

RHINO PSB24-BCM960S Battery Control Module

READ INSTRUCTIONS BEFORE INSTALLING OR OPERATING THIS DEVICE. KEEP FOR FUTURE REFERENCE.

General Description

The PSB24-BCM960S battery control module is designed to support a 24V system with up to 40A output and 4.5 minutes back up time for 15AH battery capacity. It offers a wide input voltage from 24-28V and a wide operating temperature range from -20°C to +60°C. This product comes with dry contacts for battery management signals and LED indicator for battery status. The rugged compact aluminum case is shock and vibration resistant according to IEC 60068-2.

IMPORTANT SAFETY INSTRUCTIONS

- Retain these instructions. This manual contains important safety instructions.
- When replacing batteries, only use the same type of batteries as described in the Specifications.
- Proper disposal of batteries is required. Refer to the relevant local codes for disposal requirements.
- Switch main power off before connecting or disconnecting the device. Risk of explosion!
- If the orange status LED is on steady, this indicates a failure in the installation. In this case, do not turn on power supply while the battery is connected. Danger of explosion!
- To guarantee sufficient convection cooling, keep a distance of 50mm above and below the device as well as a lateral distance of 20mm (for vertical mounting) or 50mm (for horizontal mounting) to other units. See Figure 4.
- Please note that the enclosure of the device can become very hot depending on the ambient temperature and load of the power supply. Risk of burns!
- The mains power must be turned off before connecting or disconnecting wires to the terminals!
- Do not introduce any objects into the unit!
- Dangerous voltage present for at least 5 minutes after disconnecting all sources of power.
- This is a built-in unit and must be installed in a cabinet or room (condensation free environment and indoor location) that is relatively free of conductive contaminants.
- CAUTION: FOR USE IN A CONTROLLED ENVIRONMENT.



Risk of electrical shock, fire, personal injury or death.

1. Turn power off before working on the device.
2. Make sure the wiring is correct by following all local and national codes.
3. Do not modify or repair the unit.
4. Use caution to prevent any foreign objects from entering into the housing.
5. Do not use in wet locations.
6. Do not use the unit in area where moisture or condensation can be expected.

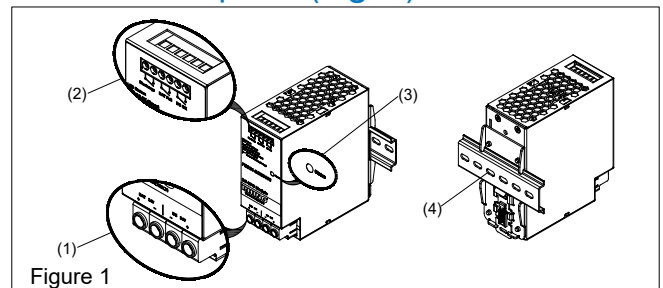
FOR TECHNICAL ASSISTANCE CALL



Highlights & Features

- Full corrosion resistant Aluminium chassis
- Suitable for 24V system up to 40A
- Built-in diagnostic monitoring for DC OK, Discharge and Battery Fail by relay contacts
- LED indicator for DC OK, Battery Fail, DC Input, Battery Reverse Polarity and Battery Discharge
- High MTBF > 500,000 hrs as per Telcordia SR-332
- Wide operation temperature range from -20°C to +60°C
- Conformal coating on PCBA to protect against chemical and dust pollutants

Device description (Fig. 1)



- (1) Input & Output/Battery terminal block connector
- (2) Signal terminal block connector
- (3) LED display status
- (4) Universal mounting rail system

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Mounting

The unit can be mounted on 35mm DIN Rails in accordance with EN60715. For vertical mounting, the device should be installed with Input & Output/Battery terminal block on the bottom. For horizontal mounting, the device should be installed with Input & Output/Battery terminal block on the left side.

Each device is delivered ready to install.

