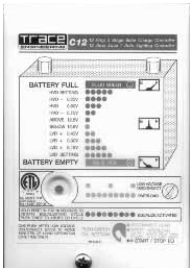
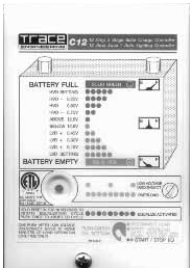
Charge Controls

Charge controllers, or voltage regulators, protect batteries from becoming overcharged or discharged which can severely shorten battery life. Charge controls which operate with Pulse Width Modulation (PWM) technology are built with 100% solid state circuitry. This makes them much more efficient and long-lasting than those using simple on-off charge switching, but they cost more. Electronic circuitry in a regulator measures battery voltage, which rises as the battery state of charge increases. At a determined voltage, which will differ from one battery type to another, and at different battery cell temperatures, the regulator will begin to reduce the charge into the battery. When charging stops, the battery voltage will begin to fall. At a preset lower voltage, the regulator will allow charging to resume. Regulators for photovoltaic, wind and water power systems perform the same function as voltage regulators in automobiles, but they do it in different ways. Automobile regulators will not work at all as a battery charge controller in renewable energy power systems.

Xantrex Charge Controllers



C12



C35

C40 / C60

Xantrex charge controls are very versatile and can work as load controllers, or as diversion controls for solar, wind and small hydro electric power systems, or as three-stage charge controllers for solar electric systems. Regardless of the charging source, Xantrex makes the right control to suit virtually any application. A range of optional features make these charge controls even more versatile and user friendly. Xantrex charge controls and multifunction charge-load diversion controls are all covered by two year warranties.

C12

The Xantrex C12 Charge/Lighting/Load controller is unique in that no other controller offers three-stage charging, user definable voltage parameters, and automatic battery equalization. Standard in the load control circuitry of the C12 are field adjustable low voltage disconnect and reconnect points, along with a five minute low battery disconnect warning. The C12 also functions as a lighting controller. Run time of the lights is adjustable from 2 to 8 hours or they may be set to run from dusk to dawn.

C35, C40, & C60

The C Series has long been the mainstay of Xantrex's charge controller line-up. It is field configurable for 12, 24 or 48 volt DC operation, and can be used as a charge or diversion or load controller. In addition to the standard multi-color charge status LED, the C40 offers an optional cumulative amp hour meter. This meter can either be installed on the face of the controller (DVM) or remotely up to 50 feet (15 m) away with the DVM. An optional battery temperature sensor (BTS) for these controllers ensures precise battery charging regardless of outside temperature fluctuations. The C Series is designed for use with solar electric, hydro electric, wind generator, PV/wind hybrid, and telecommunications power systems. Features include: silent, Pulse Width Modulated (PWM) microprocessor control (maximizes battery life), field-adjustable voltage and battery type set points, electronic protection against short-circuit overload, over temperature, and reverse polarity conditions.

20-105	**Xantrex C12, 12 Amp Charge/Load Control 12 Volt**	**$144**
20-111	**Xantrex C35, 35 Amp Charge Control 12/24 Volt**	**$162**
20-106	**Xantrex C40, 40 Amp Charge Control 12/24/48 Volt**	**$219**
20-116	**Xantrex C60, 60 Amp Charge Control 12/24 Volt**	**$274**
20-115	**Battery Temperature Sensor for C12, C40**	**$ 39**

Charge Controls

MORNINGSTAR corporation

This sophisticated line of charge controls for PV systems incorporate micro-processor control for constant voltage pulse-width modulation to make maximum use of valuable PV power. They have automatic equalization, temperature compensation and are very efficient. All of the ProStar controllers can be used with 12 volt and 24 volt systems with sealed, gel-electrolyte or wet-cell lead acid batteries. Optional front panel LCD indicates when the batteries are being charged and relative battery state-of-charge. Automatic low voltage disconnect (LVD) for the batteries is current-compensated to prevent false disconnect when the battery is heavily loaded.

