



ARTHUR N. ULRICH
COMPANY

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M-F 8:00am-5:00pm EST

www.anu-co.com

Rail Catalog

Quality AC & DC Power Systems Since 1958





About Us

Arthur N. Ulrich Company

The Arthur N. Ulrich Company was founded in 1958 and today is a third-generation family owned, operated and managed manufacturer's representative agency specializing in the technical application and sale of high integrity AC and DC power systems for critical infrastructure markets including rail transportation, healthcare, financial/data center, utilities (electric/gas/water), telecom, manufacturing facilities, government agencies and others.

We are currently the exclusive rail wayside sales representatives for **SAFT America** and **La Marche Manufacturing Co.**, in the US & Canada market.

We also own and operate a manufacturing subsidiary known as **RedHawk Energy Systems, LLC**. RedHawk Energy Systems, LLC is an ISO 9001-2015 certified manufacturer that specializes in helping customers tackle their critical prime and backup power challenges with fully engineered and innovative power solutions (solar & wind, fuel cells, stirling engines, generators, switch boost systems and more).



What's New?

Switch Boost™ 120V System

RedHawk Energy's innovative and patented Switch Boost™ 120V System utilizes Ultracapacitor technology to significantly improve the reliability and extend the life of new or existing battery/charger powered railway switches. The Switch Boost™ 120V System offers built-in safety & security and plug & play integration for rapid deployment in the field.



See page 12

GenCell BOX™ Fuel Cells

GenCell Energy develops unique Alkaline Fuel Cell solutions (5kW+). Using the ultra-reliable and exhaust-free technology that powered the American space program, the GenCell BOX™ 5kW long-duration backup power solution provides a compact, resilient and emission-free source of backup power designed especially for critical rail telecommunication sites.



See page 22

P250i (GEN4) Fuel Cells

Building upon the foundation of the previous generation P250i Solid Oxide Fuel Cell, the new GEN4 P250i features easier setup/commissioning and enhanced operational visibility through remote monitoring. Available at 250W @ 12/24/48VDC, our P250i Solid Oxide Fuel Cell is an eco-friendly, long-life, low-maintenance alternative to gas/diesel generators, capable of providing automated battery charging at crossings, signals and other wayside sites.



See page 20

SPL+ Ni-Cd Batteries

Trackside Power When It Matters Most

Stationary batteries, housed in trackside bungalows and cabinets, play a vital role in ensuring continuity of supplying power to critical signaling and communication operations including Positive Train Control (PTC) and Communication Based Train Control Systems (CBTC). Batteries are used to meet peak electricity demand and to provide backup power to all systems in case of an emergency.

Not all nickel cadmium batteries are created equal. For critical wayside applications a track record of proven reliability like that of SAFT's SPL and SPL+ pocket plate nickel cadmium batteries should be of the utmost importance. Building upon the foundation of the original SPL, the SPL+ is the most trusted wayside signaling and communication battery available.

- **Excellent High and Low Temperature Performance**

Operates: -30°C (-22°F) to +40°C (+104°F)

Tolerates: -40°C (-40°F) to +55°C (+131°F)

- **Low Total Cost of Ownership (TCO)**

High reliability and low operating costs over life.

- **Abuse Tolerance**

Can withstand and recover from sustained undercharging and overcharging.

- **Predictable 20+ Year Life**

No "sudden death", thermal runaway and cell dry out as seen with VRLA batteries.

- **Ultra-Low Maintenance**

High level of gas recombination is beyond requirements of IEC 62259.

One topping up interval during life at +20°C (+68°F) or +40°C (+104°F).

- **Built-in Safety & Convenience**

Cell containers are polypropylene with visible electrolyte levels and are equipped with flame arresting flip top vent caps.

Cells above 25 lbs have integrated carrying handles.

- **Storage Capability**

Can be stored for up to **2 years** before installation.



| Cell Type | Capacity C5Ah |
|-----------|---------------|
| SPL+80 | 80 |
| SPL+100 | 100 |
| SPL+130 | 130 |
| SPL+165 | 165 |
| SPL+200 | 200 |
| SPL+250 | 250 |
| SPL+290 | 290 |
| SPL+340 | 340 |
| SPL+380 | 380 |
| SPL+420 | 420 |
| SPL+470 | 470 |
| SPL+510 | 510 |



TLX Ni-Cd Batteries

Compact Solution for Trackside Power

SAFT's TLX Ni-Cd Batteries deliver the optimum combination of high-energy performance, reliability and long-life in a compact, modular maintenance-free design. The TLX is a direct replacement for VRLA batteries commonly used in rail wayside applications that overpromise and underdeliver.

The TLX is quickly becoming a preferred choice for rail and transit agencies in place of VRLAs used for signals, switch machines, hot box detectors, AEI readers, WILD (wheel impact load detectors), UPS and telecom systems.



- **Excellent High and Low Temperature Performance**

Operates: -20°C (-4°F) to +50°C (+122°F)

Tolerates: -50°C (-58°F) to +70°C (+158°F) for short durations

- **Lowest Total Cost of Ownership (TCO)**

High reliability and maintenance-free operation.

- **Weight Savings vs. VRLA**

Reduces battery weight by 30% over VRLA in same space.

- **Predictable 20+ Year Life**

No "sudden death", thermal runaway and cell dry out as seen with VRLA batteries.

- **Maintenance-Free**

Low pressure venting system reduces water consumption to absolute minimum. No topping up necessary in normal operation.

