

MULTIFUNCTION WATT METER

Thank you for purchasing Libra-METER. Please read this entire operating manual completely and attentively as it contains important information and safety notes, therefore you need to keep this manual in a safe place, and be sure to pass it on to the new owner if you ever dispose of Libra-METER.

Special features

Libra-METER is a very sophisticated electronic device that controlled by high performance microprocessor and precise resistors. It has three functions of 'watt-meter', 'battery checker' and 'self-balancer'. Those functions are essential for electric flyers to ensure safe battery condition and to measure the electric consumptions of the power system. And also, the built-in self-balancer can equalize the individual voltages instantly.

Libra-METER can handle all types of Lithium batteries (LiPo, Lilo, LiFe) consisting of series-wired cells, but the battery pack has to have a balancing plug for checking voltage.

-Watt-meter program

The Watt-meter circuit can measure the electric current up to 100A. You can verify the electric consumptions on your power system.

-Battery checker

Libra-METER can show you the voltage and residual capacity of your Lithium battery pack with its individual voltage of each cells.

-Integrated self-balancer

Libra-METER has an integrated self-balancing circuit which is self-operative without linking to charger. When you connect the battery pack to the individual port of the device the balancing job will be started instantly. In this case the individual cell voltage will be equalized to the lowest cell voltage of the battery pack.

Specifications

Input power:	Max. 60.0V (both on watt-meter and battery checker)
Max. current:	100A (watt-meter)
Min. operating voltage:	6.6V
Current consumption:	20mA at battery checker program
Dimension:	105×57×20mm
Weight:	80g

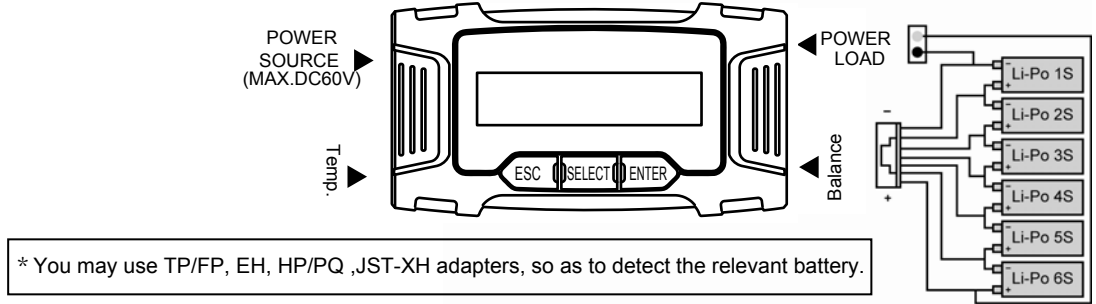
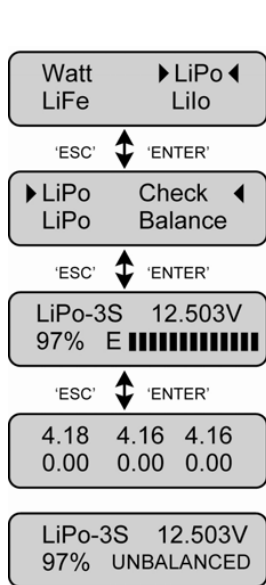
Basic operation

Libra-METER is activated when the battery is connected to the unit. For the battery checker function, connect the battery pack to the individual port via a suitable adaptor board, or connect the battery to the cable of 'Power source' for watt-meter.

Battery checker program

This feature can be used to check the residual battery capacity and the voltage of individual cells.

- Select the program by pressing 'SELECT' button to suit the type of battery which is being measured.
- And press 'ENTER' to go to the next screen.
- There are two programs which are voltage-checking and self-balancing. Select 'LiPo Check' program using 'SELECT' button and press 'ENTER'.



* You may use TP/FP, EH, HP/PQ, JST-XH adapters, so as to detect the relevant battery.

