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SI-6200
Battery Analyzer

More Than a Cycler

The new SI-6200 analyzer is more than just a battery cycler, it has a range of capabilities that are usually only found in research-grade equipment including impedance EIS measurements per channel (not multiplexed).

Designed for testing battery materials, coin-cells, supercapacitors and micro fuel-cells (MFC), the SI-6200 has the flexibility to test higher power (10 W) devices by connecting synchronized channels in parallel.

Key Features and Functionality

- Stand-alone or cabinet based
- Fast DC data capture on all channels 1000 samples per second, no overall system data acquisition limit
- 24 bit high resolution ADCs
- Simultaneous 1 mHz to 20 kHz EIS per channel built-in (not multiplexed)
- Built-in temperature measurement (thermistor) per main channel
- Data saved direct from cycler to disk – not via PC
- High current parallel channel connections up to 2 Amps per module
- Climate Chamber integration (e.g. ESPEC)
- Data Logger (temperature / voltage measurement) integration (e.g. VTI EX1401)

Take your cell materials test capability to the next level

Multiple current ranges 200 mA, 20 mA, 2 mA, 200 µA, 20 µA

Impedance per channel as standard (not multiplexed)

Real-time data analysis

Fast data Acquisition

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Stand-alone Operation

SI-6200 modules can be stacked on a desk-top in stand-alone configuration, saving the cost of the cabinet. The uninterruptible power supply and network attached storage drive are recommended accessories for this configuration, providing power-fail recovery capability. If at some later stage a cabinet is needed, this can easily be purchased separately and configured by the user.

Test Type

The SI-6200 system is capable of running many types of tests typically used for testing batteries, fuel cells and supercapacitors.
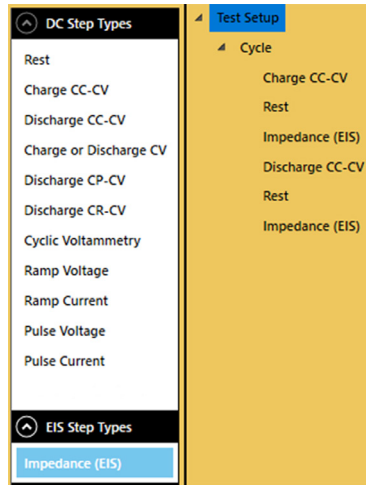
## High Speed Data Capture (All Channels)

SI-6200 uses unique, patent-pending Direct-to-Disk technology to save data direct from the cycler channels via its Ethernet port direct to the disk drive (without PC intervention). This provides the following advantages:

- ✓ Data can be collected and saved at full data rate (1000 samples/second) on ALL channels simultaneously. There is no system data rate limit, which enables detailed data to be collected on all channels from for example pulse tests.

- ✓ PC lockups have no effect on tests that are running, data is collected as normal as PC is not involved in data collection and storage to disk.

EIS Per Channel

Uniquely the SI-6200 has built-in impedance measurement hardware that is able to run EIS simultaneously on all channels, this is not a multiplexed solution where channels have to wait for EIS hardware availability. The EIS measurements are "Solartron Inside" so are very high quality featuring separate EIS calibration per range per channel.
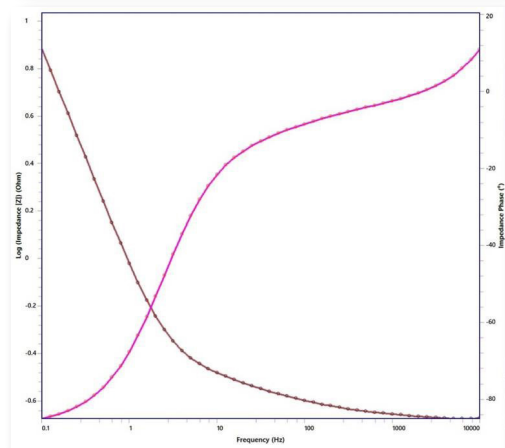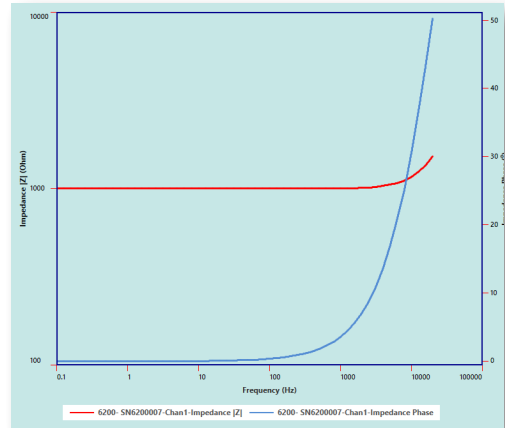
High Current Configurations

SI-6200 Modules are configurable in many ways allowing 10 fully independent tests to be run per module (one per channel) each at up to ±200 mA and –3V to +10V. Alternatively for higher current tests at up to 2 amps, groups of channels may be synchronized and connected in parallel.

