



2019

Home, Cabin and Lodge  
Power Systems

Spring Issue

## Generating Electricity for a Sustainable World



Off-Grid System Installed at Cathedral Lake Lodge, BC



[www.ipwr.net](http://www.ipwr.net)

IPS Integrated Power Systems #101-2387 Dominion Rd West Kelowna, BC Canada V1Z 2Y4  
Phone: 250-769-2843 Toll Free: 1-866-607-7640

## **We offer design, engineering and installation.**

We are a technically orientated company. All our systems are designed based on the specifications of each product and its compatibility with all the components used.

**Our goal is to give you, the client,  
the best products and services we can provide.**

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**1-866-607-7640 sales@ipwr.net www.ipwr.net**

# Why We Are Different

At IPS Integrated Power Systems, we strive to provide the latest and most up-to-date products available in the industry. We are continually researching products and discussing with our suppliers new and innovative ways to approach power solutions.

We have the knowledge and expertise to custom design a system specifically to meet your needs and incorporate the power sources you have available - solar, wind, hydro, or generator. We can design a system using one or all of your power sources to provide your home or business with safe reliable electricity 24/7. In addition, we have the equipment to do a proper site check before designing your system. This ensures whichever source is used, be it solar, wind and/or hydro, it is the most viable and practical solution to your power requirements.



Solar pathfinder

**IPS Integrated Power Systems has been serving Western Canada since 1993.** It's all we do ! We have a fully stocked 3600 sq. ft warehouse and the equipment to do the job right!

Would you buy and drive a car without a gas gauge? No, of course you wouldn't! That's why we use a variety of metering systems - depending on the system size and how much information you need to know regarding the day to day operation. Eg. "amp-hours used", "battery percent full", etc. Read about Battery Monitors on pages 6 & 7.

When planning a stand-alone residential/cabin/lodge system, a careful analysis of the household power consumption needs to be made. We have made this easier for you by including a Power Consumption Table and a worksheet on pages 15 & 16 called "Let's Size Your System".

With so many different systems available, we take the time to discuss your needs so you can make the best informed choice. You will get the system that is right for you!

**We know inverters! We are a factory authorized warranty depot for Magnum Energy.** All our systems use pure sine wave inverters.

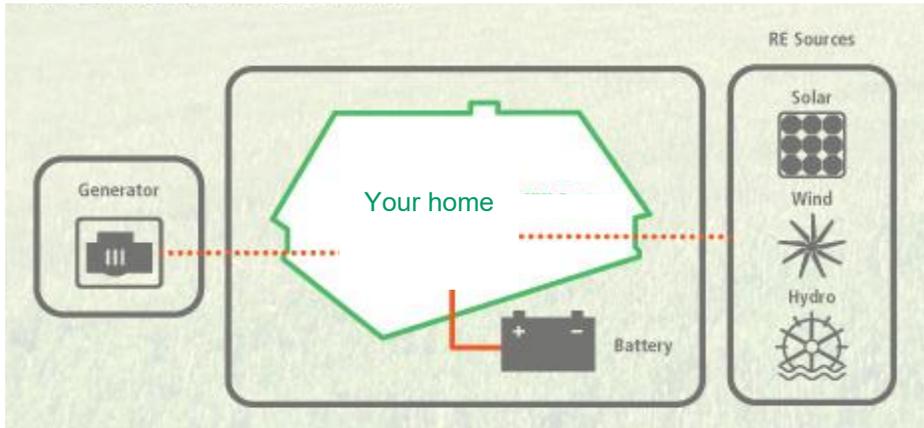
All our prices are landed cost to Kelowna, BC Canada. There are no extra charges such as brokerage, duty, etc. added (only the applicable taxes).

For years we have had the mind set that to live "off the grid" we would have to listen to a generator or do without modern conveniences. Thankfully, this is no longer the case. Our systems vary from basic lighting to being able to provide power to a fulltime lodge. The money saved by not having to run a gas or diesel generator fulltime is worth the investment, not to mention the negative impact generators have on the environment. Solar and inverter power systems are virtually maintenance free and quiet. We also provide installation service. Wind and hydro systems are available for those who have this natural resource.

**OUR SYSTEMS WORK!**

# Power Systems Explained

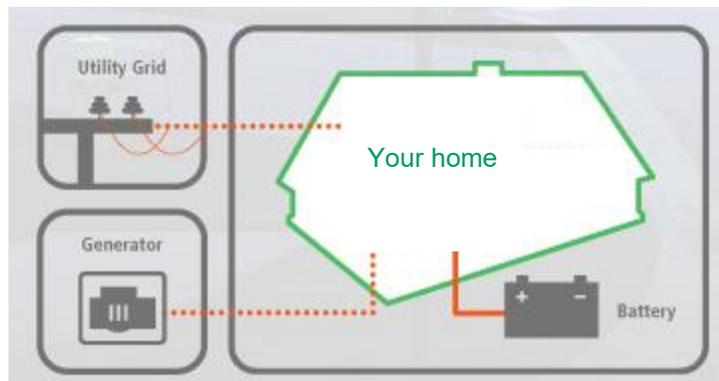
## Off-Grid System



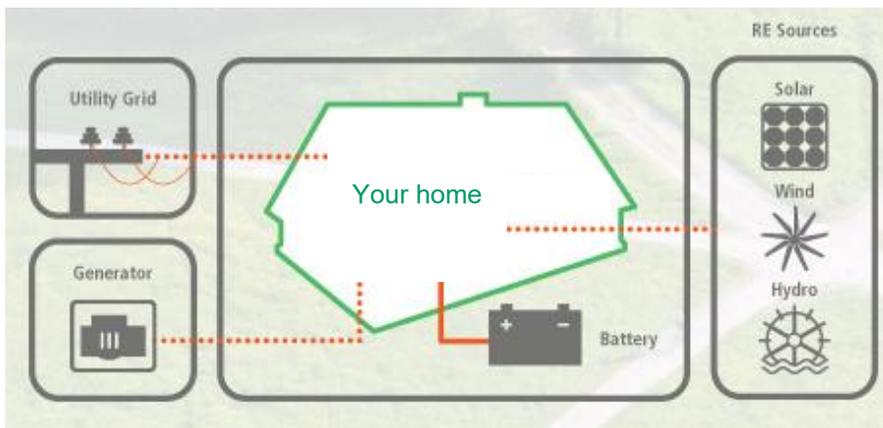
Our off grid systems will provide your home with a completely autonomous supply of electricity. Most systems use solar arrays, but a wind generator, micro-hydro generator, and/or a fuel generator can also be incorporated into our systems.

## Backup Power System

Grid connected homes can benefit from having a backup power system. When a power failure occurs, the inverter will automatically detect it and instantly switch to the backup power stored in the battery bank. When the grid power comes back on, the batteries will then be recharged and ready for the next power failure. Imagine being the only home on the block with power.



## Grid-Tie System with Backup Power



This system is for homes that are connected to the grid, and want to incorporate a renewable energy (RE) system with back-up power. A grid-tie system allows any excess energy that is generated to be sold back to the utility company, and allows the grid to act as an additional energy source to charge the systems batteries. If the grid should fail, the inverter will automatically supply energy from the batteries and the RE sources, to support your homes electrical needs.

# Battery Types

## Lead Acid Batteries

Using an electrolyte consisting of sulphuric acid, a battery can store impressive amounts of electrical energy in a relatively small space. This energy is stored in chemical form within lead grids mounted inside the battery. Currently, there are three common lead-acid battery technologies: Flooded, Gel and AGM.

- **AGM** stands for Absorbed Glass Mat, a newer type of battery construction that uses saturated absorbent glass mats. AGM batteries are sealed and therefore require no maintenance. This also means no acid spills, gassing, watering or an equalization process to contend with.
- **Gel** batteries use a thickening agent like fumed silica to immobilize the electrolyte. If, by chance, the battery container cracks or is breached, the battery will continue to function. As with the AGM battery, the Gel cell is sealed and user friendly as well.
- **Flooded** batteries are the most common lead-acid battery-type in use today. However, they do require maintenance on a regular basis. Along with the need to have the electrolyte solution topped up, specific gravity checks done with a hydrometer, an equalization process performed, they also need a specially built container and a separate ventilated room as they “off gas” (produce toxic fumes). Since the battery is not sealed, great care has to be used when working with these batteries as the electrolyte solution (sulphuric acid) will burn your skin!

## Salt Water Batteries

A salt water (sodium ion) battery use a concentrated saline solution as its electrolyte. The batteries are non-flammable and more easily recycled than batteries that have toxic or flammable materials. Some saltwater batteries are maintenance-free, with no battery management required, and are compatible with leading power control electronics.

