



Battery Doctor

PRODUCT INFORMATION

The PowerPilot is a precision balancer / discharger for Li-Polymer and Li-Fe batteries between 2 and 6 cells; it measures and displays the voltage of the whole battery and each individual cell. The balance and discharge function matches the individual cells to within $\pm 0.01V$.

The balance function can be used before, during, or after charging to maintain the battery pack in optimum condition. The clear display continually updates with whole battery and individual cell voltages allowing the user to monitor the pack for a faulty or poorly performing cell. A warning feature is included to warn of voltage deviations above 0.2v per cell. To prevent over discharging the user can set the minimum voltage at which balancing can start.

The discharge function can be used to safely discharge all cells in the pack to a safe storage voltage. To prevent over discharging the user can set the discharge cut off voltage.

The PowerPilot can also be used as a precision D.C voltmeter to measure receiver batteries etc by using the receiver battery slot.

WARNING

Please take time to read through these instructions before using the PowerPilot.

Due to the high energy density of Li-Polymer and Li-Fe batteries and their ability to provide high discharge currents, the user must be satisfied that operation of this device can be conducted safely. Consult the battery manufacturer's data sheets for relevant safety warnings.

Overcharging or discharging of batteries can cause permanent damage to the battery, please ensure that voltage limits are set to battery manufacturers recommendations.

SETTING BALANCE AND DISCHARGE LOWER VOLTAGE LIMITS

1. Connect battery to correct port on PowerPilot. The screen will indicate the number of cells, voltage of the battery pack and voltage in each individual cell. Press the 'MODE' button once to display the 'Balance Voltage Limit'
2. Press the _ (Discharge) button to increase the value or the _ (Balance) button to decrease the

value. The balance starting voltage is pre-set at 3.30V and can be user adjusted between 2.50V and 4.20V. Press the mode button again to display the 'Discharge Voltage Set'

3. Press the _ (Discharge) button to increase the value or the _ (Balance) button to decrease the value. The low discharge voltage is pre-set at 3.90V and can be user adjusted between 2.00V and 4.00V.
4. Press the 'MODE' button again to display the start screen.

NOTE

Pressing the 'MODE' key repeatedly scrolls through the Start, 'Balance Voltage Limit' and 'Discharge Voltage Set' displays without altering the settings. The PowerPilot memorises all last set values for voltage limits.

BATTERY DISCHARGE

DISCHARGE FUNCTION DESCRIPTION

On pressing the 'Discharge' button the PowerPilot will automatically register the lowest single cell voltage and then apply a discharge current to each of the higher voltage cells to balance the cell voltage in the pack.

The discharge function will continue until all cells are matched to within $\pm 0.01V$ of the set discharge voltage limit.

1. Connect battery to correct port on PowerPilot. The screen will indicate the number of cells, voltage of the battery pack and voltage in each individual cell. Press 'Discharge' button
2. Discharge mode symbol flashes on screen until battery reaches 'Discharge Voltage Set' value. When discharge mode symbol stops flashing the discharge function is complete.
3. Press 'Cancel' button to return to start screen. Note: pressing 'Cancel' stops the discharge program at any time.
4. At start screen, disconnect battery from PowerPilot

BATTERY BALANCING

BALANCE FUNCTION DESCRIPTION

On pressing the balance button the PowerPilot will automatically register the lowest single cell voltage and then apply a discharge current to each of the higher voltage cells to balance the cell voltage in the pack.

The balance function will continue until all cells are matched to within $\pm 0.01V$.

EG: A balanced battery pack of 3 cells could read 4.14, 4.15 and 4.15V.

The balance function will not start until the voltage in each cell exceeds the 'Balance Voltage Limit'.

The balance function can be use while the battery is being charged but the user must monitor the display for any abnormal voltage or the 'Battery Warning' symbol and stop charging immediately.

