ESTi Energy Storage Test Instrument

The ESTi

The Energy Storage Test Instrument (ESTi) combines capabilities into a single, easy-to-use instrument that measures programmable voltage, current, constant power, and electronic load for energy storage cell test, including super capacitors and fuel cells.

With the **ESTi** system's highly intuitive **ESTiView™** software, users can quickly program charge, discharge, pulse, and ramp operations to reflect what they need to measure. Users also can easily modify parameters based on changing application needs, create custom reporting dashboards, module tests, and provide meaningful and actionable data from tests

Powerful—Up to 90 Watts and 5 Amps

Isolated—Each channel is fully isolated

High Sampling—Up to 200 kHz data acquisition rates

Upgradeable—Can be upgraded to higher capability models as your needs change

SMS Texting—Receive activity notifications via cell phone

The new **ESTi** platform offers users in industries ranging from healthcare, to automotive, to the military a variety of benefits over traditional custom test systems including the following:

- Constant Charging and Discharging
- Intuitive ESTiView software that provides a flexible, drag-and-drop graphical user interface (GUI) to easily create and manage test programs
- Instruments that are ideal for use in harsh environments, thermally calibrated from 0°C to 50°C
- The ability to test multiple cells simultaneously in a multi-node environment
- Scalable system that is easy to upgrade to increase testing capacity as your application needs evolve
- Low cost of ownership (lowest cost-per-watt testing capacity on the market)

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Electrochemical Techniques Supported

- Constant Charging and Discharging (current or voltage)
- Constant Power or Load
- Linear Sweep Voltammetry (LSV)
- Cyclic Voltammetry (CV)
- Step Voltammetry
- Pulse Voltammetry [e.g., square wave voltammetry (SWV)]
- Electrochemical Impedance Spectroscopy
- Potentiostatic Intermittent Titration (PITT)
- Galvanostatic Intermittent Titration (GITT)
- AC Voltammetry

Only Instrument on the Market with Wide Thermal Support

All ESTi instruments are thermally calibrated for an ambient operating temperature range of 0°C to 50°C. You can be assured of accurate results whether you are testing a controlled lab environment, a factory environment where temperatures are not regulated well, or a thermal chamber to test battery efficiency at varying temperatures.

EIS Performance

Our 23xx line of instruments includes built-in Electrochemical Impedance Spectroscopy (EIS) circuitry to support EIS and AC Voltammetry testing. All AC measurement calculations are done utilizing a special 48-bit math technique, incorporating a 32-bit mantissa for DFT summations, to provide higher dynamic range in your results.

Many systems may only use standard floating point math techniques, limited to a 23-bit mantissa. The electrometer also has built-in auto-ranging in conjunction with bias elimination on the voltage channel to achieve more accurate results in your impedance data. Finally, our instruments perform calibration to the individual samples being measured, in real time, for use in AC data results. This allows our instruments to be calibrated using DC standards, for higher accuracy than can be achieved through the use of AC calibration standards required for calibration to post-computed RMS results.

Accessories

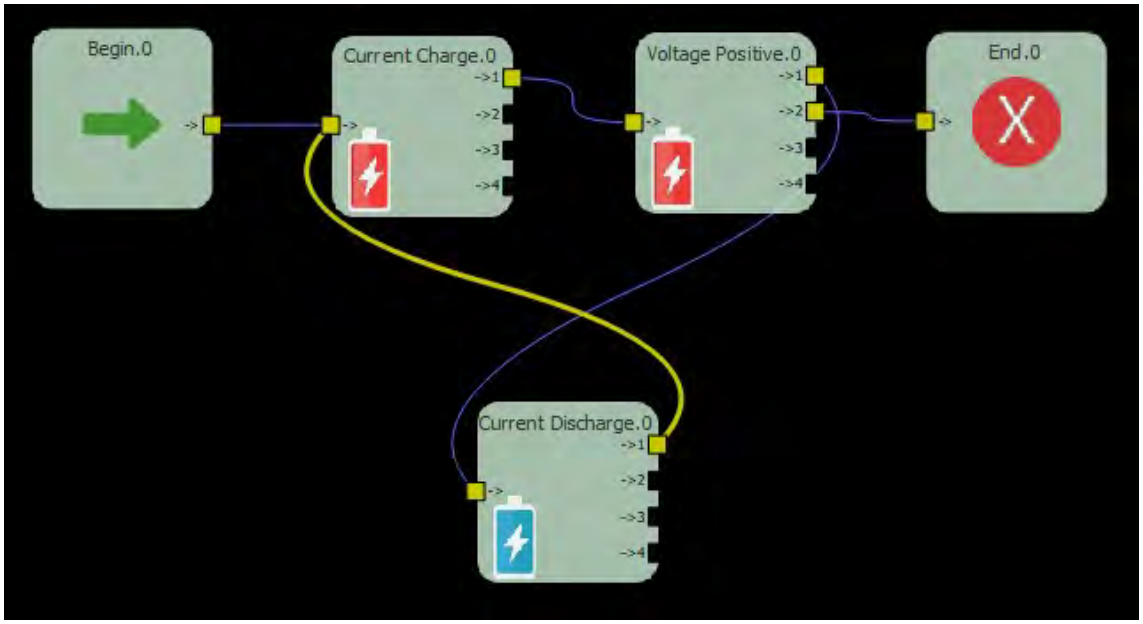
Each instrument can support multiple sensors, up to 4 thermocouples and 2 pressure sensors*, per channel with the use of our optional Auxiliary Interface Boxes. All sensors can be user calibrated in our ESTiView software. Aux interface also supports additional voltage measurements.