Unfortunately, salt water batteries have a low round trip efficiency and therefore waste energy that could be used by the consumer.

## NiFe Nickel Iron Batteries

The nickel–iron battery (NiFe battery) is a is a very versatile battery which is tolerant to overcharge, over-discharge, and short-circuiting. The batteries can have very long life even if improperly maintained, and are often used in backup situations where it can be continuously charged and can last for more than 20 years.

Due to its low specific energy, extremely high-maintenance, poor charge retention, and high cost of manufacture, other types of rechargeable batteries have displaced the nickel–iron battery in most applications. The round trip efficiency is also very low.

# Battery Types

## LiFePO4 Lithium Iron Phosphate Batteries

LiFePO4 batteries have a very constant discharge voltage. System voltage doesn't fluctuate during discharge until the cell is exhausted. This allows the cell to deliver virtually full power until it is discharged.

LiFePO4 batteries are relatively lightweight compared to other batteries, but they are very expensive. The challenge for using these batteries effectively in renewable energy systems is making sure the other equipment is able to communicate directly with the internal BMS of the lithium batteries. LiFePO4 batteries have a high round trip efficiency.

## Lead Carbon Batteries

**Super Long Cycle Life:** Lead Carbon batteries have a 50% depth of discharge, giving you more usable power in a smaller battery bank, in comparison to regular lead acid batteries, 30% depth of discharge is typical.

**Leading Lead Carbon Technology** improves the charge acceptance ability, reduces the negative plate sulphation, and along with the deeper depth of discharge combine to make lead carbon batteries more suitable for PSOC applications. Use of the Lead Carbon battery in an application where full battery recharges aren't always possible, like off-grid, can maximize your overall cycle life by up to 4 times versus a traditional deep cycle battery.

**Safety: Lead Carbon batteries offer all the safety and convenience of AGM batteries with comparable power to lithium batteries.**

### Generally Speaking:

- Flooded type (wet cells) can lose up to 12% per month due to self-discharge while AGMs, Gel cells, and Lead Carbon lose only 1-3% per month.
- Lead acid batteries are good for wide temperature ranges
- Lithium batteries need a controlled environment - not below freezing
- Some Lead Carbon batteries are suitable for colder temperatures to - 20°C (See Our SWE12-100 & SWE12-150)
- All batteries perform better at a constant temperature between 10°C and 25°C.

### Please Note:

- We use the 10 & 20 hour discharges rate for battery calculations as this is the realistic amount of time it will take to discharge a battery. Some manufacturers use the 100 hour rate which we feel is not practical in real life situations.
- In our Solar Kits, we list both the Battery Capacity and the Daily Useable Capacity as no battery should be fully discharged.

# Battery Comparisons

Batteries	Retail CDN	Amp hour 20hr rate	Volts	Total kWh	Cost/ kWh	Rec. D.O.D	Usable kWh at D.O.D	Cost/ usable kWh	Cycle Life @Rec. D.O.D.	Life-time in Years	Life-time kWh	Life-time cost/ usable kWh	Main. Re-quired
<b>Lithium</b>													
Pwrsync Ess-LiFePo4	\$3,711	250	12.8	3.20	\$1,160	50%	1.6	\$2,319	5000	13.7	8,000	\$0.46	None
Iron Edison LiFePo4	\$20,115	400	48	19.20	\$1,048	70%	13.44	\$1,497	5500	15.1	73,920	\$0.27	None
PWRsync Ess-LiFePo4	\$10,400	200	51.2	10.24	\$1,016	50%	5.12	\$2,031	5000	13.7	25,600	\$0.41	None
<b>AGM</b>													
Powersonic PS1300	\$784	1200	2	2.40	\$327	30%	0.72	\$1,089	2250	6.2	1,620	\$0.48	Low
Surrette S2-1180	\$1,094	1100	2	2.20	\$497	30%	0.66	\$1,658	2250	6.2	1,485	\$0.74	Low
Deka AVR 95-33	\$611	1807	2	3.61	\$169	30%	1.0842	\$564	1800	4.9	1,952	\$0.31	Low
Vision EVL-16	\$716	400	6	2.40	\$298	30%	0.72	\$995	2700	7.4	1,944	\$0.37	Low
Surrette S6-460	\$726	415	6	2.49	\$292	30%	0.747	\$973	2250	6.2	1,681	\$0.43	Low
Outback E.C. 200RE	\$805	200	12	2.40	\$335	30%	0.72	\$1,118	1800	4.9	1,296	\$0.62	Low
Deka 8A8D AGM	\$759	245	12	2.94	\$258	30%	0.882	\$861	1200	3.3	1,058	\$0.72	Low
<b>Flooded</b>													
Surrette 2KS- 33P	\$999	1766	2	3.53	\$283	30%	1.0596	\$943	2400	6.6	2,543	\$0.39	High
Surrette 6CS-17P	\$1,285	546	6	3.28	\$392	30%	0.9828	\$1,307	2400	6.6	2,359	\$0.54	High
Surrette S-550	\$452	428	6	2.57	\$173	30%	0.7704	\$578	1800	4.9	1,387	\$0.33	High
Surrette S-605	\$711	482	6	2.89	\$246	30%	0.8676	\$819	1800	4.9	1,562	\$0.46	High
<b>Nickel Iron</b>													
Iron Edison	\$2,619	200	12	2.40	\$1,091	80%	1.92	\$1,364	11000	30.1	21,120	\$0.12	High
<b>Lead Carbon</b>													
Outback 200NC	\$989	200	12	2.40	\$412	50%	1.2	\$824	2600	7.1	3,120	\$0.32	Low
Outback 200NC	\$20,555	810	48	38.88	\$529	50%	19.44	\$1,057	2600	7.1	50,544	\$0.41	Low
SWE12-65	\$289	64	12	0.77	\$376	50%	0.38	\$752	2800	7.7	1,075	\$0.27	None
SWE12-100	\$418	100	12	1.20	\$348	50%	0.60	\$697	2800	7.7	1,680	\$0.25	None
SWE12-150	\$634	150	12	1.80	\$352	50%	0.90	\$705	2800	7.7	2,520	\$0.25	None
Sacred Sun FCP 500	\$3,109	618	12	7,416	\$419	50%	3.708	\$838	5200	14.2	19,282	\$0.16	Low
Sacred Sun FCP 500	\$6,171	618	24	14,832	\$419	50%	7.416	\$838	5200	14.2	38,563	\$0.16	Low
Sacred Sun FCP 500	\$12,342	618	48	29,664	\$419	50%	14.832	\$838	5200	14.2	77,126	\$0.16	Low
Sacred Sun FCP 1000	\$6,171	1199	12	14,388	\$432	50%	7.194	\$864	5200	14.2	37,409	\$0.16	Low
Sacred Sun FCP 1000	\$12,342	1199	24	28,776	\$432	50%	14.388	\$864	5200	14.2	74,818	\$0.16	Low
Sacred Sun FCP 1000	\$24,684	1199	48	57,552	\$432	50%	28.776	\$864	5200	14.2	149,635	\$0.16	Low

**Disclaimer :** Sacred Sun batteries have been independently tested by a Canadian engineer under real world conditions, the amp hours actually surpassed the rating of the manufacturer. All other battery values are based on manufacturers' spec. sheets. When comparing batteries request actual testing data, as manufacturers may extrapolate from partial tests.\* Lifetime in years is based on using 1 cycle per day at recommended D.O.D.

