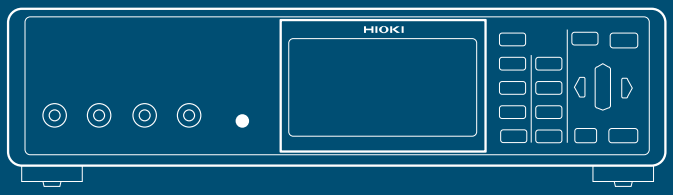
CATALOGO STRUMENTI

Ricerca & Sviluppo

PROVE E VERIFICHE

PROVA BATTERIA



TECNOLOGIA

HIOKI

asita

TECNOLOGIE DI MISURA

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SENSORI e ACCESSORI

HIOKI

BATTERY IMPEDANCE METER BT4560

Manage Electrode Reaction Resistance, Electrolyte Resistance, and Welding Resistance

The Ultimate Instrument for Measuring Large-Capacity Li-ion Batteries for EVs

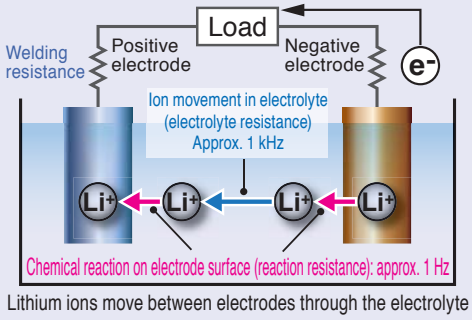
CE

Improve the quality of battery cell inspections

- Set your own measurement frequency between 100 mHz and 1.05 kHz
- Use low frequencies to measure **electrode reaction resistance**
- Use high frequencies to measure **electrolyte resistance and welding resistance**
- Create Cole-Cole plots (with bundled application program)
- Use equivalent circuit analytic software to analyze internal battery defects

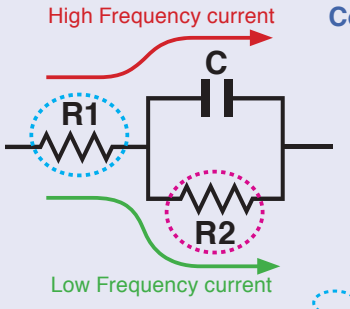
Use the BT4560 for impedance measurement... To isolate defective factors in battery cells

Conceptual diagram of a battery



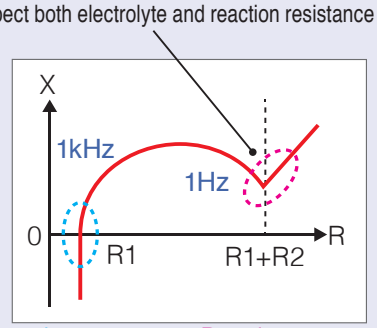
Lithium ions move between electrodes through the electrolyte

Battery equivalence circuit



Cole-Cole plot

Inspect both electrolyte and reaction resistance



Electrolyte resistance and welding resistance

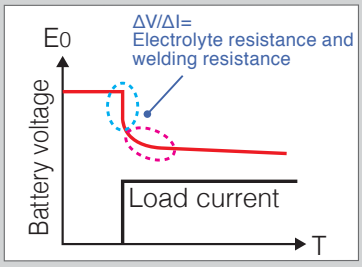
Reaction resistance

When R1 is larger... Electrolyte concentration might be reduced, or the electrode might have poor welding

When R2 is larger... A failure might have occurred during the electrode production process, or the electrode might react poorly on its surface

DC-IR measurement using a charging/discharging tester

DC-IR measurement passes electric currents into R1 and R2, which makes it difficult to measure electrolyte resistance and reaction resistance separately. (See the equivalent circuit diagram shown above)

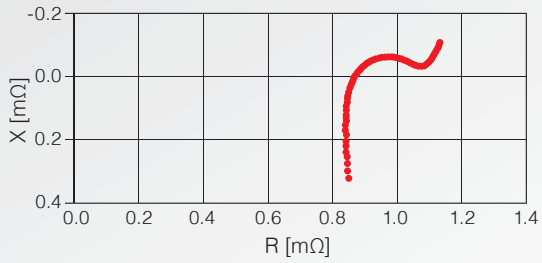


Exceptional Accuracy Unsurpassed Stability

Also measure large-capacity Li-ion batteries

Measure very low impedances of 1mΩ or less

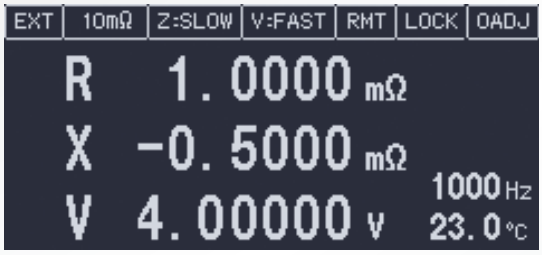
Some high-capacity Li-ion batteries have an internal impedance less than 1 mΩ.
The BT4560 can measure very low impedances of 1mΩ or less, stably and with high reproducibility.



Measure DC voltage with high accuracy

Accuracy: ±0.0035% rdg. ±5 dgt.

The BT4560 achieves an accuracy comparable to a 6.5-digit DMM. It can be used to measure both OCV and impedance in batteries.

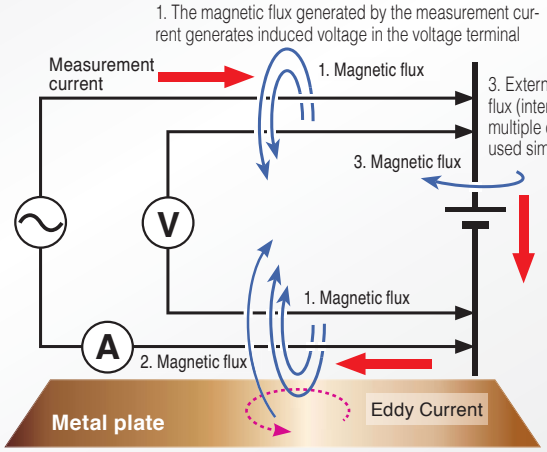


Measure 4-V Li-ion battery cells at an accuracy of ±190 µV

Four-terminal pair measurement resolves system construction problems

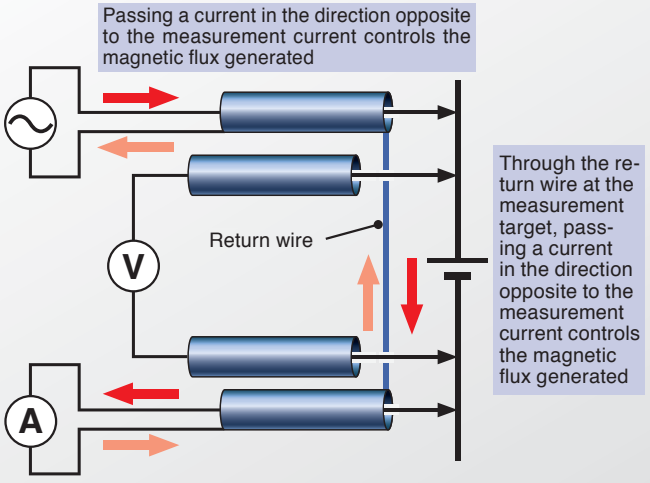
The four-terminal pair method reduces various effects of induced magnetic fields, such as cabling influence, eddy-current influence due to surrounding metals, and interference when multiple devices are used simultaneously. When compared to the conventional four-terminal method, the BT4560 controls magnetic fluxes generated by the measurement current. This significantly reduces the impact on the measured value when cabling for measurements is changed, improving stability when the measurement instrument is embedded within the production line.

