FEATURES

- **Operates over a wide DC power range 10 to 18VDC and 24VAC**
- **Adjustable thresholds for cut in and cut out points between 1 to 60VDC and 0 to 150VAC**
- **12 Amp SPDT relay contact**
- **Automatic reversible action with the cut in and cut out adjustments**
- **Adjustable 0 to 255 seconds time delay on cut in**
- **Compact size eliminates mounting problems**

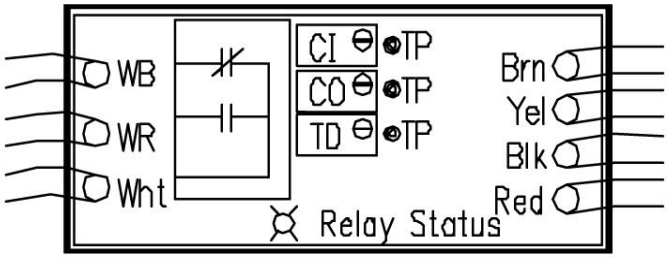
DESCRIPTION

The VRDC 12V-60 is an adjustable voltage relay for DC applications. The VRDC 12V-60 can be used in applications where a varying DC voltage is used to switch an adjustable relay such as in generator control or a low battery voltage load disconnect. The cut in voltage, cut out voltage, and the time delay value are adjusted on multi-turn potentiometers by measuring the respective test points and adjusting the potentiometers per the set-up instructions and chart on the back side of last page.

OPERATION

The VRDC 12V-60 uses a half-wave rectifier filter circuit which allows the VRDC 12V-60 to operate from a range of 10 to 18VDC power source. The VRDC 12V-60's input is internally scaled so that a 0 to 60VDC signal equals 0 to 5VDC as shown in the chart on the back side of this page. An LED lights when the relay is pulled in.

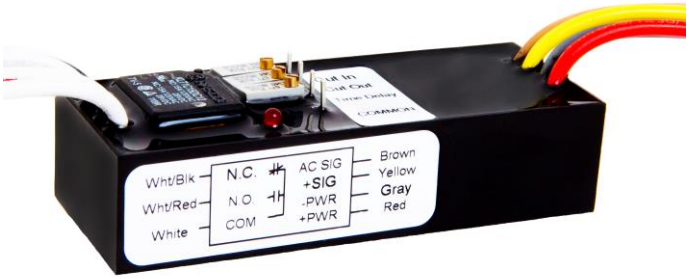
PHYSICAL CONFIGURATION



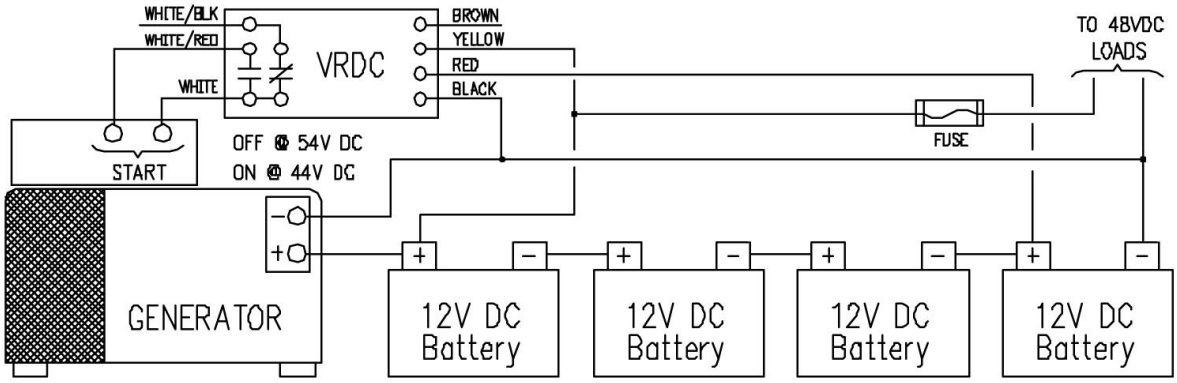
The test points shown are for field calibration of the cut in, cut out, and time delay potentiometers.