D.O.D = Depth of Discharge

Main. = Maintenance

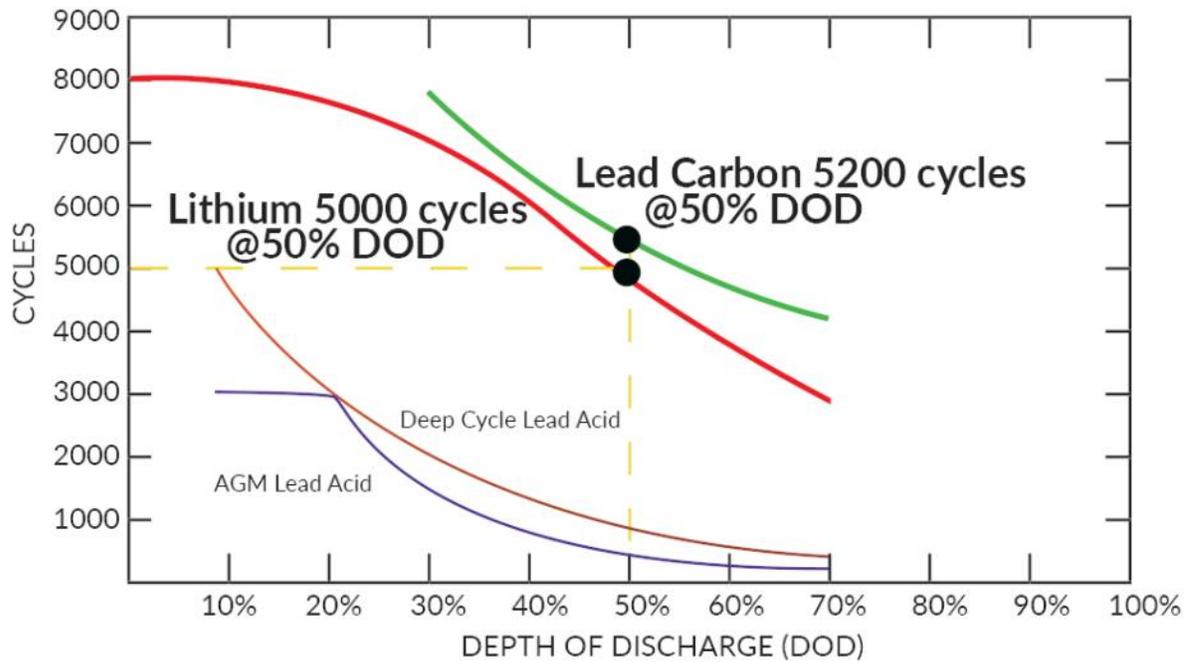
Rec. = Recommended

kWh = Kilowatt hours

# 2V & 12V Lead Carbon Batteries

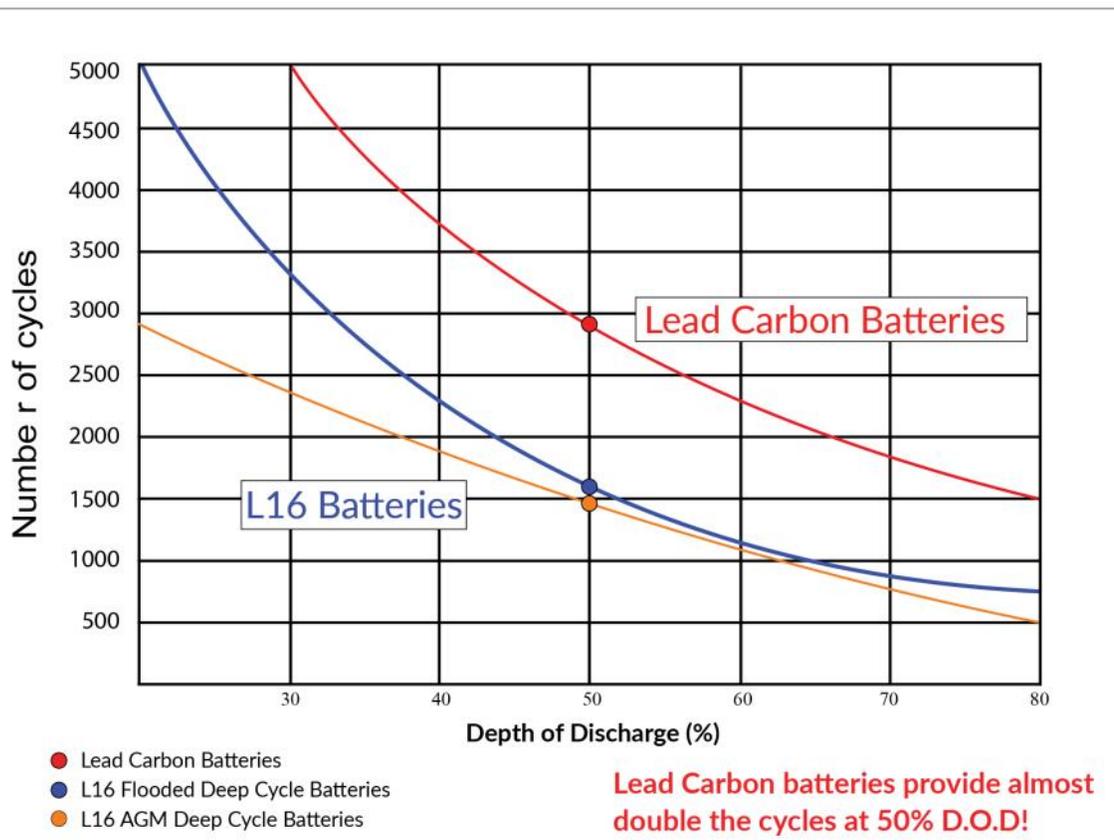
## 2V Lead Carbon

Ratings are based on 10 hour discharge



## 12V Lead Carbon

Ratings are based on 20 hour discharge



# Battery Efficiencies & Lead Carbon Advantages

## Round trip Battery Efficiency

Battery Round Trip Efficiency Chart			
100Ah Batteries	Amp hours Removed	Amp hours needed to Recharge	Efficiency
Salt Water	100	120-130	70-80%
Nickle Iron	100	120-130	70-80 %
Flooded	100	115-118	82-85%
AGM	100	108-112	88-92%
Lead Carbon	100	105-110	90-95%
Lithium	100	104-108	92-96%

\* These are typical ranges: age and usage are key factors

## Lead Carbon Batteries Advantages

- No BMS (Battery Management System) is needed to prevent over-charging or under-charging on a per cell basis that is required for lithium batteries
- No thermal run-away risk of individual cells overheating, exploding and burning
- Much greater kW storage capacity per dollar compared with lithium.
- Approximately twice the storage capacity, or about half the price for the same kW capacity
- Easy to carry modular system where each battery can be carried and put in place without needing any lifting equipment
- Suitable for On-Grid Hybrid and Off-Grid systems due to the high discharge amperage capacity
- No cooling fans/system needed for Lead Carbon
- Much higher energy density and longer life in the same size (or smaller) package compared with existing AGM/GEL and Flooded Lead-Acid batteries due to a higher depth of discharge
- No harmful or toxic gases coming off the sealed Lead Carbon batteries
- High round-trip efficiency

# Batteries: Featured Products

## Switch to Lead Carbon Batteries

*Maintenance Free, Designed for Partial State of Charge*



\* battery case colours may vary

### PSOC Applications:

- Off-Grid Cabins, Homes & Grid-Tie Battery Back-up
- Recreational, Electric & Hybrid Vehicles
- Marine Battery Replacement

### Features:

- Specifically Designed for Partial State of Charge Applications
- 2800 cycles @50% Depth of Discharge
- Precision Sealing Technology
- Suitable for Cold Temperature Usage
- 98% Recyclability



[www.ipwr.net](http://www.ipwr.net)

# SWE12-100 & SWE12-150

**2800 cycles @50%  
Depth of Discharge  
Nominal Voltage: 12V  
100Ah - 150Ah**

### Operating Temperatures

Charge: -20-50 °C  
Storage: -20-50 °C  
Discharge: -40-60 °C

# Batteries: Featured Products

## SWE12-100 Lead Carbon



### Specifications:

**Nominal Voltage**

12V

**Nominal Capacity**

100Ah(20hr)

**Weight**

28.5kg(62.8lbs)

**Dimensions**

33×17×22cm

13×6.7×8.5 inches

GROUP 31

## SWE12-150 Lead Carbon



### Specifications:

**Nominal Voltage**

12V

**Nominal Capacity**

100Ah(20hr)

**Weight**

42.5kg(94 lbs)

**Dimensions**

48.3×17×24 cm

19×6.7×9.5 inches

Group 4D Replacement

**Please Note:**

Lead Carbon batteries require a proper Coulomb counting battery monitor for warranty eligibility.

## Batteries: Featured Products

# Energy Matters



## Lead Carbon Batteries

*The Power of  
Lithium Without  
the Cost*

The patented technology from Furukawa

Japanese Furukawa battery company's advanced lead carbon technology, product design, and manufacturing experience, produces high performance AGM VRLA batteries with deep cycles for a superior energy storage system.

**Extremely long cycle life**

Using long-life technology and design, Sacred Sun batteries provide more than 5000 cycles @50% depth of discharge for a life span of over 14 years \* (based on using 1 full cycle/day)

**Innovative Lead Carbon Technology**

Using lead carbon technology improves the charge acceptance ability, reduces the negative plate sulphation, and is more suitable for partial state of charge (PSOC) applications.

# Batteries: Featured Products

## Sacred Sun FCP-1000 48V 1000Ah Lead Carbon Battery Bank



**FCP-500 2V 500Ah**

**FCP-1000 2V 1000Ah**

Available in 12,24, and 48 Volt 500Ah and 1000Ah battery banks, complete with racking and buss bars.

**Please Note:**

Lead Carbon batteries require a proper Coulomb counting battery monitor for warranty eligibility.

