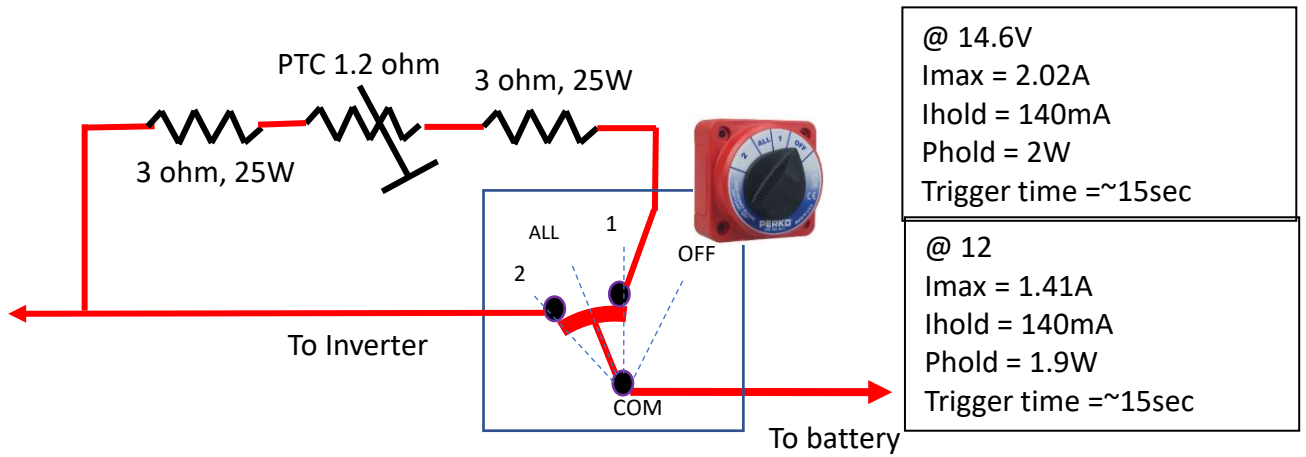
Inverter Disconnect with pre-charge

This circuit is designed as an inverter disconnect that allows the user to pre-charge the inverter capacitors before fully turning on the system.

12V SYSTEM



@ 14.6V
Imax = 2.02A
Ihold = 140mA
Phold = 2W
Trigger time =~15sec

@ 12
Imax = 1.41A
Ihold = 140mA
Phold = 1.9W
Trigger time =~15sec

PTC specs

Bulk Part Number / Taping Part Number	Max. voltage	*1 Resistance Value at+25 ºC	*2 Max. Current	*3 Hold Current +105ºC	*3 Hold Current +85ºC	*4 Trip current -10ºC	*4 Trip current -40ºC	Dimensions (mm) D	Dimensions (mm) H	Dimensions (mm) d
PTGLCSAS1R2K3B51B0	D.C. 51V	1.2ohm±10%	5.0A	315mA	449mA	1168mA	1270mA	11.5	16.5	0.6
PTGLCSAS1R2K3B51A0										

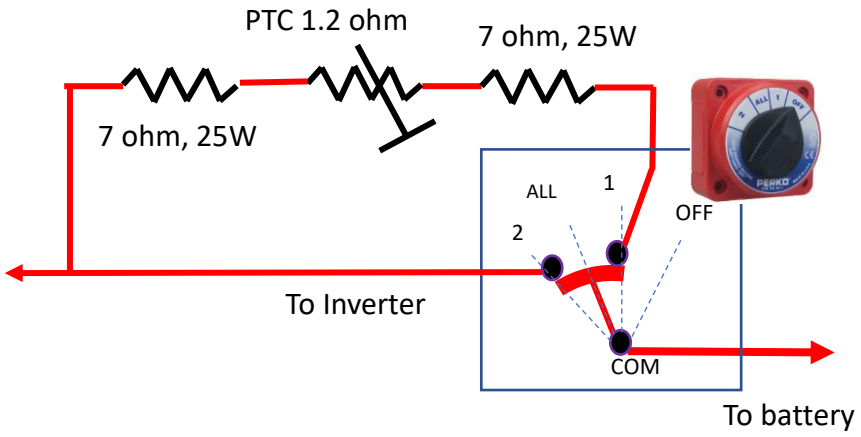
Operation:
Turn ON

1. Ensure inverter is off
2. Turn switch to position ‘1’ for ~1 second
3. Turn switch to position ‘All’ or ‘2’
4. Turn on inverter

Note: The PTC resistor is a safety that covers a miss-use of the switch.
If the user leaves the inverter ‘On’ and the switch in position 1, there may be significant current going through the resistor and over-heating it. In this case, the PTC will heat up first and will significantly reduce the current after several seconds. If the switch is used properly, this should never happen and there will be almost no heat build-up.

