

The TriMetric

MODEL TM-2025 BATTERY SYSTEM MONITORS

Measures Battery volts, Amps, Amp-hours, Battery % full, Watts and more.

If your R/V, home or boat depends on batteries for electrical power, here's why a battery system monitor should be part of your electrical system.



Two versions available

Above: TM2025-A. Shown in Wiremold™ "double gang" box (not included). Panel Size: 4.5 x 4.75 in.

Left: TM-2025-RV: Includes box shown. Size: 3.0 x 4.25 inches.

CONSERVATION

Helps save valuable energy by letting you see how much you're using.

- Shows "amps" or "watts" to educate users about how much energy different electrical loads draw.
- Check that all loads are really off when you think they're off.
- Check for "phantom loads"—small loads that steal power 24 hours per day.
- Keep informed about how much energy you have left in your battery system.
- Reduce generator use by knowing when you can efficiently shut it off because batteries are approaching full charge.

BATTERY CARE

Provides information you need to protect your battery investment

Know when to turn on your generator to avoid damage from over discharge.

- Check that all charging systems are charging to correct voltage for longest life.
- Be reminded not to let batteries go too many days between a full charge.

SYSTEM MAINTENANCE

Helps locate system problems when they occur.

- Monitor solar arrays, and inverter/chargers to be sure they are *still* charging at proper rates and voltage
- Find out if batteries are still holding energy properly.
- Even if you're not an expert, a dealer or other knowledgeable person can more easily help you "by phone" to locate a problem if you have a monitor on your system .
- Data recorded by the TriMetric can help diagnose some system problems.

The TriMetric Battery System Monitor...

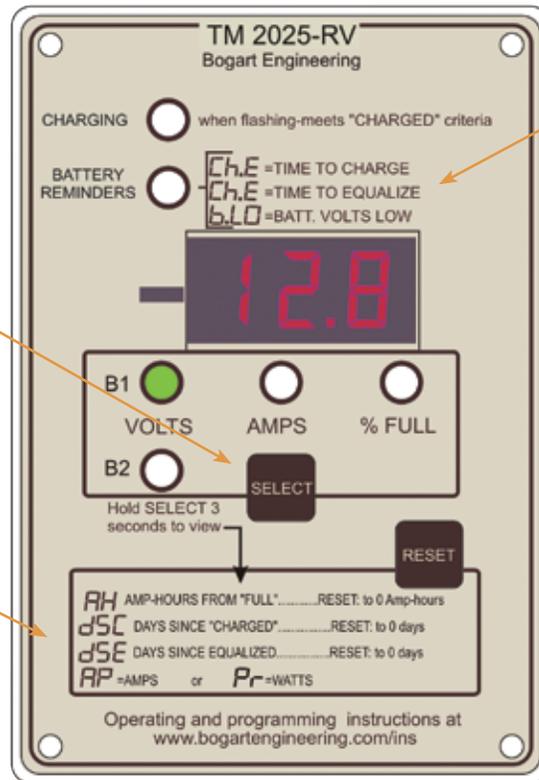
The information you need for better battery care, energy conservation, and system maintenance! Measures battery volts, amps watts, and amp hours.

SELECT

Push SELECT to switch from Volts Batt2, Volts Batt1, Amps, % Full and display off.

LESS USED DISPLAY OPTIONS

Select four other display options when SELECT is pushed down for three seconds.



“BATTERY REMINDERS”

can be set (if desired) to

- (1) notify you if batteries have not been fully charged within a number of days you designate.
- (2) remind you to equalize batteries after the number of days you specify.
- (3) notify if battery volts drops below a "low voltage" set point.

Illustration shows the TM-2025-RV Monitor.

The TM-2025-A (not shown) has identical controls and nomenclature, but is slightly wider with a different color scheme. It is designed to fit in a standard "double gang" electrical box.

OPERATION AND SPECIFICATIONS

Main data functions:

push **SELECT** to cycle through these:

Battery volts of main and secondary batteries:

Reads Battery volts 10.0-65.0V accurate to $\pm 0.2\%$ ± 1 least significant digit. For battery systems with nominal volts from 12 to 48V. Volts (only) can be read for optional second battery.

Battery amps (or watts) on main batteries:

You can choose to use either “amps” or “watts” to register the energy going in our out of the battery. Amps are accurate to $\pm 1\%$ ± 1 least significant digit. Or the meter may be set up to measure only incoming energy from solar array or other energy source, or only load amps or watts if desired. Resolution and maximum amps depends on choice of required shunt. (See last page for diagram). With the 100A/100 mV shunt: measures 0.01 to over 70 amps. With 500A/50mV shunt measures from 0.1 to over 400 amps. Speed of response: 1 second time constant.