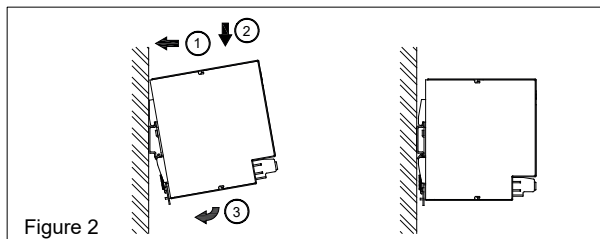


Figure 2

Snap on the DIN Rail as shown in Fig. 2:

1. Tilt the unit slightly upwards and put it onto the DIN Rail.
2. Push downwards until stopped.
3. Press against the bottom front side for locking.
4. Shake the unit slightly to ensure that it is secured.

Dismounting

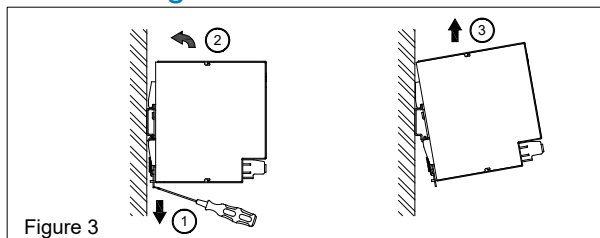


Figure 3

To uninstall, use a flat screwdriver to pull or slide down the latch as shown in Fig. 3. Then, slide the PSU in the opposite direction, release the latch and pull out the PSU from the rail.

Connection

The terminal block connectors allow easy and fast wiring. The terminal block is IP20 compliant and thus provides the user safety and protection from electrical shock hazards.

You can use flexible (stranded wire) or solid cables as follows:

| | Stranded / Solid | | Torque | | Remarks |
|-----------|------------------|-------|--------|-------|--------------|
| | mm ² | AWG | N·m | lb·in | |
| Battery | 3.3-13.3 | 12-6 | 1.52 | 13.5 | Load: 0-20A |
| DC In/Out | 8.4-13.3 | 8-6 | 1.52 | 13.5 | Load: 20-40A |
| Signal | 0.2-3.3 | 24-12 | 0.61 | 5.4 | - |

Wires between the battery control module and battery must not be longer than 2m [6.5 ft]. For reliable and shockproof connections, the wire stripping length should be 10mm for Input & Output/Battery terminal block connector and 7mm for Signal terminal block connector (see Fig. 5 (1)). Please ensure that wires are fully inserted into the connecting terminals as shown in Fig. 5 (2).

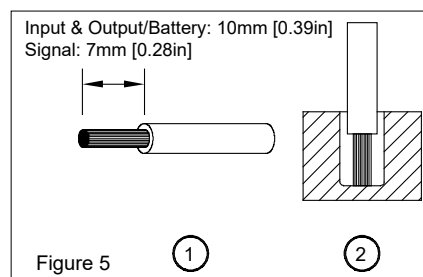


Figure 5

In accordance with EN60950 / UL60950, flexible cables require ferrules.

Use appropriate copper cables that are designed to sustain operating temperature of at least 60°C/75°C for USA or at least 90°C for Canada.