Morningstar Tristar

Morningstar's Tristar Controller is a three function controller that provides reliable solar battery charging, load control or diversion regulation. The controller operates in one of these modes at a time and two or more controllers may be used to provide multiple functions.

20-820	**Tristar 45 amp, 12/24//48 Volt**	**$252**
20-821	**Tristar 60 amp, 12/24/48 Volt**	**$334**
20-822	**Digital Meter**	**$159**
20-823	**RTS**	**$ 49**

Tristar & ProStar Product Features:

- Pulse Width Modulation (PWM)
- 3 stage charging & equalizing
- Short Circuit and reverse polarity protection
- High Voltage and high temperature disconnects
- Lightning and surge protection
- Low Voltage Disconnect (LVD)
- manual disconnect
- automatic recovery

Morningstar ProStar Charge Controls

There are models for 15 and 30 amps of PV arrays outputs @12 or 24V and 15 Amps @ 48V. All of the ProStar controls are available with optional LCD display of battery voltage and PV array charging current and a manual PV disconnect. 5 Year Warranty.

20-810	**ProStar 15 Amp Control**	**$145**
20-830	**ProStar 30 Amp Control**	**$193**
20-811	**ProStar 15 A w/LCD meter**	**$229**
20-831	**ProStar 30 A w/LCD meter**	**$264**
20-832	**RTS**	**$ 49**

Morningstar SunSaver Charge Controls

This is another line of quality charge controls from Morningstar. Sunsaver's battery charging design closely copies the Prostar's advanced charging algorithm and offers many of the advantages of the Prostar for smaller 12 volt, 1 to 3 module systems, at reduced costs. Low voltage disconnect (LVD) models available with 10 & 20 amp ratings. .

Constant voltage PWM charging is a proven advancement compared to the common on/off PV regulators. Sunsavers are field-selectable for sealed or flooded batteries. A rugged anodized aluminum case and epoxy-encapsulated electronics ensure durability and longevity. Two year warranty. A temperature compensation sensor in the charge control varies full charge voltage with temperature. They have LED charging and LVD indicators. Available in 24 volt models, add approximately $15.00.

20-840	**SunSaver 6 Amp Control**	**$ 69**
20-841	**SunSaver 10 Amp Control**	**$ 78**
20-842	**SunSaver 10 Amp w/LVD**	**$ 97**
20-843	**SunSaver 20 Amp w/LVD**	**$142**

Morningstar Sunsaver SunLight Charge/Lighting Control

SunLight has all the features of the Sunsaver 10 amp control. It has a rotary switch that allows it to turn on the loads after dusk for 2, 4, 6, 8 or 10 hours periods. It also has the option to turn loads on at dusk, off and on again before dawn, and you can choose the following settings (in hours): 3/off/1, 4/off/2, 6/off/2. On from dusk to dawn is also available. A test button turns lights on for 5 minutes. Maximum load current is 10 amps.Available in 24 volt, add approximately $15.00

20-848	**SunLight 10 Amp/12V**	**$149**
20-849	**SunLight 20 Amp/12V**	**$191**

Charge Controls

MidNite Solar

The BRAT

The Brat is simply the most versatile solar controller in its class. The Brat is a finely-tuned solar PWM charger capable of providing up to 30 Amps of charging current, with class-leading lighting and load control features including one-of-a-kind Solar Clock.

Rain-proof out of the box, and supporting dead-battery charging and low-voltage load disconnect, The Brat is perfect for outdoor, marine, RV, and unattended remote applications.

The Brat doesn't skimp on features, including temperature-compensated charging, manual and 30-day automatic equalize, and at an affordable price too!

20-614	**MNBRAT, 30A PWM charge/load controller**	**$158**

Phocos

ECO-N-T Series (10-20 A)

Phocos' ECO-N-T is a cost effective solution for many challenging solar applications. Its compact size allows it to fit well in small spaces. The industrial grade ECO-N-T is fully encapsulated, which protects the circuit board from corrosion. This unit also features UL and other certifications, proving it is a robust charge controller that will perform well in a variety of harsh environments.

