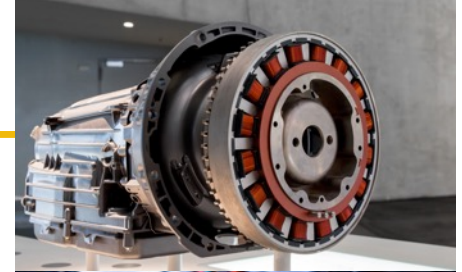




# Transportation Electrification Test Solutions

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NH Research (NHR)  
*Enabling Electrification*



# Enabling Electrification

*NHR enables electrification by accelerating innovation, validation & functional test of today's & tomorrow's technologies*

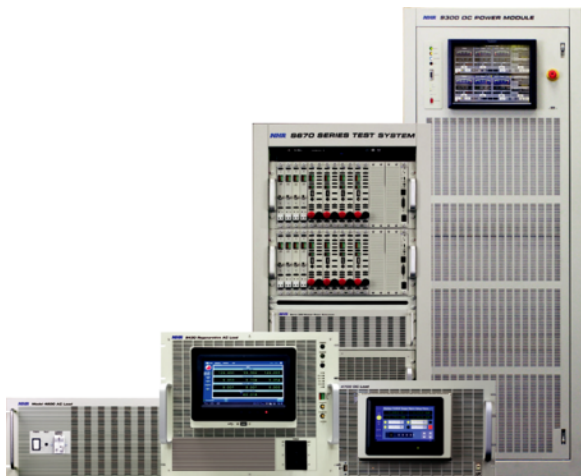
## Backed by over 50 years of experience

- ✓ Best in class performance
- ✓ Ease of use
- ✓ Modular & scalable solutions
- ✓ Reduced testing time
- ✓ Improved safety
- ✓ Energy savings



# World-Class Test Solutions

**Flexible, Modular Hardware  
AND Software**



## Product Portfolio

- ✓ Battery/Fuel Cell Test Systems
- ✓ Bi-directional DC Source
- ✓ Grid Simulators
- ✓ AC & DC Electronic Loads
- ✓ AC & DC Power Sources
- ✓ Power Supply Test Systems

