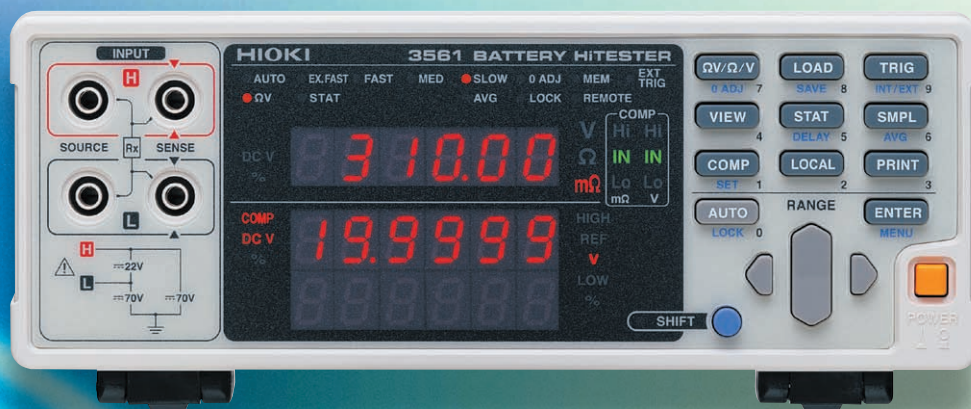




HIOKI

3561 BATTERY HiTESTER

Component measuring instruments



CE

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
 $\pm 0.5\%$ rdg. ± 5 dgt.
Voltage
 $\pm 0.01\%$ rdg. ± 3 dgt.

High Resolution

Resistance: 0.01 m Ω
 (300 m Ω 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

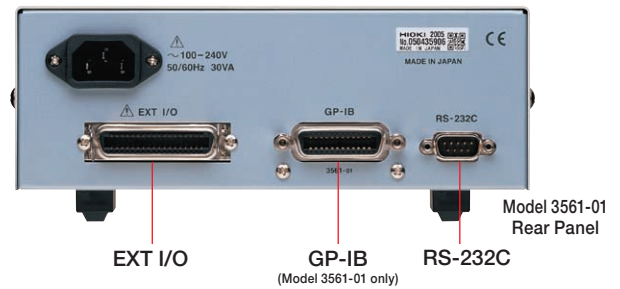


Connection to Model 3561 requires the use of Models 9638 RS-232C Cable and 9671 AC Adapter, and battery operation requires Models 9672 Battery Pack and 9673 Battery Charger.

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.

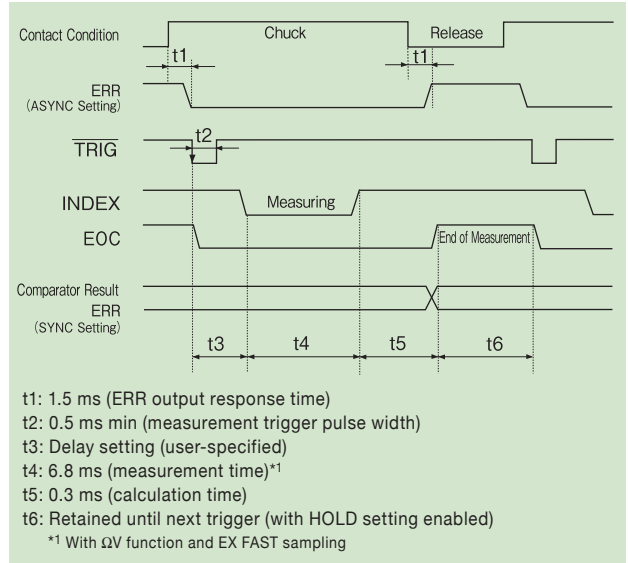


External I/O Control

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)
• Measurement trigger (TRIG)	• End-of-Measurement (EOC)
• Print (PRINT)	• Measurement-in-progress (INDEX)
• Zero adjustment (OAJ)	• Comparator results (Hi, IN, Lo, AND)
• Calibrate (CAL)	• Measurement errors (ERR)
• Manual comparator (MANU)	• General-purpose output
• Load Panel Settings (7 bits) (LOAD0 to LOAD6)	(10 bits, OUT0 to OUT9)

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.

Two Setting Methods

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

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, Ω and V
Rated voltage	: ± 22 V DC rated input voltage ± 70 V DC maximum rated voltage above ground
Input impedance	: Approx. 1 M Ω
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 temperature & humidity	: 23°C $\pm 5^\circ\text{C}$, 80% rh or less (non-condensating)
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 potential	: 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 m Ω	3 Ω
Max. Display	310.00 m Ω	3.1000 Ω
Resolution	0.01 m Ω	0.1 m Ω
Meas. Current	10 mA $\pm 10\%$	1 mA $\pm 10\%$
Meas. Current Freq.	1 kHz ± 0.2 Hz	
Accuracy*1	$\pm 0.5\%$ 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	$\pm 0.01\%$ 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 $\pm 5^\circ\text{C}$, 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 $\pm 2^\circ\text{C}$ after calibration.

[Sampling Times]

Sampling	EX.FAST	FAST	MEDIUM	SLOW
Ω V (50 Hz)	7 ms	23 ms	83 ms	258 ms
(60 Hz)			69 ms	251 ms
Ω (50 Hz)	4 ms	12 ms	42 ms	157 ms
(60 Hz)			35 ms	150 ms
V (50 Hz)	4 ms	12 ms	42 ms	157 ms
(60 Hz)			35 ms	150 ms

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: $\pm 3\%$ rdg. ± 1000 dgt.

Voltage measurements: $\pm 0.01\%$ rdg. ± 20 dgt.

Effect of conducted radio frequency

electromagnetic fields: 3 V

Resistance measurements: $\pm 0.5\%$ rdg. ± 100 dgt.

3561 BATTERY HiTESTER

3561-01 BATTERY HiTESTER (w/GP-IB)

● 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)

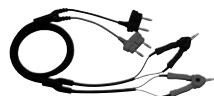
9672 BATTERY PACK (for 9670)

9673 BATTERY CHARGER (for 9672)

9237 RECORDING PAPER (80 mm $\times$ 25 m, 4 rolls)

- 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.

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

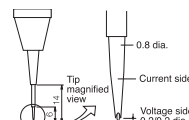


Cable length : connectors to lead branch approx. 80 cm, lead branch to probes approx. 30 cm

9455



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



9467

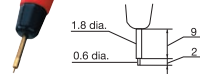


Cable length : connectors to lead branch approx. 85 cm, lead branch to probes approx. 25 cm

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

HIOKI

HIOKI E. E. CORPORATION

HEAD OFFICE :

81 Koizumi, Ueda, Nagano, 386-1192, Japan
TEL +81-268-28-0562 / FAX +81-268-28-0568
E-mail: os-com@hioki.co.jp

HIOKI USA CORPORATION :

6 Corporate Drive, Cranbury, NJ 08512 USA
TEL +1-609-409-9109 / FAX +1-609-409-9108
E-mail: hioki@hiokiusa.com

Shanghai Representative Office :

1704 Shanghai Times Square Office
93 Huaihai Zhong Road
Shanghai, 200021, P.R.China
TEL +86-21-6391-0090, 0092
FAX +86-21-6391-0360
E-mail: info@hioki.cn

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