Orientation

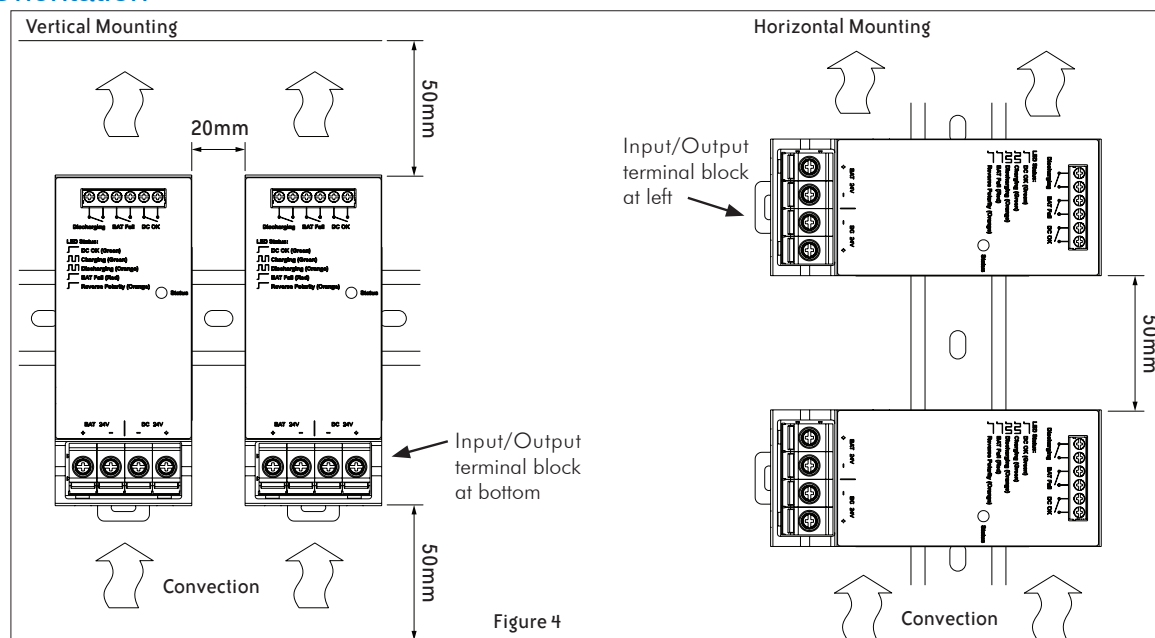
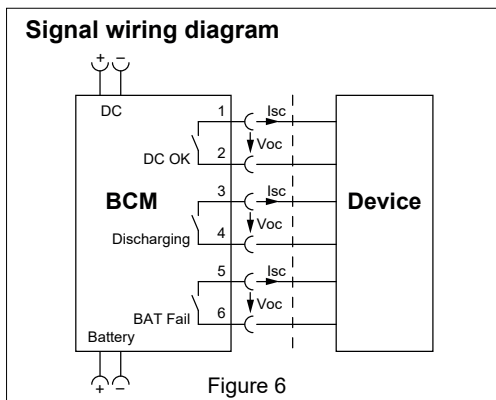


Figure 4

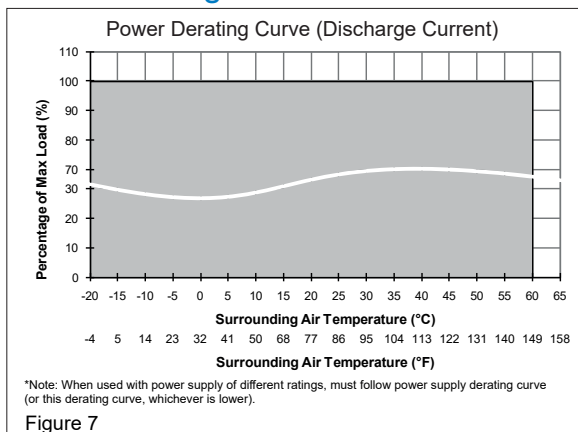
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Signal wiring diagram

Contact current: $I_{\max} = 1A$
 Contact voltage: $V_{\max} = 24VDC/VAC$ (Secondary circuit)
 No polarity requirement.