Magnetic flux influence using the conventional four-terminal method



2. The magnetic flux generated by the eddy current generates induced voltage in the voltage terminal

Impedance measurement using the four-terminal pair method

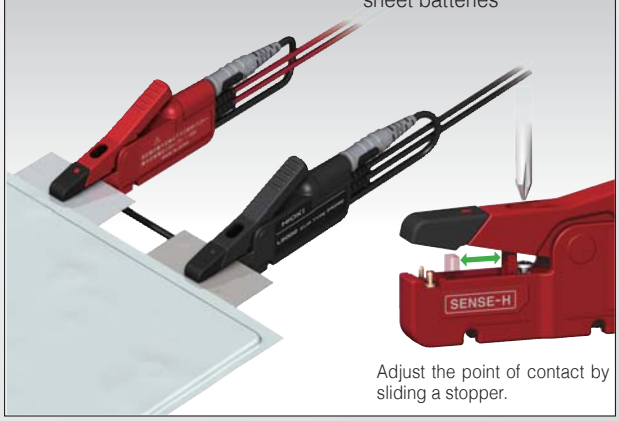


Dedicated probes for four-terminal pair measurement reduce the magnetic flux generated

Dedicated probes with the four-terminal pair structure provide stable measurement less affected by environmental noise or cabling.

CLIP TYPE PROBE L2002

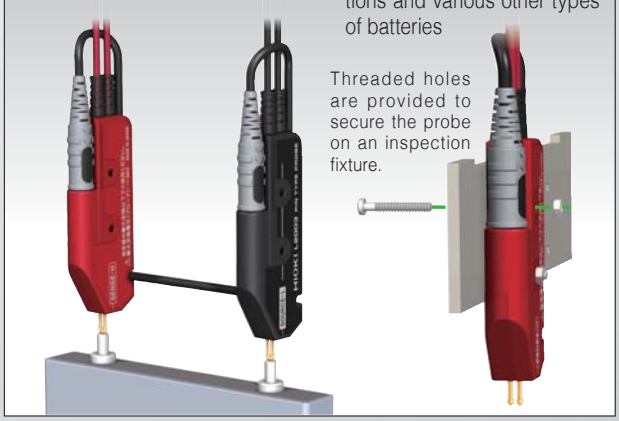
For measuring laminated sheet batteries



Adjust the point of contact by sliding a stopper.

PIN TYPE PROBE L2003

For line-embedded applications and various other types of batteries



Threaded holes are provided to secure the probe on an inspection fixture.

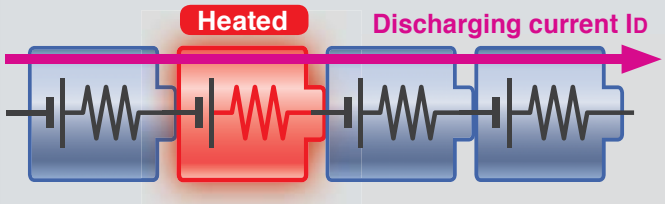
*Contact your local Hioki distributor for details of the probe tip shapes

Using impedance data measured with the

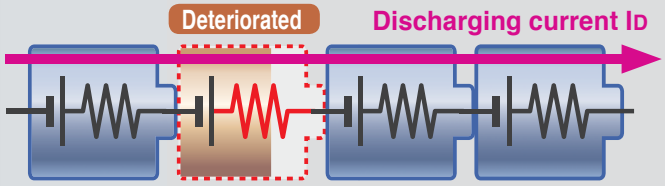
Battery cell selection extends the battery pack service life

Battery pack deterioration factors

Heat reduces or deterioriates the battery capacity. Large-capacity batteries for EVs that charge/discharge with large currents generate significant amounts of heat.



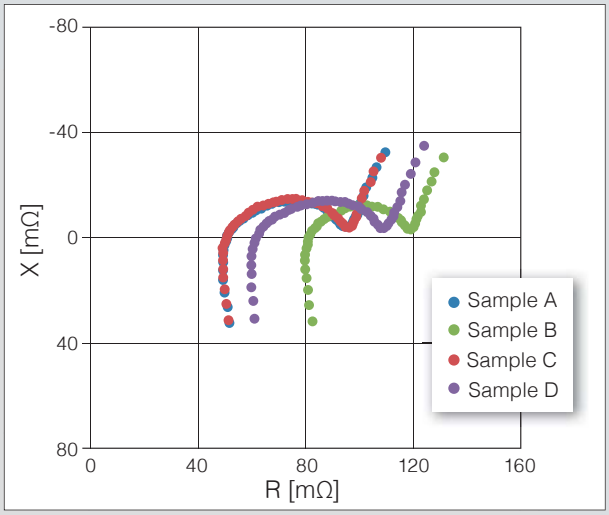
If the resistance of the battery pack is different, some of the batteries will heat up excessively, thereby lowering the capacity and accelerating deterioration.



The protective circuit works based on the cell with the lowest capacity, reducing the discharging capacity of the entire battery pack as a result.