It shows the type of battery and number of cell-count at upper right, and output voltage. At lower line, it displays the residual capacity at percentage and visual graph.

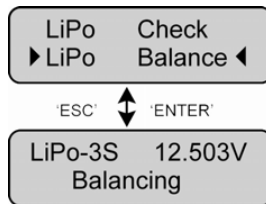
The individual voltages are shown from the first cell at upper right.

If the voltages are out of balance, it warns and shows the voltage difference from the highest to lowest one. You need to let them balance, or check the cells and cables carefully.

Self-balancing program

This program can equalize the individual voltages to their lowest one.

- Select the matched type of Lithium battery using 'SELECT' button.
- And press 'ENTER' to start balancing.



As the balancing job goes on, you can see the individual voltage by pressing 'ENTER' button. When the balancing job is completed, the beep sounds 20 times. (You can set the beep sound 'OFF' by pressing 'SELECT' button for more than three seconds. Or you can set it 'ON' by doing the job again. The default is 'ON'.)

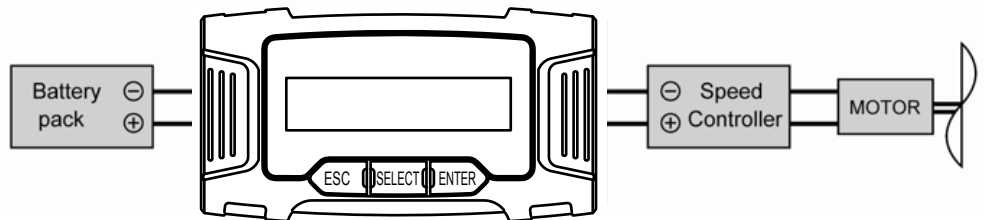
To protect the battery from the over-discharge, there are minimum voltage to be balanced for each type of Lithium batteries. If any individual voltage is lower than the limit, there shows an error message. LiPo/Lilo: 3.0V, LiFe: 2.0V.

Watt meter program

The measurement screen continuously displays Amps, Volts and Watts. All other measured values are presented sequentially, every two seconds, in the "Data-Queue" position of the display. Data values are identified by their units (Ah, Wh, Ap, Vm, Wp). All measurement screen values are updated every 0.4 seconds.

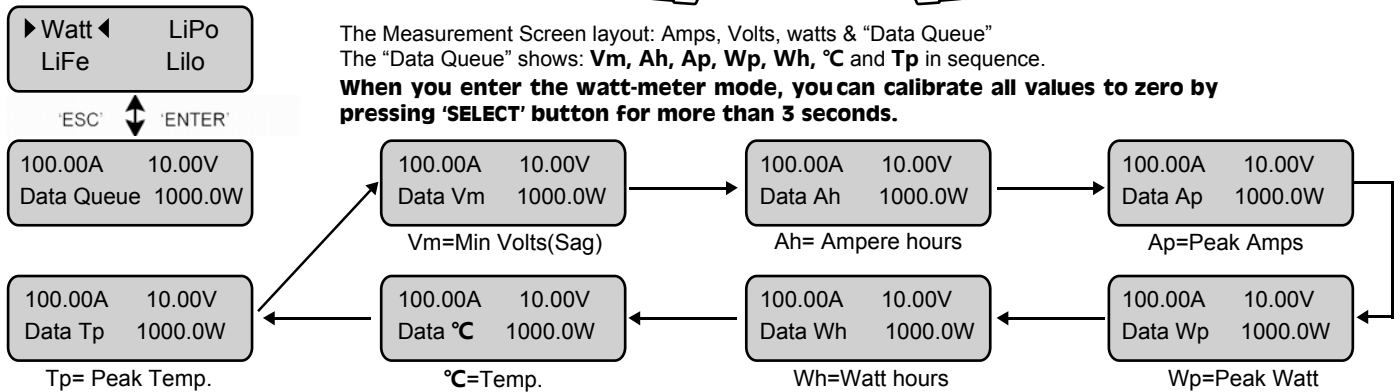
- Select the 'Watt' program by pressing 'SELECT' button.
- And press 'ENTER' to start to measure.