Power Derating

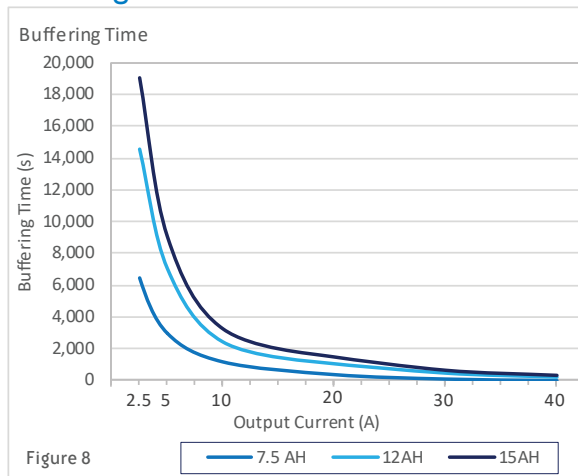


| BCM Status | Status Indicators | | | LED Display Status |
|---------------------------------------|------------------------|-------------|----------|---------------------|
| | Relay Output Connector | Discharging | BAT Fail | DC OK |
| Battery Fully Charged | Open | Open | Closed | Green LED On |
| Battery Charging | Open | Open | Closed | Green LED Flashing |
| Battery Discharging* (Buffering Mode) | Closed* | Open | Closed | Orange LED Flashing |
| No Battery Connected | Open | Closed | Open | Red LED On |
| Output Shutdown | Open | Open | Open | No Light |

* With output current 3A to 40A.

| Buffering Time | | | |
|----------------|--------|---------|---------|
| Output Current | 7.5 AH | 12AH | 15AH |
| 2.5 A | 6,500s | 14,500s | 19,000s |
| 5A | 3,000s | 7,000s | 9,000s |
| 10A | 1,200s | 2,400s | 3,200s |
| 20A | 400s | 1,100s | 1,500s |
| 30A | 120s | 450s | 600s |
| 40A | 25s | 200s | 280s |

