What Is the Mid-Voltage DC Battery Module Cycler and Emulator?

NI's Mid-Voltage DC Battery Module Cycler and Emulator stands out as a compact and adaptable solution for battery cycling and emulation. Its feature set encompasses regenerative, scalable power capabilities, catering to the evolving demands of battery testing.

Contact us

Mid Voltage DC Cycler and Emulator System Benefits

Save Resources

Boasting more than 90 percent power recovery, the system results in significant electrical cost savings and rapid response times.

Expand Range as Needed

You can test power ranges from 12 kW modules up to 252 kW with 40 or 120 V bidirectional DC loads.

Scale Test and Simulation

The system offers a full-function tester per channel with minimal output capacitance to ensure precise battery simulation, and you can include up to three modules per system.

Emulate and Simulate Safely and Precisely

The system offers accurate emulation of real-world conditions, including sub-millisecond transitions, over/undercharged battery simulation, BMS, and failures.

Technical Regenerative Battery Cycler and Emulator System Highlights

NHR-4800

Compact Battery Cycler

- Delivers up to 80 VDC and 400 A in a single unit
- Scalable power from 16.5 kW up to 165 kW
- Regenerative power >90 percent (typical)
- Fast transient speeds: slew rate <1.5 ms
- Modes: charge/discharge, load, and battery emulation
- Power hardware in the loop (PHIL) capability
- Fully integrated battery cycler

Download datasheet

NHR-9200

Battery Emulator

- Delivers 40 V or 120 V bidirectional DC load
- Power ranges from 12 kW modules up to 252 kW
- Regenerative power provides high energy efficiency
- Current, voltage, and mode transitions <1 ms
- Built-in digital measurements with charting and scope displays
- Low output capacitance for accurate battery simulation
- Battery emulation available

Download datasheet

Let's Talk About Your Battery Emulator and Cycler Needs

Contact us now and we'll have a conversation about meeting your specific regenerative battery emulator and cycler requirements.

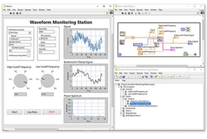
Contact us

Simplify Testing with Enerchron™ Software and LabVIEW

Enerchron Software

Enerohron is a powerful yet easy-to-use test executive created for battery testing to simplify and accelerate your test automation. A comprehensive battery test environment that includes integration with hardware and software tools, Enerohron is your shortest path to market.

Learn more



LabVIEW

LabVIEW is a graphical programming environment engineers use to develop automated research, validation, and production test systems.

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Featured Content

How to Select a Battery Cycler

NI's high-performance battery cyclers cover a range of capabilities that address test requirements across the battery lifecycle from R&D, validation, production, end of life, and remanufacturing. Let's evaluate some real-world use cases and how to choose.

Battery Recycling and Second-Life Test

As the electric vehicle (EV) and energy storage industries expand, it's time to think about how we manage battery packs as they approach end-of-life (EOL).

Approaches for EV Charger Testing

Chargers manage voltage and current to refill or recharge a battery according to the manufacturer's specifications. Let's discuss the different ways to test each type of charger.

Related Product

High-Voltage DC Cycler and Emulator

Offers modular, regenerative battery pack test systems capabilities with a power range spanning from 100 kW to 2.4 MW.

Learn more

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What Is the High-Voltage DC Battery Pack Cycler and Emulator?

The NI High-Voltage DC Battery Pack Cycler and Emulator is used as a battery cycler, regenerative, bidirectional DC source, regenerative DC load, high-power DC source, and/or battery DC emulator.

Contact us

High Voltage DC Cycler and Emulator System Benefits

Save Energy

Regenerative capability with more than 90 percent power recovery leads to significant electrical cost savings.

Scale as Needed

The modular design allows easy field expansion up to 2.4 MW and 8,000 A, ensuring adaptability as testing needs grow.

Test with Versatile Ranges

Dual voltage ranges (1,200 V/167 A and 600 V/333 A at 100 kW) cater to a wide range of testing requirements and fast voltage, current, and mode transition times.

Simulate Realistically

The system safely emulates real-world conditions, including fast transitions, over/undercharged batteries, BMS failures, and more, while standardization lowers the cost of service across applications.