Product Features

- Same model can be used in 12 or 24 V systems
- Rugged housing with corrosion-resistant screw terminals
- Simple 3-LED system status interface
- Install only requires a flathead screwdriver
- **UL1741/Class I Div. 2 certified**

20-201	**ECO-N-10T, 10A, 12/24V PWM charge/load controller**	**$ 79**
20-202	**ECO-N-20T, 20A, 12/24V PWM charge/load controller**	**$109**

CIS-N Series (10-20 A)

The CIS-N was especially developed to deliver optimum performance in industrial PV systems in demanding environments. It features 4-stage, series-switching PWM charge regulation and is fully programmable via infrared devices (CIS-CU or MXI-IR and CISCOM software).

The CIS-N includes convenient and advanced lighting control, which allows the user to decide whether they want the automatic lighting control with LED dimming to be time or low-voltage activated.

UL1741/Class I Div. 2 certified

20-204	**CIS-N-10-1.1, 10A, 12/24V PWM charge/load controller**	**$110**
20-202	**CIS-N-20-1.1, 20A, 12/24V PWM charge/load controller**	**$126**

Enerwatt

EWC 10/30

The Enerwatt EWC-10 is a very simple but effective 10 Amp PWM charge controller, for 12 Volt batteries. It can be set for sealed or flooded lead-acid batteries. A display is included that shows battery Voltage.

The Enerwatt EWC-30 is a high-performance controller with PWM function for top battery charging. LCD screen for precise reading of voltage and charge coming from solar panel. It can be mounted on any surface or fitted into the wall. Also allows you to select battery charge mode for flooded or sealed batteries.

LED indicator shows when solar panel is functioning, and five LEDs indicate if battery is charging or fully charged.

20-980	**EWC-10, 10A, 12V charge controller w/display**	**$ 79**
20-981	**EWC-30, 30A, 12V charge controller w/display**	**$128**

MPPT Charge Controls

Maximum Power Point Tracking (MPPT) technology increases charge current up to 30% or More! MPPT controllers increase charge current by operating in a manner that allows the PV module to produce all the power of which it is capable. The controller continually calculates the module's maximum power voltage, and then operates the module at its maximum power voltage to extract maximum power. The higher power extracted from the module is then provided to the battery in the form of an increased charge current. MPPT charge controls are rated by their output, therefore your arrays amperage must be 25%-30% lower than the controllers output to achieve the increased charge current. MPPT controllers allow you to use a higher output voltage PV array with lower voltage battery such as charging a 24 VDC battery with a 48 VDC PV array. This reduces wire size requirements and power loss from the array to the battery location. A doubling of PV input voltage allows a given wire size to run four times as far.

Blue Sky Energy

Solar Boost MPPT Charge Controllers

The Blue Sky Solar Boost features reverse-polarity protection, MPP tracking and selectable charge voltage for flooded and gel lead-acid batteries. An equalize function periodically conditions liquid electrolyte lead-acid batteries. An optional user-friendly digital display is available to monitor PV charge performance. The display shows battery voltage, solar current, charge current and charge mode, either in the controller, as a remote panel installed up to 300 feet away, or both. Optional temperature compensation of charge voltage is also available to further improve charge controller and battery performance. Solar Boost controllers available with or without digital display and optional remote display. 5-year warranty

Solar Boost 2000E

This 25-amp solar charge controller is for 12-volt systems. It mounts in a 5-11/16" x 3-15/16" cut-out and is wired from the rear. This controller is very popular in RV installations. Optional box allows surface mounting

20-952	**Blue Sky Solar Boost 2000E, 20 Amp, 12V only**	**$319**
20-957	**Blue Sky Solar Boost Battery Temperature Sensor, 20'**	**$ 49**
20-958	**Blue Sky IPN Remote LCD Display, 25'**	**$159**

Blue Sky IPN Controllers

Solar Boost 3024i and 2512iX charge controllers include load control outputs. These controllers can also serve as lighting controllers with complete flexibility over post-dusk and pre-dawn ON time settings. An IPN-ProRemote is required to enable and configure dusk-to-dawn lighting control. The IPN-ProRemote does not need to remain with the system and can be used as a setup tool only.