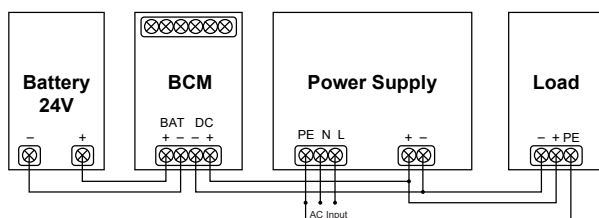
Buffering Time



Typical application notes

Typical Application Notes

9.1 Provide backup power during AC source interruption or failure



9.2 Can be combined with redundancy module (PSB60-REM40S)

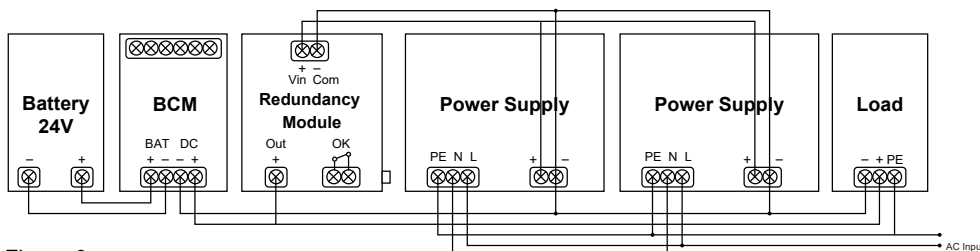






Figure 9

RHINO PSB24-BCM960S Battery Control Module

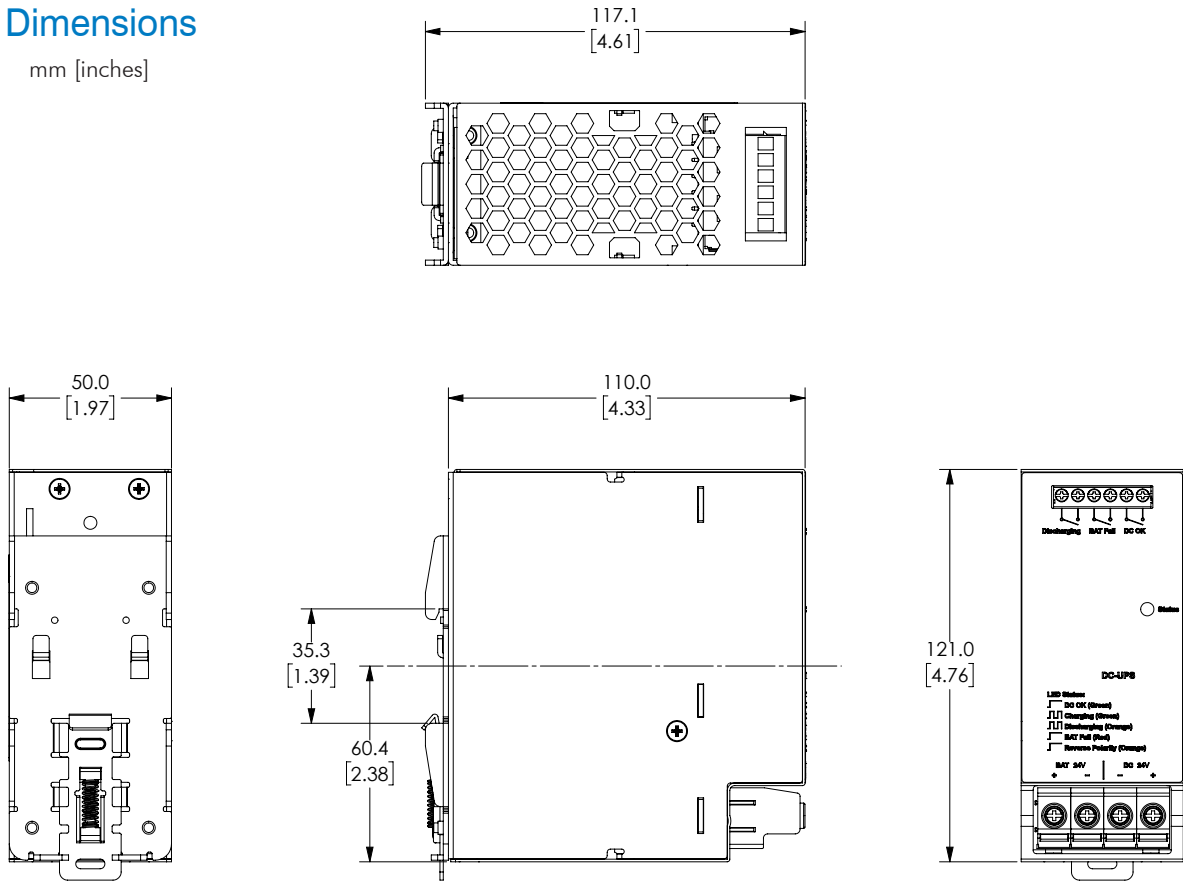
| Technical Specifications | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Input (DC) | | |
| Nominal input voltage | 24VDC | |
| Voltage range | 24-28 VDC | |
| Maximum input voltage | 30 ± 0.5 VDC | |
| Input current | Charging Mode: 2.0 ± 1.0 A (25°C), Discharging Mode: 40A Max. | |
| Maximum inrush current (cold start) | < 45A (25°C) | |
| Charging time | < 3 hr ± 1 hr (25°C) | |
| Efficiency | Charging Mode: > 70.0%, Discharging Mode: > 99.0% | |
| Output (DC) | | |
| Nominal output voltage | 24VDC typ. (depends on Vin) | |
| Discharging voltage | 23-28 VDC | |
| Maximum output voltage | 30 ± 0.5 VDC | |
| Output current | 40A Max. | |
| Derating | Refer to Fig. 7 | |
| Component derating | Vin = 28.0 VDC, Max. load | |
| Short circuit / Overload | No damage | |
| Batteries | | |
| Recommended battery types | 24V VRLA or 2 x 12V VRLA | |
| Recommended battery capacity | 7.2-15.0 Ah | |
| Battery voltage range | 23-28VDC (continuous operating), 30VDC Max (maximum voltage that will not cause damage to the unit) 14VDC Min (voltage level of battery to enable "BAT Fail" function) | |
| Battery fuse | Auto 50A / 80V, FK3 (Littelfuse) or similar in the battery path (protects the wires between the battery and the battery control module) | |
| General Data | | |
| Type of housing | Aluminum | |
| LED signals | Green LED On = Unit is fully charged Green LED Flashing = Unit is charging Orange LED Flashing = Unit is discharging Red LED On = Battery fail (no battery is connected) Orange LED On = Battery 24 V or DC 24 V reverse polarity | |
| Signal relay contacts | DC OK = Contact is closed when battery is fully charged and the unit is ready to discharge/buffer. DISCHARGING = Contact is closed when the unit is discharging/buffering with output current of 3-40 A. BATTERY FAIL = Contact is closed when the battery fails to function. | |
| MTBF | > 500,000 hrs. as per Telcordia | |
| Dimensions (L x W x H) | 121mm x 50mm x 117.3 mm [4.76 fin x 1.97 fin x 4.62 fin] (See for complete engineering drawings.) | |
| Weight | 0.39 kg [14 oz] | |
| Connection method | Screw connection | |
| Stripping length | Input & Output/Battery terminal block connector: 10mm [0.39 in] Signal terminal block connector: 7mm [0.28 in] | |
| Operating temperature (surrounding air temperature) | -20°C to +60°C [-4°F to +140°F] (Refer to Fig. 7) | |
| Storage temperature | -25°C to +85°C [-13°F to +185°F] | |
| Humidity at +25°C, no condensation | < 95% RH | |
| Vibration (non-operating) | 10Hz to 500Hz @ 30m/S² (3G peak); displacement of 0.35mm; 60 min per axis for all X, Y, Z direction. Refer to IEC60068-2-6. Note: all figures quoted are amplitudes (peak values) | |
| Shock (in all directions) | 30G (300m/S²) in all directions according to IEC60068-2-27 | |
| Pollution degree | 2 | |
| Altitude (operating) | 3000m | |
| Certification and Standards | | |
| Electrical equipment of machines | IEC60204-1 | |
| Electronic equipment for use in electrical power installations | EN50178 / IEC62103 | |
| Safety entry low voltage | PELV (EN60204), SELV (EN60950) | |
| Electrical safety (of information technology equipment) | UL/C-UL recognized to UL60950-1 and CSA C22.2 No. 60950-1 (File No. E198298), CB scheme to IEC60950-1 | |
| Industrial control equipment | UL/C-UL listed to UL508 and CSA C22.2 No.107.1-01, CSA to CSA C22.2 No.107.1-01 (File No. 249074) | |
| Protection against electric shock | DIN57100-410 | |
| CE | In conformance with EMC directive 2014/30/EU and Low Voltage Directive 2014/35/EU | |
| Component power supply for general use | EN61204-3 | |
| Immunity | EN55024, EN61000-6-2 (EN61000-4-2, 3, 4, 5, 6, 8) | |
| Emission | EN55032, EN55011 | |
| <div><div></div><div></div><div></div><div></div></div> | | |
| RoHS Compliant | Yes | |
| Safety and Protection | | |
| Isolation voltage: | Input & Output / PE Signal / PE Input & Output / Signal | 1kVAC 1kVAC 1kVAC |
| Polarity protection | Yes | |
| Protection degree | IP20 | |
| Safety class | Class III | |

