

## 1 SAFETY PRECAUTIONS

**CAUTION:** Shorting a rechargeable battery or a Watt's Up connected to a rechargeable battery can supply huge currents, causing fire, explosions, personal injury, and damage to equipment. Ensure that all wiring and connections are rated to handle the input or output current, and are properly assembled for each application.

### 1.1 Input Voltage & Current Handling Limitations

The Watt's Up is designed to be safe in systems using less than 60 V and carrying 50 A continuous, 100 A peak currents. **CAUTION:** Exceeding these limits will damage the Watt's Up and may cause personal injury.

## 2 DISPLAY SCREEN

### 2.1 Startup Screen

Each time Watt's Up is reset or power is applied across the meter's leads (or auxiliary power connector) a startup screen with firmware revision number is briefly displayed and peaks, minimums, Ah & Wh are reset to 0. Then the display changes to the measurement screen.

RCE v2.0

### 2.2 Measurement Screen

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.

The Measurement Screen layout: Amps, Volts, Watts & "Data Queue"

100.00A	10.00V	The "Data Queue" shows: Ah, Wh, Ap, Vm, Wp in sequence.
Data Queue	1000.0W	

#### 2.2.1 (Current) Amps & Peak Amps A, Ap

Only current flowing through the black wires from LOAD to SOURCE 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. Watt's Up circuit operation draws a small current (7 mA) from the meter's SOURCE side

v 1.9

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connections. This additional current can usually be ignored and the SOURCE side current be considered equal to the LOAD's current. Powering the auxiliary connector with a voltage ~1 V greater than the meter is measuring removes the meter's operation current from measurements.

#### 2.2.2 (Voltage) Volts & Minimum Volts V, Vm

The displayed Volts value 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.

#### 2.2.3 (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.

#### 2.2.4 (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's measured on the LOAD side.

#### 2.2.5 (Power) Watts & Peak Watts W, Wp

The displayed value is the average power delivered in Watts (= Volts X 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.

## 3 WIRING, CONNECTIONS & APPLYING POWER

**Warning:** Loose connections can damage meter and cause inaccurate measurements! Verify there are no exposed wires or connectors that may short circuit before connecting a battery or power source to the Watt's Up. User is responsible for attaching connectors rated to handle the voltage and current expected in user's application. Only use female connectors on batteries. Qualified individuals should make any high current connections. Only switch power between meter & LOAD. Remove power between meter and battery last. Remove loads (especially inductive loads) first. Connect red wire to Positive (+) battery or voltage source terminals and black to Negative (-). By connecting an auxiliary power source (e.g. a receiver battery) of 4-60V to the 3-pin connector, the meter can measure down to 0 V. Pin 1 (farthest from SOURCE wires) is Negative and 2 (middle) is Positive. Use pushbutton between pin 3 and negative to reset meter's readings when closed.

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## 4 USING Watt's Up

You can connect the Watt's Up like a set of jumper wires and measure what they're connected to. Like jumper wires, the Watt's Up is essentially a direct connection (short) between same colored SOURCE and LOAD wires, i.e. both the SOURCE and LOAD leads are electrically "hot" when a battery is connected to either side. All current of the circuit to be measured must flow through meter's black wires in LOAD to SOURCE (forward) direction. Voltage to be measured must connect to either of the red wires (3-wire connection). Two red wires are provided as a wiring convenience for "jumping" source to load terminals, but only one red is really necessary for the meter's measurements. **Reverse current flow in black wires is neither measured nor causes any damage.**

**Example use #1:** Battery on SOURCE side, Motor Speed Controller (ESC) and motor on LOAD side. With the ESC on, the Watt's Up shows the current into the motor, voltage and power at the battery and accumulates the Ah and Wh while the motor is running. **Example use #2:** with a battery charger on the SOURCE side and battery pack on the LOAD side, the Watt's Up shows the charging current into the battery, the voltage and charging power at the battery and accumulates the charge (Ah) and energy (Wh) into the battery.

## 5 USER'S MANUAL & SUPPORT

We recommend all users download and read the **complete Watt's Up manual** from our website. The website also has **FAQ's** on our products and examples of **meter applications** and **connection diagrams**.

For problems or questions unanswered in the product manual or our website FAQ, you can contact RC Electronics, Inc. for further assistance.

Thank you for purchasing a RC Electronics, Inc. product!

Email: [rc\\_support@rc-electronics-usa.com](mailto:rc_support@rc-electronics-usa.com)

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## "Watt's Up" Watt Meter and Power Analyzer

Measures EIGHT parameters key to electric power safety & performance.

Use it to: Prevent peak currents damaging battery, motor control, motors, wiring and connectors. Verify sufficient operating voltage under load. Set cutoff voltages, check battery capacity & health. Balance battery cells. Confirm proper battery charger operation. Detect stalled servos. Compare and select components for best performance and much more!

### KEY FEATURES (visit our website for more information)

- Measures: charge (mAh), Amps (A), Voltage (V), Watts (W) and energy (Wh) with peak currents up to 100 A at 60 V
- Measures peak Amps, peak Watts and minimum Volts (sag)
- Easy to use and no computer is required.
- 1% typ. accuracy & precise with 0.01 A and 0.01 V resolutions
- Aux. connector allows meter reset and measurement down to 0 V
- Small & light: 2.8" L x 1.7" W x 0.83" D, 2.3 oz.
- Heavy gage, super-flex, stranded, high-temp silicone insulated wire
- Doesn't affect measured circuit's performance. Precision 0.001 Ohm current sensing resistor and circuitry that draws only 0.007 Amps
- Powerful, 8 MIPS microprocessor. Uses DSP to increase ADC resolution and differential measurement to increase noise immunity
- Rugged - Made in USA to ISO 9001 (test equip.) quality standards
- One-year warranty. Factory calibrated. Complete user's manual

### SPECIFICATIONS (best combination of features and specs on the market!)

- Operates from 4 V-60 V, 0 V with optional auxiliary battery
- Measures 0-100 A peak, res. 0.01 A ; 0-60 V, res. 0.01 V; 0 6554 W, res. 0.1 W; 0-65 Ah, res. 0.001 Ah; 0-6554 Wh, res. 0.1 Wh
- 16x2, sharp LCD display

opt: Electric Blue

p/n: WU100-B