# Battery System Monitors

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

## CONSERVATION

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

- Use "amps" 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 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

**MAGNUM**  
E N E R G Y

## BMK from Magnum Energy

Monitoring your battery bank is easy with the Battery Monitor Kit (ME-BMK) from Magnum Energy. Acting as a "fuel gauge" for your batteries, the ME-BMK monitors their state of charge (SOC) and then provides this information in an easy-to-understand display via the ME-RC remote. With accurate SOC readings, you can avoid unnecessary battery recharging, saving on fuel and long-term maintenance costs.

### Available readings from the ME-BMK

- State of Charge (SOC) 0 - 100%
- DC volts
- DC amps
- Amp hours in/out
- Resettable amp hours out
- Total amp hours out
- Minimum volts DC
- Maximum volts DC
- Temperature compensated
- Auto detects input voltage



# Battery System Monitors



## Victron BMV-712 Smart Battery Monitor

### Bluetooth inside

With Bluetooth built-in, the BMV Smart is ready for the Internet of Things (IoT) era.

### Get the Free Victron Bluetooth app!

Use a smartphone or other Bluetooth enabled device to:

- customize settings
- monitor all important data on single screen Inverter and chargers
- view historical data
- update the software



### Other features:

- Battery voltage, current, power, amp hours consumed & state of charge
- Remaining time at the current rate of discharge
- Programmable visual and audible alarm
- Programmable relay, to turn off non critical loads or to run a generator when needed
- 500 Amp quick connect shunt and connection kit
- Shunt selection capability up to 10.000 Amps
- VE.Direct communication port
- Stores a wide range of historical events, which can be used to evaluate usage patterns and battery health
- Wide input voltage range: 6,5 – 70V
- High current measurement resolution: 10 mA (0,01A)
- Additional input to measure voltage (of a second battery), temperature or midpoint voltage, and corresponding alarm and relay settings

# Battery System Monitors

## The TriMetric

### Features:

- For 12V to 48V battery systems
- The “**amps**” or “**watts**” display measures the rate of energy going in or out of your batteries
- The “**% Full**” display is the most accurate way to keep track of how charged or discharged your batteries are until the battery voltage gets really low
- The “**volts**” display can warn you that you are near discharge and it also lets you discover if your charger is charging to an optimum voltage which is important for maximizing your battery life.
- The “**days since charged**” display shows how recently the main battery (system) was fully charged, so if it hasn't been charged recently you can perform extra charging if necessary to help maintain the capacity of your batteries.
- An **audible alarm** can signal a low battery
- **Data logging** to diagnose system problems
- **Plus 5** other data functions



## FnDC from OutBack Power

**OutBack Power's FLEXnet DC** is the ultimate DC system monitoring device.

The integrated networked communications make valuable, usable data available from your system and viewable on an OutBack MATE communications device, providing you with the critical answers about your system's health, performance and efficiency.

### Features:

- Simple DC system monitoring
- Extends battery system life
- Reduces generator runtime and fuel consumption
- Provides 128 days of system data logging



When used with an **OutBack MATE** you can view:

- **Battery Status Screen** - Easily see your systems current condition, SOC
- **Now Summary Screen** - Monitor the amount of power your system is currently producing and consuming as well as the amount of power going IN and OUT of your battery bank
- **Today Summary Screen** - Monitor the cumulative energy your system has produces and consumed as well as the total amount of energy that has gone to charging your batteries today
- **History Summary Screen** - Review energy production/consumption for the previous 128 days



# Whole System Monitoring

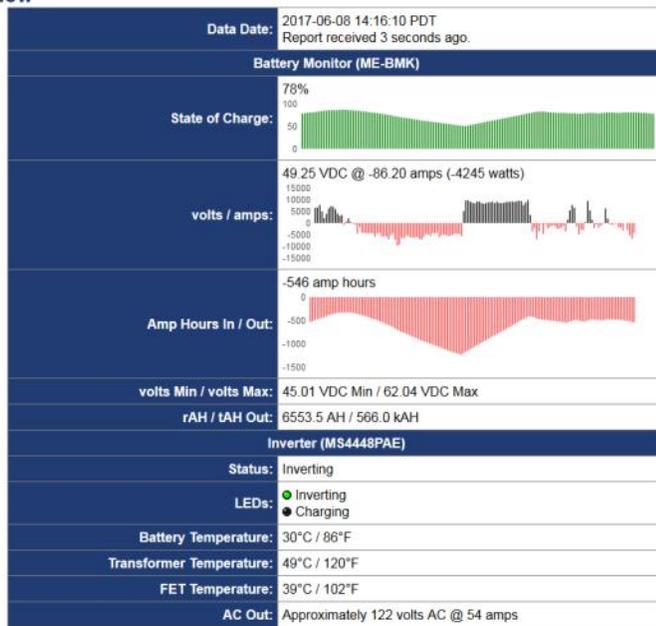
## MagWeb from Magnum Energy

The MagWeb is a powerful and cost effective tool for remotely monitoring Magnum Energy's inverters and accessories. Installed on the Magnum network, the MagWeb provides live Internet monitoring of the inverter, battery monitor, and automatic generator start module. Using your always on Internet connection, the MagWeb makes live and historical conditions available to you through a web browser at [data.magnumenergy.com](http://data.magnumenergy.com).

### Data Samples

The MagWeb constantly streams data to your personal web pages, providing details on Current Conditions, Current Settings, and Daily Summaries for historical records.

Now



Last 24 Hours

Battery Monitor			
	Minimum	Maximum	Average
State of Charge: (% full)	50	87	74.1
DC volts:	46.71	55.98	50.72
DC amps:	-267.8	238.8	1.5
Inverter			
	Minimum	Maximum	Average
AC volts Out: (when volts > 80)	105	127	119.5
AC amps Out: (when not charging)	22	96	47.2
AC amps Out: (when charging)	18	73	39.4
AC amps In:	0	98	0.1
AC Frequency: (Hz)	57.2	60.0	59.5
Battery Temperature:	27°C / 80°F	31°C / 87°F	28°C / 83°F
Transformer Temperature:	44°C / 111°F	80°C / 176°F	54°C / 130°F
FET Temperature:	35°C / 95°F	60°C / 140°F	42°C / 108°F
AGS			
	Minimum	Maximum	Average
AGS Temperature:	19°C / 67°F	29°C / 85°F	24°C / 76°F
AGS Voltage: (volts DC)	46.40	56.00	50.57

## Mate3 from OutBack Power

The new MATE3 System Display and Controller makes it easier than ever to program and monitor your complete OutBack Power system. An intuitive user interface and integrated system configuration wizard makes system setup and programming quick and seamless.

The MATE3 is packed full of features to make system management simple. The easy-to-read graphical LCD display is backlit for dark operating conditions. Improved tactile buttons and a user programmable "favorite" key give you immediate access to the features you want.

A built-in clock and calendar function enables timer-based programming of inverter and charger operation. This allows you to limit a generator's run time to a specific time period of the day or week. All of your settings are stored in permanent memory to eliminate the need to reprogram in the event of a system shutdown or battery replacement.

The MATE3 is an internet enabled device - simply connecting to the internet will allow full remote system monitoring via an easy-to-use web interface.



# About Solar Panels

## Hanwha Q Cells

### Q.ANTUM solar module

The new high-performance module Q.PEAK-G4.1 is the ideal solution for all applications thanks to its innovative cell technology Q.ANTUM. The world-record cell design was developed to achieve the best performance under real conditions – even with low radiation intensity and on clear, hot summer days.

#### Features:

- Low Electricity Generation Costs  
- higher yield per surface area, higher power classes, and an efficiency rate of up to 18.6%
- Innovative All-Weather Technology  
- optimal yields, whatever the weather with excellent low light and temperature behavior
- Enduring High Performance  
- long-term yield security with Anti LID technology, anti PID Technology<sup>1</sup>, Hot-Spot Protect and Traceable Quality Tra.Q™.
- Extreme Weather Rating  
- high-tech aluminum alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa) regarding IEC.
- A Reliable Investment  
- inclusive 12-year product warranty and 25-year linear performance guarantee<sup>2</sup>.

**Q CELLS**



We do have a solar panels of various brands, sizes and prices.

Solar Panel Spec's		
Rated Power	watts	300-305
Current at Max. Power	amps	9.26
Voltage at Max. Power	volts	32.41
Short Circuit Current	amps	9.77
Open Circuit Voltage	volts	39.76
Maximum System Voltage	volts	1000
Length	inches	65.7
Width	inches	39.4
Depth of Frame	inches	1.26
Weight	lbs	41.45
Warranty on Power Output	years	25

# Charge Controllers

A charge controller, or charge regulator is basically a voltage and/or current regulator to keep batteries from being overcharged. It regulates the voltage and current coming from the solar panels going to the battery. Most "12 volt" panels put out about 16 to 18 volts, so if there is no regulation the batteries will be damaged from overcharging.

