

Stationary Power Battery Charger Specification for 24/48/120/125/130 Vdc Applications

1. GENERAL

- 1.1. This specification describes a battery charger for 24/48/120/125/130 volts DC (nominal) stationary/reserve/standby power applications.
- 1.2. The charger is a constant DC output voltage float type.
- 1.3. The charger is designed to maximize uptime, availability, reliability, and durability in industrial environments.
- 1.4. The charger utilizes a modular architecture with a chassis, system controller that serves as the user interface, and one (1) or more power (rectifier) modules.
- 1.5. Multiple power modules in a chassis provide redundancy. If a power module stops operating, the other power modules in the system continue to operate and will automatically increase their DC output current to source the load (up to the maximum DC output power or current capabilities of the remaining power modules). Power modules will also continue to operate, using the last configuration communicated to them, if the system controller stops operating.
- 1.6. In order to maximize uptime and availability, the power modules are hot swappable to facilitate adding modules to or removing modules from the chassis without taking the charger offline.
- 1.7. The charger is natural convection cooled with no fans or other moving parts.

2. STANDARDS

- 2.1. The charger is listed to UL/cUL 1012.
- 2.2. The charger is compliant with NEMA PE 5-1997.
- 2.3. The charger is compliant with FCC Part 15, Class A.
- 2.4. The charger is certified to the California Energy Commission (CEC) Appliance Efficiency Regulations, Title 20.

3. ENVIRONMENTAL

- 3.1.** The charger has an operating temperature range of -40 to 70 °C (-40 to 158 °F) with over-temperature protection. The charger retains full DC output power across this entire operating temperature range with no de-rating or cutbacks due to temperature.
- 3.2.** The charger has a storage temperature range of -55 to 85 °C (-67 to 185 °F).
- 3.3.** The charger circuit boards are conformal coated for protection from moisture and other contamination.
- 3.4.** The charger has an operating humidity range of 0 to 95 percent, non-condensing.
- 3.5.** The charger has a storage humidity range of 0 to 95 percent, non-condensing.

4. MECHANICAL

- 4.1.** The charger case and modules are constructed out of heavy-gauge, powder-coated steel.
- 4.2.** The charger has a terminal block for the AC input and DC output wiring.
- 4.3.** The AC input and DC output terminals are covered. A tool is required to gain access to the terminals. Standard lockable door can be used to further secure access to the terminals and Ethernet port.
- 4.4.** The 4/8/16-slot charger includes standard, adjustable hardware to be mounted to a wall, shelf, countertop, floor, or EIA 19-inch rack. Optional, adjustable hardware is available for EIA 23-inch rack mounting.

5. AC INPUT

- 5.1.** To enable use of the charger anywhere in the world, as well as locations within North America with periodic or permanent low AC line voltages, the charger has a wide AC input rating range of 100-240 volts, 50-200 hertz, single-phase. The charger has an AC input operating range of 90-264 volts, 45-205 hertz, single-phase. Below 100 volts, the charger may reduce output power.
- 5.2.** The charger automatically adjusts to an AC input voltage within its operating range. No manual adjustments or tapping are required.
- 5.3.** The charger efficiency is at least 91 percent at 120 volts AC input and full load and 93 percent at 240 volts AC input and full load.
- 5.4.** The charger power factor is at least 0.98 at 120 volts AC input and full load and 0.96 at 240 volts AC input and full load.

5.5. The AC input includes current limit, surge, transient, under voltage, and over voltage protection.

5.6. The following table shows the chassis AC circuit breaker ratings. Optional High AIC breaker, 22 kAIC available based on chassis configuration/size.