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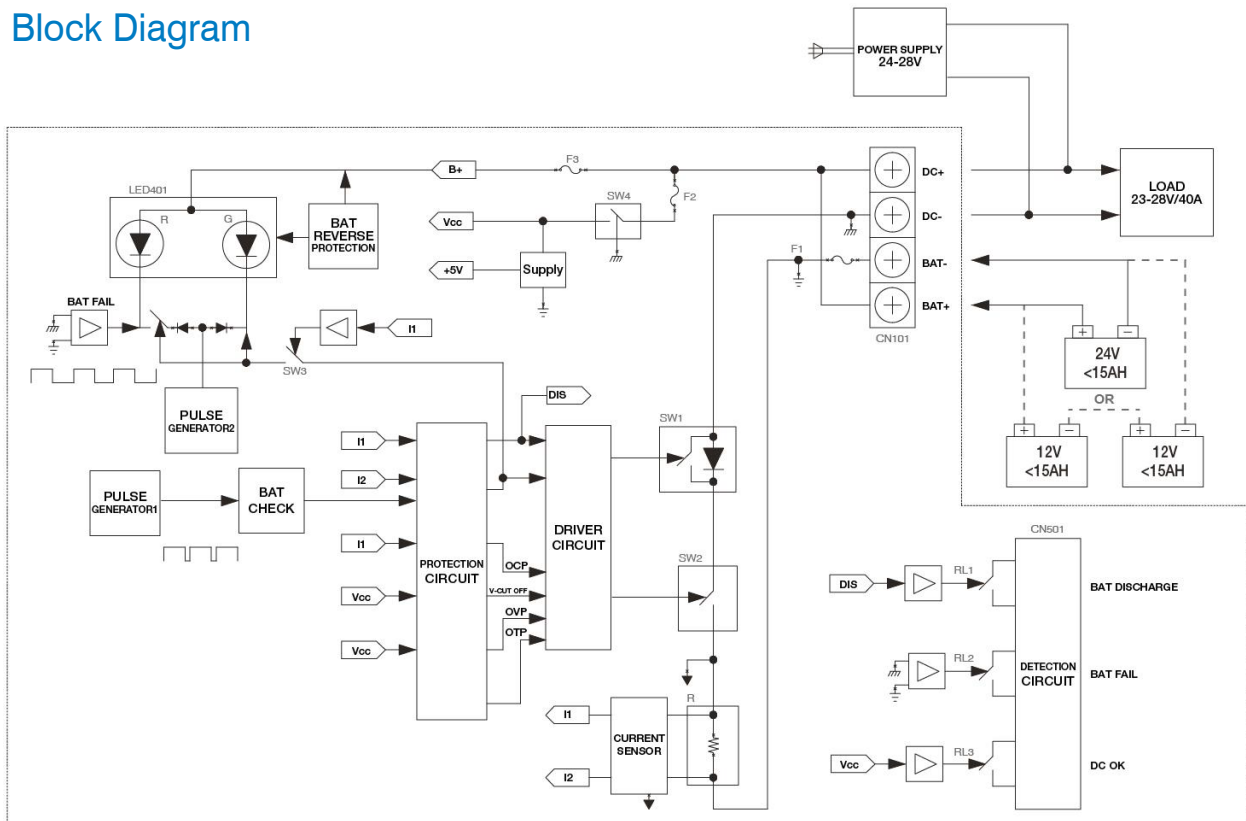
RHINO PSB24-BCM960S Battery Control Module