Charge controllers come in all shapes, sizes, features, and price ranges. They range from small 4.5 amp controllers, up to 60 and 100 amp MPPT (Maximum Power Point Tracking) programmable controllers with computer interface.

## All our systems use MPPT charge controllers.

Innovative MPPT technology ensures that your solar array is operating at its peak power regardless of age, shading or environmental conditions - increasing the performance by up to 30%.

## PT-100 from Magnum Energy

Works with all Magnum Inverters or as a stand-alone controller using internal settings.



### Features:

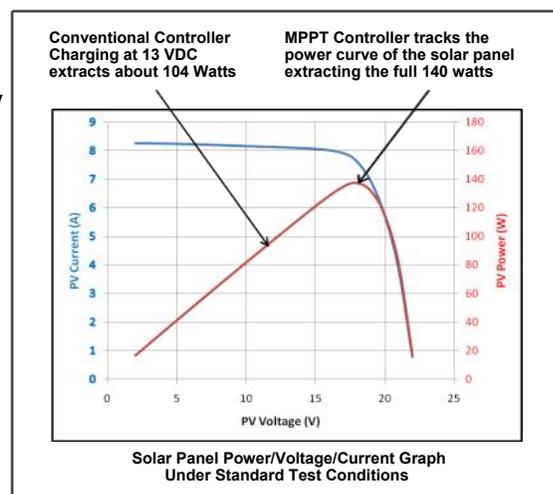
- **High Efficiency:** Provides higher than 99% conversion efficiency and uses less than two watts of power in night time mode
- **Voltage Options:** 12, 24, or 48V battery systems. The PT-100 will produce up to 100 amps regardless of battery voltage
- **Supports a Large PV Array:** A single controller can support up to 6600 watts
- **Multi-stage Charging:** Maximizes system performance & improves battery life
- **AFCI:** An integrated PV Arc-Fault Circuit Interrupter detects, indicates, and extinguishes series arcs

## The Classic from MidNite Solar



### Features:

- **Voltage Options:** 150, 200 and 250V operating voltages
- **Rated:** 63 to 96 amps
- **Protection:** Built in DC-GFP and Arc Fault Protection
- **3 Charging Sources:** Solar, Wind and Hydro MPPT modes
- **Exclusive hyperVOC:** extended VOC limits
- **Easy Set-up:** Wizard walks you through complete set-up
- **Computer Interface:** Ethernet, USB and RS232
- **Data Logging:** 20 megs



## TriStar from MorningStar



### Features:

- **Voltage Options:** 12, 24, or 48V
- **Rated:** 45 and 60 amps
- **Max System Size:** 3200 watts@48V
- **Extensive Networking & Communications Capabilities:** Enables system monitoring, data logging and adjustability
- **Optional Meter and Remote Meter:** provides detailed operating data, alarms and faults. Up to 200 days of data logging via meters or communications ports

## XW80-600V from Schneider



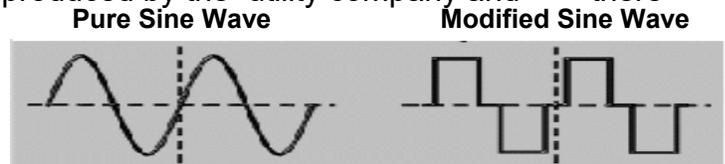
### Features:

- **Voltage Options:** 24 or 48V
- **Rated:** 80 amps
- **Max System Size:** 4800 watts@48V
- **Best Option:** for long distance transmission of solar energy from array site to battery bank

# Magnum Energy Inverter/Chargers

## About Inverters

An inverter is an electronic device that converts DC electricity, which is stored in your batteries, into AC electricity which you use to run typical household appliances such as microwaves, TV's, computers, lights, etc. There are two types of inverters: modified and pure sine wave. Due to technological advances made in the electronics industry over the past few years, some appliances such as microwave ovens and TV's can be very sensitive to the modified sine wave and will not run. You may also notice a buzzing or humming sound coming from the modified sine wave inverter when it is under load. A pure sine wave inverter provides power that is exactly like the power produced by the utility company and therefore capable of running all electronics.



## The MS Series Inverter/Charger

The MS Series Inverter/Charger - A **pure sine wave** inverter designed specifically for the most demanding mobile and off grid applications. Run your TVs, stereos, plasma screens, and other sensitive electronics without worry. The cost effective pure sine wave inverter/charger provides clean, reliable power with a low total harmonic distortion (THD) of less than 5%.

Magnum Energy's PFC (Power Factor Corrected) charger is built into all of their inverters. It uses less energy from a generator than a standard charger - using only 15 amps vs. 23 amps.



## Off Grid living with a 120/240 volt inverter/charger.

It has never been easier or more cost effective!



Web Based System  
Monitoring Available -  
See how your system is  
performing via the internet

To view the system at Beaver Lake Resort, click on the following link: <http://data.magnumenergy.com/MW1153/>



## The MS-PAE Series Inverter/Charger

The MS-PAE 120/240V Series Inverter/Charger from Magnum Energy - A **pure sine wave** inverter designed specifically for the most demanding renewable energy applications. With this inverter, you can run any 240 volt load, such as a well pump.

If more power is required, configurations of up to 4 inverter/chargers in parallel is possible.

# Kisae Inverters

KISAE Pure Sine Wave inverters offer the most reliable wave form available, providing power identical to utility power – no harmonic distortion, noise or excess heat. Some appliances also require a Pure Sine Wave to run properly, including: digital clocks, light dimmers, variable speed motors, battery chargers, and audio/visual equipment.

Kisae inverters are ideal for small cabin systems as they have the least amount of self consumption or “tare loss”.

## Features:

- Regulated output
- Low battery shutdown to prevent total battery discharge
- GFCI outlets for safe operation
- Build-in LED display for battery status & load measurement
- Silent operation
- Over temperature shutdown
- Remote on/off switch
- USB port for charging USB devices



# OutBack Inverters

The new Radian Series Inverter/Charger is an integrated power appliance that does it all. The Radian Series Inverter/Charger introduces a radical new feature to the world of renewable energy: Simplicity. Nearly all of the components you need are combined in a single package. The Radian Series is unique in its ability to support large dynamic load variations without voltage spikes or sags.



## Radian 8048A Series Inverter

### Features:

- Pure sine wave output
- Grid-interactive and stand-alone capability in the same package
- 8000 watts of continuous power
- Unsurpassed surge capacity
- 120/240V split-phase power
- Dual AC inputs
- Field serviceable modular design
- GSLC load center option allows for quick and easy installation

Also available: Radian 4048A Series Inverter

# Magnum Energy Power Panels

**Our Products are Evaluated Under the QPS Evaluation Services**

## ALL POWER PANELS INCLUDE:

- Magnum Inverter/Charger
- Magnum Mini Panel with AC/DC breakers
- MPPT Charge Controller
- Battery Monitoring Kit
- Remote Control or Advanced Remote Control
- Battery to Inverter Cables housed in Flexible Conduit
- Mounting Back Plate
- Easy Connection Points for Solar and AC Wiring
- CSA Evaluated as a Unit
- Built and Fully Tested by IPS

Pre-assembled. Pre-wired.  
Fully-tested. Ready to be installed  
Power Panels.



Single inverter system



Dual inverter system

When installed on a  
Magnum Power Panel,  
the warranty on the  
Inverter & accessories\*  
increases to 5 years.

\*Applies to Magnum  
Energy products only



Quad inverter system

The Magnum Power Panels are quick and easy to install, and are electrical inspector friendly.

# Generators

**LIFE...UNINTERRUPTED™**



There are many choices when it comes to generators, from small portable gasoline units to prime power commercial diesel generators.

When choosing a generator, it needs to be a part of the overall design, as sizing is important. For most weekend cabins or occasional use, a portable unit will work fine. Full time off grid homes require a standby propane or a prime power rated diesel unit. If you are buying a standby generator, it most likely is not warranted or appropriate for off grid use. The Kohler models listed below are.

## **Kohler Propane Generators Off Grid**

Available in: **12 & 14 kW AC or 6 kW DC**

## **Standby/Back-up**

Available in: **8 to 48 kW** Call for pricing



Small portable generators are an excellent backup generator for smaller systems. The newer inverter type are much quieter and more efficient than the older type generators. Be sure to get one that is large enough and buy a quality unit. Typical running hours per year is under 250 with a correctly designed system.