An alternative to the PTC is use a single 50W 10 ohm resistor in place of the ptc and two resistors. However, in this case, you might need to mount the resistor on a heat sync external to the switch in order to dissipate the heat in a miss-use condition.

24V SYSTEM



@ 29.2V Imax = 1.76A Ihold = (80mA) Phold = 2.3W Trigger time =~10sec
@ 24.0V Imax = 1.45A Ihold = (90mA) Phold = 2.2W Trigger time =~25 sec

PTC specs

Bulk Part Number / Taping Part Number	Max. voltage	*1 Resistance Value at+25 °C	*2 Max. Current	*3 Hold Current +105°C	*3 Hold Current +85°C	*4 Trip current -10°C	*4 Trip current -40°C	Dimensions (mm) D	H	d
PTGLCSAS1R2K3B51B0	D.C. 51V	1.2ohm±10%	5.0A	315mA	449mA	1168mA	1270mA	11.5	16.5	0.6
PTGLCSAS1R2K3B51A0										

Operation:

Turn ON

1. Ensure inverter is off
2. Turn switch to position ‘1’ for ~1 second
3. Turn switch to position ‘All’ or ‘2’
4. Turn on inverter

Turn Off

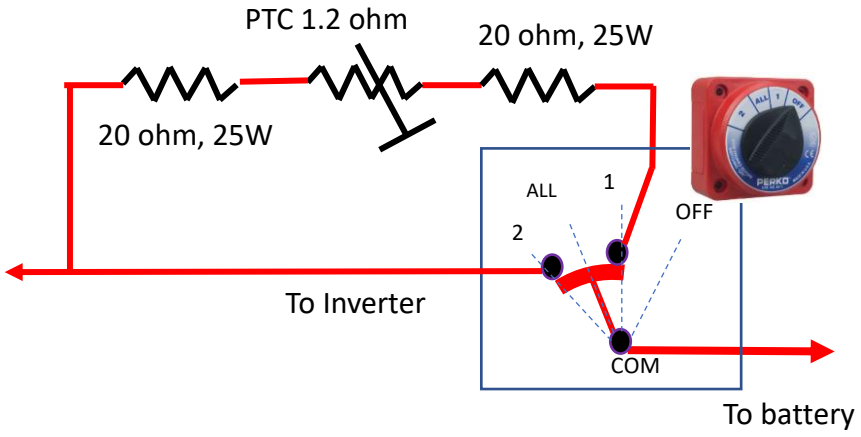
1. Turn off Inverter.
2. Turn Disconnect switch to ‘Off’ position.

Note: The PTC resistor is a safety that covers a miss-use of the switch.
If the user leaves the inverter ‘On’ and the switch in position 1, there may be significant current going through the resistor and over-heating it. In this case, the PTC will heat up first and will significantly reduce the current after several seconds. If the switch is used properly, this should never happen and there will be almost no heat build-up.

An alternative to the PTC is use a single 50W 20 ohm resistor in place of the ptc and two resistors. However, in this case, you would need to mount the resistor on a heat sync external to the switch in order to dissipate the heat during a miss-use condition.

48V SYSTEM

(Warning: I have **not** built/tested this design**)**



@ 58.4V Imax = 1.42A Ihold = Phold = Trigger time =
@ 48.0V Imax = 1.17A Ihold = Phold = Trigger time =

Operation:

Turn ON

1. Ensure inverter is off
2. Turn switch to position ‘1’ for ~2 second
3. Turn switch to position ‘All’ or ‘2’
4. Turn on inverter

