

# BATTERY MONITORING SYSTEMS

About the only real maintenance necessary on a photovoltaic system is to the battery bank. And probably the easiest way to keep track of your battery bank's health is by monitoring its voltage. Paying close attention to your battery bank voltage, especially for the first few months you own it, will go a long way to increasing its life and keeping your system working properly.

We offer several types of monitoring systems, from a simple voltmeter to a much more elaborate battery monitoring system. Many of the charge controllers come with monitoring LED's. While these are somewhat useful, they can be confusing at times. We strongly recommend getting, and using (!), some sort of voltage monitoring equipment on you system.

We include a Battery Care Sheet with almost everything we sell. We now include a Battery Book with any battery bank or system purchased from us. Either of these will instruct you on how to use a voltmeter to monitor your system, and what the various voltmeter readings mean.

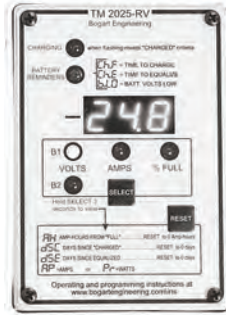
One last note: even though you may have a system voltmeter or monitor, a hand held digital voltmeter (DVM) comes in real handy to measure individual batteries within the bank. This type of voltage measurement is a quick way to check the status of each battery and hence insure the entire bank is working correctly.

## Tri-Metric Battery Monitor

369-006 Model 2025-RV \$169

The Tri-Metric is a high quality digital meter which monitors three major battery functions:

- Volts
  - Amps
  - Amp-Hours
- 6 other parameters:
- How many days since the batteries were fully charged
  - How many amp-hrs from full charge
  - Days since equalized
  - Total charge removed since batteries were fully charged
  - Minimum Battery Volts
  - Maximum Battery Volts
- and 3 battery reminders:
- Time to charge full
  - Time to equalize
  - Battery volts low



It works on 12, 24 and 48 volt systems . Pushing a button on the front panel selects which function will be seen on its LED display. The display draws only .02 amps and can be switched off if desired. Other LEDS indicate a fully charged battery or one that is being charged. Voltage readings are accurate to 0.1 volt between 8 and 35 VDC.

The Tri-Metric meter requires either a 100 amp or 500 amp shunt. The Tri-Metric meter is accurate to 3% using either shunt, but the 100mA shunt gives an extra digit of resolution on current readings below 100 amps. Most inverters, however, require more than 100 amps, so most everyone will need the 500 amp shunt.

Total amp-hours can be measured from +999 to -999 within 3%. A net discharge causes the meter to add amp-hours to its total while a net charge causes amp-hours to be subtracted. When the adjustable "charge criterion" is met the amp-hour meter resets itself to zero. This criterion is set by the user depending on battery bank and charging system type.

## PentaMetric System Monitor

369-009 Pentametric Input Unit \$199

369-010 Pentametric Display Unit \$179

369-011 P-M Computer Interface \$89

The PentaMetric System monitor has the capability of working on 12V to 48V systems with the ability to measure current from three sources (shunts). It measures volts, amps, amp-hours, watts, watt-hours, temperature and battery % full. It also can perform data logging functions and output the data to a spreadsheet. Amp hours, Watt hours, Temp.max/min, Volts, Amps and Battery % full can be recorded from once a day up to once a minute. Also included is a battery voltage triggered relay (up to 1A) and audible and visual alarms.



The PentaMetric System consists of three major components: an Input unit, a Display unit and a computer RS232 Interface unit. For USB operation an RS232 to USB adapter would be required. Software for Windows is provided.

The Input works with either the Display, the RS232 Interface or both. A rather extensive set of installation instructions is provided with the System and both the software and Instructions are kept up-to-date on the Bogart Engineering website ([www.bogartengineering.com](http://www.bogartengineering.com)).

This is now the System Monitor to get for anyone wanting to achieve complete monitoring and control of and stand-alone alternative energy system.