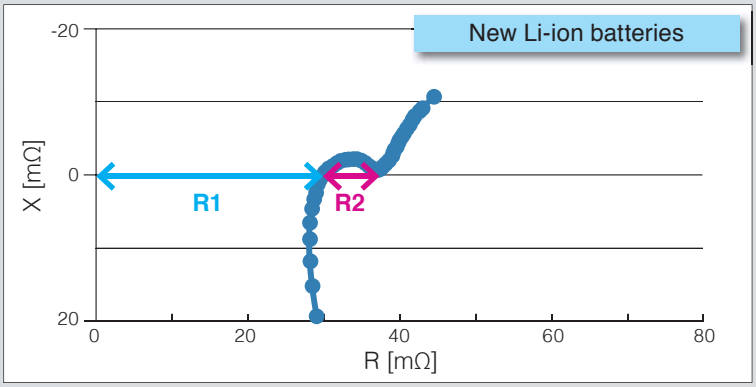
Selection is necessary for extending battery pack service life

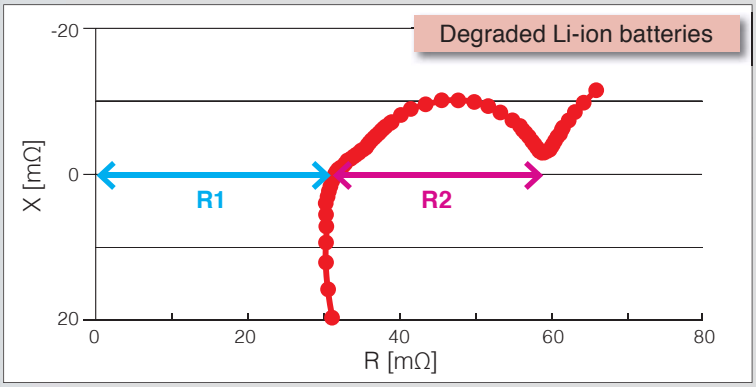
Combining cells with the same battery capacity and internal resistance equalizes heat generated, extending the service life.



The above diagram contains Cole-Cole plots for new battery cells of the same kind. A and C have almost consistent impedance characteristics.
Due to having impedance greater than A and C, B and D produce heat and deteriorate first when they are used within the same battery pack.

Checking the battery deterioration level





Compare measured data for new and deteriorated batteries

Here, Cole-Cole plot data is compared for new Li-ion battery cells (upper-left plot) and deteriorated Li-ion battery cells of the same kind (lower-left plot).

R1: Electrolyte resistance and welding resistance

R2: Reaction resistance
(Reaction resistance of positive/negative electrodes)

Comparing the new Li-ion battery with the deteriorated one confirms significant changes in the reaction resistance value.
Although much depends on the deterioration factors, in addition to heat effects, the deterioration of the electrode reactive portion appears on a graph as reaction resistance for particular applications, such as repeated charging/discharging at low temperature and repeated deep charging/discharging (SOC:Between 0 and 100%).

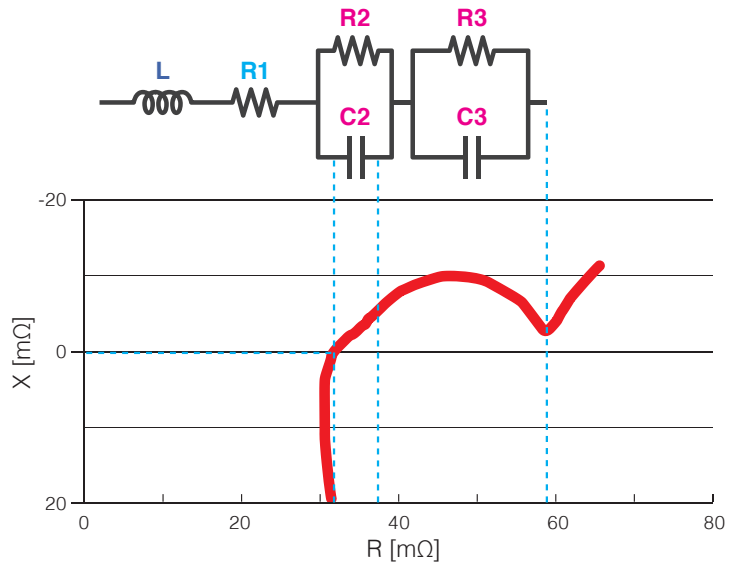
BT4560

To assess Li-on battery deterioration levels and select batteries for inclusion in manufacturing and production lines

Isolate battery deterioration factors

Cole-Cole plot data obtained by using the BT4560 and commercially-available equivalent circuit analysis software, such as "ZView®", can be used to analyze deterioration factors.

An example of a pseudo-equivalent circuit



The impedance characteristics of a Cole-Cole plot are generally expressed as a pseudo equivalent circuit.

A pseudo equivalent circuit is expressed by:

Resistance in the electrolyte and tab welding portions (R1)

Positive/negative electrode reactions within the battery (R2//C2, R3//C3)

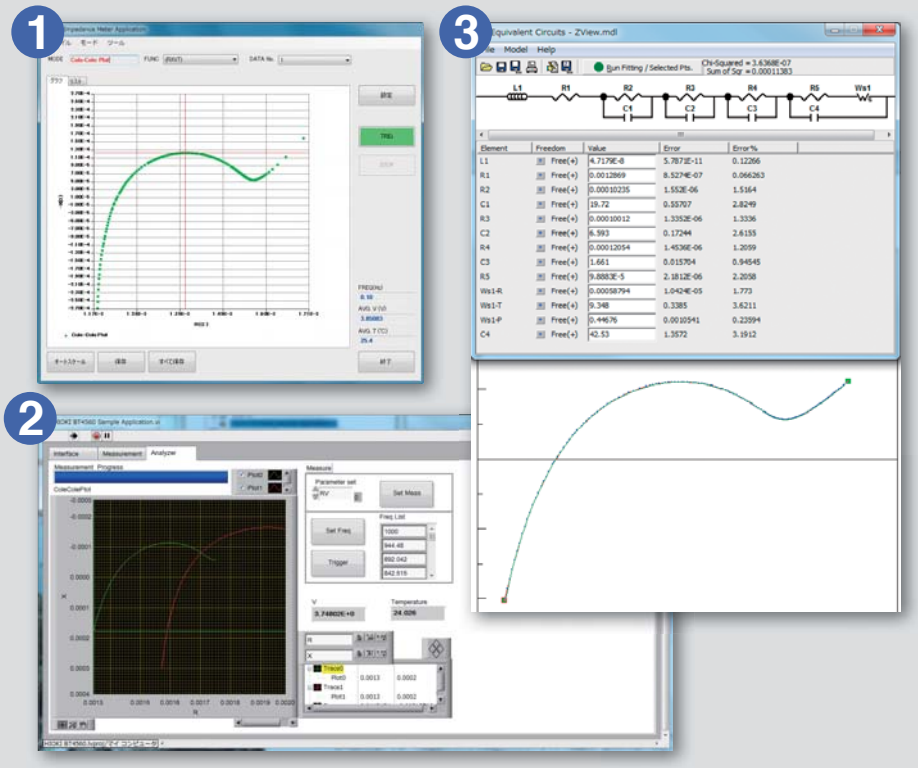
Lead and other inductance (L)

... to give just a few examples.

Once a pseudo equivalent circuit is constructed, equivalent circuit analysis software (ZView®) can provide the circuit constant of each element by means of curve fitting. Quantifying the changes in each element's constant when a battery is new and when it deteriorates allows analysis of which portions within the battery have changed. This serves to isolate battery deterioration factors.