Solar Boost 3024iL

SB3024iL is designed to charge 12- and 24-volt battery systems from a 24-volt array (maximum open circuit voltage is 57). Maximum charge current is 40 amps output at 12 and 30 amps at 24 VDC. The new IPN network interface coordinates multiple controllers and shares temperature sensors and display.

Solar Boost 2512i-HV and 2512iX-HV

The low-cost Solar Boost 2512i-HV provides a fully automatic 3-stage charge controller system. A partial IPN network interface is also included to allow use of the IPN-Remote or IPN-ProRemote displays.

Additional features provided in the Solar Boost 2512iX-HV include automatic or manual equalization, battery temperature sensor input, full IPN network compatibility, lighting control and an auxiliary output. The user-configurable auxiliary output can serve as either a 25-amp load controller or a 2-amp auxiliary battery charger. The auxiliary battery charge feature is ideal for charging a separate battery such as the engine battery in an RV.

Controllers w/Integrated Power Net (IPN) capabilities:

20-970	**Solar Boost SB3024iL 40A/12V - 30A/24V (w/o display)**	**$499**
20-971	**Solar Boost SB3024iL w/display**	**$539**
20-974	**Solar Boost SB1524iX 15A/24V w/load control**	**$269**
20-975	**Solar Boost SB2512i-HV 25A/12V for higher voltage modules**	**$312**
20-976	**Solar Boost SB2512iX-HV 25A/12V for higher voltage modules**	**$349**
20-977	**Solar Boost SB3000i, 30A, 12V, flush mount w/digital display**	**$398**

MPPT Charge Controls

OutBack: FM60/80

Rated for up to 60 amps of DC output current, the OutBack FM60 can be used with battery systems from 12 to 60 VDC with PV open-circuit voltage as high as 140 VDC. The FM60 setpoints are fully adjustable to allow use with virtually any battery type, chemistry and charging profile. The OutBack FM60 allows you to use a higher output voltage PV array with a lower voltage battery – such as charging a 12- or 24-VDC battery with a 48-VDC PV array. This reduces wire size and power loss from the PV array to the battery/inverter location and can maximize the performance of your PV system. Array size can be up to 750 watts when charging a 12-volt battery, 1,500 watts when charging at 24 volts and 3,000 watts when charging at 48 volts.

The FLEXmax80 (FM80) is the latest innovation in Maximum Power Point Tracking (MPPT) charge controllers from OutBack Power Systems. Its innovative MPPT algorithm is both continuous and active, increasing your renewable energy yield up to 30%. Thanks to enhanced cooling, the FM80 can operate at its full 80-amp maximum current rating in ambient temperatures as high as 104°F (40°C). Array size can be up to 1,000 watts when charging a 12-volt battery; 2,000 watts when charging at 24 volts; and 4,000 watts when charging at 48 volts.

Both controllers come standard with an easy-to-use-and-understand display of PV system performance. The 4-line, 80-character backlit LCD display is also used for programming and monitoring of the system's operation. They come with standard 5-year warranty with a 5-year extension available.

FM60

20-960	**OutBack FM60, 12/24/48 VDC, 60 Amp**	**$ 675**
20-961	**OutBack Remote Temperature Sensor**	**$ 49**
20-962	**OutBack FM80, 12/24/48 VDC, 80 Amp**	**$ 780**

Xantrex: XW-MPPT60-150

The Xantrex XW Solar Charge Controller incorporates a dynamic MPPT algorithm designed to maximize energy harvest from the PV array. Features: Integrated PV ground-fault protection; communicates settings and activity to other Xanbus-enabled devices, such as the XW Hybrid Inverter/Charger, the XW Systems Control Panel, XW Autogenstart and other XW Solar Charge Controllers; ultra-reliable, convection cooled design does not require a cooling fan. Large, aluminum, diecast heat-sink allows full output current up to 45 C without thermal derating, indoor enclosure; 5-year warranty.