SPECIFICATIONS

Size & Weight:	3.2 x 1.2 x .75 inches
Enclosure:	Epoxy potted in PVC plastic
Mounting:	Double stick tape
Power:	10 to 18VDC
Mounting:	Double sided stick tape
Load Capacity:	12 Amps @ 28VDC, SPDT 12 Amps @ 120VAC, SPDT HASCO KLT1C12DC12
Input Signals:	0 to 60VDC, 0 to 150VAC
Thresholds:	Cut in @ 1 – 60VDC Cut out @ 1 – 60VDC 0.25VDC minimal differential
Time Delay:	0 to 255 seconds delay on energize
Action:	Direct – energizes on increase Reverse – energizes on differential
Signal Filtering:	>2Hz
Current Draw:	Continuous – less than 1mA Relay energized – 30mA
Indication:	LED indicates relay is energized
Temperature:	-20 to 75°C
Relay Life:	100 million plus mechanical operations

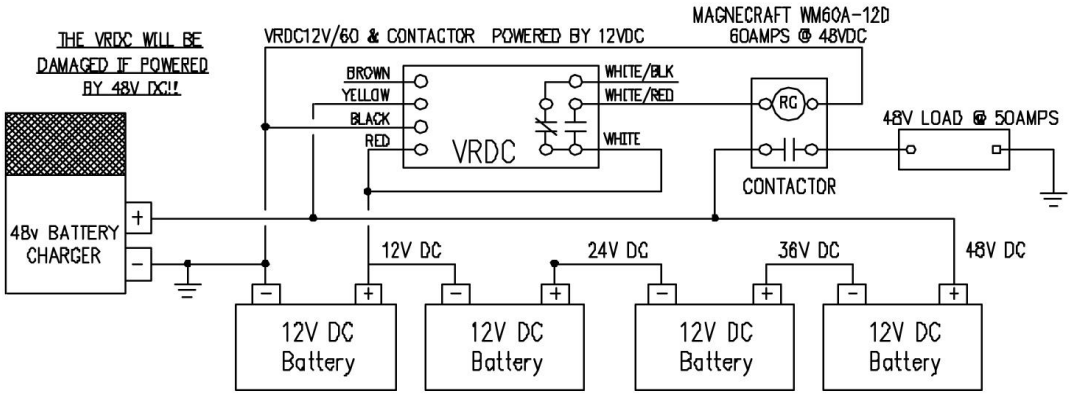


APPLICATION 1 GENERATOR CONTROL – BATTERY CHARGING



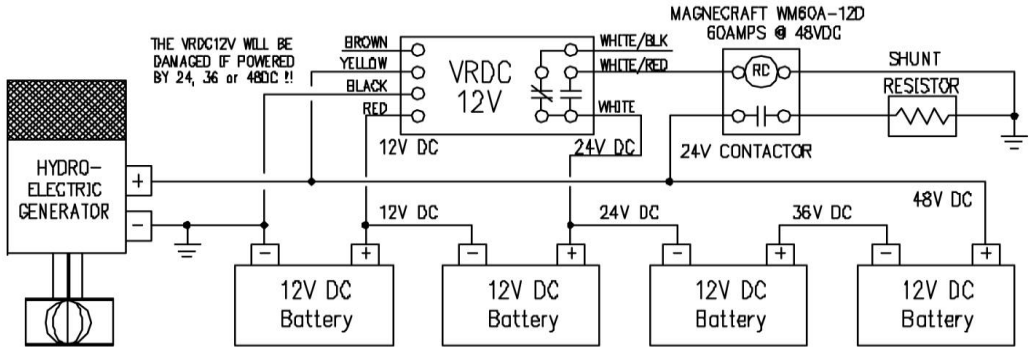
The VRDC 12V/60 senses when the battery bank is being discharged below a minimum threshold point and starts the generator to charge the batteries. It shuts off the generator when the desired battery voltage is achieved. The time delay prevents the generator from starting on temporary battery voltage drops due to switching loads.

APPLICATION 2 BATTERY CHARGE CONTROLLER



The VRDC 12V-60 senses when the battery bank is being discharged below a minimum threshold point and acts as a low voltage disconnect, disconneing the load to allow the battery charger to charge the batteries. It reconnects the loads when the batteries have been charged. The time delay prevents the loads from being disconnect early due to temporary battery voltage drop due to switching loads.