1. Connect battery to correct port on PowerPilot. The screen will indicate pack voltage and the voltage in each cell. Press 'Balance' button
2. Balance mode (Scales) symbol flashes on screen until battery reaches set value. The Balancing (discharging) symbol appears at the side of each cell as it is balanced to within $\pm 0.01V$ of other cells.
3. When the cells in the battery are balanced the Balancing (discharging) symbols will switch off. Press 'Cancel' button to return to start screen. Note: pressing 'Cancel' stops the balance program at any time.
4. At start screen, disconnect battery from PowerPilot

VOLTMETER FUNCTION DESCRIPTION

The PowerPilot can measure the voltage of batteries between 1.2V and 8.5V using the receiver battery slot. No Balance or discharge functions are available.

The voltmeter function requires an external DC power source between at the JST slot between 7.4 and 11.1V

FAULT WARNINGS

If there is a variation of 0.2 V or more between any cells in the pack, the 'Check battery' symbol flashes. Cancel all programs / charging and check battery.

A triangle _ identifies the faulty cell or cells.

The PowerPilot will not perform balance or discharge functions when the 'Check battery' symbol is displayed.

DO NOTS!

Do Not discharge cells below their minimum voltage limits.

Do Not leave battery unattended while charging, balancing or discharging

Do Not leave the balancer connected to the battery pack. While it consumes very little power it will eventually drain the pack below its lowest set value.

PRODUCT SPECIFICATION

Dimensions

93.5 X 60 X 17mm

Voltage Limits

Balance ports LiPo - LiFe 2 – 6 Cells
Receiver slot 1.2V – 8.5V

Voltmeter power supply

7.4v – 11.1v JST port

Discharge / Balance current

450mAh @ 4.2v

Discharge Voltage Lower Limit per cell

User adjustable between 2.00V and 4.00V (pre-set at 3.90V)

Balance Voltage Lower Limit per cell

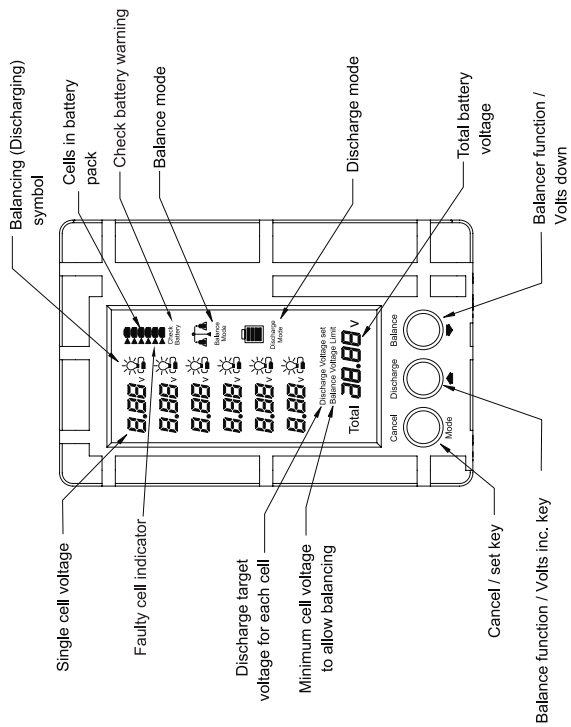
User adjustable between 2.50V and 4.20V (pre-set at 3.30V)

Balance connections

JST-XH



Li-Polymer / Li-Fe Battery Balancer



Balancer screen and key position drawing

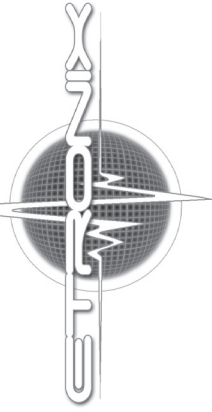
Product instruction:

The Balancer / Discharger is designed for Li-Polymer and Li-Fe battery, it can measure battery voltage precisely and balance cell voltage in battery pack, or discharging battery for long time storage.

