

The High Rate (HR) Energy Storage Rack from NEC Energy Solutions is a fully integrated battery storage system offering high durability energy storage for a wide range of high power applications including grid stabilization.



The HR Energy Storage Rack is a rack-integrated lithium ion energy storage component and the core building block of NEC Energy's GBS® grid battery systems designed for high power, high durability service. The HR Energy Storage Rack is a standardized product that delivers high power performance and inherent multi-layer safety for the most demanding energy storage scenarios and can also be configured as a standalone DC source for a multitude of customized grid and commercial applications.

HR Energy Storage Racks include:

- HR Battery Modules utilizing NEC's industry-proven technology
- Battery Management System (BMS) that continuously monitors voltage, temperature, and system conditions and performs cell balancing
- Integrated forced air thermal management system
- Nested safety features provide layered protection at the cell, module, BMS, and rack level
- CAN bus communications between BMS and high-level system controls

EXAMPLE APPLICATIONS

Grid Storage/Grid Stabilization

HR Energy Storage Racks support third party systems and can be furnished in NEC's Grid Battery Storage System (GBS®) for high power and stabilization applications such as:

- Frequency-regulation services
- Voltage stabilization/VAR support
- Renewable firming/stabilization
- Power balancing (or bridging)
- Spinning reserve
- Inrush control (e.g., light rail, trolley, etc.)

Battery Rack Characteristics	HR
Battery Type	Lithium ion
Nominal Voltage	950 VDC
Operating Voltage Range	750–1050 VDC
Max. Charge/Discharge Power	136 kW (1 full cycle/day)
Continuous Charge/Discharge Power	68 kW
Available Energy (Nominal)	34 kWh**
Nominal Capacity	40 Ah
Maximum Discharge Current	160 A
Usable State of Charge (SOC)	0–100%
Round Trip Efficiency	97% (1C), 98% (C/2)
Cycle Life (1C charge / 1C discharge, to 80% BOL @ 23°C)	>9,500 cycles (100% DOD)
Operating Temperature	-40 to 60°C**
Shipping/Storage Temperature Range	-40 to 60°C
Communications	CAN bus
DC Contactor Interlock	Yes
Dimensions (W x D x H)	600 x 1070 x 2438 mm (24 x 47 x 96 in)
Weight	872 kg / 1923 lbs

** Recommended temp range for optimal battery performance is 15°C–30°C

STANDARDS AND COMPLIANCE

IEC 62133, Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety

UL 1642, Lithium Batteries

HIGH PERFORMANCE

The HR Energy Storage Rack delivers an unparalleled combination of cycle life, calendar life and high power performance. Multi-year testing of the cells and modules, under both realistic and extreme conditions, confirms life expectancy of > 9,000 cycles.

NESTED SAFETY DESIGN

The HR Energy Storage Rack is engineered for the utmost safety, enabled by the layered safety design, fusing at the cell, module and rack levels, extensive fault monitoring down to the module level and automatic opening of the dual contactors upon power loss or safety cover removal.

BATTERY MODULE FEATURES

HR Energy Storage Racks contain field-replaceable battery modules with on-board intelligence that communicates with the BMS and:

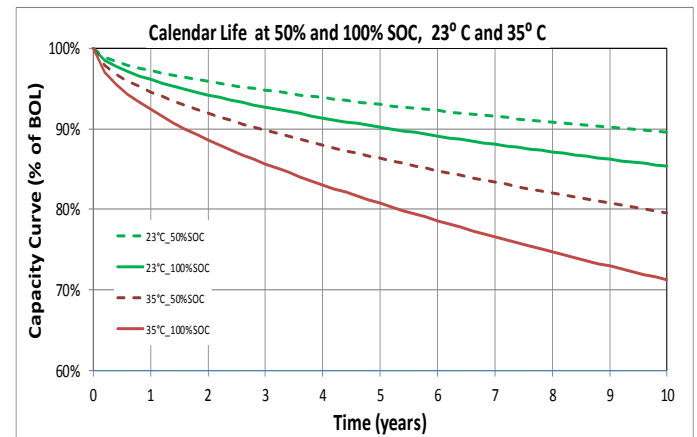
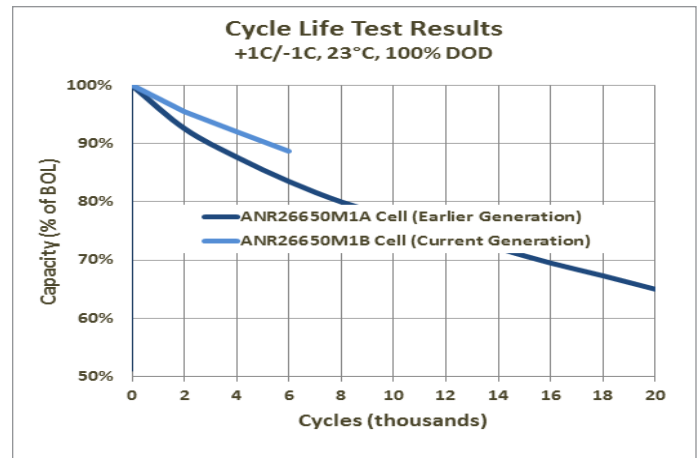
- Monitor voltage on every cell bank and provide independent module voltage measurements
- Measure representative cell temperatures
- Maintain cells in optimum state-of-charge and help prevent overvoltage conditions
- Monitor overvoltage conditions and signal shutdown if detected

BMS FEATURES

The HR Energy Storage Rack's BMS continuously monitors voltage, temperature, and current to initiate protective actions if any unsafe condition is detected. Each BMS has automated independent control of two separate contactors that disconnect and de-energize an individual rack from the external DC bus if needed. These contactors mechanically default open (OFF) if the control link from the contactor to the BMS is lost, or, if power to the BMS is interrupted. The BMS also contains a high voltage rack level fuse to supplement contactor overcurrent protection. The BMS offers communications through a configurable CAN bus interface for integration with a larger system, as well as a separate local serial communications interface for local diagnostics.

RACK-LEVEL FEATURES

- Supports standalone, single rack applications, or scalable multi-rack megawatt (MW) systems
- Built-in rigging/lifting points
- May be installed to Seismic Demand Spectrum (SDS) 1 or 2
- DC Bus Contactor (24V)



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