solartron analytical / AMETEK

SI-9300R Battery Analyzer

The Solartron Analytical SI-9300R is a modular, multichannel battery analyzer that offers unrivaled measurement and diagnostic capabilities for the analysis of battery cell technologies intended for energy and power applications.

More Than a Cycler

Industry demand for better batteries with higher capacity, shorter charge time and longer life represents a significant measurement challenge. Solartron Analytical has developed a suite of battery measurement and analysis tools intended for high power cells based on direct insights from the market and understanding of customer workflows.

Each module consists of up to five independent analyzer channels, each capable of 3 kW power. Up to eight modules can be installed in a 42U rack (40 channels) or four modules in 24U rack option (20 channels).

Key Measurement Specifications

- Channel/module configurations to suit all budgets and applications with up to 5 channels per module and 8 modules per cabinet
- Regenerative technology to reduce power and increase channel packing density
- Flux Gate Current Sensor Technology for high accuracy and excellent temperature stability
- Current Accuracy of 0.03% FSR, 300 A, 20 A and 2 A current ranges
- 10 kHz Solartron Analytical EIS on board on every channel as standard with real-time EIS fitting for instant cell diagnostics
- Up to 10 V polarization suitable for single cells and small eV modules
- Two auxiliary voltage measurement channels on every channel for DC and EIS anode/cathode characterization
- Patented Direct to Disk technology for increased system reliability and reduced PC high channel count data overload
- Ability to parallel channels for 1000 A measurements
- Patented EIS SoH algorithm for NISSAN LEAF and other pouch cell formulations for rapid cell grading applications

Save Energy, Optimize Power

Regenerative technology – high channel density, efficiency, power savings

Multiple current ranges
300 A – 20 A – 2 A
24 –bit resolution

Impedance measurement per channel as standard (not multiplexed)

Direct-to-Disk patented technology – reliability and high data acquisition rates

Regenerative Technology

End users are conscious of cost of ownership and cost of test. The SI-9300R utilizes regenerative technology that reduces operating costs.

REDUCING COST OF TEST

Built-in energy recovery hardware actively balances charge/discharge channels within each module and enables excess power to be utilized by other modules within the system, enabling energy and operating-cost savings of up to 90% compared to non-regenerative technology.

CONSERVING SPACE

Since energy is recycled, little space is required for cooling of electronic components. This allows the SI-9300R to achieve a high channel count density in a single 19" cabinet – up to three times the number of channels compared with non-regenerative systems. When test space constraints represent a challenge, the SI-9300R maximizes test capabilities while optimizing lab space.

Speed and Reliability

Solartron Analytical has developed a unique, innovative approach to data storage that enables fast data capture with increased system reliability. The weakest link in battery test systems is often the PC, especially when overloaded collecting and storing high acquisition rate data from multiple channels. Solartron's unique patented approach enables cyclers to save data direct-to-disk, releasing the PC from the data storage process.

Multi-Range, Flux Gate Sensor Technology

The system utilizes a three-current range, flux gate sensor. It is ideally suited for both high C Rate tests and trickle charge measurements with no loss in accuracy or precision. Flux gate sensor technology offers up to five times better temperature stability than shunt technology. As a result, accuracy is not compromised by temperature changes in the measurement circuitry.

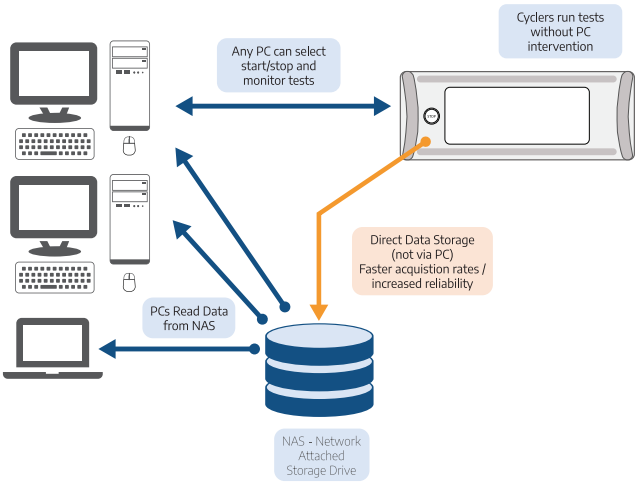
Multi-User Systems

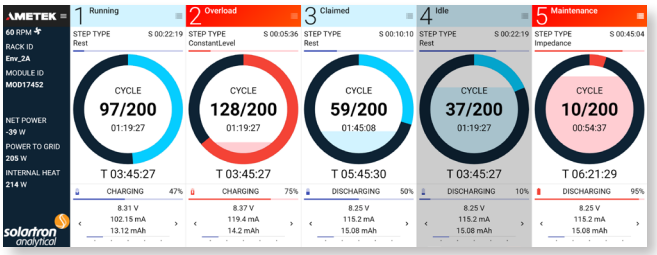
The Aspire software can be installed on as many PCs as you wish. From a simple single PC system to a fully networked, multi-operator solution – the system is fully scalable. PCs, cyclers, data storage drives and ancillary equipment are networked to allow easy access from anywhere on the system. Any PC / user can connect to any cycler channel to start / stop / monitor test progress. Data analysis is available on all PCs.

