



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						
+V _{in}	Input Voltage	-	100	-	240	V AC
	Input Frequency	-	50	-	60	Hz
	Input Current	V _{in} = 120 V AC	-	-	5	A AC
		V _{in} = 240 V AC	-	-	2.5	A AC
Ethernet Specifications						
RJ45 Port 1-9	Connection Speed	10BASE-T 100BASE-TX 1000BASE-T	10	-	1000	Mb/s
	Twisted-pair cable rating	-	Cat 5e	-	Cat 6	
	Ethernet jack rating	-	-	Cat6	-	
RJ45 Port 10-11	Connection Speed	1GBASE-T 10GBASE-T	1	-	10	Gb/s
	Twisted-pair cable rating	-	Cat 6	-	-	
	Ethernet jack rating	-	-	Cat6	-	
SFP+ Port 12-13	SFP+ Port Speed	-	1	-	10	Gb/s



Systems involving more than 10 Ethernet connected ports for equipment will require an external network Ethernet switch to be connected to the nController EMS.

This external switch is not provided. An industrial grade, un-managed switch is recommended.

2.2. Environmental Conditions

Symbol	Parameter	Conditions	Min	Max	Units
Thermal Specifications					
T _a	Operating Temperature	-	5	45	°C
	Storage Temperature	-	-40	70	°C
Humidity Specifications					
RH	Operational Relative Humidity	Non-Condensing	8	90	%
	Storage Relative Humidity	Non-Condensing	5	95	%



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.



The Battery Stack Emulator unit should not be shipped while installed in a rack.

2.3. Regulatory Compliance

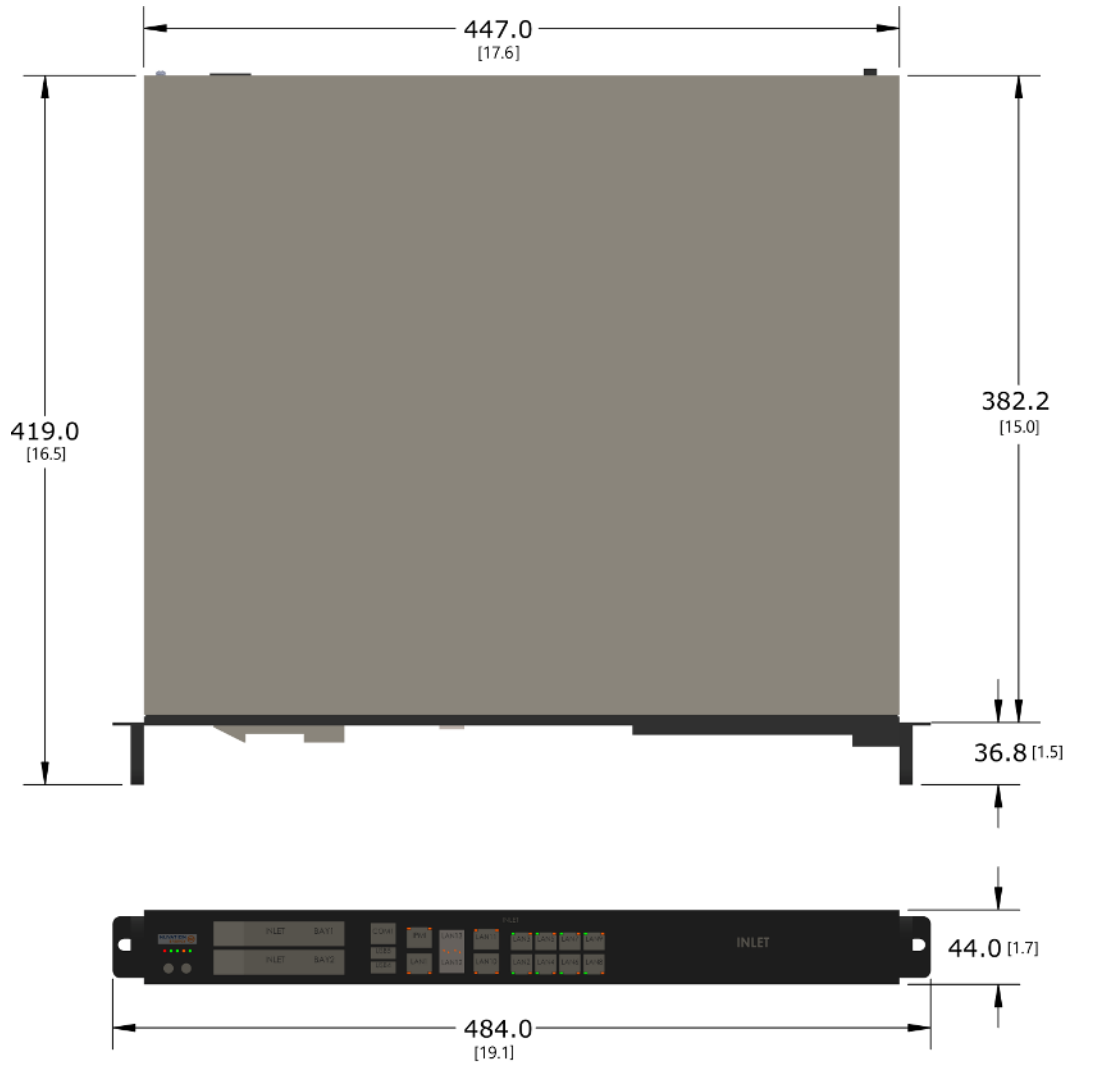
Standard	Name
Electromagnetic Emissions	
FCC Class B	US Federal electromagnetic radiation limits
EN 55032 Class B	European Electromagnetic compliance testing of multimedia equipment
EN 61000-3-2/3-3	European Electromagnetic limits for harmonic current emissions
CISPR 32 Class B	International Electromagnetic compatibility of multimedia equipment
Electromagnetic Immunity	
EN 55024/CISPR 24	European information technology equipment immunity characteristics
Safety	
CSA/EN/IEC/UL 60950-1 Compliant	Information technology equipment safety general requirements
CE Marking	Compliant with European Union (EU) directives and regulations

3. Mechanical Installation

3.1. Dimensions and Weight

The overall dimensions of the Battery Stack Emulator are 484 mm × 419 mm × 44 mm (19.1 in × 16.5 in × 1.7 in). It has a 1 U height and fits in a standard 48 cm (19 in) size server rack.

The Battery Stack Emulator module weighs 6.5 kg (14.3 lb).



All dimensions in mm [in]

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 (41 °F) to 45 °C (113 °F). It is designed for indoor use.

The Battery Stack Emulator should be installed correctly into its supported size rack with no additional space required above or below the unit when mounting.

3.2.1. Mounting Clearances

A clearance of approximately 762 mm (30 in) in the back of the rack is recommended to allow sufficient space for airflow, cable connections, and access when servicing.

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-R	Battery Stack Emulator, Rack-mount, up to 16 stacks

5. Document Revision History

Revision	Date	Details
1.0	2020-12-18	Initial Release

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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