Diesel generators are robust and long lasting. We have seen many that have been well maintained exceed 30,000 hours. The negative side is the cost compared to propane units. They work well for larger homes and lodges, and are quite efficient. When considering purchasing, stay with a name brand and be sure to get a prime power unit, as there are a lot of lower grade diesel generators for sale at low prices. Typical running hours per year can be more than 1500 hours plus.

We can supply generators if needed, and will help pick the correct unit for the application.

## **Primary Power Diesel Generators**



We have diesel generators available in sizes from 11 kW to 50 kW

Call for more info.

# Let's Size Your System

## Power Consumption Table

These figures are approximate representations. The actual power consumption of your appliance may vary substantially from these figures depending on its age. Where a range of numbers are given, the lower figure often denotes a technologically newer and more efficient model. Check the power tags, or better yet, measure the amperage draw with a clamp-on ammeter or plug in a Kill-a-Watt measuring device.

Item	Watts	Item	Watts	Item	Watts
Fridge	800-2000	Iron	800	Garage Door Opener	350
Freezer	800-1500	Clothes Dryer (Gas Heated)	300-400	Computer (Desktop)	80-150
Coffee Maker	800	Air Conditioner (Room)	1200	Computer (Laptop)	20-50
Toaster	800-1500	Espresso Machine	1000-1500	Popcorn Popper	1250
Blender	300	Microwave	600-1500	Hot Plate	1200
Waffle Iron	1200	Dishwasher	1200-1800	Shaver	15
Frying Pan	1200	Vacuum (Upright)	500-1800	TV	200
Vacuum (hand)	100	Blow Dryer	1000-1800	Satellite Dish	20
Washer (Automatic)	500	Cell Phone Charger	10	Satellite Internet	25
Furnace Blower	300-1000	Tablet	15	Heater (Portable)	1500
Air Conditioner (Central)	2000-5000	VCR/DVD	100	Ceiling Fan	10-50
Well Pump (1/2-1 1/2 HP)	1000-3000				

Multiply the hours used on the average day by the wattage listed. This will give you the watt hours consumed per day. Remember that some items, such as garage door openers, are used for only a fraction of an hour or minutes per day. A 300 watt item used for 5 minutes per day will only consume 25 watt hours per day.

We recommend for "off grid" living, the use of propane to operate ranges and hot water heaters as well as changing your lighting to the newer energy efficient compact fluorescent or LED bulbs.



# Let's Size Your System Guide

## I have my Corrected watt-hrs per day...Now What?

Points to keep in mind when you are looking at the different systems:

### **1. Make sure the inverter is large enough to run your loads concurrently.**

- take the highest AC loads in watts,  
Eg. 6000 watts Given inverters have a 50% surge rate, a 4000 watt inverter will work
- take the total AC connected wattage at one time. This must be lower than the inverter rating

### **2. That you have enough battery storage for 1 - 2 days, roughly 30% of total kW storage capacity.**

- take your corrected watt-hrs per day,  
Eg. 5000 watts x 3.33 = the battery capacity you need, which in this case is 16,650 watts or 16.6 kWh

### **3. Solar array size required: given good southern exposure with no shading.**

- take your corrected watt-hrs per day, divided by 3 sun hrs/day = the array size  
This is a good 3 season average number to divide by  
Eg. 5000 watts /3 = 1660 watts This is the minimum size solar array needed  
If there will be shading, adjust accordingly.

Using the above points and wattage examples, our Small Home Kit #2 would be a good system to install (providing there are only 120V loads).

## OFF-GRID WARRANTY:

**One (1) year on installation plus all our products include the manufacturers warranty which range from one (1) to five (5) years, and up to twenty-five (25) on solar panels.**

**After one (1) year, we offer an annual service contract which will cover our labor and travel, all parts will be extra.**

# Cabin Solar Kits

**These cabin kits are perfect for the weekend get-away.**

Our economy cabin kits are designed to provide power for a few days at a time. Then when you leave the cabin, the system has time to recharge and be ready for your next get-away.

The Power Panel consists of an inverter, charge controller and battery meter mounted on a back plate which is ready to attach to your cabin wall.

## **Economy Weekend Cabin Kit #1**

1 300 watt Solar Panel with Roof Mounting Kit  
 1 Kisae 1000 watt Power Panel  
 1 SWE12-100 Lead Carbon Battery: 1.2 kWh  
 (100Ah@12V)  
 Daily Useable Capacity: 0.6 kWh

**CK9100 \$3,566.13**

## **Economy Weekend Cabin Kit #2**

2 300 watt Solar Panel with Roof Mounting Kit  
 1 Kisae 2000 watt Power Panel  
 1 SWE12-150 Lead Carbon Battery: 1.8 kWh  
 (150Ah@12V)  
 Daily Useable Capacity: 0.9 kWh

**CK9101 \$4,230.30**



Kisae Power Panel

The following two Economy Kits have an inverter/charger on the Power Panel which allows the use of a generator to charge the batteries during low light conditions.

## **Economy Weekend Cabin Kit #3**

1 300 watt Solar Panel with Roof Mounting Kit  
 1 Kisae 1000 watt Power Panel  
 1 SWE12-100 Lead Carbon Battery: 1.2 kWh  
 (100Ah@12V)  
 Daily Useable Capacity: 0.6 kWh

**CK9102 \$4,094.53**

## **Economy Weekend Cabin Kit #4**

2 300 watt Solar Panel with Roof Mounting Kit  
 1 Kisae 2000 watt Power Panel  
 1 SWE12-150 Lead Carbon Battery: 1.8 kWh  
 (150Ah@12V)  
 Daily Useable Capacity: 0.9 kWh

**CK9103 \$5,786.46**



## **Expansion Solar Kits**

Additional solar panels can be installed in the above systems.

**Call 250-769-2843 for more info and pricing.**

# Cabin Solar Kits

## Magnum Energy Systems 120VAC

These systems come preassembled and wired on a Magnum Power Panel with all AC/DC breakers and inverter cables, ready to attach to your wall and wire to your AC breaker panel. Just connect your batteries, mount and connect in your solar panels. All systems come preprogrammed and ready to go. Voila! You are done!!

The **pure sine wave** inverters come with a built in charger and transfer relay for easy connection to a generator if needed. Auto gen start is also available.

### Cabin Kit #1

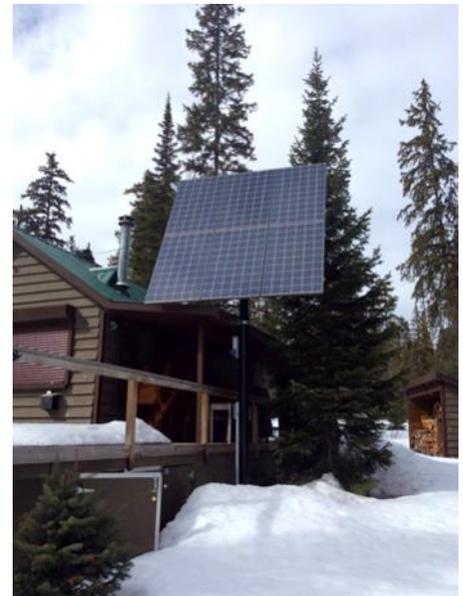
600 watt Solar Array  
 1 Magnum 2000 watt Power Panel  
 2 SWE12-150 Lead carbon batteries 3.6 kWh  
 (300ah@12V)  
 Daily Useable Capacity: 1.8 kWh  
 1 Top of Pole Mount  
**CK9104 \$10,163.51**

### Cabin Kit #2

900 watt Solar Array  
 1 Magnum 2800 watt Power Panel  
 2 SWE12-150 Lead carbon batteries 3.6 kWh  
 (300ah@12V)  
 Daily Useable Capacity: 1.8 kWh  
 1 Top of Pole Mount  
**CK9105 \$11,058.50**

### Cabin Kit #3

1200 watt Solar Array  
 1 Magnum 2800 watt Power Panel  
 4 SWE12-150 Lead carbon batteries 7.2 kWh  
 (600ah@12V) or (300ah@24V)  
 Daily Useable Capacity: 3.6 kWh  
 1 Top of Pole Mount  
**CK9106 \$13,079.57**



**Please Note:** All the kits in this catalogue do not include the pole to mount the panels on or the solar wire to run from the solar array to the system. We have the solar wire available for an additional cost.

# Small Home Solar Kits

## Magnum Energy Systems 120VAC

The following systems are designed for homes with moderate power consumption. As with all renewable energy systems, conservation is the key.