20-965	**XW-MPPT-60-150**	**$ 869**
20-966	**XW-MPPT-80-600**	**$1,956**

Morningstar: SunSaver MPPT

Morningstar's SunSaver MPPT (15 Amps at 12/24 volts) solar controller with TrakStar Technology is a maximum power point tracking battery charger for off-grid photovoltaic (PV) systems. It is designed for 12V and 24V battery charging from PV modules with a maximum open circuit voltage of 75W. It can be used with 200W of PV when charging 12V and up to 400W when charging a 24V battery. The controller features a smart tracking algorithm that maximizes the energy from the PV and also provides load control to prevent over discharge of the battery. The SunSaver MPPT is well suited for both professional and consumer PV applications. Its charging process has been optimized for long battery life and improved system performance. 5-year warranty.

Features include:
- Temperature compensation
- Compatible with high voltage PV modules and all battery types
- Records 30 days of PV system data logging
- Operating temperature range: -40°C, +60°C
- Converts 36V or 24V to 12V
- Epoxy encapsulated
- User adjustable settings
- Efficient MPPT tracking and four stage charging
- System status LEDs

20-851	**SunSaver MPPT-15L**	**$359**
20-852	**RM-1 Remote meter w/30' cord (for MPTT and SureSine)**	**$164**

MPPT Charge Controls

Morningstar TriStar MPPT Controllers

Morningstar's *TriStar MPPT* solar controller with TrakStar Technology™ is an advanced maximum power point tracking (MPPT) battery charger for off-grid photovoltaic (PV) systems up to 3kW. The controller provides the industry's highest peak efficiency of 99% and significantly less power loss compared to other MPPT controllers.

The TriStar MPPT features a smart tracking algorithm that maximizes the energy harvest from the PV by rapidly finding the solar array peak power point with extremely fast sweeping of the entire I-V curve. This product is the first PV controller to include on-board Ethernet for a fully web-enabled interface and includes up to 200 days of data logging.

		TS-MPPT-45	TS-MPPT-60
• Maximum Battery Current		45 amps	60 amps
•NominalMaximumSolar Input	12 Volt	600 Watts	800 Watts
	24 Volt	1200 Watts	1600 Watts
	48 Volt	2400 Watts	3200 Watts

20-828	**TriStar TS-MPPT-30, incl. Remote Temp. Sensor**	**$ 574**
20-824	**TriStar TS-MPPT-45, incl. Remote Temp. Sensor**	**$ 695**
20-825	**TriStar TS-MPPT-60, incl. Remote Temp. Sensor**	**$ 869**
20-826	**TS-M-2 Digital Meter for TS-MPPT**	**$ 159**
20-827	**TS-RM-2 Digital Remote Meter for MPPT**	**$ 194**
20-855	**Meter Hub Hub-1**	**$ 162**
20-856	**EIA-485/RS-232 Communications Adaptor RSC-1**	**$ 83**
20-871	**TriStar TS-MPPT-60-600V-48 w/RTS**	**$1,984**
20-872	**TriStar TS-MPPT-60-600V-48 w/RTS & Disconnect**	**$2,380**

Morningstar Prostar-MPPT Controllers

The NEW ProStar MPPT™ is a mid-range MPPT solar charge controller with TrakStar Technology™ that provides maximum power point tracking (MPPT) battery charging for off-grid photovoltaic (PV) systems up to 1100 watts. This device is ideal for industrial and residential applications. A Wire Box for ProStar MPPT accessory to reduce hazards associated with exposed wires and connections can be purchased separately.