Create Cole-Cole plots using bundled software

A free PC application that comes with the BT4560 can conduct measurement and draw Cole-Cole plots.
Additionally, "ZView®" from Scribner Associates Inc. also provides detailed analysis based on equivalent circuit analysis.



❶ Bundled PC application

Creates Cole-Cole plots. Measurement results can also be output in Excel and CSV files.

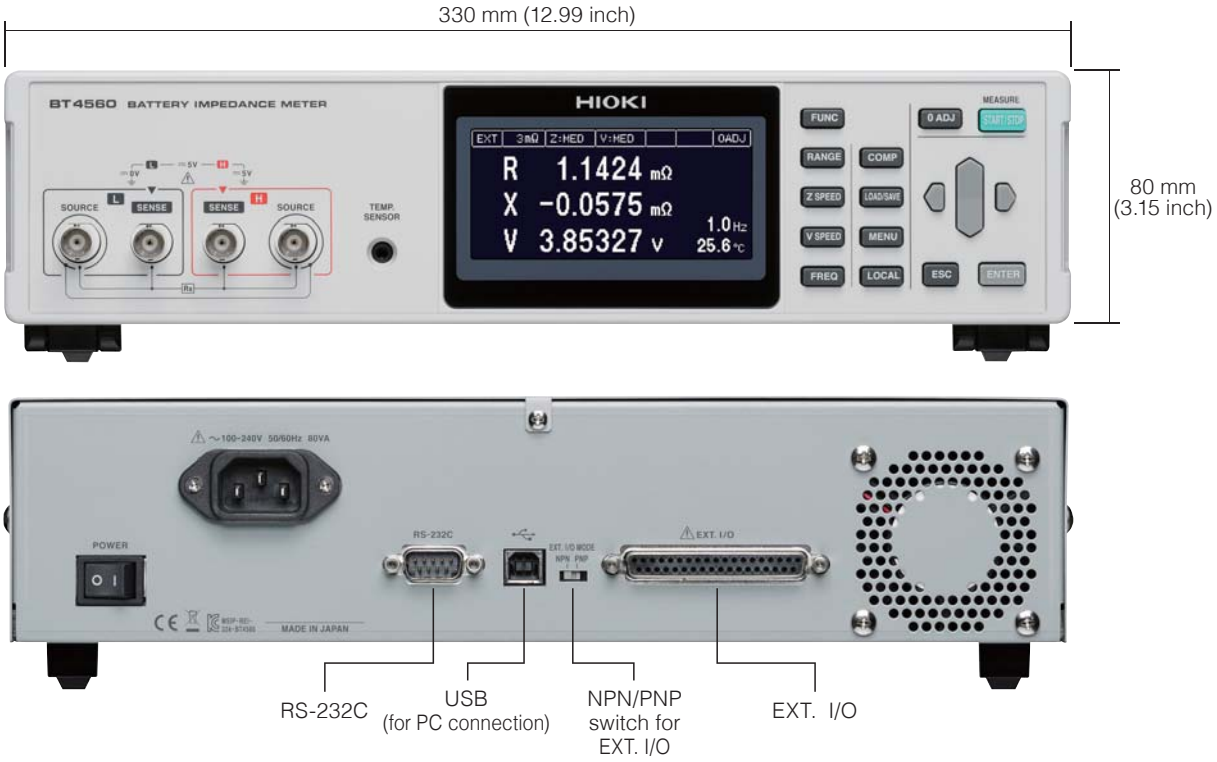
❷ Application bundled with LabView driver

Compares multiple overlaid graphs. Equipped with a simple equivalent circuit analysis function, this application also gives insight into electrolyte resistance and reaction resistance.

❸ AC impedance analysis software "ZView®"

"ZView®" creates certain equivalent circuits based on CSV files output from the above application ❶,while quantifying each element, to analyze deteriorated portions in a battery.

Characteristics and features of BT4560



All-in-one compact unit

The BT4560 requires no loading devices and provides measurements simply as a stand-alone unit, without having to establish a complicated measurement system.

Self-calibration

Correct any offset voltage and gain drift that may be present in the circuit to improve the accuracy of voltage measurement.

Sample delay*

Specify a delay between AC voltage being applied and sampling being started so that measurement can start after the response stabilizes.

Prevent charging or discharging when AC voltage is applied*

To prevent the battery that is being measured from charging or discharging, the battery impedance meter terminates the applied measurement signal when zero is crossed.

Simultaneous measurement of impedance and voltage

Reduce tact time by testing both impedance and high accuracy DC voltage at the same time.

Slope correction function*

If measurement signals drift due to the battery characteristics or the input impedance of measurement instrument, the BT4560 applies correction to the linear drift.

Temperature measurement

Reaction resistance measured at low frequency is sensitive to temperature.
An optional temperature sensor measures the temperature around the battery and associates the results with data, thereby improving the reliability of the measurements.

*Functions available during impedance measurement

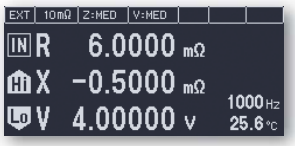
Functions to accommodate automated machines

Contact check

Monitor the contact resistance of the probe before and after measurement so that the measurement will only start when the measuring electrode on the probe is in contact with the object to be measured.

Comparator

- Simultaneously measure impedance and voltage
- Output overall determination results
- Use the two-tone buzzer to indicate determination results

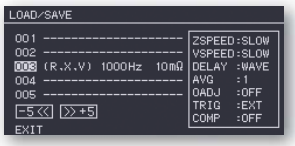


NPN/PNP switch

Switch the input/output circuits for EXT. I/O according to the type of output: current sink output (NPN) or current source output (PNP).

Panel saving and loading

Store up to 126 sets of measurement conditions in internal memory so that they can be called through EXT. I/O for future measurements.



Accuracy specifications

Impedance measurement accuracy

○ 3 mΩ range (0.1 Hz to 100 Hz), 10 mΩ range, 100 mΩ range

R accuracy = ± (0.004 |R| + 0.0017 |X|) [mΩ] ± α

X accuracy = ± (0.004 |X| + 0.0017 |R|) [mΩ] ± α

(The units of R and X are [mΩ]. α is as shown in the table below.)

Z accuracy = ± 0.4% rdg. ± α (|sinθ| + |cosθ|)

θ accuracy = ± 0.1° $\pm 57.3 \frac{\alpha}{Z}$ (|sinθ| + |cosθ|)

(α is as shown in the table below.)

