-60VDC input - TPv = Vtp X 0.0833

TPv – Test Point Voltage
mAtp – mA trip point
Vtp – Voltage trip point

ADJUSTMENT TABLE

ADJUSTMENT CHART



ADJUSTMENT PROCEDURES

The cut-in, cut-out and time delay values are set by adjusting the corresponding potentiometers and each value is measured between the potentiometer's test point loop and the ground loop. The pots are adjustable between 0 and 5VDC which represents 0-20mA, 0-15VDC, 0-30VDC, 0-60VC and 0-150VAC input signal. The Time Delay's 0-5VDC represents 1 to 255 seconds.
If the cut-in value is greater than the cut-out value then the relay energizes when the signal voltage is greater than the cut-in point and de-energizes when the signal voltage drops below the cut-out point. If the cut-in value is less than the cut-out value then the relay energizes when the signal voltage drops below the cut-out point and de-energizes when the signal voltage rises above the cut-in point. If the cut-in and cut-out differential is less than 0.2VDC then the relay may or may not work.
The time delay represents 1 to 255 seconds of time delay for the relay to energize on cut-in for either direct or reverse modes dip switch closed position, and for the relay to de-energize on cut-out for either direct or reverse modes dip switch open position.

Procedure:

1. Determine if the operation is direct or reverse, the relay is to energize on increase of control signal (direct) or is to energize on decrease of control signal (reverse). If direct the cut-in value will be larger than the cut-out value. If reverse then the cut-in value will be smaller than the cut-out value.
2. Next determine the trip points in regards to the input signal. Relay to energize @ 13.0VDC and de-energize at 12.5VDC. So your Cut-in point is 13.0VDC divided by the 15VDC range, then multiplied by 5VDC ((13/15)*5)=cut-in value. The cut-out point is 12.5VDC divided by the 15VDC range, the multiplied by 5VDC ((12.5/15)*5=cut-out value.
3. Next determine if you're going to have any time delay, if so how long? # of seconds divided by 255, then multiplied by 5, yields the Time Delay value. ((#sec/255)*5) = Time Delay value.
4. Next determine if delay is applied to the relay being energized of de-energized (dip switch 1)
5. Power the VRDC SEL, using a DC volt meter, connect the negative lead to the VRDC common test loop, and connect the positive lead to the cut-in loop and using a small screw driver to adjust the cut-in potentiometer so the voltage on the test point matches your calculated value. Do the same for the cut-out. At time leave the time delay potentiometer set to 0VDC.
6. Power down the VRDC, connect your meter to the a voltage simulator connect the simulator to the VRDC's input terminal #4, Power both the VRDC and signal simulator and adjust the input signal up to the cut-in point and verify the relay energizes, if the relay does not energize adjust the cut-in potentiometer until the relay energizes, remembering that there is about a 1 second delay between the time you meet or cross the cut-in point and when the relay energizes. Then adjust input signal down to the cut-out point and verify the relay de-energizes. Again if it does not adjust the cut-out potentiometer until it does. Repeat the process to verify operation.
7. Next connect your meter back to the ground loop and the time delay loop and set the desired time delay value. Run your input signal back up above the cut-in point and check the delay on energize time and back down below the cut-out point to verify the delay on de-energize depending on the dip switch 1 setting.