

9210 Series Single Channel Test System



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

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.



9210 Single Channel Test System

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.

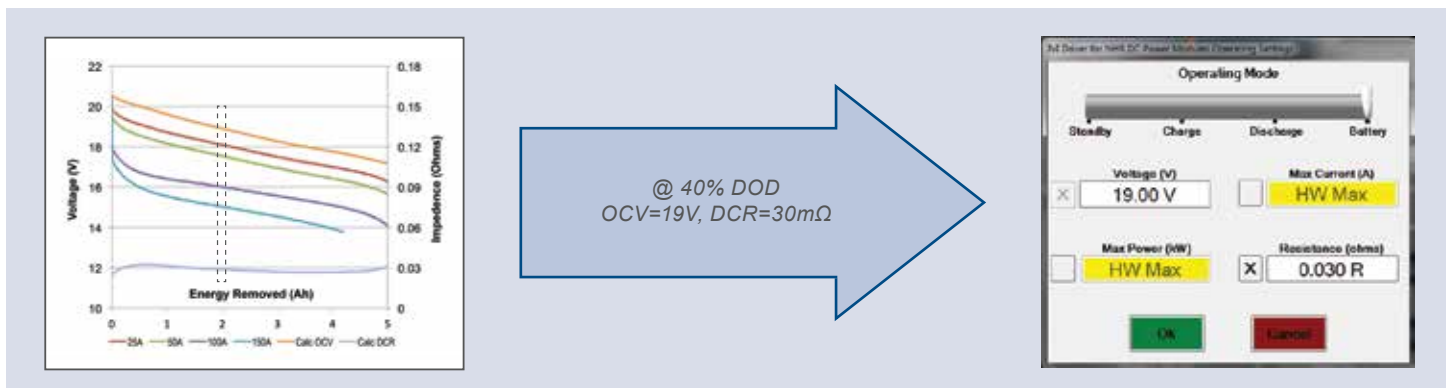


Figure 1 - Two settings emulate any battery at any state of charge.

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 Number | 9210-4904 | | | 9210-4912 | | | 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 7/1105 x 711 x 787mm (including casters) | | | | | | | | |
| Cabinet Weight | 500lbs/227kg | | | | | | | | |
| Operating Temperature | 0 - 35°C full power | | | | | | | | |
| Input Power ² per Module | 3 ∅, 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