Technical High-Voltage Battery Test System Highlights

NHR-9300

- Right-sized 100 kW modules scalable to 2.4 MW/8,000 A
- Wide operating envelope, dual range 600 V, 1200 V
- Regenerative power >90 percent energy efficiency
- Bidirectional DC source and load
- Current, voltage, and mode transitions <2 ms
- Battery emulation mode
- Built-in digital measurements with charting and scope displays

Download datasheet

ERS-BIC

- Right-sized 600kW modules scalable to 2.4MW
- Up to 180% overload capacity with fast recovery times
- Wide operating envelope 0 V to 1,500 V
- High dynamic DC source and load with energy recovery
- Optimized operation modes for 400 V/800 V class
- Output floated and short-circuit proof
- Voltage, current, or output control
- Water-cooling system for lower operating noise and low heat transmissions

Download datasheet

HPS-17000

- Right-sized 150kW modules scalable to 1.5 MW
- Wide operating envelope 400 V to 1,500 V
- Parallel cycler operation without physical proximity
- AC and DC overcurrent protection
- EMI filter
- Grid interface
- Modular design and swappable power bricks

Download datasheet

Let's Talk about Your Regenerative High-Voltage Battery Test Systems Needs

Contact us now and we'll have a conversation about meeting your specific regenerative high-voltage battery test systems requirements.

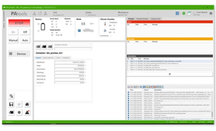
Contact us

Simplify and Accelerate Testing with Powerful Software

PAtools™ Software

PAtools is a software solution for test station automation in the automotive industry. PAtools streamlines and automates testing processes and provides essential tools to improve test procedures and increase reliability and efficiency.

Learn more



Enerchron™ Software

Enerchron is a powerful yet easy-to-use test executive created for battery testing to simplify and accelerate your test automation. A comprehensive battery test environment that includes integration with hardware and software tools, Enerchron is your shortest path to market.

Learn more

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Battery Recycling and Second-Life Test

As the electric vehicle (EV) and energy storage industries expand, it's time to think about how we manage battery packs as they approach end-of-life (EOL).

Advancing eVTOL Test Capabilities

NI and ENA, an NI partner, collaborated to help Lilium develop a modular and extendable testing environment for their eVTOL aircraft.

Related Product

Mid-Voltage DC Cycler and Emulator

Serves as a multifunction solution for battery cycling and emulation for low- to medium-power applications in research, validation, and production labs.

Learn more

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What Is the Regenerative Grid Simulator System?

The NI Regenerative Grid Simulator System offers ultimate flexibility for testing high-power grid-tied applications, with programmable frequency, power scalability up to 300 kW, and versatile AC/DC output options. It returns greater than 85 percent of power to the facility.

Contact us

Regenerative Grid Simulator Benefits

Scale for Future Demands

Available from 100 kW modules up to 300 kW for future increased power demands. The same unit can act as the controller or parallel auxiliary unit.

Emulate any Conditions

True power operating envelope covers the broadest selection of grid-tied products with a single product. Fully emulate any utility/grid condition.

Measure with Accuracy

High-accuracy current measurement increases performance and optimizes testing with built-in galvanic isolation eliminates the need for an external transformer and simplifies test setup.

Leverage Load Options

Maximize your investment with dual functionality as a regenerative grid simulator or four-quadrant AC load.

Regenerative Grid Simulator Highlights

NHR-9410

- Options range from 12 kW to 96 kW
- Reactive power capability 2.6x true power
- Output AC voltage ranges: 175, 350 VRMS (L-N)
- Output frequency: DC, 30 Hz to 100 Hz (option up to 880 Hz)
- Output DC voltage ranges: 200 VDC, 400 VDC
- Programmable 1-, 2-, or 3-phase modes
- 9" touch panel user interface

Download datasheet

NHR-9510

- 100 kW power modules, scalable to 300 kW
- Configured as regenerative AC/DC grid simulator or four-quadrant AC load
- Wide true power operating envelope (voltage and current)
- Galvanic isolation: output, channel to channel UUT
- Programmable three-phase, split-phase, or single-phase
- Highest power density with small footprint

Download datasheet

Let's Talk about Your Regenerative Grid Simulator Needs

Contact us now and we'll have a conversation about meeting your specific Regenerative Grid Simulator requirements.

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Simplify Testing with Enerchron™ Software and LabVIEW

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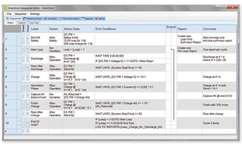

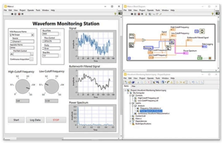

LabVIEW

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Learn more

Featured Content

Approaches for EV Charger Testing

Chargers manage voltage and current to refill or recharge a battery according to the manufacturer's specifications. Let's discuss the different ways to test each type of charger.