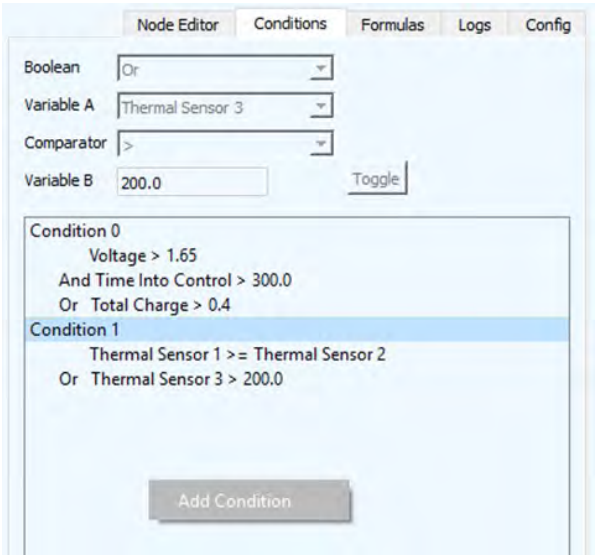
** Pressure sensors available mid 2020.*

ESTiView

The ESTi system includes the highly intuitive ESTiView drag-and-drop software that powers the ESTi platform that you can use to quickly program charge, discharge, pulse, and ramp test scenarios.

These scenarios are created through drag-and-drop test mode selection icons and connected together with condition-based exit paths. Each test node provides up to 4 different exit paths based on different exit criteria for each path to allow for complex test sequences to be easily developed.





Example of Cyclic Voltammetry Test

An exit path condition is selected and configured through an editor that allows for complex exit criteria to be created based on both standard data and user-defined parameters.

The software allows you to connect to multiple cell testers at once and provides the ability to monitor status on any cell with a simple click .

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	2161	2165	2185	2361	2365	2385
Potentiostat/Galvanostate	6V / 1A	6V / 5A	18V / 5A	6V / 1A	6V / 5A	18V / 5A
EIS & AC Voltammetry Capability				★	★	★
Thermal Calibration Range	0^{o} C - 50^{o} C					
Zero Resistance Ammeter	Yes					
Floating	Yes					
Cell Connections	2,3,4					
Maximum Current	± 1 A	± 5 A	± 5 A	± 1 A	± 5 A	± 5 A
Current Ranges	5 (5uA - 5A)					
Current Ranges (including internal gain)	5 (5uA - 5A)					
Minimum Current Resolution	90 pA					
Maximum Applied Potential	± 6 V	± 6 V	± 18 V	± 6 V	± 6 V	± 18 V
Rise Time	<2µs					
Minimum Time Base	5µs					
Voltage/Current Sensitivity	1µV / 1µA					
Weight	6.5 lbs					
Dimensions	22 cm (W) x 8 cm (H) x 40 cm (D)					
Control Amplifier						
Compliance Voltage	± 19 V	± 19 V	± 19 V	± 19 V	± 19 V	± 19 V
Output Current	± 1 A	± 5 A	± 5 A	± 1 A	± 5 A	± 5 A
EIS Measurement						
EIS	N/A	N/A	N/A	10 µHz - 200 kHz		
AC Amplitude	5V / 1A max	5V / 3A max	5V / 3A max	5V / 1A max	5V / 3A max	5V / 3A max
Electrometer						
Input Impedance	$<10^{12}$ Ω ‖ <4 pF					
Input Current (typical)	<25pA					
Bandwidth	<40 MHz					
CMRR	>80dB (10KHz) / >70dB (200KHz)					
Potential						
Applied Accuracy	±18 mV					
Applied Resolution	610 µV/bit					
Measured Accuracy	±0.2% of range (15mV range: ±0.5%)					
Measured Resolution	±0.0017% of range					
Current						
Applied Accuracy	±0.2% of range					
Applied Resolution	±0.0018% full-scale/bit					
Measured Current						
Measured Accuracy	±0.2% of range					
Measured Resolution	±0.0018% full-scale/bit					