



Nuvation Energy Battery Stack Emulator

NUVBSE Datasheet

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1. Product Overview

Nuvation Energy Battery Stack Emulator provides the ability to emulate the Nuvation Energy BMS to allow early engineering development on tasks such as:

- Evaluating Battery Management System operation/configuration with a new battery model/chemistry
- Allow third-party integration with the Modbus TCP interface of the Battery Management System
- Evaluate external control management of the Battery Management System
- Evaluating Battery Management System algorithms and control with emulated system clock for real-time and faster than real-time emulation
- Use the Nuvation Energy BMS Operator Interface with the Battery Stack Emulator
- Use the Multi-Stack Controller with the Battery Stack Emulator



Figure 1. Battery Stack Emulator

The Battery Stack Emulator hosts 16 emulator instances providing the following services:

- BMS Emulator: An emulator built from the firmware of the BMS that mimics the high-level application software. Data acquisition is not included and the modelled data of the battery must be entered into the emulator.
 - Emulated BMS port for connecting an Operator Interface. This port can be used to connect the Operator Interface using a web browser.
 - Emulated BMS port for connecting to the Modbus interface of the emulated BMS. Clients can test the BMS Modbus interface using this port.
- CLI: A CLI (Command Line Interface) application to aid in high-level operation to enter emulated data into the BMS Emulator.
- HTTP API: An HTTP interface used by the Nuvation Energy provided Battery Stack Emulator Python library for controlling the emulated BMS
- Modbus TCP: A Modbus TCP interface used to enter emulated data into the BMS Emulator.

To use the Battery Stack Emulator, Nuvation Energy provides:

- CLI SSH user credentials
- Python library that provides the following capabilities

While executing the emulation, an operator can access and view the Operator Interface in their browser to observe the emulation in progress.

2. Operating Limits



Exceeding the maximum ratings will damage the module.

2.1. Electrical Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Power Specifications						
+Vin	Input Voltage	-	11.4	12	12.6	V DC
	Input Current	+Vin = 12 V DC	-	7.5	12.5	A DC
Ethernet Specifications						
ETH RJ45: 1-4	Ethernet Connection Speed	10BASE-T 100BASE-TX 1000BASE-T	10	-	1000	Mb/s
ETH RJ45: 5,7	Ethernet Connection Speed	1GBASE-T 10GBASE-T	1	-	10	Gb/s
ETH Twisted_Pair: 1-4	Ethernet Cable Rating	-	Cat 5e	-	Cat 6	
ETH Twisted_Pair: 5,7	Ethernet Cable Rating	-	Cat 6	-	-	
ETH SFP+: 6,8	SFP+ Port Speed	-	1	-	10	Gb/s
ETH_Connector	Ethernet jack rating	-	-	Cat6	-	

2.2. Environmental Conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Thermal Specifications						
T _a	Operating Temperature	-	5	25	40	°C
	Storage Temperature	-	-40	25	70	°C
Humidity Specifications						
RH	Operational RH	Non-Condensing	8	-	90	%
	Storage RH	Non-Condensing	5	-	95	%
Shock and Vibration Specifications						
Vertical	Vertical Shock/Vibration	-	-	-	10	m/s ²
Longitudinal	Longitudinal Shock/Vibration	-	-	-	10	m/s ²
Transverse	Transverse Shock/Vibration	-	-	-	10	m/s ²
Pulse Vibration	On each axis	-	-	-	245	m/s ²

If the Battery Stack Emulator is stored at temperatures below 5 °C, it must be warmed up in a 20 °C or warmer environment for 45 minutes before applying power. Powering the unit below 5 °C may impact data logging or cause other unexpected behaviour.

2.3. Standards and Certifications

The Battery Stack Emulator has been designed to meet the requirements of SAE J2464 (shock) and SAE J2380 (random vibration).

The following directives and standards apply to the Battery Stack Emulator:

- EMC/EMI: 2014/30/EU (EMC Directive)
- Electromagnetic Compatibility Regulations 2016
- FCC Part 15 Subpart B
- ICES-003
- VCCI 32-1
- AS/NZS CISPR 32
- BS/EN55032
- BS/EN55035
- BS/EN 61000-3-2
- BS/EN 61000-3-3
- BS/EN 61000-4-2
- BS/EN 61000-4-3
- BS/EN 61000-4-4
- BS/EN 61000-4-5
- BS/EN 61000-4-6
- BS/EN 61000-4-8
- BS/EN 61000-4-11
- Green Environment: 2011/65/EU (RoHS Directive)
- EC 1907/2006 (REACH)
- 2012/19/EU (WEEE Directive)
- Product Safety: 2014/35/EU (LVD Directive)
- Electrical Equipment (Safety) Regulations 2016
- UL/CSA 62368-1 (USA and Canada)
- IEC 62368-1

3. Mechanical Installation

3.1. Dimensions and Weight

The overall dimensions of the Battery Stack Emulator are 340 mm × 218.5 mm × 89.8 mm.

