

9210 Series Single Channel Test System

Automated Characterization, Power Cycling & Life-Cycle Testing of
Battery Modules & Packs

NHR
NH Research

Key Features

- Small footprint permits easy movement within a lab
- Custom waveform/profile generation
- Sub-mS voltage, current, & mode transition times
- Built-in controller with pre-installed charging & control software
- Provides one (1) bi-directional channel at 40V, 120V or 600V
- Parallels with 9200 Series or 9210 Series test systems
- 87% efficiency returning discharge power to the facility
- Multiple safety layers to protect device under test
- Battery emulation & burn-in applications

Full Feature Tester in a Small Footprint

The 9210 Series test system is a single channel version of the popular 9200 family of test systems. The small footprint makes it easy to move within engineering or manufacturing environment thereby allowing it to be brought to the unit under test (UUT) or into an engineers workspace.

The 9210 Series test system can be configured with any of the same bi-directional modules that are available in the 9200. These modules are designed for testing or emulating any energy storage technology including: lead-acid, NiMH & Li-Ion. Each module is independent and may be paralleled with other modules that are installed in 9200 Series or 9210 Series test systems.

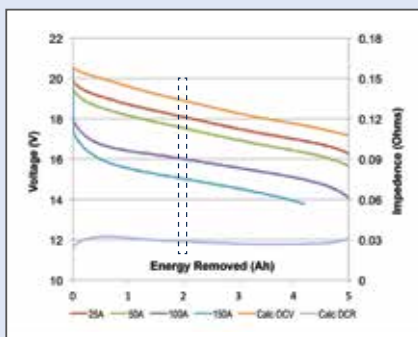
Drive Cycles & Battery Emulation

Drive cycles including FUDS, DST, EUDC/NEDC, and similar table-lookup based profiles are easy to implement using NHR's Enerchron® software or using fully documented software drivers integrated into a customer's system.

Emulating any battery chemistry at any state of charge is simplified to two settings: the open circuit voltage (OCV) and series resistance (DCR) (Fig. 1). Dynamic response to current changes at this state of charge are handled at hardware regulation speeds while allowing the slower charge & discharge curve characteristics to use a simplified lookup table.



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@ 40% DOD
OCV=19V, DCR=30mΩ



Figure 1 - Two settings emulate any battery at any state of charge.

Flexible Control Options

Each 9210 system is supplied with an internal controller pre-configured with PowerPanel software (Fig. 2) and an installation CD that contains: a second PC-Based version of PowerPanel, fully documented drivers including samples and tutorials (Fig. 3), and a complete LabVIEW VI Library (Fig. 4). NH Research offers Enerchron® Test Management Software (Fig. 5) as a separate software package which designed to simplify test creation, execution, data collection and analysis of test sequences such as drive cycles or those tests which require additional test equipment such as chambers or data acquisition.



Figure 2 - PowerPanel Software



Figure 4 - Complete LabVIEW VI Library



Figure 3 - Documented Drivers



Figure 5 - Enerchron® Test Management Software

Model 9210 Individual Power Module Specifications

	Model 9210-4904			Model 9210-4912			Model 9210-4960		
Programming Capability	Operating States Charge (Source), Discharge (Load), Standby, Battery								
Charge/Discharge Modes	Constant-Voltage(CV), Current (CC), Power (CP), Resistance (CR)								
Charging Envelope	0 - 40 V, 8 kW, 600 A			0-120 V, 8 kW, 200 A			0-600 V, 8 kW, 40 A		
Discharging Envelope	1 - 40 V, 12 kW, 600 A			4-120 V, 12 kW, 200 A			10-600 V, 12 kW, 40 A		
Programming	Range	Accuracy ¹	Resolution ¹	Range	Accuracy ¹	Resolution ¹	Range	Accuracy ¹	Resolution ¹
Voltage	0-40 V	0.1% + 0.1%	0.005%	0-120 V	0.1% + 0.1%	0.005%	0-600 V	0.1% + 0.1%	0.005%
Current	±600 A	0.2% + 0.2%	0.005%	±200 A	0.2% + 0.2%	0.005%	±40 A	0.2% + 0.2%	0.005%
Power	±8/-12 kW	0.4% + 0.4%	0.005%	±8/-12 kW	0.4% + 0.4%	0.005%	±8/-12 kW	0.4% + 0.4%	0.005%
Resistance	0 - 34 Ω	2%	0.005%	0 - 100 Ω	2%	0.005%	0 - 500 Ω	2%	0.005%
Slew Rate									
Voltage	0.011 V/s – 80 V/ms			0.033 V/s – 240 V/ms			0.165 V/s – 600 V/ms		
Current	0.17 A/s – 3000 A/ms			0.055 A/s – 1000 A/ms			0.011 A/s – 40 A/ms		
Resistance	0.01 Ω/s – 34 Ω/ms			0.028 Ω/s – 100 Ω/m			0.14 Ω/s – 500 Ω/ms		
Power	2 W/s – 8 kW/s			2 W/s – 8 kW/s			2 W/s – 8 kW/s		
Test Measurement (4-Wire)	Range	Accuracy ¹	Resolution ¹	Range	Accuracy ¹	Resolution ¹	Range	Accuracy ¹	Resolution ¹
Voltage, DC Average	0 - 40 V	0.05% + 0.05%	0.005%	0 - 120 V	0.05% + 0.05%	0.005%	0 - 600 V	0.05% + 0.05%	0.005%
Current, DC Average, Amp-Hr	0 - 600 A	0.1% + 0.1%	0.005%	0 - 200 A	0.1% + 0.1%	0.005%	0 - 40 A	0.1% + 0.1%	0.005%
Power, Ah, kWh	± 12 kW	0.2% + 0.2%	0.005%	± 12 kW	0.2% + 0.2%	0.005%	± 12 kW	0.3% + 0.2%	0.005%
Time	1ms - 1 Yr	0.1%	0.005%	1ms - 1 Yr	0.1%	0.005%	1ms - 1 Yr	0.1%	0.005%
Physical									
Test Channel Connectors	Buss Bars			Anderson EBC A32			Anderson SBS75X		
Cabinet ² Dim. (HxWxD)	43.5 x 28 x 31"/1105 x 711 x 787mm (including casters)								
Cabinet Weight	500lbs/227kg								
Operating Temperature	0 - 35°C full power								
Input Power ² per Module	3 Ø, 50 - 60 Hz, 200 VAC/30 A, 208 VAC/29 A, 220 VAC/28 A, 380 VAC/21 A or 480 VAC/17 A								

¹ All Accuracies are % of Set + % of Range, All Resolutions are % of Range unless otherwise indicated, ² Input Voltage set at placement of order