Features:

- Load and automatic PV-based lighting control
- Charges all battery types including Lithium Ion
- Continuous charging and no damage from PV array oversizing
- Up to 256 days of data logging
- Built-in self diagnostics
- Highly durable polycarbonate case
- Low noise design
- MODBUS communications
- Meter allows charging and temperature control adjustments without a computer

20-835	**PS-MPPT-25, 25A, 120Voc, 12/24V charge/load controller**	**$ 869**
20-836	**PS-MPPT-40, 40A, 120Voc, 12/24V charge/load controller**	**$1,956**

MPPT Charge Controls

MidNite Solar

The MidNite Classic

The Classic MPPT Charge Controller substantially increases the flexibility, features and range currently found on MPPT controllers. The Classic is the only MPPT controller that has Arc Fault Detection, making this controller the safest controller available. The Classic 150 is ranging up to 96 amps, the Classic 200, 79 amps and the Classic 250, 63 amps.

Features:

- 150, 200 and 250V operating voltages.
- 12-72V battery charging standard with models up to 120V battery bank
- Built in DC-GFP and Arc Fault Detector
- Solar, wind and hydro MPPT modes
- Ethernet, USB and RS232
- Remote and local displays possible
- 20 megs of data logging

20-611	**Classic150, 150VOC MPPT charge controller**	**$1,045**
20-612	**Classic200, 200VOC MPPT charge controller**	**$1,045**
20-610	**Classic250, 250VOC MPPT charge controller**	**$1,292**

THE KID

MidNite's The KID is the most versatile medium sized MPPT charge controller on the market.

Ideal for small renewable energy systems, the KID is a 30 amp MMPT charge controller that allows solar arrays to be wired at up to 150VDC. That's three 250W panels in series. The KID features bulk, absorption and float modes, and an equalize mode for periodic battery maintenance.

The KID allows for true input paralleling. As your power needs grow, add more modules to the array and a second KID! This will give twice the power from a single array. Also **can be used for load control, lighting control** and Includes a battery status display.

Load/Clipper function user selectable. Clipper function is used on Wind/Hydro and requires an additional Midnite KID Clipper

For 12, 24, 36 and 48V systems. C1D2 cerified model now available!

20-613	**MidNite MNKID-B, 30A, 150VOC charge/load controller, black**	**$ 539**
20-615	**MidNite MNKID-W, 30A, 150VOC charge/load controller, white**	**$ 539**
20-616	**MidNite MNKID-C1D2, Class 1 Div 2 certified**	**$ 615**

Phocos

CIS-MPPT-85/20

Phocos' CIS-MPPT-85/20 features innovative MPPT technology that yields up to 30% more energy than PWM controllers. In addition, the signature Power+TM current limiter allows for oversizing PV power by up to 50% for winter months without damage in summer months. The CIS-MPPT-85/20 controller is optimized to work with 60-cell modules and ensure maximum performance and yield from all types of PV systems year-round and in any environment.

Features:

- Smallest size in its power class - fits everywhere
- Auto-detects system voltage between 12 and 24V
- signature Power+TM current limiter allows for oversizing PV power by up to 50%
- Infrared-programmable load timing feature with dimming ideal for lighting systems
- 2 years of system performance data accessible via MXI-IR interface, PC software (CISCOM
- Ingress Protection: IP68 - fully waterproof!
- Fully encapsulated Anodized aluminum housing design prevents damage from corrosion, insects and dust

20-203	**CIS-MPPT-85/20, 20A, 85VOC charge/load/lighting controller**	**$ 399**

Multi-Function Energy System Meters-Monitors

We strongly recommend using a quality multi-function Energy Meter, such as the Tri-Metric meter, to eliminate the guess work about what is taking place in nearly every area of your *Renewable Energy Power System*. A multi-function digital energy/battery meter is a great way to monitor conditions in your power system. These keep track of battery state-of charge, total amp hours produced by the charging source(s), number of amp hours being used. When the battery is full, and the meter is first installed, it is set to zero. As you use power, the meter counts amp hours backwards showing progressive minus numbers on the read-out. When the battery is fully charged again, the meter will read zero again. If you equalize the battery, it counts how many extra amp hours you used during the equalizing cycle, then when you stop charging, it resets itself to zero. Battery voltage can be called up on the display at any time. Amp hour meters are a must for nickel cadmium and nickel iron batteries, where it is nearly impossible to tell state-of-charge from voltage, or specific gravity. They are also a must for UPS (Uninterrupted Power Supply) where generator charging ability can vary greatly depending on loads being applied to it. An amp hour meter can also be used to keep track of power consumption of inverters or other large loads. You will quickly observe how much power it takes to pump water, wash a load of laundry, make toast or saw boards with your table saw.