The Battery Stack Emulator module weighs approximately 4.5 kg (9.9 lb).

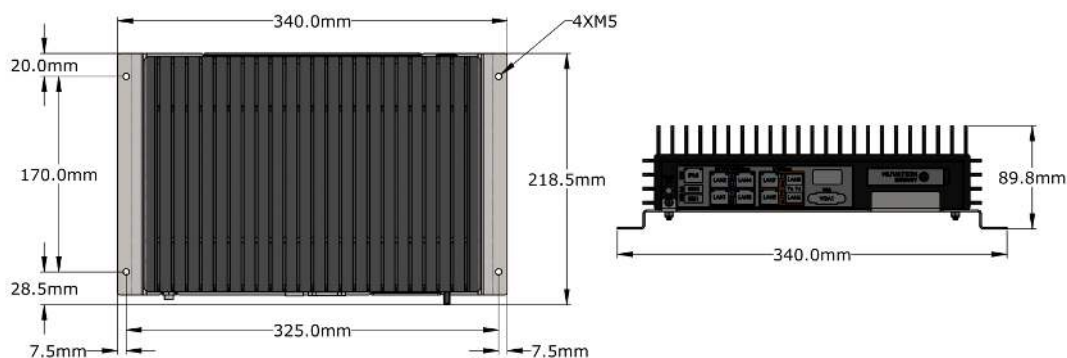


Figure 2. Mechanical Drawing of Battery Stack Emulator

3.2. Installation Location and Position

The Battery Stack Emulator is rated to operate in the temperature range of 5 °C to 40 °C. It is designed for indoor use.

For best thermal performance, the Battery Stack Emulator should be mounted to a flat vertical surface such that the face with the Ethernet / Power connectors is pointing up.

The Battery Stack Emulator can be mounted using four M5 screws.

3.2.1. Mounting Clearances

Extra space should be provided around the module to allow for cable connections, easy installation and maintenance, and to provide adequate fan-less cooling. The spatial clearance is illustrated below.

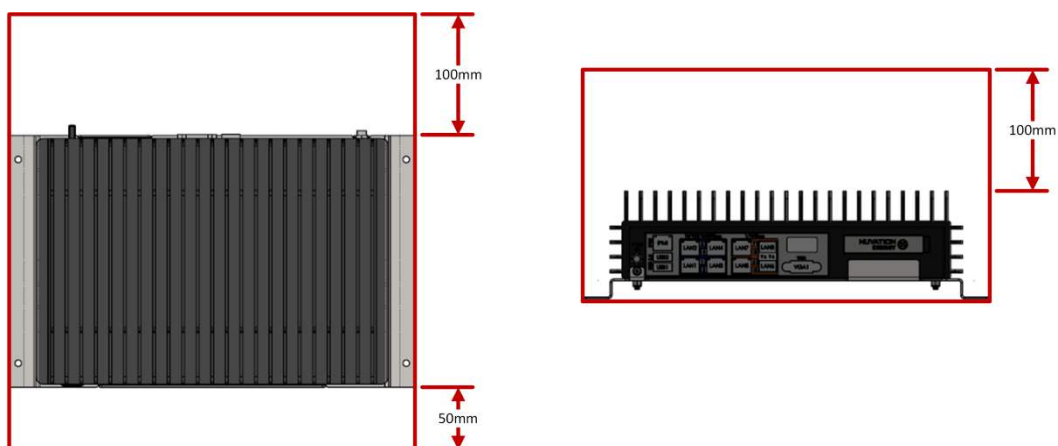


Figure 3. Battery Stack Emulator Restricted Areas

4. Ordering Information

This section provides orderable part numbers for Nuvation Energy’s offerings of Battery Stack Emulator modules and related accessories.

Product Part Number	Product Name
NUVBSE-16S-C	Battery Stack Emulator, Compact, up to 16 stacks

5. Document Revision History

Revision	Date	Details
1.0	2020-12-18	Initial Release
1.1	2020-06-05	Updated input currents
1.2	2026-09-02	Updates for Compact form factor

From time to time Nuvation Energy will make updates to products in response to changes in available technologies, client requests, emerging energy storage standards, and other industry requirements. The product specifications in this document, therefore, are subject to change without notice.

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