### Small Home Kit #1

1800 watt Solar Array  
 1 Magnum 4000 watt Power Panel  
 4 SWE12-150 Lead carbon batteries 7.2 kWh(600ah@12V)  
 (300ah@24V)  
 Daily Useable Capacity: 3.6 kWh  
**CK9107 \$15,097.24**



### Small Home Kit #2

2400 watt Solar Array  
 1 Magnum 4000 watt Power Panel  
 12 Lead Carbon 2V Batteries - Capacity: 13.8 kWh  
 (575Ah@24V)  
 Daily Useable Capacity: 6.9 kWh  
 1 Top of Pole Mount  
**CK9108 \$19,062.77**

The following systems are 120/240 volt. These are designed to be used with larger 240 volt generators and can easily run 240 volt loads such as well pumps

## Magnum Energy Systems 120/240VAC

### Small Home Kit #3

2400 watt Solar Array  
 1 Magnum 4000 watt 120/240V Power Panel  
 12 Lead Carbon 2V Batteries - Capacity: 13.8 kWh  
 (575Ah@24V)  
 Daily Useable Capacity: 6.9 kWh  
 1 Top of Pole Mount  
**CK9109 \$19,063.98**

### Small Home Kit #4

2400 watt Solar Array  
 1 Magnum 4400 watt 120/240V Power Panel  
 24 Lead Carbon 2V Batteries - Capacity: 27.6 kWh  
 (575Ah@48V)  
 Daily Useable Capacity: 13.8 kWh  
 1 Top of Pole Mount  
**CK9110 \$25,367.91**

### Small Home Kit #5

3600 watt Solar Array  
 1 Magnum 4400 watt 120/240V Power Panel  
 24 Lead Carbon 2V Batteries - Capacity: 27.6 kWh  
 (575Ah@48V)  
 Daily Useable Capacity: 13.8 kWh  
 2 Top of Pole Mounts  
**CK91105 \$28,058.36**



# Large Home Solar Kits

These are bigger systems designed for larger homes.

If you are not sure what your future power needs will be, the Large Home Kit #1 below is designed with expansion in mind.

## Expandable Large Home Kit #1

The inverter in this system is mounted on a double back plate to allow for another inverter to be added.

2400 watt Solar Array  
 1 Magnum 4400 watt 120/240V Power Panel  
 24 Lead Carbon 2V Batteries - capacity: 27.6 kWh  
 (575Ah@48V)  
 Daily Useable Capacity: 13.8 kWh  
 1 Top of Pole Mount  
**CK9111 \$26,068.33**

## Inverter Expansion Kit for Above Home Kit #1

1 Magnum 4400 watt 120/240 volt inverter/charger  
 1 Magnum router  
**CK9112 \$4,506.41**

## Solar Expansion Kit for Above Home Kit #1

2400 watt Solar Array  
 1 Top of Pole Mount  
**CK9113 \$4,650.54**



## Large Home Kit #2

4800 watt Solar Array  
 1 Magnum 4400 watt 120/240V Dual Power Panel  
 24 Lead Carbon 2V Batteries - Capacity: 27.6 kWh  
 (575Ah@48V)  
 Daily Useable Capacity: 13.8 kWh  
 2 Top of Pole Mounts  
**CK9114 \$35,172.60**

## Large Home Kit #3

7200 watt Solar Array  
 1 Magnum 4400 watt 120/240V Dual Power Panel  
 48 Lead Carbon 2V Batteries - Capacity: 55.2 kWh  
 (1150Ah@48V)  
 Daily Useable Capacity: 27.6 kWh  
 3 Top of Pole Mounts  
**CK9115 \$54,303.21**



**Please Note:** All the kits in this catalogue do not include the pole to mount the panels on or the solar wire to run from the solar array to the system. We have the solar wire available for an additional cost.

# Large Home Solar Kits

The Magnum Energy stackable products allow us to build systems of up to 17,600 watts 120/240VAC, making them the perfect choice for resorts, lodges, and full time homes. The innovative MPPT technology that we use gets the most from your solar array. The MPPT regulator charge controller can also control hydro or wind turbine charging sources.

## Large Home Kit #4

9,600 watt Solar Array

1 Magnum 4400 watt 120/240V Triple Power Panel

48 Lead Carbon 2V Batteries - Capacity: 55.2 kWh (1150Ah@48V)

Daily Useable Capacity: 27.6 kWh

4 Top of Pole Mounts

**CK9116 \$64,950.02**

**\*\*\*This system is expandable to 4 inverters using the Expansion Kit on page 21\*\*\***

## Large Home Kit #5

14,400 watt Solar Array

1 Magnum 4400 watt 120/240V Quad Power Panel

48 Lead Carbon 2V Batteries - Capacity: 55.2 kWh (1150Ah@48V)

Daily Useable Capacity: 27.6 kWh

6 Top of Pole Mounts

**CK9117 \$79,958.09**

## Resort #1

19,200 watt Solar Array

1 Magnum 4400 watt 120/240V Quad Power Panel

48 Lead Carbon 2V Batteries - Capacity: 110.4 kWh (2300Ah@48V)

Daily Useable Capacity: 55.2 kWh

8 Top of Pole Mounts

**CK91175 \$116,254.47**



Quad inverter system

At IPS Integrated Power Systems, we have the expertise and knowledge to design a system specifically to meet your power needs by using the power sources you have available - solar, wind, hydro, or generator.

No matter what your energy source, we can build a system to provide your home or business with safe reliable electricity 24/7.



Ground Mount Solar Arrays

# Water Turbines

## Water Turbines

### Where there is water, there is energy!

You can power a small cabin to the largest resort for a fraction of the cost of other energy sources. Water - harness the power of a clean and renewable energy source!



## The Power of Moving Water

### Micro Hydro Systems Explained

The commercial micro-hydro generators available today use a small turbine connected to an electrical generator or alternator. Water is collected in an intake pipe upstream, travels down to the turbine in a plastic pipe, and is forced through one or more nozzles by its own gravity pressure. The system includes a regulator charge controller that sends power to the batteries and diverts excess power to prevent overheating. To decide whether a micro-hydro system will work for you, some measurements and calculations have to be made. First, you need to know the vertical drop in meters (called head), and also the amount of water flow available during different seasons measured in liters per second. The basic formula is:

**liters/sec x 10 x vertical drop in meters = theoretical power (usable power is approx. 50% of this #)**

The more fall and flow that you have, the more potential power you can generate. Our turbines come with different size nozzles which are designed to be switched in and out as the stream conditions change throughout the year.

### Mini Hydro Kit #1

800 watt Water Turbine  
 1 Spring Box  
 1 Magnum 2000 watt Power Panel  
 1 SWE12-150 Lead Carbon Battery: 1.8 kWh  
 (150Ah@12V)  
 Daily Useable Capacity: 0.9 kWh  
 2 Dump Loads  
**CK9118 \$10,527.06**



Permanent Magnet Water Turbine

Keep in mind that a water turbine will produce power 24 hours a day. Provided you have the resource, a water turbine can be added to all our solar systems.

# Micro Hydro Systems

## The Power of Moving Water

If you have the resource available, micro hydro is the least expensive method (in the field of renewable energy) of providing power to your home. Once in place, a system is not difficult to operate or maintain and its lifespan is literally measured in decades. These small hydro systems will typically provide far more power than a solar (PV) system.

For example: Let's say you have measured your creek and you have 3 liters/second flow and the drop is 40 meters. Using the formula on the previous page, you can expect to produce 600 watts continuous. This will yield 14.4 kWh per day!

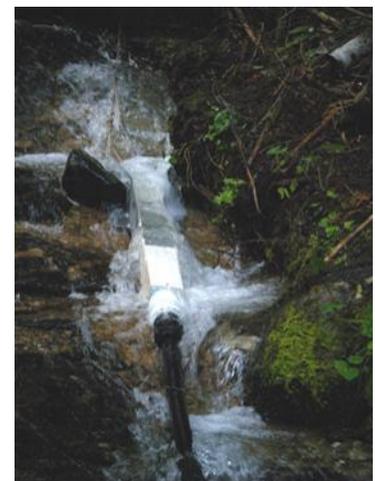
### Small Hydro Kit #1

800 watt Water Turbine  
 1 Spring Box  
 1 Magnum 2800 watt Power Panel  
 1 SWE12-150 Lead Carbon Battery: 1.8 kWh  
 (150Ah@12V)  
 Daily Useable Capacity: 0.9 kWh  
 2 Dump Loads  
**CK9119 \$10,881.95**



### Small Hydro Kit #2

1400 watt Water Turbine  
 1 Spring Box  
 1 Manifold  
 1 Magnum 4000 watt 120/240V Power Panel  
 4 SWE12-150 Lead carbon batteries 7.2 kWh  
 (600ah@12V) or (300ah@24V)  
 Daily Useable Capacity: 3.6 kWh  
 2 Dump Loads  
**CK9120 \$15,315.33**



Hydro screen

### Large Hydro Kit #1

1400 watt Water Turbine  
 1 Spring Box  
 1 Manifold  
 1 Magnum 4400 watt 120/240V Dual Power Panel  
 8 SWE12-150 Lead carbon batteries 14.4 kWh  
 (600ah@24V) or (300ah@48V)  
 Daily Useable Capacity: 7.2 kWh  
 2 Dump Loads  
**CK9121 \$23,349.33**

**Please Note:** All hydro kits do not include the cost of the pipeline.

# Grid-Tie Ready Solar Kit

This system is designed to be connected to the utility grid and has the added benefit of a battery bank which will provide you with power when the utility grid goes down.

