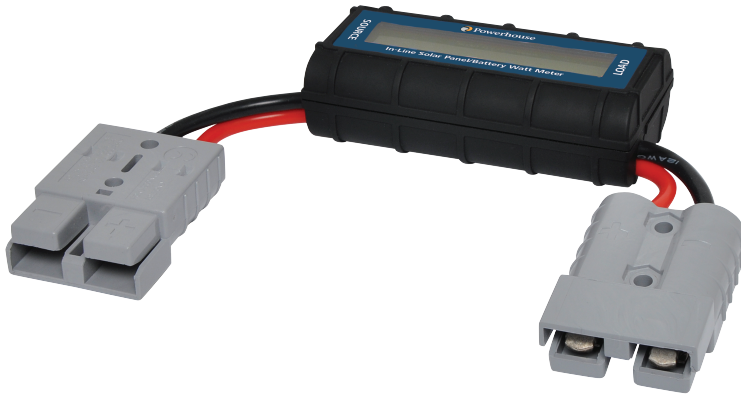# Powerhouse

# 200A In-Line Solar Panel/Battery Watt Meter
# OPERATING INSTRUCTIONS



**OVERVIEW**
The perfect solution for measuring input and output currents and wattage from solar panels or batteries. This watt meter accurately measures DC power usage. The display measures volts, watts and amps in real-time. The device also has a data scroll of eight key electrical parameters which reset every time the meter is powered off. Ideal for monitoring the output of solar panels or current draw from DC appliances such as portable fridges, lighting etc. 50A anderson style connectors provide an easy in line connection to the supply and load.

**SPECIFICATIONS**
Operating voltage: 8-60V
Measures: 50A continuous. 200A (Max - 1min)
　　　　0-60V, resolution 0.01V
　　　　0-6554W, resolution 0.1W
　　　　0-65Ah, resolution 0.001Ah
　　　　0-6554Wh, resolution 0.01W
Display: 16x2 backlit LCD screen
Dimensions: 85x42x25mm
Weight: 82g

**FEATURES**
• Operates 8-60V DC
• Ideal for 12V or 24V DC electrical systems
• Displays volts, amps, watts and average watts
• Backlit LCD Screen
• Anderson style connectors for easy connection
• Use with fridges, solar panels, dual battery systems and battery packs.

## 1. SAFETY PRECAUTIONS
CAUTION: Shorting a rechargeable battery or Watt Meter 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 Handing Limitations*
The Watt Meter is designed to be safe in systems using less than 60V and carrying currents up to 130A.
CAUTION: Exceeding these limits will damage the Watt Meter and may cause personal injury.
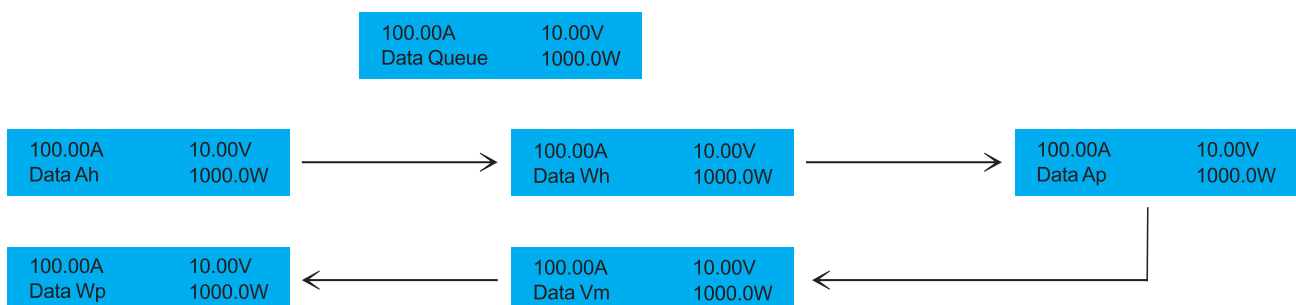
## 2. WIRING, CONNECTIONS & APPLYING POWER
Warning: Loose connections can cause component damage! Only switch power between meter & LOAD. The Red SOURCE wire goes to positive(+) battery or other device terminals and black to Negative(-). User is responsible for attaching connectors rated to handle the voltage and current expected in user's application. Ensure all connections are firm and secure to avoid arcing. Verify there are no exposed wires or connectors that may short circuit before connecting a battery or power source to the Watt Meter. Only use female connectors on batteries.

## 3. DISPLAY SCREEN
*3.1 Startup Screen*
Each time power is applied across the Watt Meter Leads (or auxiliary power connector) a startup screen with Logo is briefly displayed and peaks, minimums. Ah & Wh are reset to 0. Then the display changes to the measurement screen.

| 100.00A | 10.00V |
|---|---|
| Data Queue | 1000.0W |

| 100.00A | 10.00V |
|---|---|
| Data Ah | 1000.0W |

→

| 100.00A | 10.00V |
|---|---|
| Data Wh | 1000.0W |

→

| 100.00A | 10.00V |
|---|---|
| Data Ap | 1000.0W |

| 100.00A | 10.00V |
|---|---|
| Data Wp | 1000.0W |

←

| 100.00A | 10.00V |
|---|---|
| Data Vm | 1000.0W |

←

## 3.2 Measurement Screen

The measurement screen continuously displays Amps, Volts and Watts. All other measured values are presented sequentially, every 2s, in the "Data-Queue" position of the display. Data values are indentified 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" The "Data Queue" shows: Ah, Wh, Ap, Vm, Wp, in sequence.

### 3.2.1 (Current) Amps & 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) display 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.

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

The display Volts value is the average voltage over the last screen update interval, The displayed Minimum Volts value(vm) is the Minimum voltage (or "say") measured on the SOURCE side, since the startup screen ended. The Volts value is measured on the SOURCE side.

### 3.2.5 (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.

### 3.2.4 (Charge) Amp-hours Ah

The displayed value is the total energy in Amp-hours (x1 000=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 an charge measurement 3.2.4 (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.

## 4. WATT METER

The Watt Meter is essentially a direct connection 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. Current flows from SOURCE to LOAD Make sure connections are secure to prevent component damage! Example use #1: Battery on SOURCE side, Motor Speed Controller(ESC) and motor on LOAD side. With the ESC on, the Watt Meter 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 Meter 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. FUNCTIONS '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, cheek battery capacity & health. Balance battery cells. Confirm proper battery charger operation. Detect receivers and actual operating current so as to make sure whether an UBEC is needed.