Model 3561 BATTERY HiTESTER is a low-resistance meter employing the four-terminal AC method to measure the internal resistance (IR) of small secondary batteries while measuring battery voltage at the same time. Compared to Model 3560, performance capabilities have been greatly enhanced by increasing measurement speed tenfold to 10 ms (measuring resistance and voltage simultaneously), and increasing voltage measurement accuracy nearly fivefold to 0.01% rdg. The high-resolution 0.01 mΩ (in the 300 mΩ range) and 0.1 mV capabilities are ideally suited to production line battery testing. The many built-in features include comparator and statistical calculation functions and a variety of interfaces, making Model 3561 suitable for a wide range of applications including quality and process control such as in high-speed automated assembly lines.

* Measurement time = sampling time + response time
Advanced Functions

Measurement Error Detection
Detect contact failure of test probes and broken leads for 100% measurement reliability.

Self-Calibrating
Minor drift within the internal measurement circuitry and gain fluctuations are automatically corrected to maintain high accuracy.

Store Measured Data in Internal Memory
Using external I/O triggering, up to 400 measurement values can be stored and then transferred as a batch.

Averaging Function
By averaging from two to 16 measurements, stable readings can be consistently obtained.

Statistical Calculations
To facilitate quality and process control, statistical calculations can be applied to up to 30,000 data points.

Obtain These Results
Total data count; valid data count; maximum, minimum and average values; standard deviation; population standard deviation and process capability indices (Cp and Cpk).

Save Measurement Setting Configurations
Up to 126 measurement setting configurations such as comparator threshold settings can be saved in internal memory and reloaded. Saved panel settings can be selected by external control.

Save Frequently Used Settings in Memory
Panel settings that can be saved include the measurement function, resistance measurement range, auto-range setting, zero-adjust setting data, sampling rate, trigger source, delay setting, averaging and comparator settings, statistical calculation setting, display switching and key-lock.

External Printer
Data can be printed on the optional Model 9670 Printer via the RS-232C interface. Measurements including judgment results and statistical calculation results can be printed.

Print method: Thermal line dot
Print width: 72 mm
Print speed: 47.5 mm/s
Power: 9671 AC Adapter or 9672 Battery Pack

Connection to Model 3561 requires the use of Models 9638 RS-232C Cable and 9671 AC Adapter, and battery operation requires Models 9672 Battery Pack and 9673 Battery Charger.

High Precision
- Resistance: ±0.5%rdg. ±5dgt.
- Voltage: ±0.01%rdg. ±3dgt.

High Resolution
- Resistance: 0.01 mΩ (300 mΩ range)
- Voltage: 0.1 mV (20 V range)

Quick Response
- Resistance & Voltage
  Simultaneous measurement within 10 ms*

* Sampling time + response time: with EX. FAST sampling
Ideal for High-Speed Production Lines

High Speed Interfaces

The built-in RS-232C interface enables data transfer at up to 38,400bps, or about 10ms per measurement. Connect to the 9670 Printer for instantaneous printouts of measurement results and statistical calculations. Choose Model 3561-01 for additional GP-IB interfacing capabilities.

External I/O Control

Triggering, loading of measurement setting configurations and zero-adjustment can be externally controlled. The 3561 provides outputs for comparator results, end-of-measurement and measurement error notifications.

<table>
<thead>
<tr>
<th>External I/O Items</th>
<th>Input (CMOS level)</th>
<th>Output (Open-collector)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement trigger (TRIG)</td>
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<td>• End-of-Measurement (EOC)</td>
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<tr>
<td>Print</td>
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<td>• Measurement-in-progress (INDEX)</td>
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<tr>
<td>Zero adjustment (ZADJ)</td>
<td>•</td>
<td>• Comparator results (Hi, IN, Lo, AND)</td>
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<td>Calibrate (CAL)</td>
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<tr>
<td>Manual comparator (MANU)</td>
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<tr>
<td>Load Panel Settings (7 bits)</td>
<td>(LOAD0 to LOAD6)</td>
<td></td>
</tr>
</tbody>
</table>

Comparators

Simultaneous Resistance & Voltage Judgments

Dual comparators independently judge Hi/IN/Lo states of resistance and voltage. Judgment results are indicated on the display and beeper, and are available from external I/O. Both results can be displayed simultaneously.

AND Calculation Output

Besides independent judgment results for resistance and voltage, ANDed calculation results can be output through the external I/O interface, so that overall judgment results can be verified by one signal.

Two Setting Methods

Threshold settings can be specified as either absolute Hi/Lo values or as deviation (%) from a standard value.