○ 3 mΩ range (110 Hz to 1050 Hz)

R accuracy = ± (0.004 |R| + 0.0052 |X|) [mΩ] ± α

X accuracy = ± (0.004 |X| + 0.0052 |R|) [mΩ] ± α

(The units of R and X are [mΩ]. α is as shown in the table below.)

Z accuracy = ± 0.4% rdg. ± α (|sinθ| + |cosθ|)

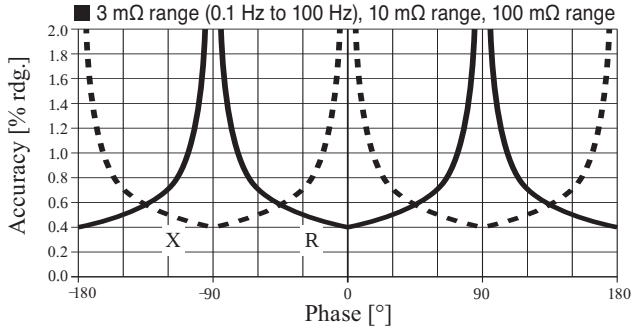
θ accuracy = ± 0.3° $\pm 57.3 \frac{\alpha}{Z}$ (|sinθ| + |cosθ|)

(α is as shown in the table below.)

		3 mΩ range	10 mΩ range	100 mΩ range
α	FAST	25 dgt.	60 dgt.	60 dgt.
	MED	15 dgt.	30 dgt.	30 dgt.
	SLOW	8 dgt.	15 dgt.	15 dgt.
Temperature coefficient		R: ± R accuracy × 0.1 / °C, X: ± X accuracy × 0.1 / °C, Z: ± Z accuracy × 0.1 / °C, θ: ± θ accuracy × 0.1 / °C, (Applied in the ranges of 0 °C to 18°C and 28°C to 40 °C)		

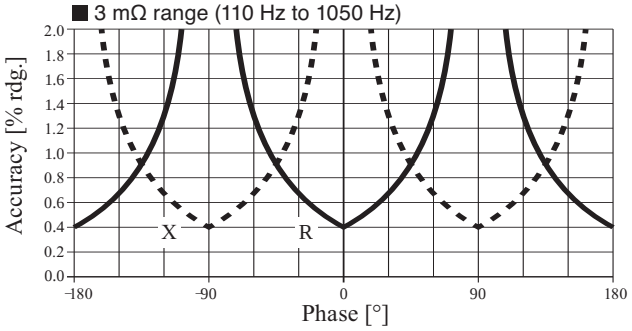
Accuracy graph

■ 3 mΩ range (0.1 Hz to 100 Hz), 10 mΩ range, 100 mΩ range



Impedance accuracy excluding α (0.004|R|+0.0017|X|, 0.004|X|+0.0017|R|)

■ 3 mΩ range (110 Hz to 1050 Hz)



Impedance accuracy excluding α (0.004|R|+0.0052|X|, 0.004|X|+0.0052|R|)

Voltage measurement accuracy (when self-calibration is performed)

V	Display range	−5.10000 V to 5.10000 V
	Resolution	10 µV
Voltage accuracy	FAST	±0.0035% rdg. ±5 dgt.
	MED	±0.0035% rdg. ±5 dgt.
	SLOW	±0.0035% rdg. ±5 dgt.
Temperature coefficient		±0.0005% rdg. ±1 dgt. /°C (applied in the ranges of 0°C to 18°C and 28°C to 40°C)

Temperature measurement accuracy (BT4560 + Z2005 temperature sensor)

Accuracy	±0.5°C (measurement temperature: 10.0°C to 40.0°C) ±1.0°C (measurement temperature: -10.0°C to 9.9°C, 40.1°C to 60.0°C)
Temperature coefficient	Temperature coefficient: ±0.01°C/°C (applied in the ranges of 0°C to 18°C and 28°C to 40°C)

BT4560 specifications (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measured signals	Impedance, voltage, temperature

Impedance measurement

Measurement parameters	R resistance, X reactance, Z impedance, θ phase angle
Measurement frequency	0.1 Hz to 1050 Hz
Frequency setting resolution	0.10 Hz to 0.99 Hz in 0.01-Hz increments 1.0 Hz to 9.9 Hz in 0.1-Hz increments 10 Hz to 99 Hz in 1-Hz increments 100 Hz to 1050 Hz in 10-Hz increments
Measurement ranges	3.0000 mΩ, 10.0000 mΩ, 100.000 mΩ

Measurement current/DC load (DC load: offset current applied to measured object during impedance measurement)

	3 mΩ range	10 mΩ range	100 mΩ range
Measurement current	1.5 Arms ±10%	500 mArms ±10%	50 mArms ±10%
DC load current	1 mA or less	0.35 mA or less	0.035 mA or less

Measurement wave number

	FAST	MED	SLOW
0.10 Hz to 66 Hz	1 wave	2 waves	8 waves
67 Hz to 250 Hz	2 waves	8 waves	32 waves
260 Hz to 1050 Hz	8 waves	32 waves	128 waves

Voltage measurement

Measurement range	5.00000 V (single range)
Resolution	10 µV
Measurement time	FAST : 0.1 s MED : 0.4 s SLOW : 1.0 s * When self-calibration is performed, 0.21s is added to the measurement time.

Temperature measurement

Display range	-10.0°C to 60.0°C
Resolution	0.1°C
Measurement time	2.3 s

Measurement functions	(R,X,V,T)/(Z,θ,V,T)/(R,X,T)/(Z,θ,T)/(V,T)
Function	Comparator, self-calibration, sample delay, average, voltage limit, potential gradient compensation for impedance measurement, charge/discharge prevention during AC signal application, key lock, system test, panel saving and loading (up t o 126 condition sets)
Measurement error detection	Contact check, measurement current error, voltage drift on measured object, overvoltage input, voltage limit
Interface	RS-232C/USB (virtual COM port) * Cannot be used simultaneously Transmission speed: 9,600 bps/19,200 bps/38,400 bps
EXT. I/O	TRIG, LOAD, Hi, IN, Lo, and others (NPN/PNP can be switched)
Allowable input voltage	Up to 5 V
Operating temperature and humidity range	0°C to 40°C, 80% RH or less (no condensation)
Storage temperature and humidity range	-10°C to 50°C, 80% RH or less (no condensation)
Operating environment	Indoor, pollution degree 2, altitude up to 2,000 m
Power supplies	Rated supply voltage: 100 to 240 VAC Rated supply frequency: 50/60 Hz
Rated power	80 VA
Dielectric strength	1.62 kVAC, 1 min, cutoff current 10 mA (Between power supply terminal lump and protective ground)
Applicable standards	Safety: EN61010 EMC: EN61326, EN61000-3-2, EN61000-3-3
Dimensions and mass	Approx. 330W × 80H × 293D mm (12.99W × 3.15H × 11.54D in), Approx. 3.7 kg (130.5 oz)
Accessories	Power cord ×1, instruction manual ×1, zero-adjustment board ×1, USB cable (A-B type) ×1, CD-R (communication instruction manual, PC application software, USB driver) ×1

Instrument

Model : BATTERY IMPEDANCE METER BT4560

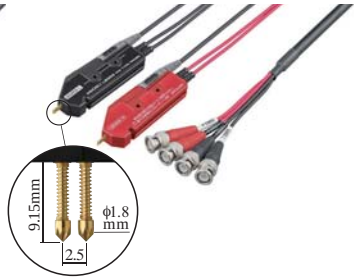
Model No. (Order Code) (Note)

BT4560

Note: This product is not supplied with measurement probes. Please select and purchase the measurement probe options appropriate for your application separately.