Xantrex TM-500A Energy Meter

The TM-500A will monitor 12 or 24 volt power systems, and with the addition of part No. 28-052 it will monitor 48 volt systems. After all the negative leads from DC charging/load circuits are connected to the current shunt, connecting the shunt to the meter is simplified with a snap in phone jack lead. Using the six conductor phone cord included, plug the shunt and meter together and all the connections are made. Comes with a 50 foot six conductor phone cord with jacks and a special 500A/50mV shunt. Measures volts, amps, amp hours, and state of charge.

28-051	**Xantrex TM-500A Meter**	**n/a**
28-052	**Xantrex TM-48 48V Adapter**	**n/a**

Blue Sky Energy IPN-ProRemote

The IPN-ProRemote is a full featured IPN compatible charge controller and battery system monitor which provides parameter setup and monitoring capability for up to 8 controllers. It provides a variety of battery and controller data capture functions and computes remaining battery amp-hours displayed as a fuel gauge type indicator. Only one IPN-ProRemote may reside on a single IPN network. A 500A/50mV battery shunt is required. 2-year limited warranty.

Features include:
- Backlit multi-line LCD display
- Accesses advanced controller parameters
- Monitors up to 8 controllers
- Complete battery system monitor
- Coordinates and displays charge control and battery monitor activities

28-109	**IPN Pro Remote w/o shunt**	**$315**
28-500	**500 Amp shunt**	**$ 55**

Multi-Function Energy System Meters-Monitors

Tri-Metric 2020 Battery/Energy Monitor

This battery monitor for 12 or 24 volt (and 48 volt with adapter) battery systems reads amp-hours, amps and volts on an LED display. Amp hours can be displayed in actual amp-hour numbers, or as "percent of full". An LED lights when the battery is charging and flashes when the battery has reached full charge. A "Battery Reminder" LED flashes when batteries should be recharged or equalized or when battery voltage drops too low. It uses only .03 amps with the display on and .016 amps with display off. It also records minimum and maximum battery voltage, days since batteries were last fully charged, days since equalized and total lifetime amp-hours withdrawn from the batteries.

Total amp-hours can be measured to ±100,000 amp-hours at an accuracy of ±1%. Amp-hour reading resets to "0" when the charged criterion is met. This set-point is fully adjustable by the user, depending upon battery type or charging system. Amp-hours can also be reset to "0" manually by the front panel reset control. The Tri-Metric can be located hundreds of feet away from the batteries using 4 conductor meter wire.

A shunt is required for operation.

28-106	**Tri-Metric Digital 7 Function Meter 12/24V**	**$239 w/gang box**
28-107	**Tri-Metric 2030-A Digital battery monitor 12/24/48V**	**$275 w/gang box**
28-300	**100 Amp 100A 100mV Shunt**	**$ 45**
28-500	**500 Amp 500A/50mV Shunt**	**$ 55**

PentaMetric Battery Monitor

The PentaMetric monitor measures 1 or 2 battery systems with a common negative. With one battery system, battery current plus two charging sources/loads can be measured.

