



# HIOKI

## 3561 BATTERY HiTESTER

Component measuring instruments



### Simultaneous high-speed testing of the internal resistance and voltage of small secondary batteries

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



ISO 9001  
JMI-0216



ISO 14001  
JQA-E-90091



<http://www.hioki.co.jp/>

HIOKI company overview, new products, environmental considerations and other information are available on our website.

# High Precision • High Resolution • Quick Response



## 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

## 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

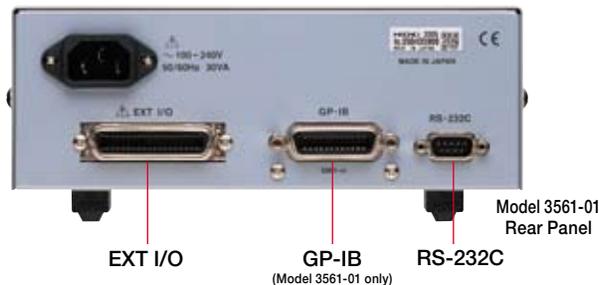


Connection to Model 3561 requires the use of Models 9638 RS-232C Cable and 9671 AC Adapter, and battery operation requires Models 9672 Battery Pack and 9673 Battery Charger.

# 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.

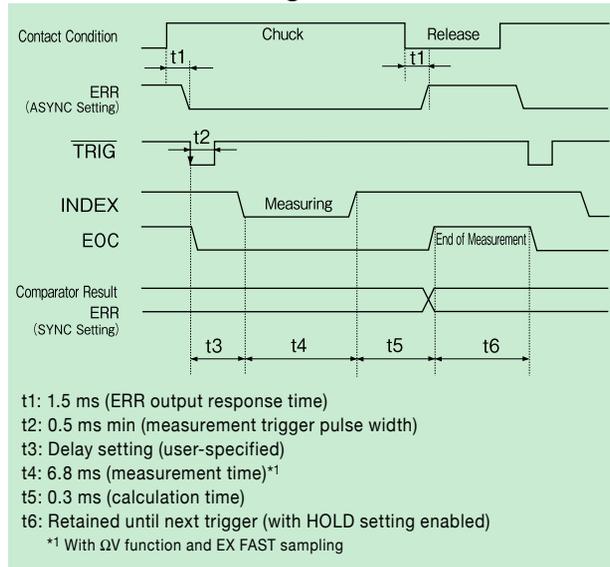


## External I/O Control

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.

External I/O Items	
Input (CMOS level)	Output (Open-collector)
<ul style="list-style-type: none"> <li>Measurement trigger (TRIG)</li> <li>Print (PRINT)</li> <li>Zero adjustment (OAJ)</li> <li>Calibrate (CAL)</li> <li>Manual comparator (MANU)</li> <li>Load Panel Settings (7 bits) (LOAD0 to LOAD6)</li> </ul>	<ul style="list-style-type: none"> <li>End-of-Measurement (EOC)</li> <li>Measurement-in-progress (INDEX)</li> <li>Comparator results (Hi, IN, Lo, AND) (Resistance, Voltage, AND)</li> <li>Measurement errors (ERR)</li> <li>General-purpose output (10 bits, OUT0 to OUT9)</li> </ul>

### External I/O Timing Chart



## 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.



Resistance comparator setting



Voltage comparator setting

### 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.

### Manual Comparator Function

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

### Two Setting Methods

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

### 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 : ΩV, Ω and V  
 Rated voltage : ±22 V DC rated input voltage  
 ±70 V DC maximum rated voltage above ground  
 Input impedance : Approx. 1 MΩ  
 Sampling rate : Four steps – Extra Fast, Fast, Medium or Slow  
 Response time : Approx. 3 ms for resistance measurements  
 Approx. 3 ms for voltage measurements  
 Note: Response time depends on reference values and the measurement object.  
 Total measurement time : Sampling time + Response time  
 Zero-adjustment : 1000-count range (both resistance and voltage)  
 Triggering : 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 standard deviation and process capability indices  
 Measurement value output function : 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 RS-232C (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 : 0 to 40°C, 80% rh or less (non-condensating)  
 Storage temperature & humidity : -10 to 50°C, 80% rh or less (non-condensating)  
 Guaranteed accuracy : 23°C ±5°C, 80% rh or less (non-condensating) temperature & humidity  
 Operating conditions : Indoors, below 2000 m ASL  
 Rated supply voltage : 100 to 240 V AC (auto-selecting)  
 Rated supply frequency : 50/60 Hz  
 Rated power consumption : 30 VA  
 Insulation withstand : 1.69 kV AC for 15 s (with 10 mA cut-off current) between power supply line and protective ground terminal