Options

CLIP TYPE PROBE L2002
Cable length 1.5 m (4.92 ft)



PIN TYPE PROBE L2003
Cable length 1.5 m (4.92 ft)

TEMPERATURE SENSOR Z2005
Cable length 1 m (3.28 ft)

RS-232C CABLE 9637
For the PC, 9 pins - 9 pins, cross,
Cable length 1.8 m (5.91 ft)

Custom specification line-up

				Measurement frequency	
				Standard 0.10 Hz to 1050 Hz	Custom 0.01 Hz to 1050 Hz
Measurement voltage	Standard	5 V (±5.10000 V)	Measuring range: 3mΩ/10 mΩ/100 mΩ Measurement current: 1.5 A/500 mA/50 mA	Standard specification	Custom specifications 1
	Custom	10 V (±9.99999 V)	Measuring range: 30 mΩ/300 mΩ Measurement current: 500 mA/50 mA	Custom specifications 2	Custom specifications 3
	Custom	20 V (–1.00000 V to 20.40000 V)	Measuring range: 30 mΩ/300 mΩ/3 Ω Measurement current: 150 mA/50 mA/5 mA	Custom specifications 4	Custom specifications 5

Custom-made options

4-TERMINAL PROBE L2000
Cable length 1 m (3.28 ft)

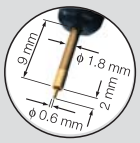
Custom-made SET options

BNC-Banana Plug Transducer

+

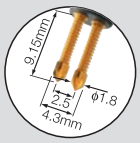
PIN TYPE PROBE 9770, 9771, 9772
Cable length 0.85 m (2.8 ft)

Probe tip shape



9770

9771



9772

Measure electrochemical parts and materials

For property evaluation of electrodes and electrolyte

Model : CHEMICAL IMPEDANCE ANALYZER IM3590

Model No. (Order Code)

IM3590

Measurement range : 100 mΩ to 100 MΩ
Measurement frequency : 1 mHz to 200 kHz

HIOKI
HIOKI E.E. CORPORATION

HIOKI

BATTERY HiTESTER BT3563, BT3562, 3561

Simultaneous high-speed measurement of internal resistance and battery voltage

From large-cell to high-voltage battery testing - HIOKI is The Choice

The **BT3563, BT3562,** and **3561 BATTERY HiTESTERs** support simultaneous high-speed measurement of internal resistance (IR) and battery voltage (OCV) for the ever-expanding production lines of increasingly larger lithium-ion low resistance batteries, and other battery packs for high voltage applications.

- Measure high-voltage battery packs up to 300V (with the BT3563)
- Ideal for high-precision cell voltage measurements (accurate to 0.01% of reading)
- Measurement circuitry employs enhanced current regulation
- Fast 10 ms response and 8 ms sampling time for high-speed measurements (with the BT3563 and BT3562)
- Ranges from 3 mΩ to 3000 Ω (with the BT3563 and BT3562) support coin-size to large-cell batteries

CE

Resistance and voltage measurements

BATTERY HiTESTER BT3563
BT3562
3561

■ Measurement Parameters and Applications

BATTERY HiTESTER BT3563
BATTERY HiTESTER BT3562

- High-voltage battery pack testing
- Battery module testing
- Large (low-resistance) cell testing
- High-speed mass production testing of coin batteries
- Fuel cell stack measurements
- Battery research and development measurement applications

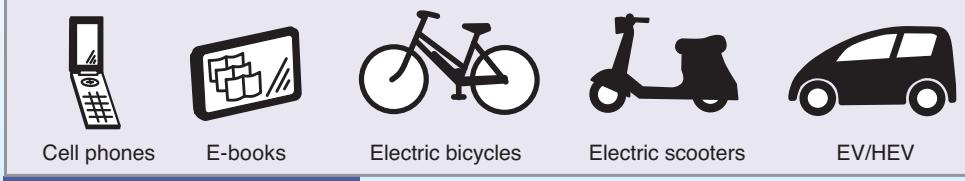
BT3563 Up to **300V**

BT3562 Up to **60V**

Voltage measurement ranges: 6V/60V/300V (BT3563)
6V/60V (BT3562)

Resistance measurement ranges: 3mΩ/30mΩ/300mΩ/
3Ω/30Ω/300Ω/3000Ω

Lithium-Ion and Secondary Batteries



Battery-Powered Devices

■ Advanced Functions

● Four-Terminal AC Method

The four-terminal, 1-kHz AC method uses four contact probes to measure resistance independently of that of the measurement leads.

● Measurement Error Detection

Detects test probe contact failure and broken leads, for 100% measurement reliability.

● Self-Calibrating

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

● Averaging Function

Stable readings can be consistently obtained by averaging two to 16 measurements.

to confirm finished quality

Features of Battery HiTester Series

High Precision

Resistance
±0.5% rdg. ±5 dgt.
Voltage
±0.01% rdg. ±3 dgt.

Common to the BT3563, BT3562 and 3561

High Resolution

Resistance: 0.1 μΩ*1
(3 mΩ range)
Voltage: 10 μV*1
(6 V range)

*1 BT3563 and BT3562

Quick Response

Resistance & Voltage
Simultaneous measurements
within 18 ms*2

*2 Sampling time + response time:
with EX.FAST sampling
BT3563 and BT3562

- The 3 mΩ range (with 0.1 μΩ resolution) is ideal for testing ever lower-resistance large cells (BT3563 and BT3562).
- The 6 V range (with 10 μV resolution and 0.01% accuracy) is ideal for the high-precision voltage measurements required for cell testing (BT3563 and BT3562).

- Provides high-speed measurement of high-voltage*3 battery packs, for improving productivity (BT3563).