*...Your Partner in Test*

# E-Mobility Test Solutions



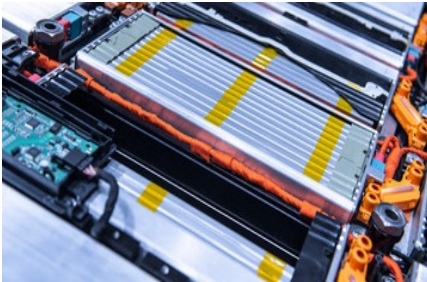
Electric Vehicles



School Buses, Public Transportation



Fast Charging



Batteries , Fuel Cells, Powertrain



Heavy Duty Commercial Trucks



E-Motorcycle, E-Bikes

*...and more!*



High Voltage  
Battery

DC/DC  
Converter

1

3

2

4

5

Onboard  
Charger & EVSE

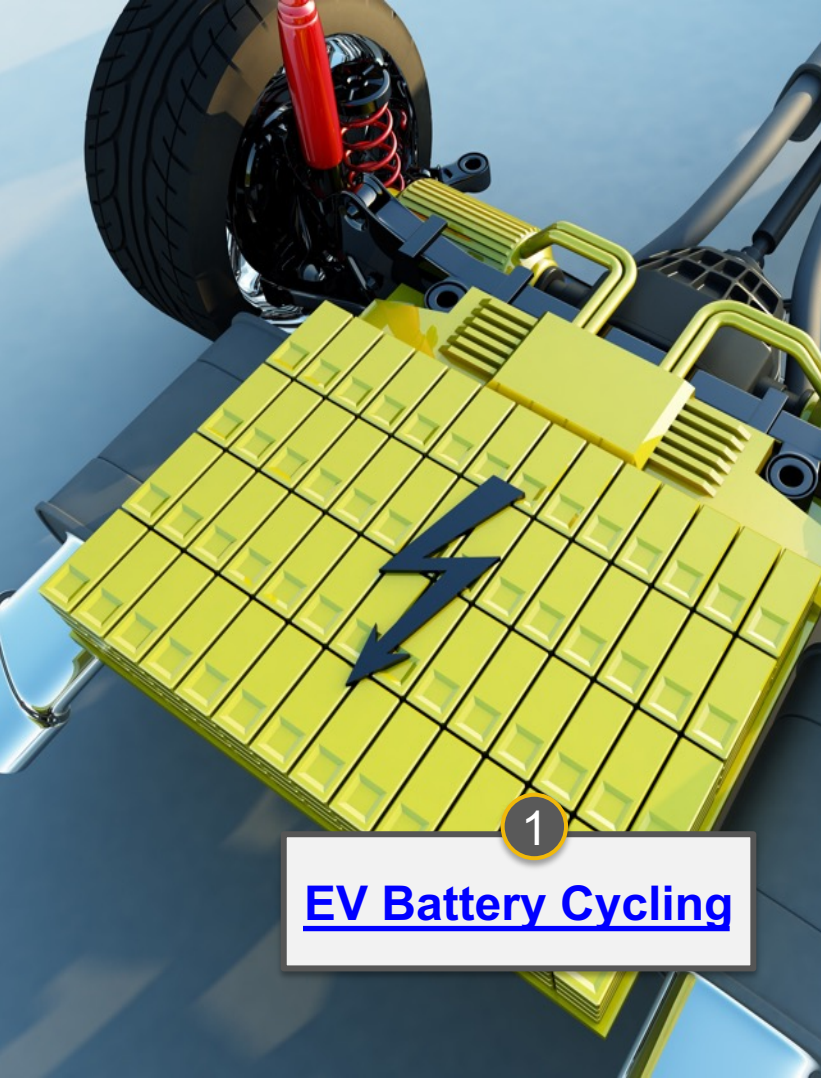
12V Battery

EV Drive Train

*EV Hybrid Vehicle*

**EV Testing Solutions**

# High or Low Voltage

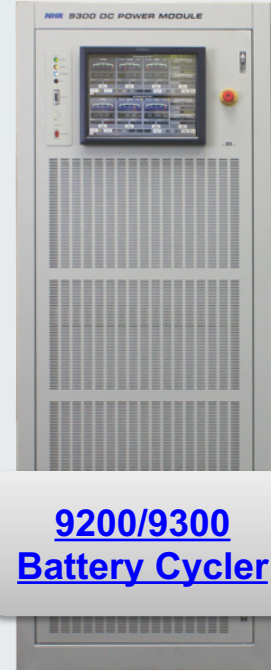
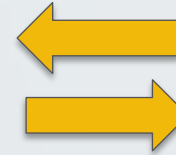


