

Onstate PEBP2 Battery Protector is a multi-function battery protection and voltage monitoring module. It automatically shuts off power to a load when the power source voltage is below a preset level. The module also monitors the battery voltage by flashing the LED at a preset level and will flash faster as the voltage decreases to give notice to safely shut-off the equipment. Other features include adjustable trigger voltage settings, over-voltage shut-off and photocell on/off control for solar applications. The Battery Protector unit is suitable for unmonitored battery protection for marine, industrial, recreational, or solar applications. The op-amp based circuit using discrete components will provide many years of reliable service.

Features:

- Adjustable low and high voltage shut-off.
- Flashing LED status/level indication.
- Simple design with discrete components.
- Easy-to-use. Simple wiring.
- Automatic operation. Auto shut-off and reset.
- Surge delay sensing.
- Low power consumption.
- Photocell or external sensor on/off option.
- Malfunctioning charger LED indicator option.

Benefits:

- Extends battery lifespan.
- Prevents over discharged batteries.
- Prevents low and high voltage to equipment.
- Maintains reserve power for emergency use.

Applications:

- Marine, boat, car, remote field use, solar
- Battery and load protection
- Voltage protection to equipment.

Technical Specifications (12V model):

Standard recommended settings.

Operating voltage:	10V-16VDC
Low flashing voltage:	12.0V (adjustable)
Low shut off voltage:	11.4V (adjustable)
Low voltage reset:	12.4V (adjustable, $\Delta 0.3-1.2V$)
Over voltage shut off:	14.8V (adjustable)
Over voltage reset:	0.6V lower than over-voltage shut-off (fixed hysteresis)
Output current:	7A with N-CH MOSFET, 10A max. with larger heatsink
Power consumption:	10mA with LED on
LED display:	Red/Green LED, good=amber (red/green), low battery= flashing amber (red/green), over-voltage=red, shut-off=fast flashing red.
Operating temperature:	-35°C to +65°C (-30°F to +150°F)
Vsense surge delay:	~5 seconds
Module dimensions:	1.71" square (43.4mm square, V-score cut.)
Mounting holes:	1.50" square (38.1mm square), 1/8" holes for M3 or #4 bolts.

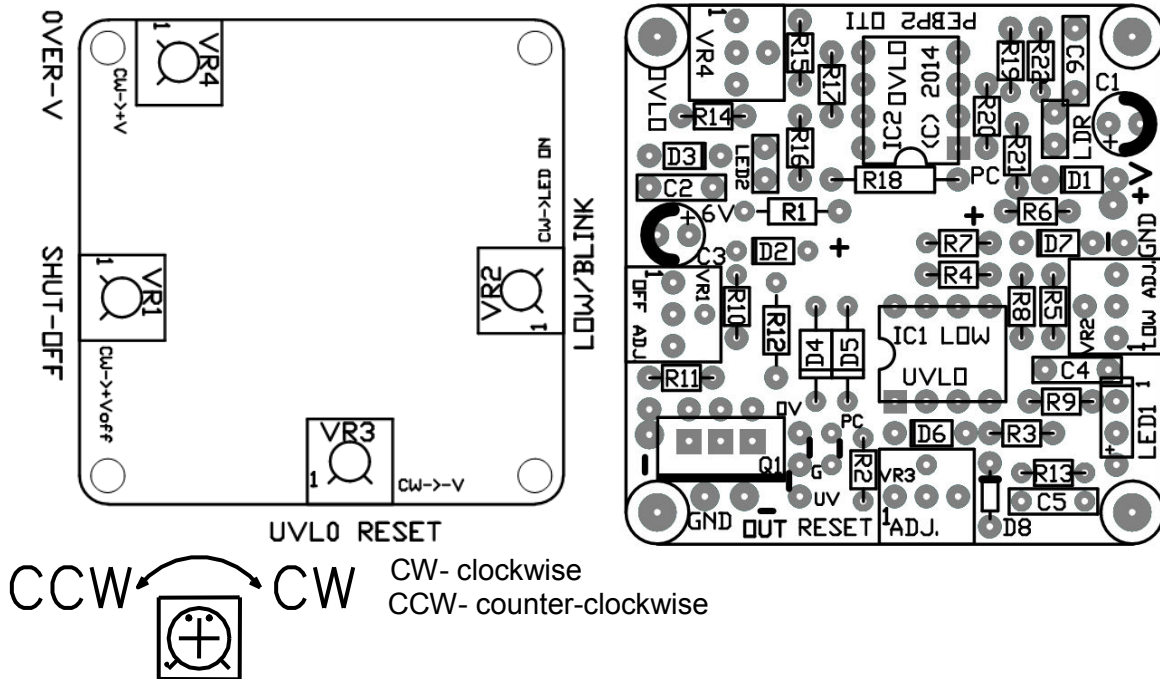
Table 1. List of features of various Battery Protector versions.

12V Models (assemble appropriate parts as required)

Part code	low shutoff adjust (UVLO)	low flashing adjust (LOW)	shutoff reset adjust (PWR ON)	over voltage adjust (OVLO)	N-CH MOSFET output (LOAD)	battery status LED (FLASHING)	PC/Ext sensor ON/OFF (PC)	charging (N-CH, OV OFF)
CIR-PEBP2-12V-1 basic module	X	X	X		7A	GRN		
CIR-PEBP2-12V-2 full module	X	X	X	X	7A	RED/GRN	X	Signal (20mA)

Extra wiring required for 12-2 version. 24V or other voltage versions possible with some components change.

See bills-of-materials (BOM) list for component list.

Adjustments and setup:


VR1-shut off (UVLO), CW to increase shut-off output voltage (+Voff).

VR2-low flashing LED (LOW), CW to decrease low voltage flashing LED voltage. CCW=LED blink.

VR3-reset (UVLO RESET, POWER ON), CW to lower reset voltage (lower ΔV).

VR4-over voltage shut off (OVLO), CW to increase OVLO voltage (+Voff) setting.

NOTE: Solar/PC version with power diodes, add 0.3-0.7V to VR adjustment settings.

Setup: Basic Unit. (Use adjustable power supply and voltmeter)

1. Set VR1=CCW, VR2=CW, VR3 center.
2. Set power supply to shut-off (UVLO, 11.4V) voltage. Wait >5s for Vsense to stabilize. Adj VR1 CW-> until LED trips (fast blinking). Slowly increase input voltage for UVLO reset voltage (~12.4V @VR3 center). Adj VR3 for required ΔV_{reset} . CCW->+ ΔV . VR1/VR3 are dependent. Re-adjust VR1 as required for accurate UVLO.
3. Set input voltage to low flashing (12V). LED should not be flashing. Wait >5s for Vsense to stabilize. Adj VR2 CCW-> until LED starts flashing.

Full version: Set VR1 CCW, VR2 CW, VR3 center, VR4 center

Set power supply to over-voltage shut-off (OVLO, 14.8V). Adj VR4 CW until LED2 is ON. For finer VR4 trim, adjust CCW until LED2 is OFF then slowly adjust VR4 CW until LED2 is ON. Decreasing Vinput will reset OVLO (LED OFF). Follow basic standard version setup for VR1, VR2, VR3.

Select mode control to Q1 gate. UV-G (UVLO), OV-G (OVLO), PC-G (LDR/Ext). A SPST switch can be used as the LDR/PC for manual power ON/OFF control. External sensor ON/OFF control is a voltage comparator circuit.