Direct-to-Disk Data Storage

The SI-9300R patented direct-to-disk data storage provides unrivaled system reliability and performance for detailed analysis of arbitrary and fast pulse waveforms with high-data rates available at up to 1000 s/s on all channels. EIS per channel provides instant analysis without the delays associated with multiplexed systems. Regenerative power offers increased channel density, system efficiency and operating-cost savings.

Direct-to-Disk Data Storage

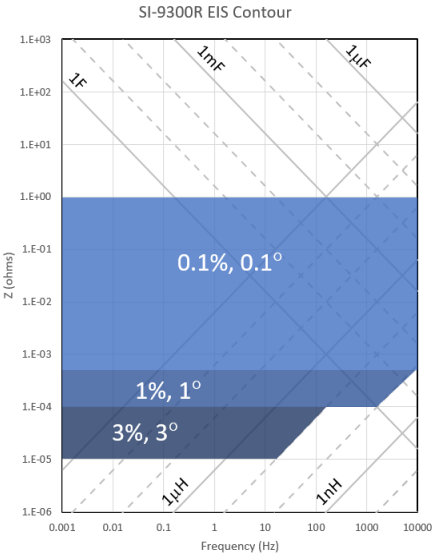




Advanced Capabilities:

Affordable, EIS per channel as Standard

Solartron renowned FRA technology on each measurement channel. Unlike expensive multiplexed solutions, Solartron has been able to deliver this capability without increasing system cost. Furthermore, each channel has two auxiliary voltage measurement channels as standard allowing impedance measurements on individual electrodes within a cell. The SI-9300R offers all of this plus the ability to live fit EIS data while tests are in progress for instant cell diagnostics.



Urban Profiles (FUDS cycles)

Direct-to-Disk technology is particularly suited to reproduction of Urban Profiles (arbitrary waveforms). The NAS drive can hold multiple arbitrary waveforms that are unlimited in length and have time resolution to 1 msec. Profiles are read directly by the cyclers one segment at a time. Multiple waveforms can be automatically sequenced and can even be sequenced with EIS and standard charge/discharge tests.

System Variables

Control parameters can be automatically sequenced in loops using variables. This makes it easy to create loops that partially charge or discharge cells and characterize EIS at each State of Charge (SoC).

Climate Chambers

The Aspire Energy PC software is compatible with climate chambers including those from ESPEC. The software is able to control temperature and humidity as part of integrated test setup including the full range of electrical tests CC-CV, CP-CV. . . and EIS. The climate chamber driver can easily be adapted to add more chamber options from other suppliers.

Temperature and humidity data collected from the chamber is automatically integrated with cycler data so that correlation of climate chamber events together with cycler data can easily be investigated from within the Aspire software package.

Data Loggers

The Aspire Energy PC software is compatible with data loggers including the EX1401 from VTI-Ametek. Temperature and voltage measurements from data loggers are fully integrated with cycler data allowing, for example, electrical and temperature events to be easily correlated within the Aspire software package.

A range of different thermocouples can be used.

Additional data logger types can easily be added as needed by adapting one of the existing drivers.

SI-9300R Specification

System Configuration	
Module Variants	SI-9300R (full-up 5 channel module) SI-9300R-4CH, SI-9300R-3CH, SI-9300R-2CH, SI-9300R-1CH
Channel Upgrades	SI-9300R-DCDC_MODULE_UPGRADE add channels to maximum 5 per module
Cell Connections	4 terminal
Cell Control	
Applied Voltage Range	+300 mV to +10 V
Applied Voltage Accuracy	0.02% FSR
Applied Current Range	±200 A continuous, 300 A (60 s pulse)
Applied Current Accuracy	0.03% FSR
Slew Rate	200 A step in < 1 ms
Current Measurement	
Max Current	±300 A
Current Ranges	300 A, 20 A, 2 A
Current Accuracy	±0.03% FSR
Current Resolution	2 µA (24-bit ADC)
Voltage Measurement	
Voltage Range	±10 V
Voltage Accuracy	±0.01% FSR ±0.3 mV
Voltage Resolution	20 µV (24-bit ADC)
Impedance Measurement	
EIS Frequency Range	1 mHz to 10 kHz
EIS Frequency Resolution	1 mHz
EIS Max AC Current Amplitude	100 A rms
Temperature Measurement Option	
Number of Channels	16 channels per measurement unit
Thermocouples	K, J
Additional Voltage Inputs	
Number of Channels	2 per main measurement channel (enables DC V and EIS measurement)
Other	Same specifications as main voltage measurement channel
Cabinet Configurations	
42U Cabinet	8 modules [4U size] per cabinet, 40 channels, 2050H x 1000D x 620W (mm)
24U Cabinet	4 modules [4U size] per cabinet, 20 channels, 1255H x 1000D x 620W (mm)
Power	3 phase, 200 V AC to 480 V AC, Regenerative System with Charge/Discharge Power Share
Uninterruptable Power Supply	Enables tests to recover after power failure
NAS Drive	Network Attached Storage (NAS) drive enables direct to disk data storage

Specifications subject to change.

Learn more at www.ameteksi.com.

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