- **Modular Design**

Suits specific capacity needs from 83Ah to 185Ah in modular block construction. Each module comprises 3 to 10 cells in flame retardant material. Parallel assembly possible up to 4 strings.

- **Simple Charging**

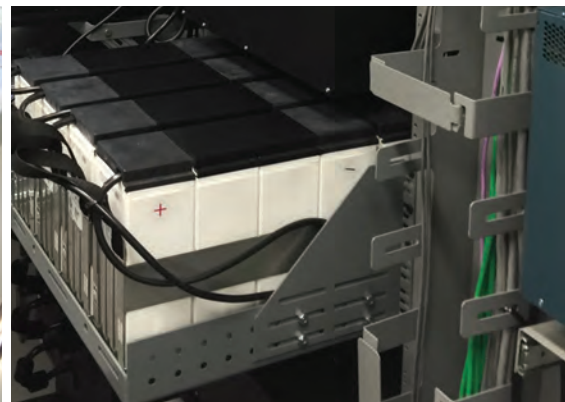
Compatible with VRLA charging systems thanks to its 1.43v/c float voltage. No need for temperature compensation.

- **Storage Capability**

Can be stored for up to **1 year** before installation.



| Cell Type | Capacity C5Ah |
|-----------|------------------|
| TLX 80 | 83 Ah |
| TLX 100 | 103 Ah |
| TLX 150 | 152 Ah |
| TLX 180 | 185 Ah |



SUN+ Ni-Cd Batteries

Robust Daily Cycling Solution for Off-Grid Solar PV

SAFT SUN+ Ni-Cd Batteries are fully engineered and tested to meet the specific performance and reliability needs of Solar PV applications.

- **Superior High and Low Temperature Performance**
Operates/Tolerates: -50°C (-58°F) to +70°C (+158°F)
- **Excellent Cycling Capability**
Up to 10,000 cycles at 15% of Depth of Discharge during the 20-year service life.
- **Flexible Operation**
Ability to operate under fluctuating charging conditions (voltage, current) created by the intermittent nature of solar power.
- **Predictable 20+ Year Life**
No “sudden death”, thermal runaway and cell dry out as seen with VRLA batteries.
- **Ultra-Low Maintenance**
Internal gas recombination exceeds IEC 62259 requirements.
Interval for topping up is every 6 years.
- **Storage Capability**
Can be stored for up to **2 years** before installation.



SUN+ Range:

| | | | |
|---------|---------|----------|----------|
| SUN+50 | SUN+505 | SUN+960 | SUN+1420 |
| SUN+100 | SUN+555 | SUN+1015 | SUN+1470 |
| SUN+150 | SUN+610 | SUN+1065 | SUN+1520 |
| SUN+200 | SUN+660 | SUN+1115 | SUN+1570 |
| SUN+250 | SUN+710 | SUN+1170 | SUN+1620 |
| SUN+305 | SUN+760 | SUN+1215 | SUN+1670 |
| SUN+355 | SUN+810 | SUN+1270 | SUN+1720 |
| SUN+405 | SUN+860 | SUN+1320 | SUN+1775 |
| SUN+455 | SUN+910 | SUN+1370 | SUN+1830 |



Battery Accessories

RH-3

Portable Battery Capacity Tester

The innovative La Marche RH-3 Portable Battery Testers take the guesswork out of determining the true health of your battery system(s) by providing convenient and automated capacity testing of all battery technologies and voltages from 10-60V.

- **True Capacity Measurement**
Monitors the battery's voltage, discharge current and Amp-hrs drawn as it measures the time it takes to discharge the battery under specific load
- **Selectable Termination Modes**
Battery End Voltage, Elapsed Time, or Maximum Amp-hrs drawn.
- **Self-Powered**
Powered by the battery being used. No connection to AC required.
- **Data Logging**
Maintains a CSV log file for each battery, which keeps track of charge and discharge cycles. Also has 8GB internal memory and USB port.
- **Dual Test Modes**
Tests the battery with either a Constant Current (CC) or Constant Power (CP) load.



RH-3 Models

RH-3-500W-10/60V-50A

RH-3-750W-10/60V-50A

Ni-Cd Battery Tool Kit

Insulated Torque Wrench Tool Kit

The Battery Insulated Torque Wrench Tool Kit provides a safe and convenient means of installing and adjusting SAFT's nickel-cadmium batteries in the field. The robust insulated torque wrench and provided sockets take the guesswork out of torquing batteries and ensure that batteries are torqued to recommended factory specs.

Included in Kit:

- 15" Insulated Torque Wrench - 1/2" Drive - 8-54Nm
- Torque Wrench Plastic Case for Protection
- 10mm Insulated Socket
- 13mm Insulated Socket
- 16mm Insulated Socket
- 30mm Insulated Socket
- Canvas Pouch for Sockets
- Canvas Tool Bag (9"H x 19"W x 6"D)



Rail Battery Chargers

A75R

SCR Railroad Battery Charger

The La Marche A75R series battery chargers are specifically developed for the rail and transit market using proven SCR charging technology.

- **Auto Sensing Input**
No tap changes; senses 120/240VAC and switches relays accordingly.
- **Multi-Level Surge & Lightning Protection**
Protection on the front end (AC), back end (DC) and circuit board levels.
- **Remote Shutdown Capability**
Ability to test the DC system or remotely shutdown unit in emergency conditions.
- **Conservative Component Design**
Fitted with Class H insulation and heavier gauge wire to help unit run in extreme temperatures.
- **Meets Applicable Standards**
Meets AREMA specifications.
Meets ANSI C62-41 Standards for Surge Voltages
- **Class Leading Warranty**
The A75R comes with a standard 3-year warranty.



