



Nuvera[®] fuel cell systems are fast-fueled power options that replace lead-acid batteries in Class I, II, and III electric lift trucks. The Nuvera[®] fuel cell system is designed and built to provide customer return on investment over the lifecycle of the product. It meets both regulatory and lift truck requirements.



C-Series
for Electric Rider Class I
(Conventional)



N-Series
for Narrow Aisle
Class II



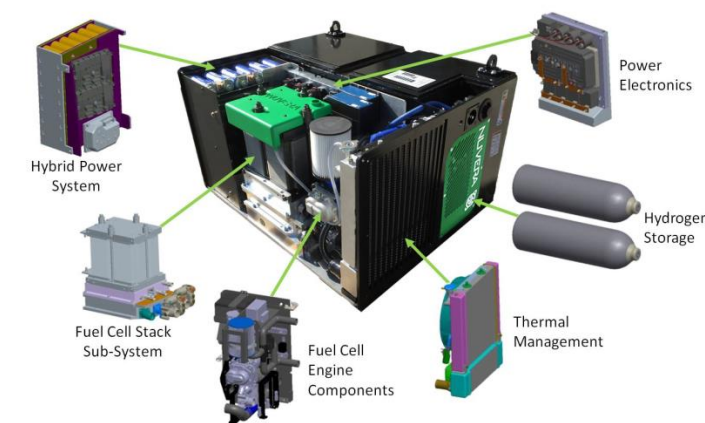
M-Series
for Motorized Hand Trucks
Class III

PRODUCT LINE

Nuvera[®] fuel cell power systems for use in Class I, Class II, and Class III electric lift trucks.

Product Overview

Nuvera[®] fuel cell systems feature core component design, functional battery-box replacement design, and truck design know-how to meet the demands of multi-shift materials handling applications including heavy manufacturing, food processing, warehousing and distribution.



CORE COMPONENT DESIGN

The Nuvera[®] system is developed around our eighth-generation fuel cell stack designed by Nuvera specifically for motive power.

FUEL CELL SYSTEM DESIGN FOR BATTERY BOX REPLACEMENT

The Nuvera[®] system is engineered to meet lift truck power, weight and performance requirements.

TRUCK DESIGN KNOW-HOW

Built and tested by professionals who understand the demands of materials handling service.



Specifications to Meet Lift Truck Requirements

Requirement	Nuvera® Fuel Cell System Specification/Capability
External Dimensions	Designed to fit into existing truck battery compartments, per respective nominal product dimensions: Model C95A-33 (48V): 38.6 x 32.2 x 22.6 in. Model N95A-21 (36V): 38.6 x 20.4 x 30.9 in. Model M55A-13 (24V): 30.9 x 13.0 x 31.1 in.
Weight	Model C95A-33: 3457 lb. Model N95A-21: 3197 lb. Model M55A-13: 500 lb.
Handling	Compatible with existing lead-acid battery removal equipment (incl. vertical & side extraction equipment).
Power Connection	Type, size and connector compatible with existing truck connectors.
Fueling	Non-communication fueling is possible with dispensers that are compliant with SAE 2601-3, <i>Fueling Protocol for Gaseous Hydrogen Powered Industrial Trucks</i> and have been validated with the Nuvera® fuel cell system to ensure delivered fueling rate profile does not result in fuel tank temperatures exceeding manufacturer's specifications.
De-Watering	Nuvera® fuel cell systems that require dewatering are compatible with industry standard dewatering systems. The system user interface indicates when dewatering is required. Dewatering and refueling may be done concurrently. Dewatering takes approximately two minutes using Nuvera recommended products/procedures.
Vibration	Designed to endure vibration requirements within typical lift truck operating environments.
Regulatory	Designed for sale in North America, the Nuvera® fuel cell system design is premised upon UL 2267, the industry standard for fuel cell power systems installed in industrial electric trucks, as well as hydrogen codes and standards from organizations such as the International Electrochemical Commission (IEC), National Fire Protection Association (NFPA), Canadian Standards Organization (CSA), and the International Organization for Standardization (ISO). The system is not currently UL certified.
Environmental Ingress	Designed to meet the requirements of IP31.
Durability	The system is intended to have an operational life of 20,000 hours with a single stack rebuild during that time.
Maintenance & Serviceability	Design allows for easier access for regular maintenance on components such as lubrication ports (for pumps & compressors), oil and air filters etc. Full service available through Nuvera-certified personnel.
Personnel Ingress	The system is designed with covers in place to help prevent operator and service personnel from contact with potential hazards including but not limited to thermal, electric shock, chemical contact, mechanical moving and stationary parts.
Equipment Protection	The system will not proceed to startup if the system detects a hazardous fault.
Manufacturing Quality Control	Nuvera® fuel cell systems are manufactured in Nuvera's ISO 9001:2008 facility in Billerica, Mass. Each subassembly and fully assembled system, go through rigorous quality control processes including a factory acceptance test in accordance with UL 2267.
Storage	The fuel cell system may be stored in the 'off' condition for up to 6 weeks without special maintenance. After storage in excess of 6 weeks, the system may require a minor service procedure to re-start, using standard tools.



Telemetry

The Nuvera® fuel cell system utilizes optional Hyster-Yale telemetry systems (ordered separately) to wirelessly transmit data:

1	Number of fuel cell operating hours
2	Hydrogen consumed
3	Fuel cell operation time between fills
4	Number of refueling events
5	Fault codes

User Interfaces

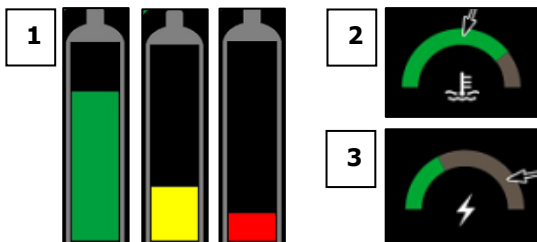
Nuvera® fuel cell systems are controlled through an operator interface, the HMI. The HMI features an LCD to show system status.



HUMAN-MACHINE INTERFACE (HMI)

The HMI mounts on the lift truck near the driver in the operator compartment. Functions include:

1. System Status LCD
2. Start button
3. Stop button



The LCD screen provides system status indications:

1. Hydrogen level meter (green, yellow, and red levels) indicate “full,” “time to refuel,” and “warning refuel” indications, respectively
2. Temperature indicator
3. State-of-charge indicator

<https://www.nuvera.com/>