■ Measurement Ranges and Accuracy

[ Resistance Measurement ]

Range	300 mΩ	3 Ω
Max. Display	310.00 mΩ	3.1000 Ω
Resolution	0.01 mΩ	0.1 mΩ
Meas. Current	10 mA ±10%	1 mA ±10%
Meas. Current Freq.	1 kHz ±0.2 Hz	
Accuracy*1	±0.5% rdg. ±5 dgt.	
Open-Terminal Voltage	7 V peak	

[ Voltage Measurement ]

Range	20 V
Max. Display	±19.9999 V
Resolution	0.1 mV
Accuracy*2	±0.01% rdg. ±3 dgt.

\*1 Add ±3 dgt for EX FAST, or ±2 dgt for FAST and MEDIUM  
 \*2 Add ±3 dgt for EX FAST, or ±2 dgt for FAST and MEDIUM

[ Conditions of Guaranteed Accuracy ]

Temperature & humidity: 23 °C ±5 °C, 80% rh or less (non-condensating)  
 Zero-adjustment: After executing zero-adjustment  
 Warm-up time: At least 30 min.  
 Self-calibration: Unless using SLOW sampling, execute self-calibration after warm-up and restrict temperature fluctuations to within ±2 °C after calibration.

[ Sampling Times ]

Sampling		EX.FAST	FAST	MEDIUM	SLOW
Ω V	(50 Hz)	7 ms	23 ms	83 ms	258 ms
	(60 Hz)				
Ω	(50 Hz)	4 ms	12 ms	42 ms	157 ms
	(60 Hz)				
V	(50 Hz)	4 ms	12 ms	42 ms	157 ms
	(60 Hz)				

Items in the parentheses () indicate supply frequency settings; Tolerance: ±5 ms for SLOW sampling, and ±1 ms for other settings.

Dimensions : Approx. 215Wx 80Hx 295D mm (excluding projections)  
 Mass : Approx. 2.4 kg  
 Accessories : Power Cord (1)  
 Applicable Standards : Safety: EN61010-1:2001  
 EMC: EN61326:1997+A1:1998+A2:2001 Class A  
 EN61000-3-2:2000, EN61000-3-3:1995+A1:2001  
 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.

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.

● Options

- 9287-10 CLIP TYPE LEAD
- 9452 CLIP TYPE LEAD
- 9453 FOUR TERMINAL LEAD
- 9455 PIN TYPE LEAD (for ultra precision)
- 9467 LARGE CLIP TYPE LEAD
- 9770 PIN TYPE LEAD
- 9771 PIN TYPE LEAD
- 9637 RS-232C CABLE (9pin-9pin/cross/1.8m)
- 9638 RS-232C CABLE (9pin-25pin/cross/1.8m)
- 9151-02 GP-IB CONNECTOR CABLE (2m)
- 9151-04 CONNECTOR CABLE (4m)
- 9670 PRINTER
- 9671 AC ADAPTER (for 9670)
- 9672 BATTERY PACK (for 9670)
- 9673 BATTERY CHARGER (for 9672)
- 9237 RECORDING PAPER (80 mm × 25 m, 4 rolls)

9287-10 Cable length : connectors to lead branch approx. 85 cm, lead branch to probes approx. 8 cm

9452 Cable length : connectors to lead branch approx. 80 cm, lead branch to probes approx. 20 cm

9453 Cable length : connectors to lead branch approx. 80 cm, lead branch to probes approx. 30 cm

9455 Cable length : connectors to lead branch approx. 40 cm, lead branch to probes approx. 25 cm

9467 Cable length : connectors to lead branch approx. 85 cm, lead branch to probes approx. 25 cm

9770 Cable length : connectors to lead branch approx. 45 cm, lead branch to probes approx. 26 cm

9771 Cable length : connectors to lead branch approx. 45 cm, lead branch to probes approx. 26 cm



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