9220 Series
Low Voltage/High Current Cycler

Automated Characterization, Power Cycling, & Life-Cycle Testing of Low Voltage/High Current Batteries

Key Features

- Single output up to 40V/3,600A/72kW per system
- Parallel expansion up to 7,200A
- Built-in digital measurements including Ah & kWh
- Multiple safety layers to protect battery/DUT
- SCPI, VXI-11, & LabVIEW control via LAN interface
- NI-Compliant LabVIEW Drivers
- 87% efficiency returning discharge power to facility
- Crane/hoist lifting hangers & robust casters

High Current Battery Testing

The 9220 Dual Bay Series Test System is designed for testing all battery chemistries including lead-acid, lead-cadmium, and other low voltage, high current, large format batteries (LFB) typically used in energy storage systems (ESS). The system is bi-directional requiring no additional equipment to charge or discharge the unit-under-test (UUT). Additionally, the built-in measurement system eliminates external measurement devices by providing time-stamped digital readings for voltage, current, power as well as Ah and kWh.

***9220 Dual Bay Test System** front panel view*

Recycle Discharge Power Back to the Facility

Unlike typical high-current systems which convert battery discharge power into waste heat, the 9220 Dual Bay converts up to 87% of the battery discharge power into usable electrical power that precisely matches the facility's AC line. This process, called regeneration, results in lower operating costs, reduces air-conditioning usage, eliminates expensive water cooling systems, and often provides enough savings to payback the entire system within a few years.

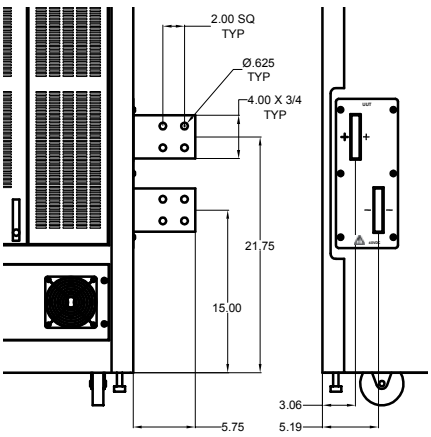

***Figure 1** - Caster & output connections*

System Cabinet Features for Easy Installation

The 9220 Dual Bay has been designed with vertical lifting hangers at each corner allowing the entire system to be lifted using a 4-point hoist or crane. Each hanger has been designed to safely support up to 3000 lbs. when the system is lifted with ½" grade 8 bolts.

The system has been equipped with robust casters (Fig.1) permitting easy movement for final placement within or reconfiguration of the laboratory.

Output connections are solid 4"x ¾" (102mm x 19mm) buss bars which have been staggered to minimize the risk of accidental shorting. Each buss bar provides four 5/8" (15.88mm) mounting holes on 2" (50.8mm) centers allowing for easy connection of additional buss bars or heavy duty power cables.