*3 BT3563: up to 300V
BT3562: up to 60V

Measurement Parameters and Applications

BATTERY HiTESTER 3561

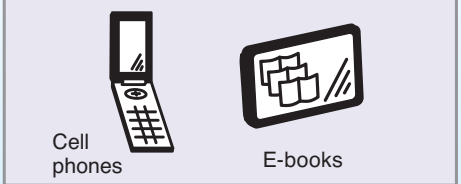
- For high-speed production line testing of small battery packs for mobile and portable communications devices
- For high-speed production line testing of small cells

3561
Up to
20V

- High-speed 10ms inspection in the 300mΩ and 3Ω ranges
- Improve inspection efficiency during mass production of compact cells

Voltage measurement ranges: 20V
Resistance measurement ranges: 300mΩ/3Ω

Lithium-Ion and Secondary Batteries



Battery-Powered Devices

Quick Response
with small cell measurement

Resistance & Voltage
Simultaneous measurements
within 10 ms*4

*4 Sampling time + response time:
with EX.FAST sampling
3561

Battery HiTester Series

- Measurement Value Storage

Store up to 400 measurement values by external trigger input, for bulk transfer to a computer.

- Statistical Calculations

Apply statistical calculations to up to 30,000 data points to facilitate process and quality control.

- Save Measurement Setting Configurations

Up to 126 measurement configurations such as comparator setting criteria can be saved and reloaded. Saved configurations can be selected by external control.

Automatic Testing Lines

■ High Speed Interfaces

The fastest 10 ms measurement data can be transferred via the standard RS-232C interface at up to 38,400 bps.
Models with the -01 suffix include a GP-IB interface.

■ Handler Interface

Triggering, measurement configuration loading, and zero adjustment can be externally controlled. Output signals provide comparator results, end-of-measurement events, and measurement errors. (Because the BT3563/BT3652 are different from the 3561, consult each model's Instruction Manual for specific details or designs.)

BT3563, BT3562 and 3561 External I/O Items	
Input (no-voltage contacts*1)	Output (open collector*1)
• Measurement trigger ($\overline{\text{TRIG}}$) • Print ($\overline{\text{PRINT}}$) • Zero adjustment ($\overline{\text{0ADJ}}$) • Calibrate ($\overline{\text{CAL}}$) • Manual comparator ($\overline{\text{MANU}}$) • Load panel settings (7 bits) ($\overline{\text{LOAD0}}$ to $\overline{\text{LOAD6}}$)	• End-of-Measurement ($\overline{\text{EOM}}$) • Measurement-in-progress ($\overline{\text{INDEX}}$) • Comparator results ($\overline{\text{R-Hi}}$, $\overline{\text{R-IN}}$, $\overline{\text{R-Lo}}$, $\overline{\text{V-Hi}}$, $\overline{\text{V-IN}}$, $\overline{\text{V-Lo}}$, $\overline{\text{PASS}}$, $\overline{\text{FAIL}}$*2) *2 $\overline{\text{FAIL}}$ is BT3563 and BT3562 only • Measurement error ($\overline{\text{ERR}}$) • General-purpose output ($\overline{\text{OUT1}}$ to $\overline{\text{OUT9}}$) (only 3561)

*1 The input and output signals of the BT3563 and BT3562 are isolated via photoocuplers.

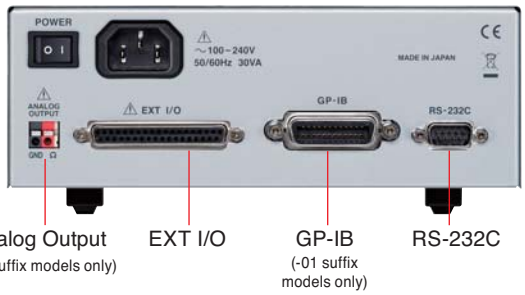
■ EXT I/O Connectors (BT3563 and BT3562, accessories not supplied)

Installed connector (HiTester side):	37-pin D-SUB accepts #4-40 screws
Mating connectors:	DC-37P-ULR (solder type) or DCSP-JB37PR (welded type) from Japan Aviation Electronics Industry, Ltd., or equivalent

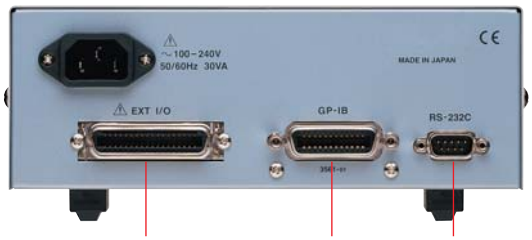
■ EXT I/O Connectors (3561, accessories not supplied)

Installed connector (HiTester side):	57RE-40360-730B (D29) (DDK)
Mating connectors:	57-30360 (DDK), RC30-36P (Hirose Electric Co., Ltd.), or equivalent

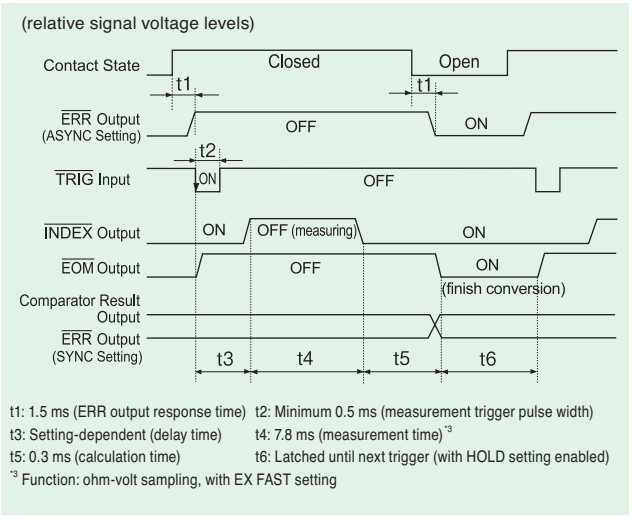
BT3563-01 and BT3562-01 Rear Panel



3561-01 Rear Panel



■ BT3563 and BT3562 External I/O Timing Chart



t1: 1.5 ms (ERR output response time) t2: Minimum 0.5 ms (measurement trigger pulse width)
t3: Setting-dependent (delay time) t4: 7.8 ms (measurement time)*3
t5: 0.3 ms (calculation time) t6: Latched until next trigger (with HOLD setting enabled)
*3 Function: ohm-volt sampling, with EX FAST setting

■ Comparator Functions

● Judges Resistance & Voltage Simultaneously

Resistance and voltage can be simultaneously judged Hi/IN/Lo by independent comparators. Judgment results are provided on the display, beeper, and external I/O. The display allows confirming both results at a glance.

Resistance comparator settings

Voltage comparator settings

● Composite Judgment Result Output

External I/O provides both separate and combined outputs of resistance and voltage judgment results, so composite results can be monitored.

● Alternative Setting Methods

Set judgment thresholds by specifying high/low (Hi/Lo) values or by specifying a standard value and deviation (%).