Battery % full:

This number is based on net-amp hour reading divided by the user programmable value of battery capacity. This is more accurate than other methods which do not use amp-hours to compute battery energy content (for example less expensive monitors which rely only on battery voltage to estimate energy content). It shows a percentage from 0 to 100. The assumed BATTERY CAPACITY, upon which this display is based, can be programmed from 10-10,000 amp-hours.

Display off:

The display may be turned off (to darken display and for lowest current draw of 16 milliamps.)

For more details on TM-2025 operation, or for Installer's and User's instructions, go to our website:
www.bogartengineering.com

EXTRA DATA

Hold SELECT button down for three seconds—then push SELECT to cycle through these 4 functions.

The data alternates with identifier letters which are shown on front label.

Amp Hours from “full”:

Shows actual “net” amp-hours removed from the battery from ± 0.01 to $\pm 80,000$ amp-hours. A flashing decimal point reminds you to multiply the reading by 1000 when the Amp-hour number exceeds 999. It is also possible for this display to measure only total amp-hours produced by an energy source, such as solar array, or only load amp-hours, by wiring the shunt in the desired current path.

Days ago since batteries were last fully charged:

To prolong their life, lead-acid batteries shouldn't go too long between being fully charged. This display will show you how long since they last received a full charge—measures from 0.01 day to over 600 days. If desired a “battery reminders” lamp will flash to alert the user when this number exceeds a value programmable by user from 1 to 60 days.

How many days ago since the battery was equalized:

It is often recommended that “wet cell” lead acid batteries should be periodically given an overcharge, called “equalization,” to maintain their capacity. This is typically done every month or two. It's easy to forget how many days since they were last equalized—this timer will keep track for you. You will need to reset this number manually whenever you equalize the batteries. If desired the “battery reminders” lamp will alert you when this number exceeds a user adjustable “maximum equalize time” from 1-250 days.

Watts or Amps:

This “extra data” display shows whichever one was not chosen for the “main data”.

OTHER DETAILS AND FEATURES

A proven measurement circuit with added features.

The TriMetric measurement circuit has proven accurate and reliable for over a decade. Newer features include improved lightning protection, easier programming, some data logging and measurement of watts. All programmed information retained when meter unpowered.

Now choose three levels of operation.

Defaults to Level 1 for most users to keep operation simple. Level 2 and 3 add logged data and additional flexibility for more technical users.

May be located up to 100 feet (30 m) from batteries.

Connect with four AWG 22 (.644 mm²) wires. Up to 300 feet (90 m) with AWG 18 (.823 mm²) wire. Longer distances are possible with larger wire size.

Bright display with low current draw.

Requires about 30 milliamps with display on—about 16 milliamps with display off.

Battery system size:

For 12-48V nominal system voltages. Battery system size: 10 to 10,000 amp hours.

Serial Data Output: Technical users can access all real time data via serial data output

Logged data: The TriMetric records some system data that is intended to help verify that your system is working OK and that the settings on the meter are correct. Information from these can help a technician to diagnose some system problems.

For the last five discharge/charge cycles:

- Length of time (hours) between full charges.
- Hours ago since each full charge occurred
- System efficiency: how many amp-hours lost per cycle.
- Minimum battery % full value
- Minimum volts reached during each charge cycle

For the last 5 days:

- Maximum voltage achieved
- How close to “charged” the batteries got.

Cumulative battery amp-hours:

- Records only discharging amp-hours—displays to minus one million amp hours. This function acts like an odometer in a car, to show how much total chemical change the battery has seen in its life.

Size:

TM2025-RV:

3.2 x 4.3 x 1.4 inches, (8.2 x 11 x 3.6 cm) enclosure included.

TM-2025-A:

4.5 x 4.75 x 0.9 deep (inches) (11.4 x 12 x 2.3 cm.)

Panel only, designed to fit into many “double-gang” electrical boxes, mounted 90 degrees from the usual position.

BATTERY MONITOR ACCESSORIES

Choice of two shunts for use with TriMetric battery Monitor: Choose one of the following shunts for making the “Amps” and Amp-hour measurement as shown in photo below.