Removing the Cost of Heat with Regenerative Loads

Regenerative loads not only reduce electrical costs over a traditional load, they also eliminate the need for expensive equipment required for facility cooling.

Related Products

Regenerative AC Load

Simulates any inductive, capacitive, or resistive load.

Learn more

AC Power Source System

Uses HiVAR™ technology to address reactive power for efficient load performance across industries.

Learn more

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What Is the Regenerative AC Load System?

The NI Regenerative AC Load System is a four-quadrant, regenerative AC load that is current-regulated with selectable phase inputs/outputs, has a built-in waveform digitizing measurement system, and can simulate almost any linear or nonlinear load. You can also field upgrade it to higher power.

Contact us

Regenerative AC Load System Benefits

Simulate in Four Quadrants

The AC load's unique bidirectional operation in all four quadrants accurately replicates real-world reactive power flows, expanding AC load simulation beyond two-quadrant loads.

Test High Load Input

The HiVAR™ feature allows for testing high reactive load input power without the customary reduction of true power (watts) normally required with conventional loads.

Emulate with Full Control

The AC load operates in several emulation modes including constant current (CC), constant resistance (CR), constant power (CP), and constant apparent power (CS); it also simulates nonideal and transient phase currents.

Program Custom Waveforms

In addition to programmable power and crest factors, the Regenerative AC Load System can create nonlinear waveforms using a unique graphics editor. You can start with a straight line or modify a generated waveform based on current, power, and crest factor.

Regenerative AC Load System Highlights

NHR-9430

- Full-featured four-quadrant AC electronic load
- Power ratings: 12 kW to 96 kW (varies by option selected)
- Voltage ratings: 10 VAC to 350 VAC and 10 VDC to 400 VDC
- Frequency: 30 Hz to 880 Hz
- Sink power back to facility with >90% efficiency
- 9" touch panel user interface

Download datasheet

Let's Talk About Your Regenerative AC Load Needs

Contact us now and we'll have a conversation about meeting your specific regenerative AC load requirements.

Contact us

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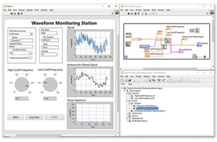

LabVIEW

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Related Products

Regenerative Grid Simulator

Offers capabilities for grid-tied inverter testing, vehicle to grid testing, AC power product testing, and more.

Learn more

AC Power Source System

Uses HiVAR™ technology to address reactive power for efficient load performance across industries.

Learn more

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Power Electronics Test Systems

NI's industry-leading power electronics are used by OEMs, top tier suppliers, and research labs worldwide. Our selection of cyclers addresses a wide range of conditions to meet your evolving needs.

We provide modular, high-performance, easy-to-use, safe, and reliable solutions for industries like automotive, aerospace, and defense—and we are committed to supporting the product lifecycle from R&D, high-volume manufacturing/production, end of life, and remanufacturing.

DC Power Electronics | AC Power Electronics | Test Management Software

DC Power Electronics

NI's DC power electronics portfolio provides the speed and performance to accurately emulate today's technologies and tomorrow's innovations for all battery chemistries, fuel cells, supercapacitors, and energy storage systems. Modular battery test systems address the increasing power requirements of battery modules and packs used in the electric vehicle and renewable energy storage industries.

Battery test equipment includes high- and medium-voltage DC power test systems. NI battery test systems can be used as battery cyclers, regenerative bidirectional DC sources, regenerative DC loads, high-power DC sources, or battery/DC emulators.

High-Voltage DC Power Electronics

The High-Voltage DC Battery Pack Cycler and Emulator offers modular, regenerative battery pack test capabilities with a power range spanning from 100 kW to 2.4 MW. This versatile range caters specifically to EV battery pack testing needs, ensuring comprehensive and scalable solutions for validating and testing battery packs across various power capacities.

Learn more

Mid-Voltage DC Power Electronics

Designed for EV battery module testing, NI's Mid-Voltage DC Battery Module Cycler and Emulator serves as a multifunction solution for battery cycling and emulation needs. This system is ideal for low- to medium-power applications in research, validation, and production labs.

Learn more

AC Power Electronics

NI's AC loads and sources provide versatile capabilities for custom test systems. These high-performance AC power electronics offer flexibility and ease of use, with features tailored to meet the diverse test needs of the electric vehicle, aerospace, renewable energy, and energy storage industries. They're critical for simulating real-world electrification conditions, enabling faster testing and reducing energy costs by emulating bidirectional power flows in transportation and renewable energy systems.