The Powerful Advantage

Since 1945

La MARCHÉ

ISO 9001:2015 CERTIFIED



| Model Number | DC Output | | | | Overall Dimensions W x D x H | Net Weight | |
|-----------------|-----------|-------|-----------|-------|---------------------------------|------------|------|
| | Amps | Volts | Lead Acid | Ni-Cd | | lbs | kgs |
| A75R-10-12V-AB1 | 10 | 12 | 5-8 | 8-12 | 12" x 9.3" x 10" | 42 | 19 |
| A75R-20-12V-AB1 | 20 | 12 | 5-8 | 8-12 | 12" x 9.3" x 10" | 44 | 19.9 |
| A75R-40-12V-AB1 | 40 | 12 | 5-8 | 8-12 | 14.3" x 12.2" x 13.4" | 67 | 30.4 |
| A75R-60-12V-AB1 | 60 | 12 | 5-8 | 8-12 | 15.5" x 12.2" x 13.4" | 89 | 40.3 |
| A75R-30-24V-AB1 | 30 | 24 | 10-16 | 16-24 | 14.3" x 12.2" x 13.4" | 87 | 39.5 |



Rail Battery Chargers

RHF2

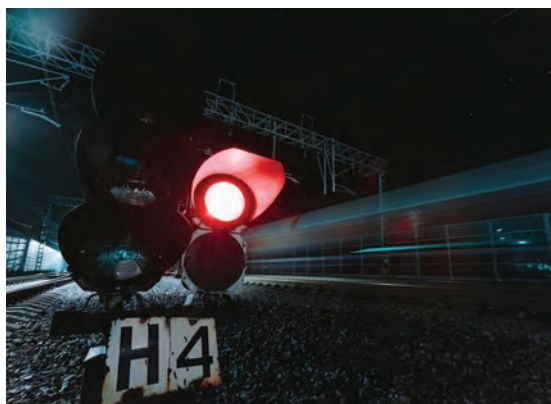
Compact Railroad Battery Charger

La Marche's all-new RHF2 Rail Charger utilizes proven high frequency charging technology. Compared to traditional SCR rail chargers, the RHF2 features a reduced size and weight (11-18 lbs) for easier handling and mounting in the field. The RHF2 features enhanced communication capability and is CEC compliant.

- **Auto Sensing Input**
No tap changes; senses 120/240VAC and switches relays accordingly.
- **Multi-Level Surge & Lightning Protection**
Protection on the front end (AC), back end (DC) and circuit board levels.
- **High Efficiency & Power Factor**
Power factor correction better than .95.
- **Meets Applicable Standards**
Meets AREMA specifications.
Meets ANSI C62-41 Standards for Surge Voltages.
Meets CEC efficiency regulations.
- **Optional Communications**
Ethernet Communications (SNMP and Remote Monitoring) available.



| Model Number | DC Output | | | | Overall Dimensions W x D x H | Net Weight | |
|--------------|-----------|-------|-----------------|-------|---------------------------------|------------|-----|
| | Amps | Volts | Lead Acid | Ni-Cd | | lbs | kgs |
| RHF2-20-12V | 20 | 12 | 5-8 | 8-12 | 14.06" x 5.08" x 12.55" | 11 | 5 |
| RHF2-40-12V | 40 | 12 | 5-8 | 8-12 | 14.06" x 5.08" x 12.55" | 11 | 5 |
| RHF2-60-12V | 60 | 12 | 5-8 | 8-12 | 14.06" x 5.08" x 12.55" | 18 | 8.2 |
| RHF2-30-24V | 30 | 24 | 10-16 | 16-24 | 14.06" x 5.08" x 12.55" | 11 | 5 |
| RHF2-50-24V | 50 | 24 | 10-16 | 16-24 | 14.06" x 5.08" x 12.55" | 18 | 8.2 |
| RHF2-6-130V | 6 | 130 | Consult Factory | | 14.06" x 5.08" x 12.55" | 11 | 5 |



Misc. / UPS / Telecom



SC3 Single Cell Battery Charger

The La Marche SC3 single cell battery charger is designed to maintain factory charge on lead acid batteries that are either spare cells or cells that have been in storage. The SC3 helps to restore lost capacity, balance specific gravity and reverse the sulfation process that is known to degrade battery health. The SC3 can charge single, two and three lead acid cell configurations. The SC3 is lightweight and features an integral handle for portability.



LMESpro Compact Battery Charger

The La Marche LMESpro battery charger is designed to both recharge and extend life utilizing multi-stage charging. The LMESpro is completely automatic, lightweight and convection cooled. Available at 12VDC or 24VDC output, the LMESpro is suitable for various types of batteries (Flooded Lead Acid, GEL) or for **Ultracapacitors/Supercapacitors**.



IUPS Industrial UPS System 5k-60kVA

The La Marche IUPS is an industrial double conversion UPS System designed using IGBT with digital control to ensure reliability. This UPS system maintains power to critical loads during power outages, brownouts and power spikes. La Marche Industrial UPS Systems are highly customizable ; kVA Rating, Single or Three Phase, Frequency, Charger Size, System and Battery Enclosure Protection, Distribution and other features. The system's smart controller offers a dynamic color touchscreen mimic panel which displays the power flow through the system and provides visual Alarms and Status indications. This UPS system is equipped with monitoring, data logging and battery test capabilities.



Telecom Systems Small to Large Scale

- 48VDC Power
- Mount to 19" or 23" Rack
- Switchmode Rectifier Technology
- Hot-Swappable Rectifiers
- N+1 Redundancy
- **Small-Scale:** LTP & LMP - 100A
- **Mid-Scale:** LMP - 200A/400A/600A
- **Large Scale:** LMPS - 1800A

Battery Boxes & Racks

Battery Boxes

Temperature extremes and unwanted exposure can place stress on your outdoor critical battery system. Our Battery Boxes are designed to shield and protect battery systems located in harsh outdoor environments.



- **All-Welded Aluminum Construction**
Weather-tested robust construction promotes long life.
- **Fully Insulated Paneling**
Reduces temperature extremes than can degrade batteries.
- **Tamper Resistant Lockable Lid**
Protects against unwanted human or animal intrusion.
- **Five 2" Pre-Fitted Wiring Conduit Access**
Provides quick and easy interconnection capability.
- **Hinged Lid & Gas Shock Lift Assist**
Increases safety while opening and closing the box.



| Model # | Exterior Dimensions | Interior Dimensions |
|-------------|---------------------|--------------------------|
| BB-48x36x24 | 48"L x 36"W x 24"H | 44.75"L x 32.75"W x 21"H |
| BB-54x52x24 | 54"L x 52"W x 24"H | 50.75"L x 48.75"W x 21"H |
| BB-56x56x24 | 56"L x 56"W x 24"H | 52.75"L x 52.75"W x 21"H |
| BB-68x44x24 | 68"L x 44"W x 24"H | 64.75"L x 40.75"W x 21"H |

*Custom sizes available upon request

Battery Racks

Our Battery Racks are designed to accommodate 19" and 23" battery configurations and feature slide-out trays for ease of install, maintenance and replacement. These Battery Racks are meant for indoor locations and feature a high level of available customization per customer requirements.

- **Heavy-Duty Design**
36U Heavy-duty powder-coated black server racking
Dimensions: 69"H x 19"W x 28.75"D
- **Slide-Out Shelves**
(3) Heavy-duty slide-out shelves with locking, rubber matting and hold-down straps for batteries.
- **Provisions for Rack Mount Battery Charger**
Rack mount battery charger/rectifier can be mounted to top of rack assembly.
- **Highly Configurable**
Can accommodate a variety of battery sizes, chemistries and voltages'.





Switch Boost™ 120V

Application

A railway power switch application requires an AC or DC power source that can provide a high initial current to meet the in-rush/break-away current demand of the switch or hydraulic motor. This momentary inrush is followed by a lower level current for a longer duration as the switch throws. Finally, a small rise in current towards the end of the operation usually occurs as the switch drives home.

Switch Boost™ 120V System

The short-time, high current nature of the load profile of power switch applications are well aligned with the characteristics and capabilities of a relatively new device for energy storage known as an **Ultracapacitor or Supercapacitor**.

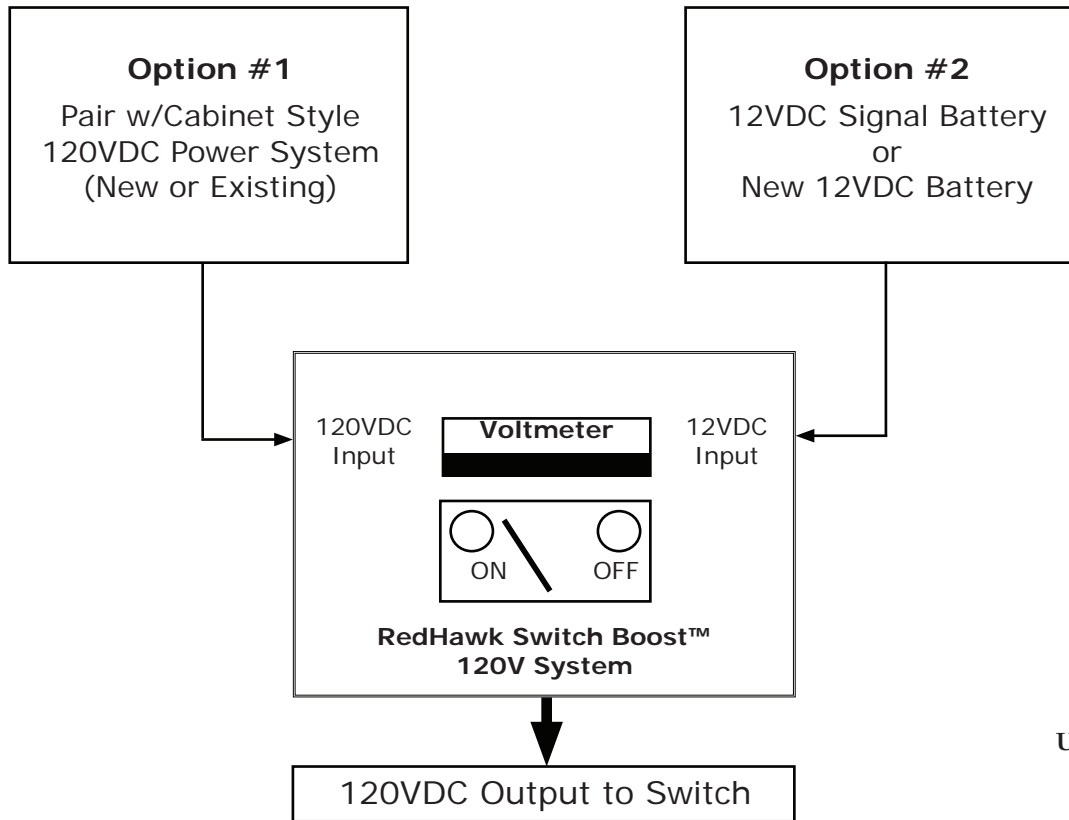
RedHawk Energy's innovative and patented Switch Boost™ 120V System utilizes one or two Ultracapacitor modules to provide enhanced power for railway power switch applications, compared to battery-only systems. The Ultracapacitor(s) provides the necessary current to throw the switch, while the battery recharges the Ultracapacitor and is preserved for outages. The Switch Boost™ 120V System can dramatically improve the reliability and life of new or existing battery/charger powered switches.

- **Wide Operating Temperature Range**
Capable of delivering energy down to -40°C and even -50°C with minimal impact on performance and efficiency.
- **Excellent Charge Efficiency**
Up to 98%+ efficient on charging throughout its life.
- **Quick Recharge Time**
Can be recharged extremely fast - from seconds to just a few minutes.
- **Cycle Life / Life Expectancy**
1,000,000 cycles when operated between full rated voltage and 50% voltage at constant current.
Designed to provide 10+ years of service when operated under nominal voltage at 25°C (77°F).



The Switch Boost™ 120V System offers built-in safety & security and plug & play integration for rapid field deployment.

Switch Boost™ 120V



Models:



UCS-1001 G4 & UCS-1002 G4
25.5"W x 24"H x 12"D
68 lbs



UCS-1001 G5 & UCS-1002 G5
21.5"W x 21.25"H x 10.25"D
48.5 lbs

Ultracapacitor Specifications:

| | | |
|-----------------------------|----------------------------------|------------------|
| Capacitance | Rated | 6F |
| | Tolerance | -0/+20% |
| Voltage | Rated | 150 VDC |
| | Surge | 171 VDC |
| ESR | ESR (DC) - maximum initial | 200mΩ |
| Current | Maximum leakage | 0.7mA |
| | Maximum peak | 214A |
| Energy Storage | Maximum energy | 18.8Wh |
| | Usable energy | 14.1Wh |
| Power | Power density | 2596W/kg |
| Temperature Characteristics | Operating temperature range | -40°C to +65°C |
| | Storage temperature range | -40°C to +70°C |
| Safety | Short circuit current | 750A |
| | Environmental ingress protection | IP54 |
| DC Life | Life (projected) | 10+ Years |
| Cycle Life | Life (projected) | 1,000,000 Cycles |
| Storage | Storage life | 4 Years |

System Options:

Dual Ultracapacitor Modules
12V to 125V DC-DC
Converter
12V Battery & Charger
Spare Parts Kit

Switch Boost™ 24V

Overview

RedHawk Energy's Switch Boost™ 24V System utilizes one or two Hybrid Ultracapacitor (HCAP) modules to provide enhanced power and energy for 24V railway power switches. This hybrid technology provides a source of short duration power and energy for long duration backup. HCAPs can replace traditional batteries and offer a more reliable, cost-efficient solution for 24V railway power switches.



Customization Available

Integrated cabinet, charger, battery backup and other accessories available.

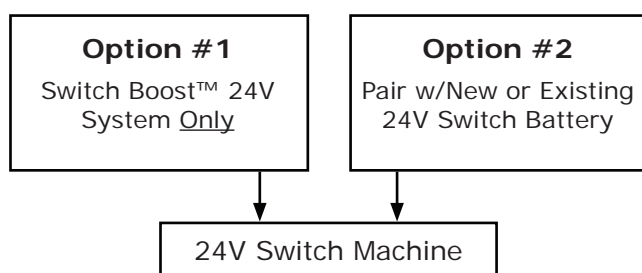


Safety

Environmentally friendly power source which does not contain heavy metals (RoHS Compliant), is non-flammable, and poses no risk of explosion or thermal runaway.



HCAP 24V Module



HCAP Specifications:

| Model | HCAP-27V-10-600 | HCAP-27V-25-900 |
|-------------------------|----------------------|-------------------------|
| Rated Capacity | 10Ah | 25Ah |
| Cranking Amps | 600A | 900A |
| Total Energy | 250 Wh | 600 Wh |
| Charging Voltage | 27V | 27V |
| Rated Voltage | 24V | 24V |
| Max Voltage | 27V | 27V |
| Min. Voltage | 17V | 17V |
| Module Capacitance | 3,000F | 10,000F |
| ESR | 15 mΩ | 12 mΩ |
| Max. Continuous Current | 100A | 150A |
| Self Discharge (T=25°C) | 180 days | 180 days |
| Dielectric Strength | 2,500 VDC | 2,500 VDC |
| Compliance | RoHS | RoHS |
| Terminals | SAE 3/8"-16 UNC | SAE 3/8"-16 UNC |
| Dimensions (W x D x H) | 10"W x 6.5"D x 8.5"H | 12.75"W x 6.5"D x 8.5"H |
| Weight | 15 lbs | 24.25 lbs |
| Operating Temperature | -40°C to +65°C | -40°C to +65°C |
| Storage Temperature | -40°C to +70°C | -40°C to +70°C |

*Specifications subject to change

Switch Boost™ 12V

Overview

RedHawk Energy's Switch Boost™ 12V System utilizes one or two Hybrid Ultracapacitor (HCAP) modules to provide enhanced power and energy for 12V railway power switches. This hybrid technology provides a source of short duration power and energy for long duration backup. HCAPs can replace traditional batteries and offer a more reliable, cost-efficient solution for 12V railway power switches. HCAP 12V modules are sized comparably to Group 31 and Group 24 batteries and can be mounted horizontally or vertically to match new or existing integrated switch-mount requirements.



HCAP 12V Module



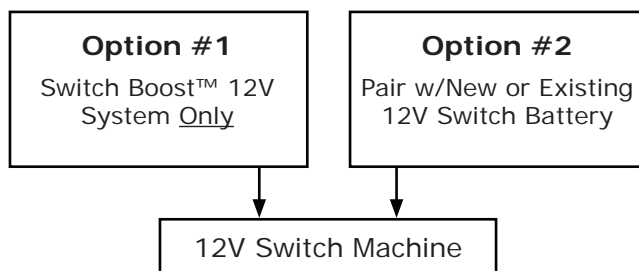
Customization Available

Integrated cabinet, charger, battery backup and other accessories available.



Safety

Environmentally friendly power source which does not contain heavy metals (RoHS Compliant), is non-flammable, and poses no risk of explosion or thermal runaway.



| HCAP Specifications: | | |
|-------------------------|----------------------|----------------------|
| Model | HCAP-13.2V-1000F | HCAP-13.2V-6000F |
| Rated Capacity | 17.8Ah | 9.7Ah |
| 1-30S Max Current | 140A | 200A |
| Total Energy | 210 Wh | 125 Wh |
| Charging Voltage | 13.2V | 13.2V |
| Rated Voltage | 12V | 12V |
| Max Voltage | 13.5V | 13.5V |
| Min. Voltage | 9V | 9V |
| Module Capacitance | 1,000 F | 6,000 F |
| ESR | 12 mΩ | 10 mΩ |
| Max. Continuous Current | 70A | 100A |
| Self Discharge (T=25°C) | 180 days | 180 days |
| Dielectric Strength | 2,500 VDC | 2,500 VDC |
| Compliance | RoHS | RoHS |
| Terminals | SAE 3/8"-16 UNC | SAE 3/8"-16 UNC |
| Dimensions (W x D x H) | 10"W x 6.5"D x 8.5"H | 10"W x 6.5"D x 8.5"H |
| Weight | 12.45 lbs | 10 lbs |
| Operating Temperature | -40°C to +65°C | -40°C to +65°C |
| Storage Temperature | -40°C to +70°C | -40°C to +70°C |

*Specifications subject to change



Solar Power Systems

Overview:

Solar Power Systems provide a reliable and proven source of DC power by converting sunlight directly into electricity. Solar Power Systems are a good fit for powering rail wayside applications because they're very economical, require very little maintenance and have no ongoing fueling requirements. Over the last 40+ years we've designed, engineered and supplied a variety of system mounting configurations to meet virtually any of your budget and/or site requirement including our patented RP Series Retractable Mast system. Our systems come pre-wired and pre-assembled with the highest quality components, including the most efficient solar panels and controllers in the industry; designed for 20+ years of reliable operation in harsh rail environments! We offer a variety of site survey services to make sure your system is optimized for its unique location and load profile. We also have experience and access to a variety of hybrid power solutions (Wind Turbines, Fuel Cells, Stirling Engines, TEGs, Generators, etc.); enabling 24/7 reliability for even the most demanding load profiles and site conditions.



- Highway Crossings
- Intermediate Signals
- Control Points
- Slide Fences
- PTC Upgrades
- AEI Readers
- Hot Box Detectors
- Switch Machines
- Track Circuits
- Telecom Systems
- Security & Surveillance
- Dark Territory

RP Series Retractable Mast *Pioneer of Safety & Convenience*

RedHawk's patented RP Series Retractable Mast system is the first and only mast system of its kind to retract to ground level along the same axis. The RP Series Retractable Mast provides unparalleled convenience and dramatically improved safety to the installation, operation, troubleshooting and maintenance of pole mounted solar power systems along the rail wayside.

- 20' Tall
- Fail-Safe Fall Protection
- Heavy-Duty Dual Drive Gear Winch
- Integrated Wiring
- Full Length Alignment Track
- *Optional:* Wind Generator Adaptor (350W SuperWind Turbine)



Solar Power Systems

Micro-Wind Turbines



Fixed Pole / Ballasted Systems



Remote Monitoring

FlexSCADA is an ultra low power SCADA device, targeting and monitoring remote sites which are powered by solar and wind. The goal of FlexSCADA is to create resources that provide users with basic web browser skills to monitor remote infrastructure. FlexSCADA can monitor various parameters like temperature, voltage, amperage, watts, etc.



Balance of System Components

- High-Quality Solar Panels (20+ Year Life Expectancy)
- MPPT Solar Charger Controllers, Relay Drivers, DC-DC Converters, Inverters, etc.
- Batteries (Ni-Cd, Li-Ion, Lead Acid)
- Battery Boxes, Racks & Enclosures
- Hybrid Solutions Available (Wind Turbines, Fuel Cells, Stirling Engine Generators, TEGs, Generators, etc.)

Comprehensive Site Survey Services

- Shading & Obstruction Analysis
- Equipment Loading Measurement
- Power Draw Measurement
- Solar Radiation & Surface Meteorology Analysis



Charge Controller & Relay Driver Assemblies come pre-wired & pre-assembled for quick onsite installation.

Solid Oxide Fuel Cells

Adaptive Energy P250i Solid Oxide Fuel Cells (GEN4)

Adaptive Energy's P250i Solid Oxide Fuel Cells provide a reliable source of DC power by converting chemical energy into electricity. The P250i is an eco-friendly alternative to maintenance-intensive gas/diesel generators; working in conjunction with 12/24/48V battery banks to keep batteries charged and loads powered. The P250i provides days, weeks and even months of extended-run backup power protection to highway crossings, intermediate signals, and other wayside locations.



- **Propane Powered**

The P250i is powered by readily available, easily transportable and low cost propane. During operation the P250 efficiently burns 1/4lb LP/hour and can provide 130-160 hours of runtime on two (2) 20# BBQ style propane tanks. Larger tanks can provide even longer runtime.

- **ZERO Maintenance**

The P250i has no moving parts, needs no oil changes or routine maintenance. In fact, the P250i is impervious to time and can sit in standby mode for months to years at a time monitoring battery voltage and only run when called upon.

- **All-Climate Performance**

The P250i utilizes a ceramic electrolyte which is not susceptible to freezing and thawing cycles common among other fuel cell types. Its robust design allows the P250i to reliably operate in virtually any climate -40°C (-40°F) to 70°C (158°F).

- **Completely Integrated Rail Package**

The P250i is housed inside of an outdoor NEMA rated enclosure with input and output terminations; provisions for customer supplied 2-20# propane cylinders; integrated 3,000 hour fuel filter assembly; gas regulator, manifold and valve assembly; hinged and lockable access door; fuel cell datalogger and cell modem for remote communications; and ethernet and USB ports.

- **Flexible Mounting Configurations**

Bungalow Mount, Foundation Mount, Pad Mount

- **Easier Setup/Integration (GEN4)**

Can be setup, configured and commissioned using front panel.



Bungalow Mount



Foundation Mount

Solid Oxide Fuel Cells



P250i (GEN4)



| Power | |
|---------------------------|---------------------------|
| Continuous Charge Power | 250W |
| Nominal Operating Voltage | 12, 24, 48 VDC |
| Nominal Charging Current | 20, 10, 5A |
| Fuel Efficiency (LHV) | 20% |
| Standby Power Draw | 0.150 W |
| Design Target Life | 250 Cycles / 3,000 Hours |
| Application (Best Suited) | Extended-Run Backup Power |

| Environmental | |
|-----------------------|-----------------------------------|
| Operating Temperature | -40°C to 70°C (-40°F to 158°F) |
| Storage Temperature | -65°C to 71°C (-85°F to 159°F) |
| Humidity | 0%-95%* RH |
| Operating Altitude | Up to 10,000 ft |

| Operational | |
|------------------------------|-------------------------|
| Weight (Complete System) | 350 lbs / 158.75 kg |
| Dimensions (Complete System) | 30"W x 56"H x 24"D |
| Noise | 40 dB (A) |
| Engineering Data | Serial RS232 9600 8N1 |
| Data Display | OLED |
| Fuel Consumption LPG | 0.25 lbs/hour |
| Fuel Consumption CNG | 3.27m ³ /day |





Alkaline Fuel Cells

GenCell Energy *BOX™ Alkaline Fuel Cells*

GenCell Energy develops unique Alkaline Fuel Cell solutions (5kW+). Using the ultra-reliable and exhaust-free technology that powered the American space program, the GenCell BOX™ 5kW long-duration backup power solution provides a compact, resilient and emission-free source of backup power designed especially for critical rail telecommunication sites.



- **Alkaline Fuel Cell Technology (AFC)**
Among the most efficient types of Fuel Cells, reaching up to 60% efficiency (up to 87% efficiency combined heat and power).
- **Platinum-Free Catalyst**
Reduces capex and opex with no expensive noble metals used in design/production.
- **No-Stack Hydration Required**
Uses a liquid electrolyte (KOH), enabling it to rapidly start in both warm and sub-freezing conditions. This contrasts with PEM Fuel Cells and other membrane Fuel Cells that must hydrate their membranes/stack with water and need to operate above 0°C (32°F) or be placed in a heated or insulated enclosure for cold weather operation.



Fueling Options:

- **Industrial Grade Hydrogen (99.95%)**
Can operate off of widely available and lower cost industrial hydrogen, compared to other PEM fuel cells that require medical grade hydrogen (99.99%).
- **Anhydrous Ammonia (NH₃)**
GenCell's Alkaline technology is the only fuel cell technology with the chemistry and robustness that can utilize hydrogen produced from cracking ammonia.



Alkaline Fuel Cells



BOX™ 5kW



| Electrical | |
|---------------------------|---------------------------|
| Rated Power | 5kW |
| Output Voltage | 43-53 VDC |
| Stack Life | 5,000 Hours |
| Application (Best Suited) | Extended-Run Backup Power |

| Gases | |
|---------------------------|--|
| Fuel - Hydrogen | Industrial Grade (99.95%) |
| Specific Fuel Consumption | 70 g/kWh @ rated power |
| Input Pressure | 3-5 BAR (43-72 PSIG) |
| Nitrogen | 99.95% or higher (used between operations) |
| Electrolyte | Potassium Hydroxide (KOH) 28-32% mass |

| Mechanical & Environmental | |
|--------------------------------------|-------------------------------------|
| Noise Pressure (@ 1m) | <55db |
| Operating Temperature | -20°C up to 45°C (-4°F up to 113°F) |
| Operating Humidity | 10-95% RH, Non-condensing |
| Operating Altitude (above sea level) | Up to 2500m (8200 ft) |
| Storage Temperature | -20°C up to 55°C (-4°F up to 131°F) |
| Installation Capability | Outdoors, IP54 Enclosure |
| Emissions | Heat, Water Vapor |
| Dimensions | 6.56'L x 2.62'W x 5.35'H |

| Control & Systems Modules and Alarms | |
|--------------------------------------|-------------------------------|
| Remote IoT Manager | Available |
| Remote Start & Shutdown | Available |
| User Interface | Local and Web Interface |
| Access Password Protection | User Level and Service Level |
| Alarm/Event Monitoring & Reporting | Local alarm with email or SMS |
| Alarm History Logging | Records, events and logs |
| Configurable Alarms | Available |

*Specifications subject to change

Stirling Engines

Qnergy PowerGen Series Stirling Engine Generators

Pioneered in space and designed for rugged and remote operation, Qnergy's PowerGen Series Stirling Engine Generators are an eco-friendly and long life alternative to diesel/gas generators capable of providing reliable electrical power supply to the most demanding and mission-critical loads.

- **Multiple Power Output Configurations**
600W, 1.2kW, 1.8kW and 5.6kW @ 120/240 VAC
- **Propane or Natural Gas Powered**
The PowerGen can operate seamlessly and efficiently with readily available, easily transportable and low cost propane or natural gas.
- **Design Life**
The PowerGen's design life is conservatively estimated at **80,000+ hours** with no start/stop cycle limitations.
- **Minimal Maintenance**
The PowerGen has few moving parts and no direct contact points that cause wear and require lubrication; minimizing maintenance needs and site visits.
- **Eco-Friendly Operation**
Compared to diesel/gas generators that have dirty emissions and require special permitting, the PowerGen is a clean power generator with low emissions and no permit requirements.
- **Plug & Play Integration**
The PowerGen can easily be integrated with new or existing power infrastructure including batteries, rectifiers, solar & wind, solar controllers, and much more.
- **Load Following Capability**
The PowerGen is capable of matching power output to the demands of the load to help conserve fuel.
- **Made in the USA**
Proudly manufactured in Ogden, UT.



Optional Accessories

| |
|--------------------------------------|
| Low Temperature Pkg -40°F (-40°C) |
| Heat Recovery |
| Custom Outdoor Enclosures |
| Remote Monitoring |
| Solar Charging Kit |

Suitable For:

| |
|----------------------|
| Off-Grid Prime Power |
| AC Backup Power |
| Solar Hybrid |

Stirling Engines

| Model # | Configuration | Output | Phase Angle | Connection | Max Power |
|---------|------------------------------|--|------------------|----------------------------------|-----------|
| PG600 | 120 / 240 VAC Split Phase | Output A: 120VAC 60Hz Output B: 120VAC 60Hz | A: 0° B: 180° | 3 Wire: L1, L2 & Common/Neut. | 600W |
| PG1200 | 120 / 240 VAC Split Phase | Output A: 120VAC 60Hz Output B: 120VAC 60Hz | A: 0° B: 180° | 3 Wire: L1, L2 & Common/Neut. | 1.2kW |
| PG1800 | 120 / 240 VAC Split Phase | Output A: 120VAC 60Hz Output B: 120VAC 60Hz | A: 0° B: 180° | 3 Wire: L1, L2 & Common/Neut. | 1.8kW |
| PG5650 | 120 / 240 VAC Split Phase | Output A: 120VAC 60Hz Output B: 120VAC 60Hz | A: 0° B: 180° | 3 Wire: L1, L2 & Common/Neut. | 5.6kW |

| Fuel Specifications | | | | |
|---------------------|---------------|-------------------------|-------------------|-----------------------------|
| Model # | Propane (max) | Fuel Pressure (Propane) | Natural Gas (max) | Fuel Pressure (Natural Gas) |
| PG600 | 4.3 gal / day | 2-10 PSI | 550 ft³/day | 3-50 PSI |
| PG1200 | 7.2 gal / day | 2-10 PSI | 935 ft³/day | 3-50 PSI |
| PG1800 | 10 gal / day | 2-10 PSI | 1,300 ft³/day | 3-50 PSI |
| PG5650 | 44 gal / day | 2-10 PSI | 3,964 ft³/day | 3-50 PSI |

| Environmental Condition Specifications (All Units) | | |
|--|-----------|---|
| Sound | Max dBA | < 75 dBA @ 1m |
| Ambient Temp Continuous Operation* | Min / Max | -13°F to 122°F |
| Ambient Temp Rated (Startup)* | Min / Max | 5°F to 122°F |
| Altitude | Derate | 5% derate every 1,000 ft (above 5,000 ft) |

Low Temperature Package (down to -40°F)

| PowerGen Description | Measurement |
|----------------------|-------------|
| PowerGen Dry Weight | 866 lbs |
| PowerGen Length (L) | 69.4" |
| PowerGen Width (W) | 28.5" |
| PowerGen Height (H) | 57.2" |

| Foundation | Measurement |
|----------------------------|-------------------------------|
| Recommended Pad Length (L) | 6 ft |
| Recommended Pad Width (W) | 3 ft |
| Recommended Pad Base | gravel / concrete / rail ties |





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Batteries

Battery Chargers

Battery Testers

Battery Accessories

Battery Boxes & Racks

UPS Systems

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