**Grid-Tie with Battery Back-up      Powered by Outback Radian**

**Available in 2 sizes: 4000 watt or 8000 watt Inverter**

There are so many variables to consider with this type of system: size of loads, run time needed

Solar & Batteries will be designed to suit your needs.

If you are already connected to the utility grid and are interested in a Grid-Tie System, be sure to ask for a copy of our Grid-Tie Catalogue. Systems available with or without battery back-up.



Grid-Tie with Battery Back-up installed on the Arena in 2009 Nakusp, BC



# Wind Turbines

We carry a full line of wind turbines and can custom design a system to suit your needs. Also available are tower systems and other wind accessories. However, the question that needs to be asked is...

Do you have enough wind for a turbine?

In order to answer "yes" to this question, you need to feel annoyed by the wind when you go outside your home. We are not talking just a light breeze or gusts of wind, we mean really bothered by it! Do your trees look similar to the one in the picture? This is called "flagging" and it is caused by the tree being continually bombarded by wind as it grew. If your trees are like this, then you should have enough wind to make a turbine viable.



If you are not sure, we do have wind data logging equipment available to rent. Call for more info.

# Water Pumps



## Water Pumps



We sell a full line of submersible water pumps that can supply all your water needs. Need water for guests at a resort, irrigation for farming, watering livestock? No problem, we have the pump to get the job done.

[Call for Info and Pricing](#)

# Purchasing Options

## [Commercial and Agricultural Leasing](#)

[We offer leasing programs to qualified clients.](#)

### **Why Lease?**

Leasing will free up your business capital as well as give you the ability to regain your investment back in a shorter term through tax deductions.

### **We have leasing plans available from 24 to 66 months**

We also have a seasonal business plan available in which your payments are set for the 6 to 8 months you are in operation.

**Call for more info  
1-866-607-7640**

# Sun Hours Per Day

Several factors influence how much sun power your solar panels will be exposed to:

When you will be using your system—summer, winter, or year-round.

Typical local weather conditions.

Fixed mountings vs. trackers.

Location and angle of PV array.

We have provided the following chart which shows ratings that reflect the number of hours of full sunlight available to generate electricity. Your solar array's power generation capacity is dependant on the angle of the rays as they hit the solar panels. Peak power occurs when the rays are at right angles to the panels.

If you use your system primarily in the summer, use the summer value: if you are using your system year-round, especially for a critical application, use the winter value. Using the chart, you should be able to determine a reasonable estimate of the sun's availability in your area.

<b>Province, City</b>	<b>Summer Avg.</b>	<b>Winter Avg.</b>	<b>Yr Round Avg.</b>
<b>Alberta, Edmonton</b>	<b>4.95</b>	<b>2.13</b>	<b>3.75</b>
<b>Alberta, Suffield</b>	<b>5.19</b>	<b>2.75</b>	<b>4.10</b>
<b>British Columbia, Kamloops</b>	<b>4.48</b>	<b>1.46</b>	<b>3.29</b>
<b>British Columbia, Prince George</b>	<b>4.13</b>	<b>1.33</b>	<b>3.14</b>
<b>British Columbia, Vancouver</b>	<b>4.23</b>	<b>1.33</b>	<b>3.14</b>
<b>Manitoba, The Pas</b>	<b>5.02</b>	<b>2.02</b>	<b>3.56</b>
<b>Manitoba, Winnipeg</b>	<b>5.23</b>	<b>2.77</b>	<b>4.02</b>
<b>New Brunswick, Fredericton</b>	<b>4.23</b>	<b>2.54</b>	<b>3.56</b>
<b>Newfoundland, Goose Bay</b>	<b>4.65</b>	<b>2.02</b>	<b>3.33</b>
<b>Newfoundland, St. Johns</b>	<b>3.89</b>	<b>1.83</b>	<b>3.15</b>
<b>Northwest Territory, Fort Smith</b>	<b>5.16</b>	<b>0.88</b>	<b>3.29</b>
<b>Northwest Territory, Norman Wells</b>	<b>5.04</b>	<b>0.06</b>	<b>2.89</b>
<b>Nova Scotia, Halifax</b>	<b>4.02</b>	<b>2.16</b>	<b>3.38</b>
<b>Ontario, Ottawa</b>	<b>4.63</b>	<b>2.35</b>	<b>3.70</b>
<b>Ontario, Toronto</b>	<b>3.98</b>	<b>2.13</b>	<b>3.44</b>
<b>Prince Edward Island, Charlottetown</b>	<b>4.31</b>	<b>2.29</b>	<b>3.56</b>
<b>Quebec, Montreal</b>	<b>4.21</b>	<b>2.29</b>	<b>3.50</b>
<b>Quebec, Sept-Isles</b>	<b>4.29</b>	<b>2.33</b>	<b>3.50</b>
<b>Saskatchewan, Swift Current</b>	<b>5.25</b>	<b>2.77</b>	<b>4.23</b>
<b>Yukon, Whitehorse</b>	<b>4.81</b>	<b>0.69</b>	<b>3.10</b>

# Definition of Terms

**Ah:** amp hour

**Amps:** a unit of electrical current or volume

**Dynamic Head:** the "net" head under actual working conditions. This # is always less than static head and is a result of friction losses in the penstock.

**Flow:** the quantity of water flowing through the nozzles in the hydro. Leaks don't count. Most residential sized systems are measured in gallons per minute (GPM). Larger systems are measured in CFS (cubic feet per second). 450 GPM. = 1 CFS

**Head:** the vertical component or elevation change between the intake and the hydro-generator measured in feet or pounds per square inch (PSI) of pressure at the nozzle in the hydro. For those of you on the metric system, you will have to make your own conversions. 1 PSI = 2.31 feet of head. 1 foot of head = .433 PSI

**kW:** kilowatt, one thousand watts

**kWh & Ah:** By convention: amps, volts, and watts are instantaneous measurements of electrical energy. Over time, we commonly use: watt hours, kilowatt hours, and amp hours. One kilowatt-hour (kWh) equals the amount of electricity needed to burn a 100 watt light bulb for 10 hours. Amp hours is easier to understand and keep track of. For example, if your hydro is producing 5 amps for 24 hours, you have added (5 X 24) amp hours into your systems batteries which can be used or stored for later.

**MPPT:** maximum power point tracking

**Ohms:** a unit of electrical impedance. Ohms law states that 12 volts through 4 ohms impedance will allow 3 amps of current to flow. It is necessary to understand voltage drop in a run of wire and Ohms law is fundamental.

**Penstock:** a pipe or conduit used to carry water to a water wheel or turbine

**PV:** photovoltaic

**Photovoltaic Module:** solar panel

**RE Source:** renewable energy source

**Solar Array:** a group of solar panels

**Static Head:** Head measurement at 0 flow rate

**Volts:** a unit of electrical force, Volts = Amps x Ohms

**Watts:** a unit of power and is a product of amps x volts, for example: 4 amps at 12 volts = 48 watts. **Power (watts) = amps x volts**

# What Are Your Energy Needs?

Please note the following:

- The products you already have such as a water pump or generator.
- If you are going to be running heavier power loads.
- What your average length of stay is, and your future plans for power requirements.

This information is necessary when designing your system. A property layout is also helpful.



Teck Coal LTD. Off-Grid Solar Installation

# About Us

## About Us:

- Over 25 years experience in the alternative energy business
- We have and work out of a fully stocked warehouse - not a garage or backyard
- We are fully insured and have WorkSafe BC coverage
- All our systems meet the current BC electrical code
- We use Licensed Electricians who will provide the necessary permit
- All our systems are complete!  
If ordering from an on-line store, be aware that the system may not meet the current BC electrical code & that all parts may not be included
- For shingle roofs, we use Kinetic Racking with Flashing to protect against leaks...using L-feet & a sealant is not an adequate alternative!
- We have lots of options available for metal roofs
- We manufacture both Ground and Top of Pole Mounts in our warehouse
- **All the installation pictures are from our installations.** Like what you see... call us and let our team of professionals install a quality system for you

## Our systems work!



[www.ipwr.net](http://www.ipwr.net)

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