1

EV Battery Cycling



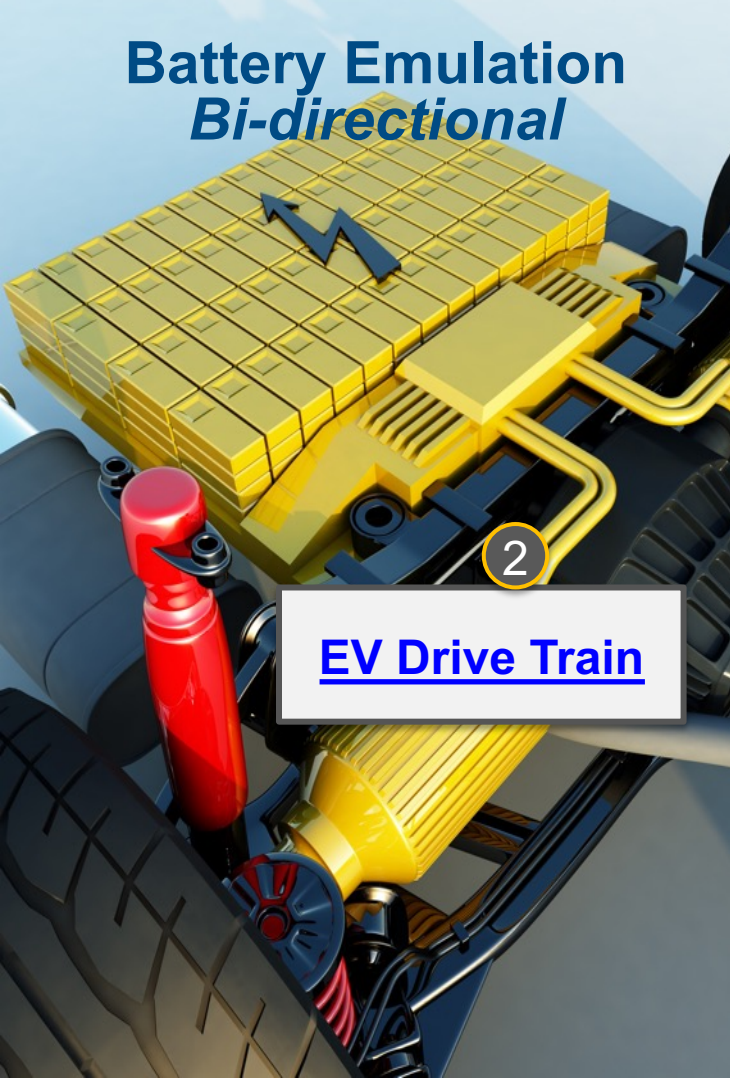
High Voltage  
Battery Pack



9200/9300  
Battery Cycler



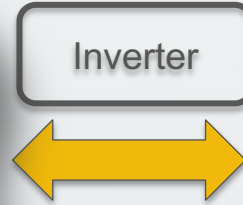
# Battery Emulation *Bi-directional*



EV Drive Train



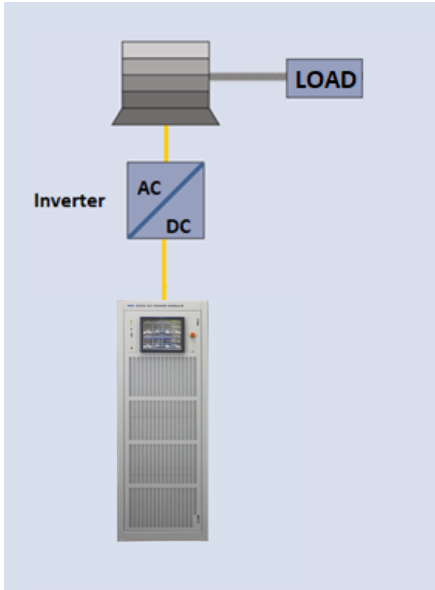
Motor



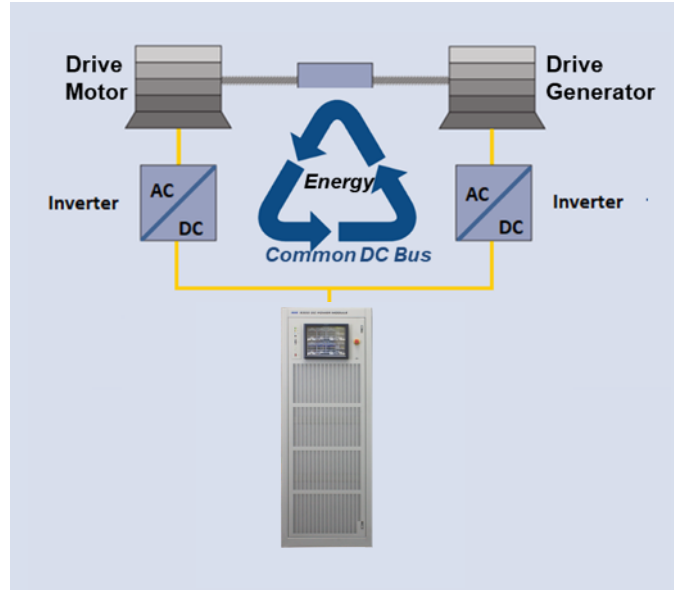
Inverter

9200/9300  
Battery  
Emulator

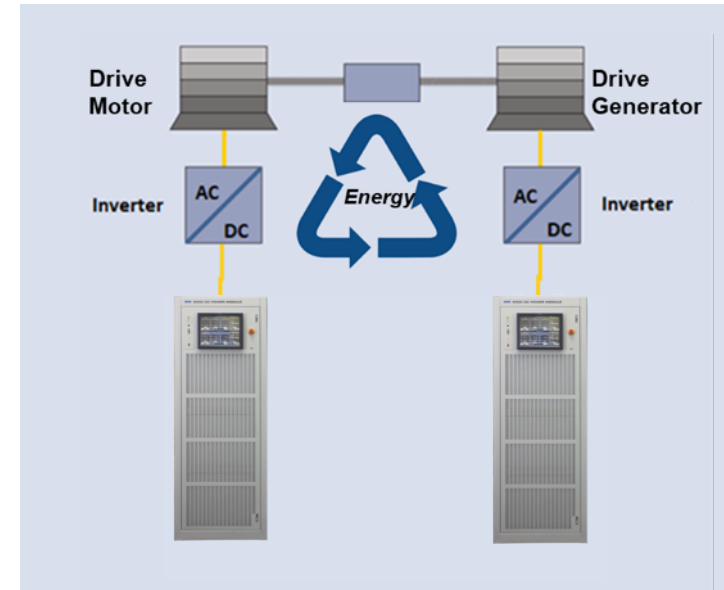
# Powertrain Test Approaches



Single-ended DC Bus



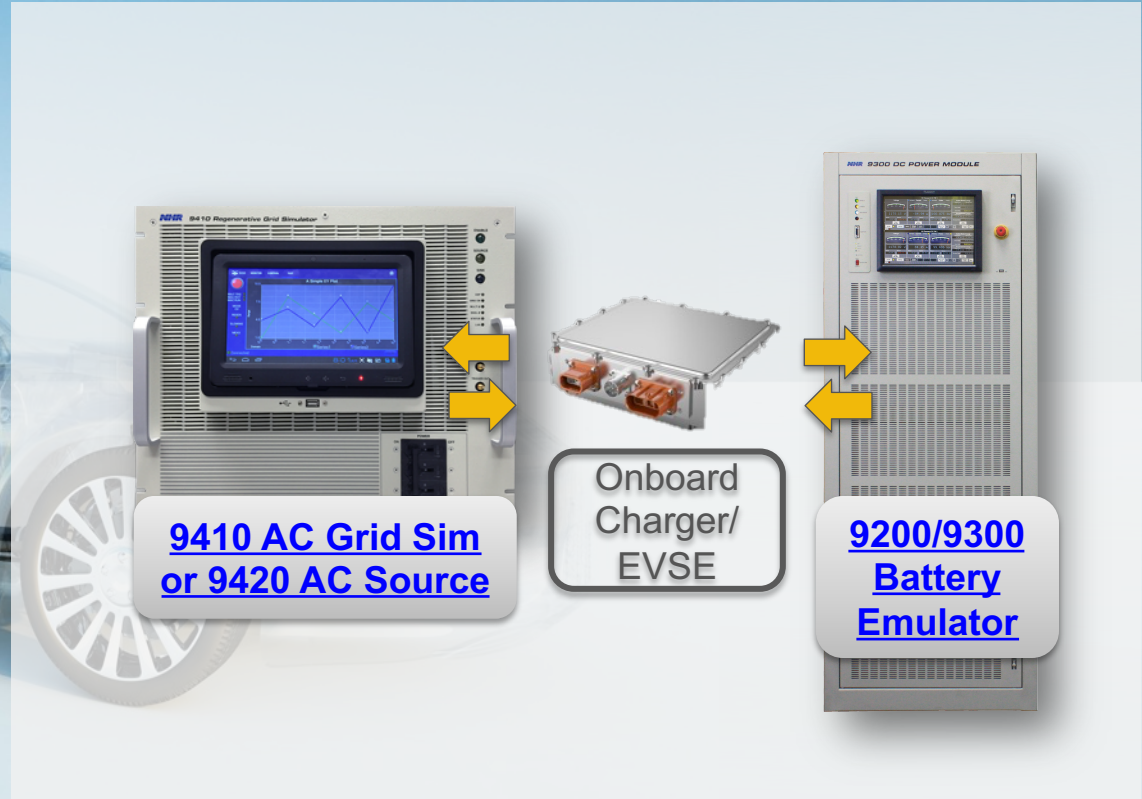
Common DC Bus



Isolated DC Bus

**The NHR Approach** accepts back EMF and prevents safety hazards. Isolated input and output paths eliminates single points of failure.





DC/DC  