External I/O Timing Chart

11: 1.5 ms (ERR output response time)
12: 0.5 ms min (measurement trigger pulse width)
13: Delay setting (user-specified)
14: 6.8 ms (measurement time)*
15: 0.3 ms (calculation time)
16: Retained until next trigger (with HOLD setting enabled)

* With ΩV function and EX FAST sampling

Manual Comparator Function

Comparator judgments can be executed on demand. Flexible control is available by footswitch or PLC.

Dual Audible Indicators

Different beeper sounds can be emitted for IN and Hi/Lo results. Also, each type of audible indicator can be enabled or disabled.

(Headphone-monitoring support for audible indicators available by special order.)
**Specifications**

- **Measurement types**: Resistance and voltage
- **Resistance measurement method**: Four-terminal AC (1-kHz) method
- **Functions**: Ω, V, and Ω
- **Rated voltage**: ±22 V DC rated input voltage
- **Input impedance**: ±70 V DC maximum rated voltage above ground
- **Sampling rate**: Approx. 1 Ω
- **Response time**: Four steps – Extra Fast, Fast, Medium or Slow
- **Total measurement time**: Approx. 2.4 kg
- **Up to 400 measurements**: -
- **■**: Total data count; valid data count; maximum, minimum
- **Sampling rate**: Approx. 3 ms for resistance measurements
- **Approx. 3 ms for voltage measurements**: Note: Response time depends on reference values and the measurement object.

- **Overview**: Approx. 3 ms for resistance measurements
- **Approx. 3 ms for voltage measurements**: Note: Response time depends on reference values and the measurement object.

- **Detailed Specifications**
  - **Input impedance**: ±70 V DC maximum rated voltage above ground
  - **Sampling rate**: Approx. 1 Ω
  - **Response time**: Four steps – Extra Fast, Fast, Medium or Slow
  - **Total data count**: Total data count; valid data count; maximum, minimum and average values; standard deviation; population
  - **Average values**: Note: Response time depends on reference values and the measurement object.

- **Total measurement time**: Approx. 2.4 kg
- **Up to 400 measurements**: -

- **Zero-adjustment**: 1000-count range (both resistance and voltage)
- **Trigging**: Internal or external
- **Delay time**: On/off, 0 to 9.999 seconds
- **Averaging samples**: On/off, 2 to 16 samples
- **Statistical calculations**: Total data count; valid data count; maximum, minimum and average values; standard deviation; population

- **Measurement values**: Measurement values are output via RS-232C upon trigger input
- **Measurement value memory**: Up to 400 measurements
- **Panel save/load**: Up to 126 configuration settings
- **External interface**: External I/O, RS232C (9600, 19200 or 38400 bps)
- **Printer**: PR-228C (all models), GP-IB (Model 3561-01 only)
- **Other functions**: Over-range display, measurement error detection, self-calibration, dual comparators, key-lock

- **General Specifications**
  - **Operating temperature & humidity**: 23˚C ±5˚C, 80% rh or less (non-condensating)
  - **Storage temperature & humidity**: -10 to 50˚C, 80% rh or less (non-condensating)
  - **Guaranteed accuracy temperature & humidity**: 23˚C ±5˚C, 80% rh or less (non-condensating)
  - **Operating conditions**: Indoors, below 2000 m ASL
  - **Rated supply voltage**: 240 V AC (auto-selecting)
  - **Rated supply frequency**: 50/60 Hz
  - **Rated power consumption**: 36 V AC
  - **Insulation withstand potential**: 1.69 kV AC for 15 s (with 10 mA cut-off current) between power supply line and protective ground terminal

- **Dimensions**: Approx. 215x80x295 mm (excluding projections)
- **Accessories**: Power Cord (1)
- **Applicable Standards**: Safety: EN61010-1:2001
  - Effect of radiated radio frequency electromagnetic fields: 10 V/m
  - Resistance measurements: ±3% rdg. ±1000 dgt.
  - Voltage measurements: ±0.01% rdg. ±20 dgt.
  - Effect of conducted radio frequency electromagnetic fields: 3 V
  - Resistance measurements: ±0.5% rdg. ±100 dgt.

- **Options**
  - 3561 BATTERY HITESTER
  - 3561-01 BATTERY HITESTER (w/GP-IB)

- **Measurement leads are not included. Purchase the appropriate lead option for your application separately.**
  - The male (system side) of the EXT I/O connector is also available. Please inquire with your HIOKI distributor.

- **3561 BATTERY HITESTER**
- **3561-01 BATTERY HITESTER (w/GP-IB)**

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- **All information correct as of Jun. 30, 2005. All specifications are subject to change without notice.**

- **3561E1-56E-05U** Printed in Japan