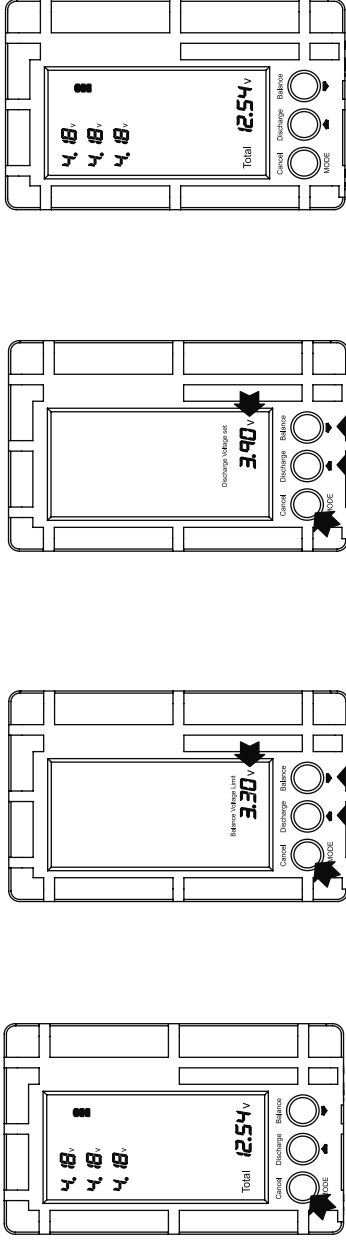
The balance function can be executed before / after battery charged. It also can be done during battery charging process. It makes sure battery pack keeping in excellent condition.

User could observe all cell voltage in whole battery pack at once. It helps user to find out which cell is abnormal during charging or discharging process.

Due to Li-polymer & Li-Fe battery are high energy density and high discharge ability storage, before using this equipment, you must be patient to study this instruction to keep from wrong operation or setting making battery damaged or other danger.



Balance / Discharge voltage setting method:



1. Under standard mode, Push Mode key to start setting mode.

2. First setting balance the lowest permitted voltage, battery must above the voltage, so it can execute balance function.

Push ▲ or ▼ key, it can change voltage setting, after setting then push Mode key into discharge voltage setting (pre-setting value 3.3V, it just only fit for general Li-Polymer battery, about Li-Fe battery please inquiry battery supplier !)

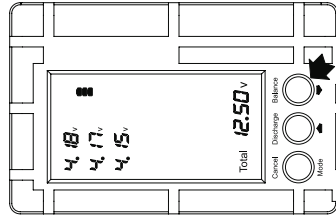
3. While discharging the permitted lowest voltage generally be setted to battery stored voltage, the voltage value, please inquiry battery supplier, Pre-setting is 3.9V(it only fit for general Li-Polymer battery, about Li-Fe battery please inquiry battery supplier.)

Push ▲ or ▼ key, it can change voltage setting, after setting push Mode key and return standard mode.

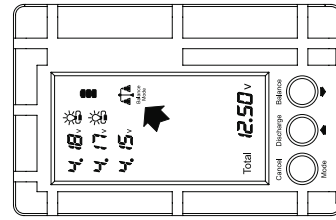
4. Return to standard mode.

P.S. During the setting procedure, if don't want to change the setting value, you can continue to push "Mode" Key to go on next setting mode or return standard mode. While setting the balance voltage or discharge voltage, please be aware not to set the voltage below the permitted lowest voltage, or you may damage the battery due to over-discharge. Please inquire the discharge cut-off voltage from battery supplier.

How start to balance battery?

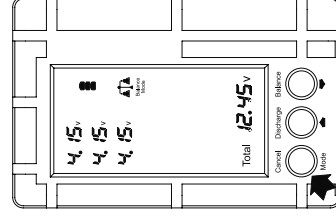


1.Push Balance key.



2.Balancer will take the present lowest voltage battery as a benchmark, start to balance action to battery cell.

They will show flash signal when batter cell working.



3. After balancing, symbol will disappear, then you can push Cancel key to quit balance mode.

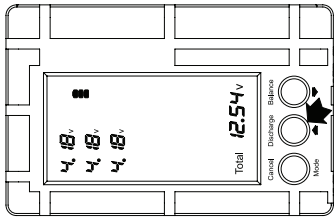
P.S. In balancing, you can push Cancel key anytime to break and back to standard mode.