9220 Series Dual Bay Specifications

MODEL NUMBER	9220-4904-48			9220-4904-60			9220-4904-72		
Programming Capability									
Operating States	Charge (Source), Discharge (Load), Standby, Battery Emulation								
Charge/Discharge Modes	Constant-Voltage(CV), Current (CC), Power (CP), Series Resistance (CR)								
Charging Envelope	0-40V, 32kW, 2400A			0-40V, 40kW, 3000A			0-40V, 48kW, 3600A		
Discharging Envelope	1-40V, 48kW, 2400A			1-40V, 60kW, 3000A			1-40V, 72kW, 3000A		
Slew Rate									
Voltage	0.012V/s – 80V/ms			0.012V/s – 80V/ms			0.012V/s – 80V/ms		
Current	0.68A/s – 12kA/ms			0.85A/s – 15kA/ms			1.02A/s – 18kA/ms		
Power	8W/s – 32kW/ms			10W/s – 40kW/ms			12W/s – 48kW/ms		
Resistance	2.5mΩ/s – 8.4Ω/ms			2.0mΩ/s – 6.7Ω/ms			1.7mΩ/s – 5.6Ω/ms		
Current Change Time	Less than 10mS								
Paralleling	Up to two (2) systems with synchronous set & measurement control								
Macro Test Profiles									
Development Source	LabVIEW or PowerPanel								
Maximum Steps	1000								
Minimum Time Delay	50uS								
Maximum Step Delay	1mS - 7 Days								
Programming	Range	Accuracy[1]	Res.[2]	Range	Accuracy[1]	Res.[2]	Range	Accuracy[1]	Res.[2]
Voltage	0-40V	0.1% + 0.1%	0.005%	0-40V	0.1% + 0.1%	0.005%	0-40V	0.1% + 0.1%	0.005%
Current	±2400A	0.2% + 0.2%	0.005%	±3000A	0.2% + 0.2%	0.005%	±3600A	0.2% + 0.2%	0.005%
Power (Charge)	32kW	0.3% + 0.3%	0.005%	40kW	0.3% + 0.3%	0.005%	48kW	0.3% + 0.3%	0.005%
Power (Discharge)	48kW	0.3% + 0.3%	0.005%	60kW	0.3% + 0.3%	0.005%	72kW	0.3% + 0.3%	0.005%
Resistance	0-8.4Ω	2%	0.005%	0-6.7Ω	2%	0.005%	0-5.6 Ω	2%	0.005%
Measurement (4-Wire)	Range	Accuracy[3]	Res.[2]	Range	Accuracy[3]	Res.[2]	Range	Accuracy[3]	Res.[2]
Voltage,	0-40V	0.05% + 0.05%	0.005%	0-40V	0.05% + 0.05%	0.005%	0-40V	0.05% + 0.05%	0.005%
Current	±2400A	0.1% + 0.1%	0.005%	±3000A	0.1% + 0.1%	0.005%	±3600A	0.1% + 0.1%	0.005%
Power	±48kW	0.12% + 0.12%	0.005%	±60kW	0.12% + 0.12%	0.005%	±72kW	0.12% + 0.12%	0.005%
Time	1mS - 1Yr	0.1%		1mS - 1Yr	0.1%		1mS - 1Yr	0.1%	
Control									
Communications	LAN (Ethernet)								
Drivers	SCPI, VXI-11, LabVIEW (Non-OS Specific)								
Software Tools	Windows based applications including Power Panel, Firmware Update & Calibration								
Safety									
Isolation AC Input	1000V AC Input to DC Output/1000V AC Input to chassis								
Isolation UUT Input	600V UUT to chassis								
Programmable Limits	Over-Voltage (OV), Under-Voltage (UV), Over-Power (OP), Internal Over Temperature								
Interlocks	External user input, emergency stop, and rear service doors								
Watchdog Timer	Continuously monitors control communications								
Physical									
Operating Temperature	0-35°C full power								
Output Connections	Buss Bars								
Cabinet Dimensions (HxWxD)	83.25 x 56.56 x 34.5”/2115 x 1436 x 876mm including lift tabs and casters								
Facility Input	3ϕ, 50-60Hz 380VAC, 400VAC, 480VAC (input voltage to be specified at time of order)								
Input Power									
3ϕ 380VAC	64 A			80 A			96 A		
3ϕ 400VAC	62 A			77 A			92 A		
3ϕ 480VAC	51 A			64 A			76 A		
Cabinet Weight	2150lbs/975kg			2450lbs/1111kg			2750lbs/1247kg		
Calibration	Semi-Automatic, closed cover with standard lab equipment								

[1] Accuracies are % of Set + % of Range,
[2] Resolutions are % of Range unless otherwise indicated
[3] Measurement Accuracies are % of Reading + % of Range

ORDERING INFORMATION	SERIES	VOLTAGE (40V)	POWER LEVEL (KW)
Model Number Construction	9220	-4904	-48

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