Floating Operation

External grounding is provided as a standard facility that allows connection to cells that are connected to ground. This feature is also used for the ganged high current configurations listed above.

Cabinet

All cabinets are provided with an Uninterruptible Power Supply (UPS) to allow modules to safely power down during power outages. This allows tests to be automatically resumed from the point where the power failure occurred. This convenient feature saves having to analyze multiple data files to calculate how many cycles were still needed for each cell that was being tested at the time of power failure. Operators have the option to continue / not continue tests on particular groups of cells as preferred.

Each cabinet contains a 24-port Gigabit Ethernet switch that provides convenient connections to/from PCs, SI-6200 battery analyzers, VTI EX1401 (or other) data loggers. There are up to twelve SI-6200 modules per cabinet, leaving plenty of ports available for other uses.

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. for other uses.

Data Loggers

The Aspire Energy PC software is compatible with data loggers including the EX1401 from VTI-Ametek. The software is able to collect temperature and voltage data from as many channels are required and integrate that data together with cycler data so that for example, temperature events can easily be correlated to electrical tests taking place on the cells.

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.

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Battery analyzer -vs- standard battery cycler SI-6200's patented direct to disk data storage provides unrivaled system reliability and performance. Data rates at up to 1000 s/s for detailed cell analysis (fast pulse included) on any number of channels. EIS per channel for fastest analysis to 1 mHz without delays associated with multiplexed systems. Fully featured, fully capable – contact us for more details of how this system can enhance your test capabilities.

SI-6200 Specifications

System Configuration	
Module Configuration	Stand-alone or cabinet operation 10 channels / module, up to 12 modules / cabinet
Communications	Gigabit Ethernet
Cell Connections	4-terminal (GEN+, GEN-, SENSE+, SENSE-)
Current Measurement	
Maximum Current	±200 mA per channel, 2A (ganged channels)
Current Ranges	5 ranges: 200 mA, 20 mA, 2 mA, 200 µA, 20 µA
Current Accuracy[1]	±0.01% of Current Range ±0.01% Reading
Maximum Current Resolution	~40pA (24-bit ADC)
Maximum Data Acquisition Rate	1,000 samples per second (with no system limit)
Voltage Measurement	
Minimum / Maximum Voltage	–3 V to +10 V
Voltage Accuracy[1]	±0.01% of Reading ±0.3 mV
Maximum Voltage Resolution	<20 µV (24-bit ADC)
Maximum Data Acquisition Rate	1,000 samples per second (with no system limit)
Applied Signal / Cell Control	
Applied Voltage Accuracy[1]	±0.01% of setting ±0.3 mV
Applied Current Accuracy[1]	±0.02% of setting ±0.01% of Current Range
Maximum Slew Rate	200 A/s
Impedance Measurement	
EIS Frequency Range	1 mHz to 20 kHz: EIS per Channel (not Multiplexed)
Frequency Resolution	0.1 mHz
Maximum AC Level	1 V RMS / 100 mA RMS
Inputs (Built-in)	
Temperature	One Thermistor Input per Channel (Built-in)
Digital Inputs	10 Inputs
External Measurement Options	
Channels per external module	16
Configuration	Temperature: J, K Thermocouples or voltage inputs ±10 V
Aspire Software Capability	Refer to Aspire Data Sheet
General	
Module Dimensions	H: 41 mm / 1.6" (feet add 12 mm/0.5") X W: 434 mm / 17.1", D: 540 mm / 21.3"
Module Power	Single Phase: 100 to 240 V AC, 50/60 Hz, 200 VA
24U Cabinet Dimensions	H: 1255 mm / 49.4", W: 625 mm / 24.6", D: 815 mm / 32.1"
24U Cabinet Power	Single Phase 90 to 120 V AC, or 208 to 240 V AC (50/60 Hz)
Operating Temperature Range	+10°C to +40°C

[1]*Specified at 23°C*
Specifications subject to change.

▶ Learn more at **www.ameteksi.com**.

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