Converter

4

9200/9300  
DC Load

9200/9300  
Battery  
Emulator

Emulate Batteries &  
DC Busses (PV)

Bi-Directional  
DC/DC  
Converter

4

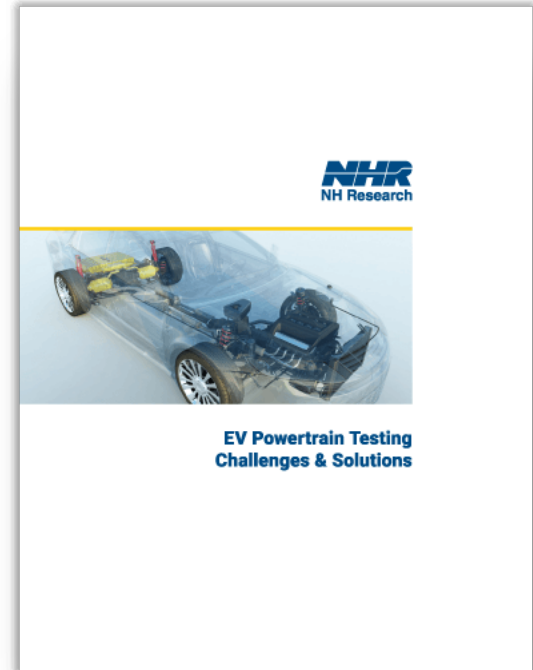
9200/9300  
Regen DC  
Load

9200/9300  
Battery  
Emulator

Emulate Batteries &  
DC Busses (PV)

# Access Resource Library

- [Download Application Notes](#)
  - [The Fundamentals of Battery Test](#)
  - [Electric Powertrain Testing Challenges & Solutions](#)
  - [Battery Emulation: Testing without Batteries](#)
- [On-Demand Webinars](#)
- [Schedule a Consultation](#)
- [Electric Vehicles Webpage](#)
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***...Your Partner in Test***