Dimensions

mm [inches]



Block Diagram



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RHINO Battery Control Modules Overview

A battery control module (BCM), in combination with an external sealed lead acid battery, can be added to a DC power supply to create a DC uninterruptible power supply (UPS) that will maintain power to a connected load upon loss of mains power.

The battery control module performs several key functions in the DC UPS system. Under normal conditions, it monitors the status of the DC input power, monitors and controls charging of the external lead acid battery, and provides status/alarm contacts to allow remote monitoring of the state of the UPS.

In the event that the DC power supply voltage drops out, the BCM monitors and supplies power to the load from the battery and monitors the battery during discharge.

Several battery control modules, with a range of features, are available for use with RHINO power supplies. Key differentiating features of the battery control modules are delineated in the following table.

| Battery Control Module Selection Guide | | | | |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|----------------------|-----------------------------------|
| Part Number | PSH-BCM360S | PSB24-BCM960S | PSL-24-BCM240 | PSM24-BCM360S |
| Price | | | | |
| Highlights | <i>Most versatile</i> | <i>Highest power Lowest cost/watt Conformal coating</i> | <i>Lowest cost</i> | <i>Legacy</i> |
| Nominal Output Voltage | 24/48 VDC | 24 VDC | 24 VDC | 24 VDC |
| Amperage Rating | 15A at 24 VDC, 7.5 A at 48 VDC | 40A | 10A | 15A |
| Number of Power Inputs | Redundant inputs for two independent power supplies | One power supply | One power supply | One power supply |
| Battery Type | 12V sealed lead acid | 24V sealed lead acid | 24V sealed lead acid | 24V sealed lead acid |
| Protection Type | Over voltage, Over current, Deep discharge, Reverse polarity, Battery overcharge, Over temperature | | | |
| Battery Temperature Compensation | Yes | No | No | Yes |
| Compatibility | Universal | Universal | Universal | Requires RHINO PSM24 power supply |