The new PentaMetric battery monitor system offers a lot more capability than the Tri-Metric monitor. The complete system consists of 3 parts: input unit (near batteries), display unit (shown here) and computer interface unit. It can monitor up to 3 shunts: For example; measure total solar input and wind input independently in addition to monitoring battery "state of charge". You can access the data with display unit (shown here) with LCD display and buttons up to 1000 feet from batteries. An optional computer interface with Windows software allows you to control and read out all data from the computer. It has a relay output to control a generator or external alarm and it has audible and visual alarms for high and low battery conditions. 2-year warranty

Basic measurements:

- 2 voltage channels: 8-100 volts. (For example you can monitor volts from two-battery systems).
- 3 amperage channels ±.01-200 amps (with 100A/100mV shunt). ± 0.1-1000 amps (with 500A/50mV or 1000A/10mV shunt). Each of these requires a separate shunt.
- Temperature -20 to +65 degrees C.

Secondary measurements:

- Amp-hour (3 channels): to ±83,000 amp-hours
- Cumulative (negative) battery amp-hours (2 channels)
- Watts (2 channels) ±.01- 20,000 watts
- Watt-hours (2 channels) ±21,000 kilowatt hours
- Battery % full (2 channels) 0-100%
- Days since batteries charged (2 channels) .01-250 days
- Days since batteries equalized (2 channels) .01-250 days

Data logging functions

There are 3 types of data logging functions. With the computer interface all 3 types can be output to spreadsheet file.

- Periodically logged data can record any or all of the following at regular intervals: once per day to up to once per minute, amp-hours (3 channels), watt hours (2 channels), Temperature max/min (1 channel), volts (1 channel), amps (1 channel)
- Battery discharge voltage profile data logs volts and amps every time charge level changes by 5% (or 10%) for 1 or 2 battery systems.
- Battery cycle efficiency data documents system efficiency for up to 2 battery systems.

28-115	**Pentametric Input Unit**	**$339**
28-116	**Pentametric Display Unit**	**$259**
28-117	**Computer Interface RS232**	**$159**
28-118	**Computer Interface Ethernet**	**$254**
28-119	**Computer Interface USB**	**$189**

DC Power Meters

Hoyt Induction Amp Meters

These meters read DC current through a wire that is placed in a slot on the back-frame of the meter case. No electrical connections are needed. The 30 Amp meter will work with wires up to #6 gauge. The dual Range meter has a 75 amp scale and a 600 amp scale, with separate slots on the back-frame case for each scale. The large slot will accept up to #2/0 gauge wire.

28-763	**Hoyt 30 Amp Induction Amp Meter**	**$36**
28-900	**Hoyt Dual Range Induction Amp Meter**	**$39**

DC Digital Multimeter w/Alarm

Displays 7-60 DC Volts and up to 500 Amps. Settable high and low audio and visual alarms. Includes 500 amp shunt, splashproof front and less than 1 watt power consumption.

28-630	**Dilgital Multimeter**	**$225**

Digital AC/DC Clamp Multimeter CM-01

Compact, slides easy into tight places. For testing input and output voltages and amperage of battery, generator, inverter, solar system, charger, etc.
Voltage range: 0-400V AC/DC
Amperage range: 0-200A AC/DC

28-700	**CM-01 Clamp Meter**	**$224**
28-701	**Blue Sea AC/DC clamp Meter True RMS**	**$259**

AC Power Meters

Kill A Watt Electricity Usage Monitor

For the individual who is energy conscientious, you can reduce energy costs and identify power hog appliances. Simply plug your appliances into Kill A Watt and it will assess how efficient they really are. Kill A Watt will track consumption and you can figure out your electrical expenses by the day, week, month, or year. Know where your power is going, acquire money saving information from the Kill A Watt.

28-802	**Kill A Watt**	**$34**

AC Kilowatt-Hour Meter

Use this meter to measure inverter power delivered to a load, or determine the power an intermittent AC load is using. If you are selling power back to the grid, you can keep track of how much they owe you. These meters have been removed from service and reconditioned. Order a raintight meter base to mount and connect wires to the meter. For use on 120 or 120/240 VAC systems. Maximum current 100 amps. Must be mounted vertically. ideal for use with utility intertie systems.

28-920	**Kilowatt Hour Meter**	**$69**
28-921	**Base for KWH Meter**	**$49**