Chassis Vdc	Chassis Slots	AC Input Breaker P/N (Standard AIC)	Description
130	4	41931	30A, 2 POLE, 120/240 Vac, 10 kAIC (@ 120/240 Vac)
130	8	41933	60A, 2 POLE, 120/240 Vac, 10 k AIC (@ 120/240 Vac)
130	16	41933	60A, 2 POLE, 120/240 Vac, 10 kAIC (@ 120/240 Vac)
48	4	41931	30A, 2 POLE, 120/240 Vac, 10 kAIC (@ 120/240 Vac)
48	8	41933	60A, 2 POLE, 120/240 Vac, 10 k AIC (@ 120/240 Vac)
24	4	41931	30A, 2 POLE, 120/240 Vac, 10 kAIC (@ 120/240 Vac)
24	8	41933	60A, 2 POLE, 120/240 Vac, 10 k AIC (@ 120/240 Vac)

6. DC OUTPUT

6.1. Each power module is 480 watts maximum and 4 amps maximum for 130 Vdc models. Each power module is 480 watts maximum and 10 amps maximum for 48 Vdc models. Each power module is 400 watts maximum and 10 amps maximum for 24 Vdc models.

6.2. Chargers have an adjustable float voltage range of 95.00 to 150.00 volts for 130 Vdc models. (including temperature compensation). Adjustable float range 30.00-61.00 volts on 48 Vdc models.(including temperature compensation). Adjustable float range 10.00-40.00 volts on 24 Vdc models.(including temperature compensation).

6.3. Chargers have an adjustable equalize float voltage range of 95.00 to 150.00 volts for 130 Vdc models. (including temperature compensation). Adjustable float range 30.00-61.00 volts on 48 Vdc models.(including temperature compensation). Adjustable float range 10.00-40.00 volts on 24 Vdc models.(including temperature compensation).

6.4.

6.5. Chassis are available with four (4), eight (8), or sixteen (16) power module slots.

6.6. The DC output includes current limit, short circuit, reverse polarity, high voltage, surge, and transient protection.

6.7. Each bank of power modules in a chassis includes an independent circuit breaker. The following table shows the chassis DC circuit breaker ratings

6.8.

Chassis Vdc	Chassis Slots	DC Output Breaker P/N	Description
130	4	41961	25A, 2 POLE, 160 Vdc, 5 kAIC (@ 160 Vdc)
130	8	41961 (2x)	25A, 2 POLE, 160 Vdc, 5 kAIC (@ 160 Vdc)
130	16	41961 (4x)	25A, 2 POLE, 160 Vdc, 5 kAIC (@ 160 Vdc)
48	4	41963	50A, 1 POLE, 65 Vdc, 10 kAIC (@ 65 Vdc)
48	8	41963 (2x)	50A, 1 POLE, 65 Vdc, 10 kAIC (@ 65 Vdc)
24	4	41963	50A, 1 POLE, 65 Vdc, 10 kAIC (@ 65 Vdc)
24	8	41963 (2x)	50A, 1 POLE, 65 Vdc, 10 kAIC (@ 65 Vdc)

7. SYSTEM CONTROLLER

7.1. The system controller is both AC and DC powered for continued operation without AC power.

7.2. The system controller includes a real-time clock with battery backup to retain the date and time in the event that both AC and DC power are lost.

8. COMMUNICATION

8.1. The charger includes 10/100BASE-TX Ethernet with auto MDI-X (auto crossover) and an RJ45 connector.

8.2. The charger includes an internal web server and supports both networked communication and communication with a directly-connected computer.

8.3. The web server uses a responsive framework to automatically adapt the display of the web pages for different devices, including laptops, PCs, smart phones, and tablets.

8.4. The charger supports SNMP (Simple Network Management Protocol) Traps for alarm events. Traps are issued both when alarms are triggered and cleared.

8.5. The charger supports NTP (Network Time Protocol) to synchronize the system date and time with a network time server.

8.6. Optional Modbus communication protocol available.

- 8.7.** Optional additional 7 Dry Contact exterior sealed module with red LED alarm status indicators. Red LED illuminated states an alarm, a non-illuminated LED indicates no fault. Alarms configured, iPM/Rectifier Failure, AC Input Failure, Low DC Current, High DC Voltage, Low DC Voltage, Ground Neg (-), Ground Pos (+). Green Power LED status light indicating operational success of the module. No ground strap required for installation.