Turn Off

1. Turn off Inverter.
2. Turn Disconnect switch to ‘Off’ position.

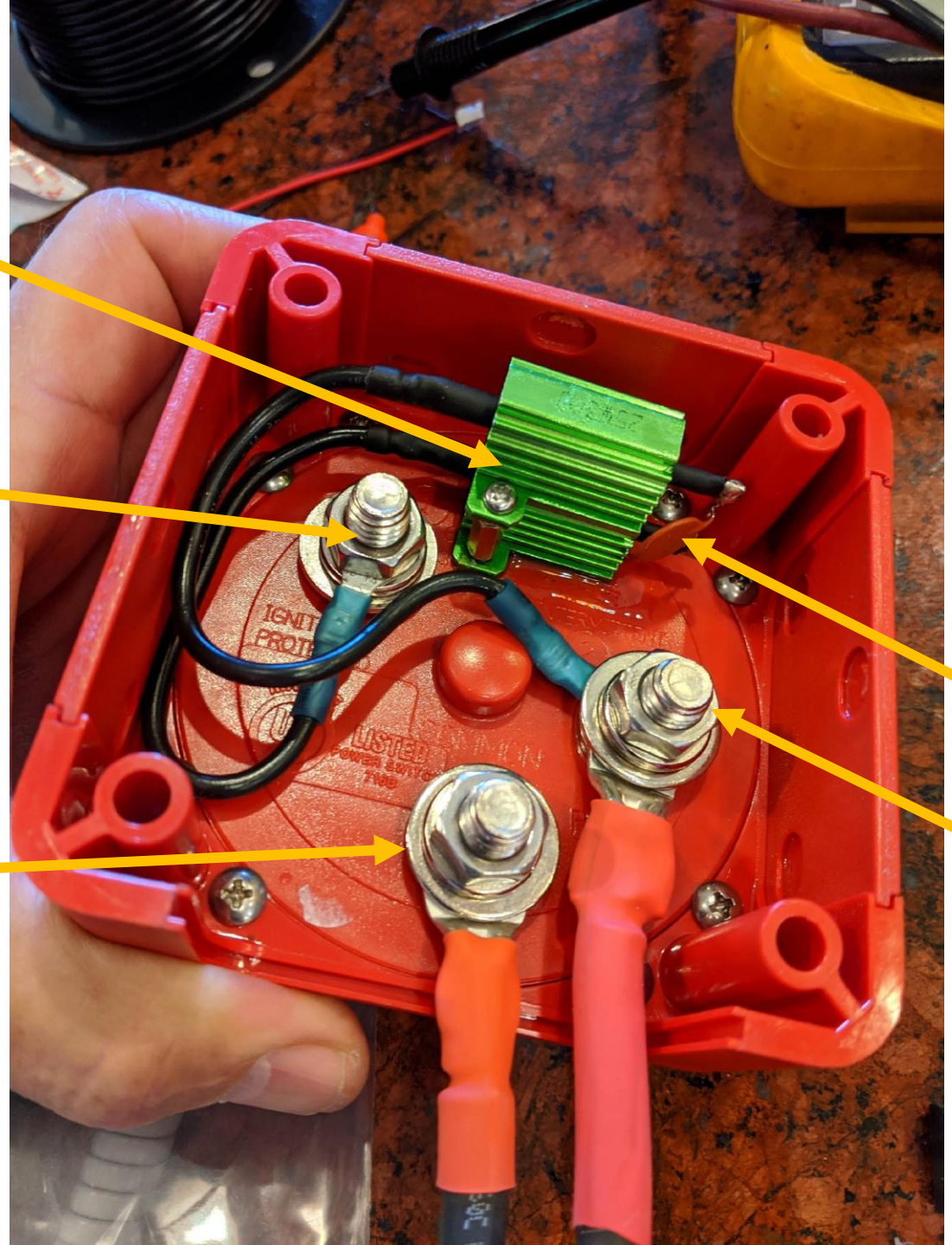
PTC specs

Bulk Part Number / Taping Part Number	Max. voltage	*1 Resistance Value at+25 ºC	*2 Max. Current	*3 Hold Current +105ºC	*3 Hold Current +85ºC	*4 Trip current -10ºC	*4 Trip current -40ºC	Dimensions (mm) D	H	d
PTGLCSAS1R2K3B51B0	D.C. 51V	1.2ohm±10%	5.0A	315mA	449mA	1168mA	1270mA	11.5	16.5	0.6
PTGLCSAS1R2K3B51A0										

Notice that this circuit requires a minimum of .185 amps during ‘ptc hold’ if the user leaves the inverter on and the switch in the ‘1’ position. Otherwise the voltage on the PTC could exceed the spec of the device. The math works out that this should be OK, but I would feel a bit more comfortable with a higher max voltage spec on the PTC.

An alternative to the PTC is use a single 50W 40 ohm resistor in place of the ptc and two resistors. However, in this case, you might need to mount the resistor on a heat sync external to the switch in order to dissipate the heat during a miss-use condition.

Assembly


Two 25W resistors
Stacked and glued
Post 1
Common
PTC resistor
soldered between
resistors
Post 2

Label to help instruct the user

Parts

Perko Switch:
https://www.ebay.com/p/1122213842
Or
https://www.ebay.com/itm/Perko-8511DP-Compact-Battery-Switch-7411/362536682888

PTC Resistor: 1.2ohm, 5 Amp.
https://www.mouser.com/ProductDetail/Murata-Electronics/PTGLCSAS1R2K3B51B0?qs=%2Fha2pyFadujTRLKUrNbfYMT8Oi18lPe7Yz7BN1JQeEARp4ZwI8415G5DFLgXHwgW/

3 ohm 25W resistor (12 V System)
https://www.ebay.com/itm/25W-3ohm-Wirewound-Power-Resistor-Aluminum-Hosing-Chasis-Mount/401838767539

7 ohm 25W resistor (24 V System)
https://www.ebay.com/itm/US-Stock-2x-7-ohm-7R-25W-Watt-Aluminum-Housed-Metal-Case-Wirewound-Resistors/401396173511