Regenerative AC Load

The Regenerative AC Load System simulates any inductive, capacitive, or resistive load.

Learn more

Regenerative Grid Simulator

The Grid Simulator System can be used for grid-tied inverter testing, vehicle-to-grid testing, AC power product testing, and more.

Learn more

AC Power Source Systems

The AC Power Source System uses HIVAR™ technology to address reactive power for efficient load performance across industries.

Learn more

Test Management Software

Battery Test Software, Enerchron™, and PAtools™, are innovative software solutions designed to revolutionize high-power and automated testing of EV components. These industry-leading tools provide seamless, efficient, and highly accurate test execution and data analysis, ensuring optimal performance and reliability in the world of battery cell, module and pack testing, and EV component evaluation.

Battery Test Software

Battery Test Software powered by PAtools revolutionizes your battery lab by harnessing NI's software-defined lab methodology. This innovative approach future-proofs your battery testing procedures, offering automated and streamlined workflows alongside advanced data management and analysis capabilities.

Contact us

PAtools Software

PAtools software is a comprehensive test development environment for EV test systems offering hardware integration, streamlined workflow interfaces, pre-built tests and analysis, and real-time reliability.

Learn more

Enerchron Software

Enerchron is a powerful yet easy-to-use test executive created for battery testing to simplify and accelerate your test automation. It's a comprehensive battery test environment that includes integration with hardware and software tools.

Learn more

Let's Discuss Your Battery Test Needs

Contact us to learn about NI's EV battery test solutions including high-performance battery cycler hardware, data analytics and lab-management software, and engineering services.

Contact a technical expert

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What Is Enerchron™ Software?

Enerchron software is powerful test execution software designed for battery cycling and other data-intensive test applications. It streamlines complex testing, minimizes errors, offers seamless scalability, and enables effortless integration, serving various industries.

Contact sales

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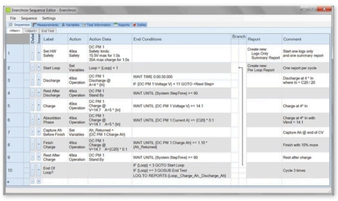


Streamline High-Power Testing

Enerchron test execution software is a powerful, yet easy-to-use test executive created for battery testing to simplify and accelerate your test automation.

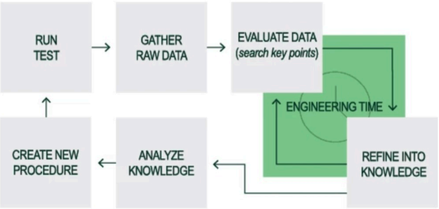
- Dramatically reduce software development time
- Streamline your battery test process and workflow
- Increase productivity; eliminate errors and repeated tests
- Save time, money, and resources
- Reduce stress and testing difficult
- Stay on schedule and budget

Need help with NI software? I can provide resources or connect you with the right person.

Simplify Data Reporting and Test Configuration

Enerchron's user-friendly interface simplifies importing test standards and data, configuring reports, and creating flexible test sequences. Its intuitive Test Sequence Editor, with a multitab layout and spreadsheet-style data entry, allows for both simple and complex sequences. This logical development environment requires minimal training for comprehensive test packages.

- Easily import and run drive cycles
- Get early access to important data and improve data visualization during test



Eliminate Post-Processing of Battery Data

Engineers usually spend significant time and effort post-processing battery test data. With Enerchron's variable feature, crucial information is stored and calculated automatically, saving time and resources. Real-time calculations during testing enable quicker decisions based on the unit under test's behavior.

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Release Notes

Search for version-specific information about NI software products, such as readmes, installation instructions, known issue lists, bug fix information, compatibility, and other important release details.

Enter software product name and version SEARCH

RELEASE NOTES FOR THE FOLLOWING POPULAR PRODUCTS

Multisim

Multisim is industry standard SPICE simulation and circuit design software for analog, digital, and power electronics in education and research.

LabVIEW

NI LabVIEW is a graphical programming environment that provides unique productivity accelerators for test system development, such as an intuitive approach to programming, connectivity to any instrument, and fully integrated user interfaces.

VeriStand

VeriStand helps you validate hardware and perform embedded software test for hardware-in-the-loop (HIL) applications.

FlexLogger

FlexLogger provides sensor configuration and data logging of mixed signals to verify electromechanical systems, all without programming.