4. Return to standard mode.

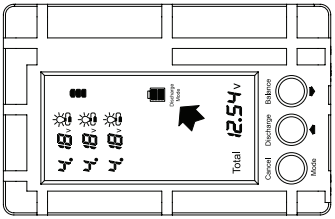
P.S. After push Balance key, balancer will automatically catch the lowest single battery voltage as standard among battery cell and start to execute balance function. Until all battery cell voltage value are equal. (voltage tolerance $\pm 0.01V$ is equal, for example standard voltage 4.15V, after balancing the voltage maybe 4.14V or 4.16V)

The balancer can be used together with serial charger while charging. However, for safety reason, Please watch voltage condition in screen, if the voltage variation looks abnormal or "Check Battery" is appeared, please stop charging immediately in order to avoid danger !!

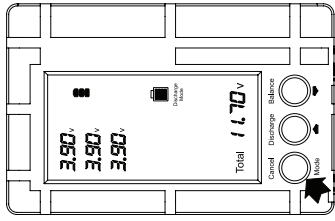
How to start battery discharge?



1. Push Discharge key

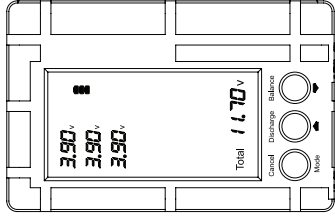


2. Discharge Mode show, symbol start flash, it means start discharge mode.



3. When battery voltage down to above setting value, signal will disappear, it means discharge is finished, push Cancel key to quit discharge mode.

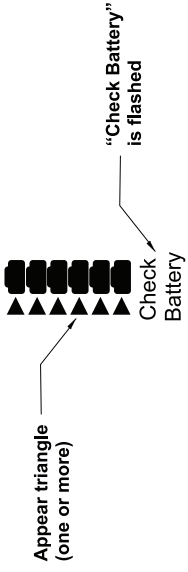
P.S. You can push Cancel key to stop discharge in anytime.



4. Return to standard mode.

P.S. The default setting for discharge cut-off voltage is 3.9 V (single Li-Polymer battery). You may adjust the cut-off voltage by yourself. Please inquiry battery supplier for storage voltage, if you use Li-Fe battery please inquiry supplier and then setting.

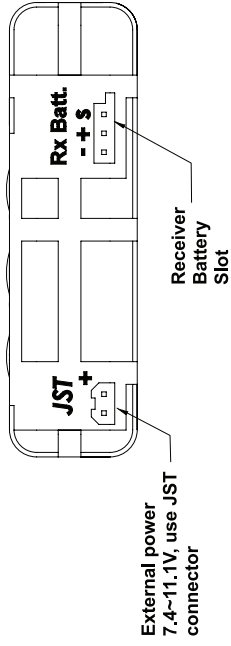
When screen appears below :



When battery voltage is different above 0.2V, The screen will appear "Check Battery", please check your battery !!

P.S. When "Check Battery" appears, it can't balance or discharge.

How to measure receiver battery ??



Balancer can measure voltage of receiver battery (not limit battery type), but have to use external power source !!

P.S. Using slot of receiver battery, no balance and discharge function.

Product specification:

Outline Dimension :

93.5 X 60 X 17 mm

Measureable battery type and amount :

Li-Polymer / Li-Fe 2 ~ 6 Cell
(standard voltage 7.4 V ~ 22.2 V using divided voltage connector)

Receiver battery 1.2 V ~ 8.5V DC

(Not limit battery type, but need external power 7.4~11.1V, use JST connector)

Balance voltage setting range (lower limit) :

2.5 V ~ 4.2 V (pre-setting value 3.3 V)

Discharge voltage setting range (lower limit) :

2.0 V ~ 4.0 V (pre-setting value 3.9 V)

Max. bleeding current :

450 mA (at 4.2V / cell)

Made in Taiwan