- **500Amp-50 mV shunt:**

For systems with maximum current 400 Amps continuous with no overloads, or 300 Amps continuous with up to 5 minute overloads to 500 Amps max. It allows Amps readings as low as 0.1 amps. Suitable for most systems with moderate or large sized inverters. Size 3-1/4 by 1-3/4 inch base, 1-7/8 in high. (8.3 x 4.4 x 4.75 cm)

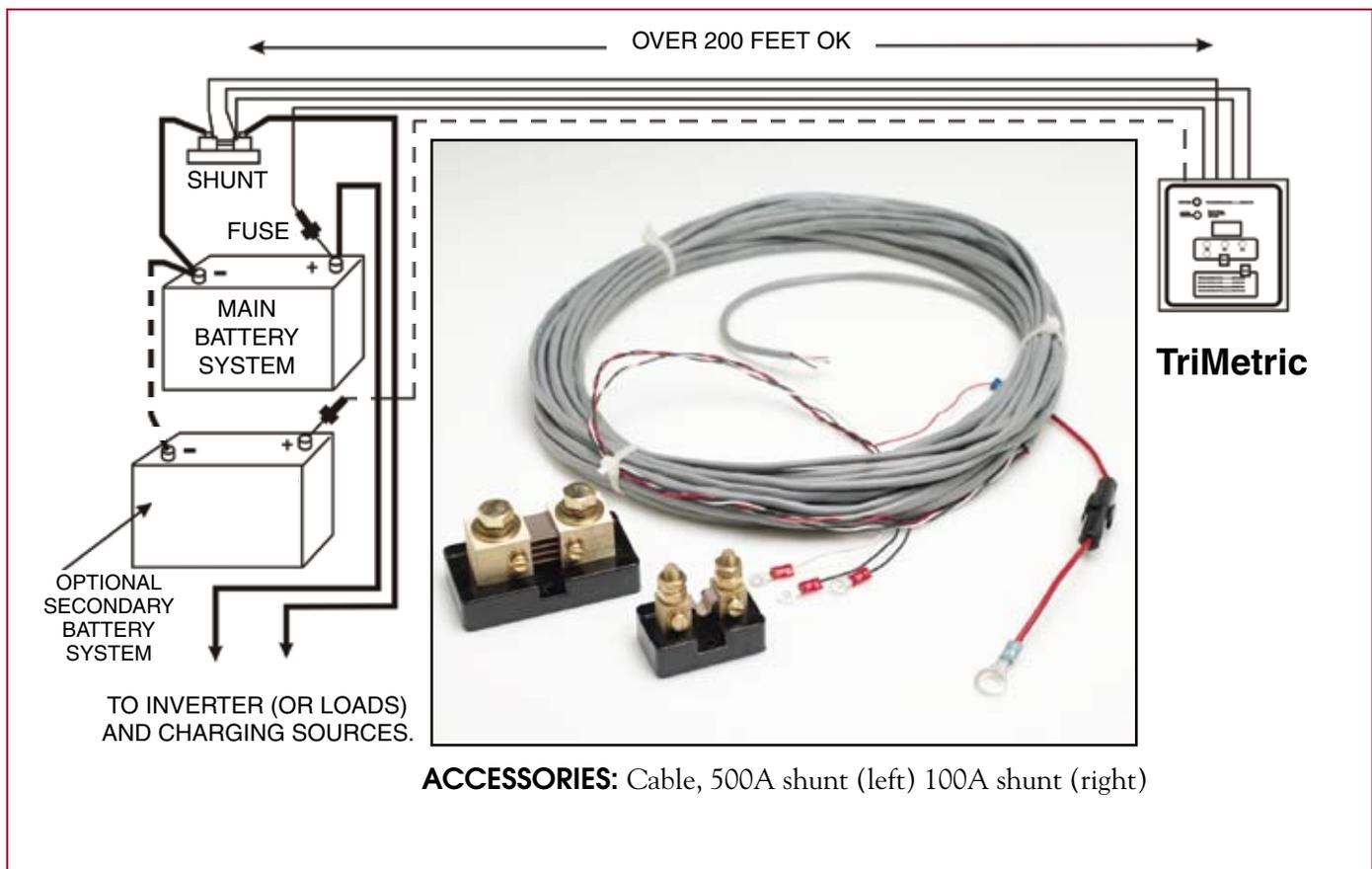
- **100 Amp-100 mV shunt:**

For systems with maximum current 70 Amps continuous with no overloads, or 50 Amps continuous with overload to 100 Amps for 8 seconds max. Suitable for small systems, or for most applications where you want to measure only solar or wind input current. It allows “Amps” readings as low as 0.01 amps.

Cable for connecting meter to shunt:

#22 gauge 4 wire twisted pair.

35 foot or 50 foot (10.5 m or 15 m) versions. With 3 small ring connectors for connection to shunt, in-line fuseholder and large ring connector for connection to battery + terminal.



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