PentaMetric RS-232 Computer Interface

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## Remote Shunts

- 368-002 100 Amp, 100 m, Shunt \$23  
 368-003 500 Amp, 50 mV Shunt \$28

One of these shunts will be needed with the Tri-Metric Monitor. A shunt is a highly calibrated, very low resistance resistor, which is placed in series (in line) with the wire carrying the current to be measured. Usually a shunt is placed in the negative line near the battery, such that all the current going into and out of the battery must go through it. Instructions for shunt installation are included with the Tri-Metric



## Shunt Cable

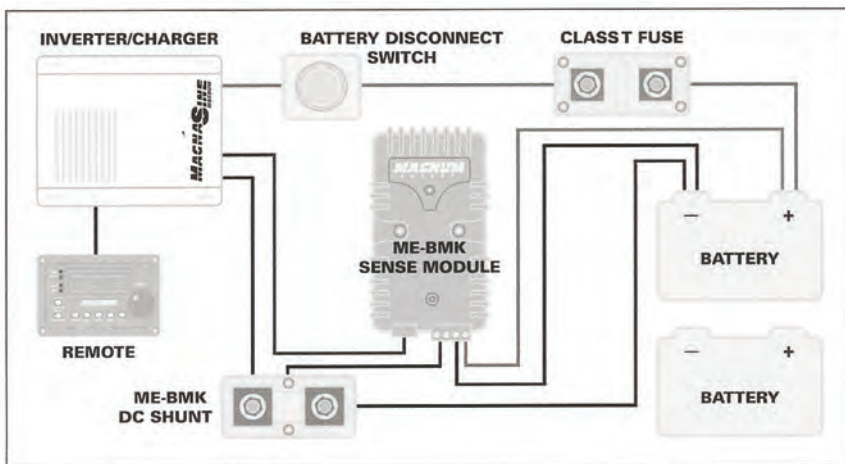
- 369-008 Meter-to-Shunt Cable \$25.00  
 22 ga., 50 feet long

One end of this cable is prepared for fastening to the shunt. The other end is attached to the terminal strip in the Tri-Metric meter.

## Magnum Battery Monitor Kit

- 747-007 ME-BMK-NS \$209

Monitoring your battery bank is easy with the Battery NMonitor Kit from Magnum Energy. Acting as a "fuel gauge" for your batteries, the ME-BMK monitors their state of charge and then provides this information in an easy-to-understand display via the ME-ARC remote. The ME-BMK-NS requires the Magnum ME-ARC50 remote and a 500A shunt to operate. Usually this monitor is used in conjunction with a Magnum inverter system.



## Kill A Watt™ Power Meter

- 369-121 Kill A Watt™ Power Meter \$29



This power meter monitors the power used by any appliance plugged into it. Simply plug the Kill A Watt™ into an outlet and plug the appliance (up to 1800 watts) into it. A large LCD display counts consumption by the kilowatt-hour just like utility companies. It keeps a running total of kilowatts used until you reset it. It also monitors line voltage, load current, line frequency, watts, volt-amps and power factor. This meter will help you figure out just what size solar you might need.

## Brand Electronics Power Meter

- 369-120 Model 4-1850 (was \$149.95) \$49.00

The Brand power meter can measure devices requiring up to 1850 watts. It keeps track of kilowatt-hours, average monthly cost, and instantaneous watts being used. For arriving at an average monthly cost figure, you must enter in your cost per kilowatt-hour.

Use of the device is simple: just plug the 4-1850 into the wall outlet and plug the device you want to measure into it.



## Sears Digital Multimeter

- 369-003 Model 82141 \$25

The Sears 82141 features all the major functions—AC and DC volts, Ohms and Amps - including a 10A range. The 10A range allows you to test short circuit current of a module or small array. The meter includes a plastic protective holster, test leads and is powered by a 9 volt battery which we include. We highly recommend owning a digital multimeter even though you may have other system monitoring devices. It allows you to check the voltage of individual batteries in your bank and makes trouble-shooting your system a lot easier.