9. DISPLAY

- 9.1.** The following display items are available via the charger web server: Battery Voltage, DC Output Current, DC Output Power, AC Input Voltage, Battery Temperature, Internal Charger Temperature, Site Name, System Controller Serial Number, System Controller Firmware Version, Power Module Serial Number(s), Power Module Firmware Version(s), DC Voltage Sensing Local/Remote, Confirmed Local Presence Time Remaining.
- 9.2.** The charger includes a display that simultaneously displays the DC voltage at the charger output to 1 decimal place with 1 percent accuracy and the DC output current to 2 decimal places with 1 percent accuracy.
- 9.3.** The system controller includes the following LEDs: System Controller Status, AC Present, Alarm Active, Confirm Local Presence.
- 9.4.** Each power module includes a tri-color LED that provides the DC output status and fault/limit notification.

10. BATTERY COMPATIBILITY AND TEMPERATURE COMPENSATION

- 10.1.** The charger is compatible with flooded lead-acid (FLA), valve-regulated lead-acid (VRLA), nickel-cadmium (Ni-Cd), and lithium-ion (Li-ion) type batteries. Charger can be used on Lithium batteries only when external BMS is utilized.
- 10.2.** The charger supports battery temperature compensation with controlled limits. Battery temperature compensation can be enabled/disabled, the compensation value/slope can be adjusted, the minimum compensation limit can be adjusted, and the maximum compensation limit can be adjusted via the charger web server.
- 10.3.** The remote probe for sensing temperature at the battery pack is available as an option.

11. REMOTE DC VOLTAGE SENSING

- 11.1.** The charger supports remote DC voltage sensing with the DC voltage sensing wire assembly connected directly to the battery pack in order to both measure the voltage of the battery pack without any DC cable drop and continue monitoring the voltage of the battery pack if the DC circuit breaker(s) is (are) open. Remote DC voltage sensing can be enabled/disabled via the charger web server.

11.2. The remote DC voltage sensing wire assembly is available as an option.

12. GROUND FAULT DETECTION (GFD)

12.1. As an option, the charger supports ground fault detection between DC positive (+) or DC negative (-) and ground with an adjustable trigger current level of 1.5 to 5.5 milliamps. Ground fault detection can be enabled/disabled and the trigger current level can be adjusted via the charger web server.

13. ADJUSTMENTS, CONFIGURATION CHANGES, AND FIRMWARE

13.1. The charger includes rotary switches to manually adjust the number of battery cells and the float voltage per cell. These settings can also be configured via the charger web server.

13.2. All settings can be configured via the charger web server.

13.3. All firmware can be upgraded via the charger web server.

13.4. The charger web server includes configurable user access levels.

13.5. In order to provide the highest-possible level of security, the charger includes a physical Confirm Local Presence (CLP) button and LED. Pressing this button is required to save any changes to the web server and ensures that the changes are being made and/or confirmed locally.

13.6. Charger utilizes High Voltage Shutdown.

14. ALARMS AND LOGGING/HISTORY

14.1. The following alarms can be individually enabled/disabled, assigned a delay, assigned a priority, and assigned to the summary alarm relay via the charger web server: AC Input Power Lost, AC Input Voltage High, Battery Voltage Low, Battery Voltage High, Battery Temperature Low, Battery Temperature High, Minimum DC Output Current, Power Module Fault, Power Module Communication Lost, Incorrect Power Module DC Voltage, System Controller Fault, Battery Temperature Sensor Fault, Remote DC Voltage Sensing Fault, Ground Fault Detection.

14.2. The following alarms have configurable trigger levels via the charger web server: AC Input Voltage High, Battery Voltage Low, Battery Voltage High, Battery Temperature Low, Battery Temperature High, Minimum DC Output Current, Ground Fault Detection.

14.3. The charger includes a Form C, dry-contact summary alarm relay with contacts rated for 2 amps at 30 volts DC, 0.6 amps at 125 volts DC, 0.6 amps at 125 volts AC, and 0.2 amps at 250 volts AC.

14.4. The charger supports Ethernet-based alarming via SNMP (see the COMMUNICATION section).

- 14.5.** The charger logs all alarm events as history records, both when alarms are triggered and cleared. Alarm records include the date/time and triggering value.
- 14.6.** History records can be downloaded via the charger web server as a CSV (comma-separated values) file.
- 14.7.** The charger includes non-volatile storage for up to 10,000 history records. If the storage reaches capacity, the oldest records are overwritten.

END OF SPECIFICATION