Beware of rotating propeller, when you check the motor with propeller. For maximum safety, hold the motor on a test bench tightly, and wear a safety eye protection and hand gloves.



The Measurement Screen layout: Amps, Volts, watts & "Data Queue"
 The "Data Queue" shows: Vm, Ah, Ap, Wp, Wh, °C and Tp in sequence.

When you enter the watt-meter mode, you can calibrate all values to zero by pressing 'SELECT' button for more than 3 seconds.



1) (Voltage) Volts & Minimum Volts V, Vm

The displayed volts is the average voltage over the last screen update interval. The displayed Minimum Volts value (Vm) is the minimum voltage(or" sag") measured on the SOURCE side, since the startup screen ended. The Volts value is measured on the SOURCE side.

2) (Charge) Amp-hours Ah

The displayed value is the total charge in Amp-hours ($\times 1000 = \text{mAh}$) delivered since the startup screen ended. It is measured on the LOAD side. For accurate results, be careful not to interrupt the SOURCE connection to the Watt Meter during a charge measurement.

3) (Current) Amps & Peak Amps A, Ap

Only current from SOURCE to LOAD is measured. Amps value displayed is the average current over the last screen update interval. Peak Amps value (AP) displayed is the maximum current drawn from the LOAD side, since the meter's startup. Peaks lasting only a fraction of a second, can be captured. Supplying the auxiliary power with a voltage greater than the meter is measuring removes the meter's operation current from measurements. To reduce meter heating, measure currents over 65 Amps for reduced time and consider using connectors which can handle large current.

4) (Power) Watts & Peak Watts W, Wp

The displayed value is the average power delivered in watts ($= \text{Volts} \times \text{Amps}$) over the last screen update interval. The displayed Peak Watts value (Wp) is the maximum power drawn on the LOAD side, since the startup screen ended. Watts values are measured on the LOAD side.

5) (Energy) Watt-hours Wh

The displayed value is the total energy delivered in Watt-hours since the startup screen ended. It is measured on the LOAD side. For accurate results, be careful not to interrupt the SOURCE connection to the Watt Meter during an energy measurement.

6) Temperature Function

Check the temperature probe's connection firstly.
 Measure temperature range: $-10 \text{---} 120^\circ\text{C}$

Error Messages

Battery check program

'UNBALANCED' – There are voltage difference more than 0.05V between the highest and lowest voltages of individual cells. 'HIGH VOL' – The voltage of any peculiar cell is higher than the safe value-LiPo: 4.24V, LiFe: 3.65V and Lilo: 4.14V. 'LOW VOL' – The voltage of any peculiar cell is lower than the minimum safe value-LiPo: 3.00V, LiFe: 2.50V and Lilo: 3.00V.

Self-balancing mode

'CELL LOW VOL' – The voltage of cell is too low.
 'CELL HIGH VOL' – The voltage of cell is too high.
 'CELL CONNECT' – There are bad connections on cable or connectors.

Lithium battery notation

	nominal voltage	max. charge voltage	min. discharge voltage
Lilo	3.6V/cell	4.1V/cell	2.9V/cell or higher
LiPo	3.7V/cell	4.2V/cell	3.0V/cell or higher
LiFe	3.3V/cell	3.6V/cell	2.0V/cell or higher

Warranty and service

We warrant this product for a period of one year (12 months) from the date of purchase. The guarantee applies only to such material or operational defects, which are present at the time of purchasing the product. During that period, we will repair or replace without service charge any product deemed defective due to those causes. You will be required to present proof of purchase (invoice or receipt). This warranty does not cover the damage due to wear, overloading, incompetent handling or using of incorrect accessories.

Date of purchase:
Dealer: