Product Catalogue
About RIC Electronics

RIC Electronics Ltd. manufactures industrial rectifiers, inverters and converters.

Since 1981 they have been manufacturing custom AC and DC UPS systems for oil & gas, utility & switchgear, telecom, defense, and mining as well as general industrial applications.

Products are robust, heavy-duty and built to withstand the harshest conditions.

Not limited to batch manufacturing, RIC Electronics can customize units to customer’s specific applications.

They have experience using all types of technology including high frequency switch-mode rectifiers, silicon controlled rectifiers (SCRs), ferro-resonant and saturable reactors.

RIC Electronics is the go-to solution for primary and secondary power needs.
SB7
SCR Battery Charger
**Product Specifications**

**Description**

The SB7 is RIC Electronics’ premiere SCR battery charger/rectifier. The SB7 provides power to critical DC loads through a wide range of outputs and is engineered for maximum reliability and ease of maintenance.

A key component of the charger is usability, that’s why they designed a responsive human-machine interface with built in LEDs and mimic screen. Providing a bright two line vacuum florescent display and central key pad, performing routine maintenance couldn’t be easier.

Focusing on continual innovation has enabled their SB7 to provide mean time between failure, or MTBF to over 200,000 hours and reduce mean time to repair, or MTTR to less than 30 minutes. Offering fast lead times and customized solutions, RIC Electronics is your go-to for all industry applications.

### Industries

- Utility, Switchgear and Substation
- Automation & Control Systems
- Department of National Defense
- Municipal & General Industry
- Hospital and Laboratories
- Data Center & Telecom
- Mining
- Oil and Gas
- Solar and Wind
- OEM
- Pulp and Paper
- Marine

### Standard Features

- Output blocking diode
- Digital output voltage and current metering
- Battery test mode
- Temperature compensation (optional probe is required)
- Modbus TCP, RS-485 & RS-232 communications
- Molded case UL 489 AC and DC breakers
- Designed for parallel operation and loadsharing
- Automatic and manual equalize and float modes w/ configurable setpoints & alarming
- High temperature shutdown
Product Specifications

Alarming and Control
- Programmable common alarm
- Programmable Form C relays and digital inputs
- High DC voltage
- Low DC voltage/end of battery voltage
- AC failure/loss
- Rectifier failure
- Ground fault (+/-)
- Charger overload
- Control card temperature (high/low)
- High ripple alarm

Human-Machine Interface (HMI)
- Vacuum Fluorescent Display - bright display panel, wide viewing angles, can withstand extremely high and low temperatures
- Alarm Logging
- Password Protected Panel - only authorized users can change settings
- Mimic screen with LED test feature
- Audible Buzzer – sounds alarm on common alarm
- Additional LEDs - customizable to any alarm
Available Options

Mechanical Options

- Enclosure options:
  - NEMA 2
  - NEMA 3R
  - NEMA 4/4X
  - NEMA 12
- Floor mount/wall mount
- Integrated battery rack
- High seismic rating as per IEEE 693
- Enclosure insulation
- Conformal coating
- Heater, air conditioner, fan c/w thermostat
- Redundant configuration
- Integrated load distribution breakers
- Breakers padlock provision/kirk-key
- Door mounted mushroom button E-stop

Electrical Options

- 12 pulse rectifier
- Input/AC monitoring (voltage, current, frequency, kW, kVA & harmonics)
- Shunt trip (AC/DC, and/or battery breaker)
- High short circuit capacity (KA) breakers
- Communication:
  - DNP3: RS-485, RS-232, Ethernet
  - Fiberoptic
  - SNMP
- Relay card (2 form C contacts per alarm)
- Auxiliary alarm contact on breakers
- Dual input source option c/w breaker interlock
- Temperature probe (5, 10, 15m)
Monitoring Solutions

When charging and providing backup power for critical devices, battery health is of the utmost importance. RIC Electronics provides two solutions for your monitoring needs: integrated monitoring on a string level or stand-alone monitoring on a single cell level.

Battery Sense Integrated Monitoring

Integrated monitoring offers battery string voltage, current and midpoint voltage measurements and alarming functionality. The additional temperature probe provides battery string temperature measurements as well as battery temperature compensation which automatically adjusts the battery charger voltage based on ambient temperature.

Single Cell Stand-alone Monitoring

Stand-alone monitoring provides full single cell battery readings including: cell conductance, voltage, temperature, and strap resistance between cells. Single cell monitoring can save hours on monthly, quarterly and annual battery checks and maintenance and in turn, substantial monetary savings.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Battery Sense (String Level)</th>
<th>Cell Monitoring (Single Cell Level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery string voltage</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Battery string current</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Battery string midpoint voltage</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Battery string temperature*</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Single cell conductance</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Single cell voltage</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Single cell temperature</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Strap resistance (between cells)</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

*Additional temperature probe may be required
## Technical Specifications

### Input

| Input AC Voltage       | 1ph - 120, 208, 240, 480, 600V (other voltages optional)  
|                       | 3ph - 208, 480, 600V |
| Input Breaker Short Circuit Rating | 240VAC – 65kAIC (standard) – up to 200 kAIC (optional)  
|                       | 480VAC – 35 kAIC (standard) – up to 200 kAIC (optional)  
|                       | 600VAC – 18 kAIC (standard) – up to 100 kAIC (optional) |
| Frequency             | 50 / 60 Hz |
| Power Factor Model Dependent | \( \leq 0.95 \) |
| Input Voltage Tolerance | \( \pm 10\% \) |
| Frequency Tolerance   | \( \pm 2 \) Hz |
| Short Circuit Protection | Auto shutdown at 250% of rated output (Auto Recovery) |

### Output

| Output Breaker Short Circuit Rating | 240VDC – 10 kAIC (standard) – up to 30 kAIC (optional) |
| Output Current          | 5 to 1200A |
| Efficiency Model Dependent | \( \leq 93\% \) |
| Regulation              | < 0.5% for input variation of 10% |
| Ripple                  | 1% (150mV optional) |

### Technical Features

| Programmable Form C Relays | 9 |
| Programmable LEDs          | 4 |
| Programmable Digital Inputs | 3 |

### Environmental

| Operating Temperature | -25 to 40°C (up to 55°C optional) |
| Storage Temperature   | -40 to 55°C |
| Altitude Above Sea Level | 1000m w/o derating |
| Method of Cooling      | Convection |
| Noise Level (1 meter)  | <60 dBA |
| Humidity               | 0 to 95%, non-condensing |

### General Features

| Enclosure               | NEMA 1 (optional: NEMA 2, 3R, 4/4X or 12) |
| Mounting Positions      | Floor mount/wall mount |
| Enclosure Size Model Dependent | Size between:  
|                           | 24"H x 20"W x 16"D & 70.87"H x 47.24"W x 31.50"D |
| Certification           | CSA 107.1/107.2/UL1012 |
| Warranty                | 5 years from shipment |
HB5
Switch-Mode Battery Charger
**Product Specifications**

**Description**

The HB5 is their most durable, digitally controlled switchmode battery charger to date.

Built for industries that demand rugged and long-lasting equipment, HB5 boasts mean time between failure, or MTBF of 200,000 hours and mean time to repair, or MTTR of just 20 minutes.

HB5 provides flexible power output (12, 24, 32, 36 and 48VDC) and built in protection (AC/DC breakers) to meet varying industry needs.

Including an LCD screen, customizable alarms, push button control, and Modbus RS-485 communication, HB5 is your solution for providing power to critical standby applications.

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- OEM
- Pulp and Paper
- Marine

**Standard Features**

- Wide range AC input (optional DC input)
- AC input and DC output breakers
- Filtered output for valve regulated batteries
- Back lit 2 line LCD display with 4 button user interface
- Modbus RS485 communications
- 4 mode equalize – manual, 30 day, start up and AC fail
- Temperature compensation (optional probe is required)
- Modify output voltage and current, alarm
- set points and equalize timer via keypad or communication protocol
- 6 form C alarm relays (configurable to any alarms)
Alarming & Monitoring

Form C Contact Alarms

- Common alarm
- Low battery voltage
- High battery voltage
- Rectifier fail
- AC/DC fail
- Equalize

Communication Alarms

- Common alarm (configurable)
- Low battery voltage
- High battery voltage
- AC/DC fail
- Low temperature
- Equalize
- Shunt trip
- Rectifier fail
- +/- GND fault
- High temperature

Technical Specifications

<table>
<thead>
<tr>
<th>Input</th>
<th>Output DC Voltage</th>
<th>12, 24, 32, 36, 48VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input AC Voltage</td>
<td>1PH 100-240VAC (3PH input on 100amp DC output units)</td>
<td></td>
</tr>
<tr>
<td>Input DC Voltage</td>
<td>Optional DC 18-32VDC</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>45 – 65 Hz</td>
<td></td>
</tr>
<tr>
<td>Short Circuit Protection</td>
<td>Electronically current limited</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th>Regulation</th>
<th>+/- 1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output DC Voltage</td>
<td>Ripple</td>
<td>50mV</td>
</tr>
<tr>
<td>Environment</td>
<td>Environment Temperature</td>
<td>-20° to 40° (Optional: Extended temperature -40° to 40°)</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40 to 50°C</td>
<td></td>
</tr>
<tr>
<td>Altitude Above Sea Level</td>
<td>1000m w/o derating</td>
<td></td>
</tr>
<tr>
<td>Method of Cooling</td>
<td>Natural Convection</td>
<td></td>
</tr>
<tr>
<td>Noise Level</td>
<td>&lt;60 dBA</td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>0 to 95%, non-condensing</td>
<td></td>
</tr>
</tbody>
</table>

General Features

- Efficiency: >90%
- Enclosure: NEMA 1 (optional: NEMA 2, 3R, 4, 4X and 12)
- Soft Start: Electronic soft start
- Certification: CSA 107.1/107.2/UL1012
- Form C Relays: 6
- Mounting Positions: Wall mount/floor mount
- Warranty: 18 mos. from shipment; 3 year w/startup; 5 year w/ service
Battery Monitoring Option

HB5 battery monitoring module adds battery monitoring and low battery voltage disconnect capabilities. It protects the battery by disconnecting the load from the battery when the battery voltage is below a critical setpoint value (voltage setpoint fully adjustable). The following monitoring and alarming features are included in this option, in addition to the standard monitoring and alarming features standard in HB5.

Additional Monitoring:
- Load voltage
- Battery voltage
- Midpoint 1 voltage
- Midpoint 2 voltage
- Current
- Battery charge/discharge

Additional Alarming:
- Low battery voltage
- Midpoint 1 battery voltage imbalance
- Midpoint 2 battery voltage imbalance
- Battery fuse open
SMR48
Switch-Mode Battery Charger
Product Specifications

Description

SMR48 is a modular, high efficiency rack mount battery charger designed for telecommunications and broadband applications.

This 48V solution utilizes switch-mode technology, has wide input range and provides up to 96% efficiency.

With 3kW power modules, SMR48 offers impressive power density with systems up to 18kW, or 15kW N+1.

Designed for operator ease of use SMR48 can be fully controlled through its webserver or HMI which provides a digital 5 button, 2 line OLED display.

Additionally, SMR48 reduces wiring and increases reliability with board-to-board connections.

Modular Capability

SMR48 is modular, which allows easy expansion for increased future load. Additionally, these modules are “hot swappable” allowing quick replacement and minimal down time.

Each individual module provides up to 56A. Voltage and current are both adjustable allowing for precise control of the output.

Standard Features

- Switch-mode rectifier technology
- Up to 96% efficiency
- 19” or 23” rack mountable
- Modular architecture
- N+1 redundant
- Adjustable output voltage and current
- Modbus TCP/IP and Modbus RTU 485
- Webserver for data monitoring and configuration
- Robust alarming functionality
- 7 distribution breakers
- Data logging
- Battery temperature compensation (w/ 15ft. temperature probe)
# Technical Specifications

## Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input AC Voltage</td>
<td>90 - 275VAC (90-185VAC at de-rated output power)</td>
</tr>
<tr>
<td>Current</td>
<td>≤ 19Arms</td>
</tr>
<tr>
<td>Frequency</td>
<td>44 to 66 Hz</td>
</tr>
<tr>
<td>Power Factor</td>
<td>&gt; 0.99 at full load</td>
</tr>
<tr>
<td>Short Circuit Protection</td>
<td>Fuses; power circuit turned off if &gt;275VAC or &lt; 90VAC</td>
</tr>
<tr>
<td>Surge Protection</td>
<td>IEEEC 62.41 / IEC 61000-4-5, IEC 61000-4-4</td>
</tr>
<tr>
<td>EMC</td>
<td>Emission: EN 61000-6-2; EN 61000-6-3, EN 61000-3-2; EN 61000-3-3</td>
</tr>
<tr>
<td></td>
<td>Immunity: EN 61000-6-1; EN 61000-6-2</td>
</tr>
<tr>
<td>Inrush Current</td>
<td>≤ 28.5 Arms peak at nominal mains voltage</td>
</tr>
<tr>
<td>Soft start</td>
<td>Minimum O/P current ramp-up time 3 seconds</td>
</tr>
</tbody>
</table>

## Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output DC Voltage</td>
<td>Float - Adjustable 48 ~ 56 V, Equalise - Adjustable 50 ~ 58V</td>
</tr>
<tr>
<td>Output Current</td>
<td>Adjustable 5 ~ 55 A</td>
</tr>
<tr>
<td>Output Power</td>
<td>3000W @ 48<del>58VDC (input&gt;185VAC), 1500W @ 48</del>58VDC (input 90~185VAC)</td>
</tr>
<tr>
<td>Module Efficiency</td>
<td>≤ 96%</td>
</tr>
<tr>
<td>Static Regulation</td>
<td>Line - ±0.1%, Load - ±1.0%</td>
</tr>
<tr>
<td>Dynamic Regulation</td>
<td>±3% for 10-90% or 90-10% load variation, ±1% for ±25% step change in AC input</td>
</tr>
<tr>
<td>Load Sharing</td>
<td>Better than ±5% of full scale with active current sharing from controller</td>
</tr>
<tr>
<td>Protection</td>
<td>Overvoltage - only faulty unit shuts down</td>
</tr>
<tr>
<td></td>
<td>Overcurrent - can sustain short circuit at output terminals indefinitely</td>
</tr>
<tr>
<td></td>
<td>Over-temperature - gradual reduction of current limit if heat-sink temperature exceeds pre-set limit</td>
</tr>
</tbody>
</table>

## Technical Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote Output Current &amp; Voltage Monitoring</td>
<td>Output current and voltage value is transmitted to the controller via the data communications link. (2) remote battery monitoring circuits inc.</td>
</tr>
<tr>
<td>Rectifier Alarms</td>
<td>Low/High output voltage Over voltage shutdown Equalize Address fault</td>
</tr>
<tr>
<td></td>
<td>Current limit alarm Fan Heat sink sensor fail Vref out of range</td>
</tr>
<tr>
<td></td>
<td>Shut down fault Temperature Rectifier failure Comm error Power limit</td>
</tr>
</tbody>
</table>

## Environmental

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-40°C - 70°C; derate 50°C - 70°C</td>
</tr>
<tr>
<td>Method of Cooling</td>
<td>Fan cooled, fan speed controlled and alarmed</td>
</tr>
<tr>
<td>Noise Level (1 meter)</td>
<td>&lt;58 dBA</td>
</tr>
<tr>
<td>Humidity</td>
<td>0 to 95%, non-condensing</td>
</tr>
</tbody>
</table>

## General Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure</td>
<td>NEMA 1</td>
</tr>
<tr>
<td>Mounting Positions</td>
<td>Rack: 19” or 23”</td>
</tr>
<tr>
<td>Certification</td>
<td>CSA C22.2 No. 60950-1</td>
</tr>
<tr>
<td>Communication</td>
<td>Modbus TCP/IP, Modbus RTU RS-485</td>
</tr>
</tbody>
</table>
MP7
Uninterruptible Power Supply
**Product Specifications**

**Description**

The industrial MP7 UPS provides your critical equipment with uninterruptible 3 phase AC power. Using high frequency dual conversion technology, MP7 protects your critical load and provides reliable power isolated from AC main distortion and fluctuation.

Using insulated gate bipolar transistors (IGBT), MP7 reduces total harmonic distortion and controls output voltage utilizing pulse width modulation (PWM).

The MP7 UPS is a fully modular and hot swappable system which also contains an internal maintenance bypass and static transfer switch through the bypass module. This enables easy expansion and maintenance, all without load interruption.

For mission-critical equipment, isolation and line maintenance is vital. MP7 comes standard with input, output and maintenance bypass breakers inside the main cabinet, or an external maintenance bypass panel option is available.

**Standard Features**

- Vienna rectifier
- Module capacity 10KVA @ 208V AC
- “Hot Swappable” modules
- Linear and nonlinear load capability
- IGBT modules in design for better regulations, efficiency and control
- Dedicated rectifier and inverter controllers in each module
- Static transfer switch (<1 ms transfer time)
- Input, output and maintenance bypass breakers
- Battery temperature compensation (optional probe required)
- Modbus RS232 & RS485 Port (optional Modbus TCP, SNMP)
- Conformal coating
- Fault isolation
- LCD Human-Machine Interface (HMI)
- Dust proof filter (front and rear)
- Top hat providing front access
- Certificates: CSA-C22.2 No.107.3, UL 1778, CE 73/23 & 93/68
Redundancy and Hot Swappable Modules

Scalable and flexible, each 208V MP7 can output 10 kVA and is available in 3, 6 and 10 module cabinets.

MP7 can be customized to meet a wide range of job specifications.

The modular design allows you to:
- Easily scale MP7 for growing power requirements
- “Hot Swap” by quickly adding/replacing modules
- Have redundant modules in case of failure
- Run cabinets in parallel
- Reduce maintenance by stocking standardized modules that fit all cabinet sizes

On the right hand side is a chart that shows you the versatility of the MP unit. N + 1 signifies a unit with one redundant module. N + 2 signifies a unit with two redundant modules. 2N signifies a secondary fully redundant cabinet. Lastly 2N + 1 signifies a fully redundant cabinet with 1 redundant module in each.

Overload Capability

![Overload Capability Chart](image-url)
MP7 has mechanical features that make it suitable for a wide variety of applications. Some of the key mechanical features include:

Integrated MBP which provides input/output breakers and maintenance bypass breaker inside the main cabinet. Optionally, you can install protection breakers into an external maintenance bypass panel completely isolating AC power from the UPS.

Touch Screen LCD provides easy navigation and enhanced control over MP7 parameters.

Small Footprint. MP7 provides the same physical dimensions (width and depth) for all cabinet options with only a variation in height. Depending on your backup time, batteries can either be inside the cabinet, or put in an external battery panel giving you more control over your space. Having a standardized module sizes across all cabinets reduces spare parts and maintenance costs.

Load Adaptability

MP7 provides 100% non-linear load capability, providing steady state voltage regulation of ±1 and unbalanced load regulation of ±1.5.

Load adaptability can help simplify integration and prevent buying an oversized unit to handle an unbalanced load.

Low Total Harmonic Distortion

MP7 uses PWM and IGBT technology to reduce harmonics. Low harmonics can prevent unnecessary equipment degradation, and avoid problems like electrical energy loss, damage to capacitors and conductor losses when power is sent back to the grid.
MP7 gives the operator full control over the UPS through the HMI. The operator can manually operate the static transfer switch and battery maintenance tests as well as monitor all measured parameters such as UPS and battery status and event and alarm logs.

MP7 and measures and displays the following:

- **Main Input, Output and Bypass**
  - Voltage (V) L-N
  - Current (A)
  - Frequency (Hz)
  - Power Factor (%)
- **UPS load per module**
  - S (KVA) (Apparent Power)
  - P (KW)
  - Q (KVAR)
  - Load (%)
- **Battery Data**
  - Battery temperature (°C)
  - Ambient temperature (°C)
  - Battery capacity (%)
  - Voltage (V)
  - Current (A)
  - Remaining backup time (min.)
  - Float charging
  - Equalized charging
- **Fault history**
- **Event log**
- **Real time alarm monitoring**
- **N# status code**

MP7 provides dedicated dry contacts for the following functions:

- **Input**
  - Remote EPO (Emergency Power Off) operation
  - Remote static transfer switch operation
- **Output**
  - Battery and environment temperature monitoring
  - Static switch feedback
  - Common alarm
  - Utility failure alarm
Optional Features

Power Distribution Unit

One central power unit when two or more power supplies are utilized.

External Maintenance Bypass Panel

Completely isolate power to one central bypass cabinet.

NEMA Enclosures

Other NEMA ratings available upon request.

Battery Cabinet

a) Internal (inside UPS)
b) Internal (external cabinet)
c) External (rack).
   (depending on battery setup and ventilation)

Additional Options

- Single cell battery monitoring
- Isolation transformer
- Temperature probe
- Dual input
- Frequency converter configuration
## Technical Specifications

### Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated AC Input Voltage</td>
<td>200/208VAC (3 phase 4 wire, sharing neutral with the bypass input)</td>
</tr>
<tr>
<td>Input Voltage Range</td>
<td>-20% to +25%</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 (range: 40Hz~70Hz)</td>
</tr>
<tr>
<td>Power factor</td>
<td>&gt;0.99 @ full load</td>
</tr>
<tr>
<td>THDI</td>
<td>&lt;3% @ 100% linear load</td>
</tr>
</tbody>
</table>

### Bypass & Static Transfer Switch

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch time (bypass &amp; inverter)</td>
<td>Synchronized switch: ≤1ms</td>
</tr>
<tr>
<td>Superior Protection Bypass Line</td>
<td>Thermal-magnetic breaker, the capacity is 125% of rated current output</td>
</tr>
<tr>
<td>Synchronization-window</td>
<td>Rated ±3Hz (selectable from ±0.5Hz ~±5Hz)</td>
</tr>
</tbody>
</table>

### Inverter Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated AC Voltage</td>
<td>200/208VAC (3 phase 4 wire, sharing neutral with the bypass input)</td>
</tr>
<tr>
<td>Inverter Voltage Range</td>
<td>±5%</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Fault Current</td>
<td>300% short current limitation for 200ms</td>
</tr>
<tr>
<td>Steady State Voltage Stability</td>
<td>±1 (balanced load), ±1.5 (100% unbalanced load)</td>
</tr>
<tr>
<td>THDu</td>
<td>&lt;1.5% (linear load), &lt;5% (non-linear load)</td>
</tr>
<tr>
<td>Slew Rate</td>
<td>1%, selectable 0.1~5</td>
</tr>
</tbody>
</table>

### Efficiency

<table>
<thead>
<tr>
<th>Mode</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal mode (dual conversion)</td>
<td>90%</td>
</tr>
<tr>
<td>ECO mode</td>
<td>98%</td>
</tr>
<tr>
<td>Battery mode</td>
<td>90%</td>
</tr>
</tbody>
</table>

### Battery

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery Bus Voltage</td>
<td>Nominal: 240 VDC, (±99V~±144V) 2 strings in series (120 Cells)</td>
</tr>
<tr>
<td>Quantity of Lead-Acid Cells</td>
<td>20= [12V unit], 120= [2V unit]</td>
</tr>
<tr>
<td>Float/Equalize</td>
<td>264 – 294V</td>
</tr>
<tr>
<td>Type of Battery</td>
<td>VRLA/Flooded Lead Acid/NiCd</td>
</tr>
</tbody>
</table>

### Communication

| Communication                      | RS-485, RS-232, (optional: Modbus TCP, SNMP card) |

### Environmental Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acoustic Noise Level at 1 Meter</td>
<td>55.0 dB</td>
</tr>
<tr>
<td>Operating Altitude</td>
<td>≤3280ft. (1000m) above sea level, de-rate power by 1% per 328ft between 3280ft and 6560ft</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>0 to 95%, non-condensing</td>
</tr>
<tr>
<td>Operating Temp.</td>
<td>0 to 40 ºC</td>
</tr>
<tr>
<td>UPS Storage Temp.</td>
<td>- 20 ºC~70 ºC</td>
</tr>
<tr>
<td>Battery Storage Temp.</td>
<td>- 20 ºC~30 ºC, (20ºC for optimum battery storage)</td>
</tr>
</tbody>
</table>

### Mechanical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabinet Specification</td>
<td>3-module, 6-module, 10-module</td>
</tr>
<tr>
<td>Dimensions, H x W x D (inch)</td>
<td>44 x 23.6 x 35.4, 63 x 23.6 x 35.4, 78.7 x 23.6 x 35.4</td>
</tr>
<tr>
<td>Weight (lb)</td>
<td>190, 381, 472</td>
</tr>
<tr>
<td>Color</td>
<td>Black</td>
</tr>
<tr>
<td>Protection Level, IEC(60529)</td>
<td>NEMA 1 (optional: NEMA 2, 3R or 12)</td>
</tr>
</tbody>
</table>

### Certification

<table>
<thead>
<tr>
<th>Certification</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certification</td>
<td>CSA-C22.2 No.107.3, UL 1778, CE 73/23 &amp; 93/68</td>
</tr>
</tbody>
</table>

### Warranty

| Warranty                           | 5 years from shipment |
AC & DC

Custom UPS
Product Specifications

Description
RIC Electronics designs and manufactures AC and DC UPS solutions to fit demanding industrial needs. Whether it be single or dual input, redundant rectification, AC and/or DC output, they will create a custom system that meets or exceeds the required technical specifications.

Not being constrained to one size of cabinet or type of system, they can utilize SCR or high frequency switch-mode rectification based on the requirements.

Backup time can be provided internally or externally depending on the amount of time needed.

Contact the sales team at RIC Electronics for more information on custom AC/DC solutions.

Features

- SCR or high frequency switch mode rectifier
- AC/AC, AC/DC, DC/AC, DC/DC
- AC single phase/three phase
- Voltage: 2-600V (input or output)
- Power: 120 Watts – 200kW
- Backup time: 5 minutes – multiple days (optional redundancy)
- Single or dual (multiple source) input
- NEMA 1 enclosure (NEMA 2, 3R, 4/4X and 12 available)
- Redundant chargers

System providing 3KW AC and DC 6.25KW DC
The sample system on the right hand side is comprised of an IGBT battery charger that outputs 48VDC/40A and 120VAC (650 Watts). The backup time for this system is 24 hours.

This system provides both midpoint and string voltage readings with 500VDC input and DC output breakers.

Sample Systems

Configuration 1

AC Input

AC Output

Configuration 2

AC Input

AC Output

DC Output

Configuration 3

AC Input

AC Output

DC to AC/DC Output 2**

DC Output 3

AC Input 2*

DC Input***

Not shown are transfer and bypass switch options which can be added to any system.

Number of battery strings dependant on backup time. Inverters and converters can be added for redundancy.

*Dual AC input with redundant rectifier available.
** DC to AC inverter and/or DC outputs.
***DC input capability
MX
Modular Inverter
Product Specifications

Description
When you need clean, efficient AC power, RIC Electronics offers its MX inverter. This modular, “hot swappable” inverter system can provide up to 20KW (1PH), 40KW (bi-phase) and 60KW (3PH, 208VAC.

Because of its modular design, MX is capable easily expandable and can provide N+1 redundancy to ensure an unforeseen failure does not take down the critical load.

Protection Circuitry

**Over Voltage**: Shut off at maximum input voltage, per input conditions. Automatic reset upon fault correction

**Under Voltage**: Shut off at minimum input voltage, per input conditions

**Thermal**: 105°C internal temperature. Warning buzz 5°C before shut off

**Output Short**: Unit shuts off (manual reset)

*Automatically reset

Options

- Maintenance bypass switch
- Static transfer switch (<4 ms)
- Communication options
  - Modbus TCP
  - SNMP

Mechanical Specifications

Four case sizes are available; all are: 7” high X 15” deep.

- 19 inch Wide: (includes hardware for rack or shelf mounting)
- 23 inch Wide: (includes hardware for rack or shelf mounting)
- 9.97 inch Wide: (for 1 to 3KW applications: surface mounting only)
- 7 inch Wide: (for 1 or 2KW applications; surface mounting only)

Available in other sizes including metric.
**Technical Specifications**

### Output Power

<table>
<thead>
<tr>
<th>Continuous Power</th>
<th>Surge Power (3 Seconds)</th>
<th>No Load Power</th>
<th>Output Voltage</th>
<th>Output Current</th>
<th>Weight (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 Watt</td>
<td>2200 Watts</td>
<td>20 Watts</td>
<td>230 +/- 6%</td>
<td>4.3</td>
<td>7.5</td>
</tr>
<tr>
<td>1000 Watt</td>
<td>2200 Watts</td>
<td>20 Watts</td>
<td>117 +/- 6%</td>
<td>8.6</td>
<td>7.5</td>
</tr>
<tr>
<td>1000 Watt</td>
<td>2200 Watts</td>
<td>20 Watts</td>
<td>100 +/- 6%</td>
<td>10.0</td>
<td>7.5</td>
</tr>
</tbody>
</table>

*10W with X2 option  
**Remote switchable

### Input Power

<table>
<thead>
<tr>
<th>Model Voltage</th>
<th>Minimum (Typical)**</th>
<th>System (Typical)</th>
<th>Maximum (Typical)**</th>
<th>Typical Efficiency @ Full Power</th>
<th>Peak Efficiency @ 1/3 Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>12Vdc</td>
<td>10.4/10.6Vdc*</td>
<td>13.8Vdc</td>
<td>17Vdc</td>
<td>85%</td>
<td>87%</td>
</tr>
<tr>
<td>24Vdc</td>
<td>19/21Vdc*</td>
<td>27.6Vdc</td>
<td>34Vdc</td>
<td>87%</td>
<td>89%</td>
</tr>
<tr>
<td>32Vdc</td>
<td>26.5/28Vdc*</td>
<td>36.8Vdc</td>
<td>45Vdc</td>
<td>87%</td>
<td>89%</td>
</tr>
<tr>
<td>48Vdc</td>
<td>41.5/42.5Vdc*</td>
<td>55.2Vdc</td>
<td>62Vdc</td>
<td>87%</td>
<td>89%</td>
</tr>
<tr>
<td>66Vdc</td>
<td>57.5/58.5Vdc*</td>
<td>75.9Vdc</td>
<td>94Vdc</td>
<td>88%</td>
<td>90%</td>
</tr>
<tr>
<td>108Vdc</td>
<td>94/ 95Vdc*</td>
<td>124Vdc</td>
<td>149Vdc</td>
<td>88%</td>
<td>90%</td>
</tr>
</tbody>
</table>

*Indicates typical cut-off voltage/warning buzzer voltage  
** +/- .3%

### General Specifications

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waveform</td>
<td>-</td>
<td>Sinusoidal</td>
<td>-</td>
</tr>
<tr>
<td>Line Regulation</td>
<td>-</td>
<td>0.1%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Load Regulation</td>
<td>-</td>
<td>0.5%</td>
<td>1%</td>
</tr>
<tr>
<td>Distortion</td>
<td>-</td>
<td>1.5%</td>
<td>2%</td>
</tr>
<tr>
<td>Frequency*</td>
<td>-0.1%</td>
<td>Nominal</td>
<td>+0.1%</td>
</tr>
</tbody>
</table>

*50, 60, 400Hz nominal

### Environmental Characteristics

- **Audible Noise**: <45.0 dBA  
- **Humidity**: 0 to 95%, non-condensing  
- **Temperature**: -25° to 40° C full power derated above 40° C. Derate 20% per 10° C  
- **Altitude**: -200 to 10k feet full power, derated above 10k ft  
- **Cooling**: Thermo–statically controlled forced air  
- **Finish**: Painted aluminum  

### Certification

- **Certification**: CSA C22.2 NO. 107.1-01 (R2011), UL 1778: 2014 (Ed. 5)

### Warranty

- **Warranty**: 18 mos. from shipment; 3 year w/startup; 5 year w/ service
Customer List

Overview

RIC Electronics has been manufacturing quality power products for oil and gas, utility and heavy industry since 1981.

Their business is based on repeat business from satisfied customers due to the reliability of their products, after sales service and prolonged support for mature products.

Here are a few customers in different sectors.

Industrial

- Barrick Gold
- Cerro Verde Mine
- Department of National Defense
- Finning
- Rio Tinto Alcan
- Seaspan
- Teck Resources

Utility

- ATCO Electric
- BC Hydro
- Hydro One
- Hydro Quebec
- Manitoba Hydro
- New Brunswick Power
- Nova Scotia Power
- Saskpower

Oil and Gas

- Access Pipeline
- BP
- Canadian Natural Resources Limited
- Enbridge Pipeline
- ExxonMobil
- Fortis BC
- Imperial Oil
- Pembina Gas & Pipeline
- Petro Canada
- Shell
- Suncor
- Synerude
- Trans Canada Pipeline
Case Study

Sea-span Esquimalt shipyards needed a regulated high voltage DC power supply for the modernization efforts of the Victoria class submarines. This innovative system would ultimately provide shore power to submarines while docked. Later named as “Gizmo”, the power system needed to charge the submarine batteries and provide full submarine DC and AC power needs. A variety of important specifications needed to be met:

The Challenge

- 1.5MW power supply converting 480VAC three phase to a regulated and adjustable 0-720VDC (0-2600Amps).
- The AC power to be supplied by paralleling four diesel 750kW Diesel Generators. The generators to be functioning in parallel and in sync with the power demands of the submarine.
- Secondary 225kW 480VAC three phase for submarine use.
- Regulated DC load bank capable of discharging up to 720VDC (0-2600Amps). The load bank will be used for trial testing the submarine machinery and discharging the batteries.
- Portable and fully integrated package including the diesel generators, AC paralleling switchgear, DC power supply and DC load banks.
- Portable and rugged design package in standard sea-cans.

The Solution

RIC Electronics designed and manufactured a fully integrated 1.5MW power supply, 1.5MW adjustable load bank and AC paralleling switch gear. The solution integrated four 750kW diesel generators for AC power supply. All the power modules and sections were fully controlled and monitored by a central PLC system. The operator has full control of the functionality of the system and individual power sections through a touchscreen HMI. The system included all secondary distribution systems; protections and high amperage bus-work.

Gizmo
1.5 MW Submarine Battery Charger