APPLICATION 3 48VDC EXCESSIVE POWER SHUNT



The VRDC 12V-60 senses the battery voltage and activates a contactor to shunt the excessive power thru a load shunt resistor to prevent an over voltage condition. The VRDC 12V-60 must be powered by 12VDC from the battery bank even though it is sensing the full battery bank voltage level.

ADJUSTMENT FORMULAS

0 TO 30VDC - Vadj = Vin X 0.1667
0 TO 60VDC - Vadj = Vin X 0.0833
0 TO 150VAC - Vadj = Vin X 0.0333
TIME DELAY - Vadj = Time Delay (sec) X 0.01961

Vadj - Adjustment voltage at cut-in & cut-out test points
Vin - Input voltage signal
Min. Resolution - 0-5V Adjust voltage / 255 steps = 0.02V DC

ADJUSTMENT TABLE

Input Voltage Ranges			Time Delay	cut-in/out & delay Tp volts
1-30VDC	2-60VDC	5-150VAC	0-255 Sec	0-5VDC
1.0v	2.0v	5.0v	8.5 sec	0.167v
2.0v	4.0v	10.0v	17 sec	0.333v
3.0v	6.0v	15.0v	25.5 sec	0.500v
4.0v	8.0v	20.0v	34 sec	0.667v
5.0v	10.0v	25.0v	42.5 sec	0.833v
6.0v	12.0v	30.0v	51 sec	1.000v
7.0v	14.0v	35.0v	59.5 sec	1.167v
8.0v	16.0v	40.0v	68 sec	1.333v
9.0v	18.0v	45.0v	76.5 sec	1.500v
10.0v	20.0v	50.0v	85 sec	1.667v
11.0v	22.0v	55.0v	93.5 sec	1.833v
12.0v	24.0v	60.0v	102 sec	2.000v
13.0v	26.0v	65.0v	110.5 sec	2.167v
14.0v	28.0v	70.0v	119 sec	2.333v
15.0v	30.0v	75.0v	127.5 sec	2.500v

Input Voltage Ranges			Time Delay	cut-in/out & delay Tp volts
1-30VDC	2-60VDC	5-150VAC	0-255 Sec	0-5VDC
16.0v	32.0v	80.0v	136 sec	2.667v
17.0v	34.0v	85.0v	144.5 sec	2.833v
18.0v	36.0v	90.0v	153 sec	3.000v
19.0v	38.0v	95.0v	161.5 sec	3.167v
20.0v	40.0v	100.0v	170 sec	3.333v
21.0v	42.0v	105.0v	178.5 sec	3.500v
22.0v	44.0v	110.0v	187 sec	3.667v
23.0v	46.0v	115.0v	195.5 sec	3.833v
24.0v	48.0v	120.0v	204 sec	4.000v
25.0v	50.0v	125.0v	212.5 sec	4.167v
26.0v	52.0v	130.0v	221 sec	4.333v
27.0v	54.0v	135.0v	229.5 sec	4.500v
28.0v	56.0v	140.0v	238 sec	4.667v
29.0v	58.0v	145.0v	246.5 sec	4.833v
30.0v	60.0v	150.0v	255 sec	5.000v

ADJUSTMENT PROCEDURES

1. The cut-in, cut-out and time-delay pot adjustments are measured on the respective test points by a DC voltmeter. The cut-in/out 0 to 5VDC represents 0 to 30VDC, 0 to 60VDC, 0 to 150VAC input signal. The time delay 0 to 5VDC represents 0 to 255 second delay on energize.
2. If the cut-in pot is greater than the cut-out pot 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 point is less than the cut-out point then the relay energizes when the signal voltage drops below the cut-in point and de-energizes when the signal voltage rises above the cut-out point. If the signal voltage differential between the cut-in and cutout adjustments is not at least 0.25VDC in the 0 to 30V range then the relay will not operate.
3. The time delay pots 0 to 5VDC represents 0 to 255 seconds of time delay for the relay to energize on cut-in for either reverse or direct mode. The input signal must exceed the cut-in point for the time delay value or the timing action will start over. The cut-out action is instantaneous.
4. After adjusting the VRDC module, interrupt power to insure that the module operates properly. This re-sets the circuitry.