DIAdem

DIAdem is data management software for measurement data aggregation, inspection, analysis, and reporting.

TestStand

TestStand is test management software that helps you develop, debug, and deploy test systems and provides full visibility into testing process and results.

RELEASE NOTES FOR THE FOLLOWING POPULAR DRIVERS

NI-DAQ™mx

NI-DAQ™mx provides support for customers using NI data acquisition and signal conditioning devices.

NI-VISA

NI-VISA provides support for customers using Ethernet, GPIB, serial, USB, and other types of instruments.

NI-488.2

NI-488.2 provides support for customers using NI GPIB controllers and NI embedded controllers with GPIB ports.

NI Linux Device Drivers

NI Linux Device Drivers software provides NI instrument drivers for NI and third-party hardware with Linux OSs.

PXI Platform Services

PXI Platform Services supports NI PXI chassis and controllers, implements PXI software specifications, and supplies system services to other NI products.

NI-XNET

NI-XNET provides support for developing applications for prototyping, simulating, and testing Automotive Ethernet, CAN, LIN, and FlexRay networks.

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NI Cable and Accessory Guides

NI offers a variety of cables, connector blocks, terminal blocks, and other accessories to help you connect signals between your device under test and your NI hardware. The guides provided here can help you better understand specifications, differences, and answer common questions about NI accessories.

Terminology and Selection

These guides will discuss NI naming terminology, wiring considerations, signal mapping and pinouts, choosing the right accessory to meet your needs—from low cost to high performance noise reducing, shielded, and more.

Recommended Accessories and Limitations

The guides will indicate recommended cables and accessories for many devices, and they will also include important notes about usage that you should consider.

Accessory Guide Links

Multifunction DAQ

- Multifunction I/O
- Reconfigurable Multifunction I/O

CompactDAQ & CompactRIO

- C Series I/O Modules
- CompactDAQ System
- CompactRIO System

PXI Instruments

- Digital Instruments
- Source Measure Units
- Switches

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LabVIEW For Loops and While Loops Explained

Updated Oct 7, 2024

Overview

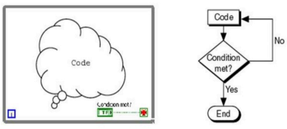
This article explores some of the basic functions and uses of For Loops and While Loops in LabVIEW and the appropriate times to use them. Tutorials for both the For Loop and While Loop structures are available if you are a beginner programmer or someone looking for more instruction on configuring these loops.

Contents

- While Loops in LabVIEW
- For Loops in LabVIEW
- Use Cases for Each Structure
- Tutorials
- Additional Resources

While Loops in LabVIEW

A While Loop is a structure you use to execute a block of LabVIEW code repeatedly until a given condition is met. When the VI runs, the code inside the While Loop executes, and then the terminal condition is evaluated. The While Loop will be a familiar concept for experienced programmers as it operates similarly in other computer languages.



LabVIEW While Loop flowchart

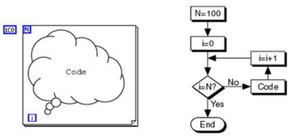
Unlike a For Loop, While Loop execution does not depend on iteration count; thus, a While Loop executes indefinitely if the condition never occurs.

For more information on what a While Loop is, including its components and configuration options, look into While Loops in LabVIEW Help.

Back to top

For Loops in LabVIEW

A For Loop is a structure you use to execute a block of code a set number of times. When the VI runs, the iteration count is evaluated, and then the code is executed.



LabVIEW For Loop flowchart

A For Loop can be configured to conditionally stop code execution in addition to its iteration-based exit. In these cases, the code will execute until the count terminal setting is reached *or* the condition is met – whichever happens first.

Back to top

Use Cases for Each Structure

While Loops should be used when:

- You want your code to run indefinitely
- You want to run code until a condition is met
- You want user control over when code should stop

For Loops should be used when:

- You need to run code for a certain number of times
- You want to write a set number of measurements to a file
- You want to take a certain number of data points
- You want to run code until a condition is met OR a set number of iterations, whichever comes first

Back to top

Tutorials

- Build and Configure a While Loop in LabVIEW
- Build and Configure a For Loop in LabVIEW

Back to top

Additional Resources

- Learn NI LabVIEW Basics – LabVIEW Getting Started
- While Loop – LabVIEW Help
- For Loop – LabVIEW Help
- Improving Performance with Parallel For Loops in LabVIEW
- Stopping Parallel While Loops in LabVIEW with One Stop Button

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