● Manual Comparator

Comparator judgments can be executed only when required, supporting flexible control by footswitch or PLC.

● Dual Beep Tones

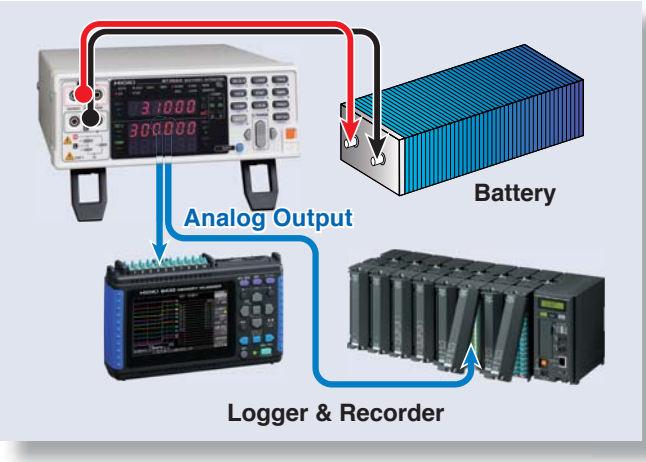
Different beep tones distinguish IN and Hi/Lo judgments. Both tones can be independently enabled or disabled.

Multiple Recording Methods

■ Analog Output (BT3563-01 and BT3562-01 only)

The BT3563-01 and BT3562-01 provide analog output of resistance measurement values. This is convenient for combining recorded data from multiple locations or of various data types, such as for logging long-term measurements and for fuel cell evaluation.

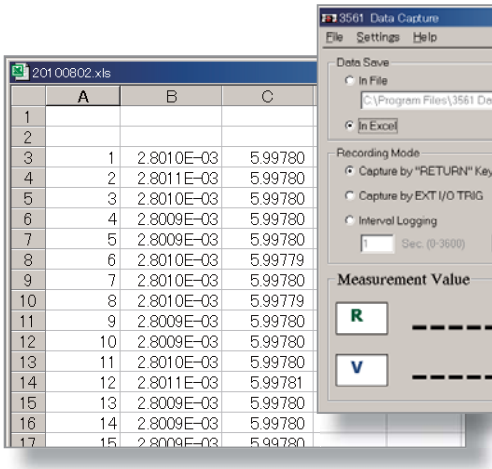
Output contents	Measured resistance (displayed value)
Output rate	0 to 3.1 V DC (corresponding to displayed value of 0 to 31000)
Resolution	12 bits
Response time	10 ms



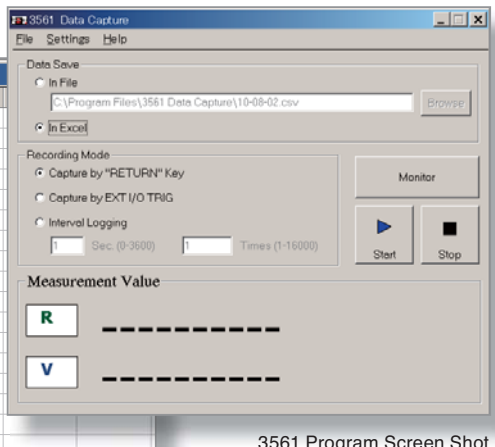
■ PC Application Program

Measurement data can be transferred to a PC for importing to a spreadsheet program or storage as CSV files. Interval and manual measurements can be triggered by a keystroke or external trigger signal.

Download the PC application program from our website:
http://www.hioki.com/



Excel Import Example



3561 Program Screen Shot

■ Data Printing

Measurement values, and those including judgment results and statistical calculation results can be printed using an RS-232C-compatible printer.

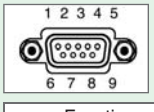
● Interval Printing

Elapsed time and measurement values can be printed over a specified interval. The interval can be set from 1 to 3,600 seconds.

● Requirement specification (printer)

The requirements for a printer to be connected to the instrument are as follows. Confirm compatibility and make the appropriate settings on the printer before connecting it to the instrument.

Interface	: RS-232C
Characters per line	: At least 40
Communication speed	: 9600 bps
Data bits	: 8
Parity	: none
Stop bits	: 1
Flow control	: none

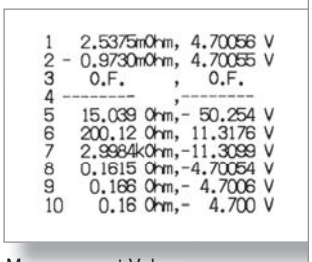


BT3563/BT3562/3561 (9-pin) Connector

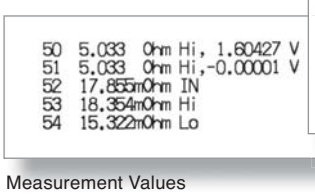
Function	Signal name	Pin
Receive Data	R x D	2
Transmit Data	T x D	3
Signal or Common Ground	GND	5

ASCII data will be sent from the BT3563/BT3562/3561. Please use a printer that can output plain text.
For the RS-232C cable, the connector at the instrument end should be a molded type. The metal type (with hooks preventing the surface from being flat) will not fit due to the instrument's design.

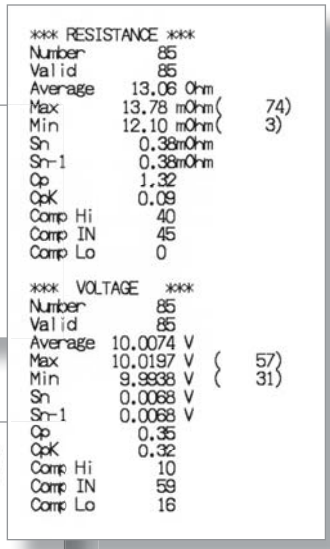
Printout Examples



Measurement Values



Measurement Values and Judgment Results



Statistical Calculations and Judgment Results

Specifications

BT3563,BT3562 and 3561 Specifications

Measurement types	Resistance and voltage
Resistance measurement method	Four-terminal AC (1 kHz) method
Functions	ΩV, Ω and V
Rated voltage	[BT3563(-01)] ±300 VDC rated input voltage ±300 VDC maximum rated voltage to ground [BT3562(-01)] ±60 VDC rated input voltage ±70 VDC maximum rated voltage to ground [3561(-01)] ±22 VDC rated input voltage ±70 VDC maximum rated voltage to ground
Input resistance	[BT3563(-01) and BT3562(-01)] 3 mΩ/30 mΩ/300 mΩ ranges: Approx. 90 kΩ 3 Ω/30 Ω/300 Ω/3000 Ω ranges: Approx. 1 MΩ [3561(-01)] Approx.1MΩ
Sampling rate	Four steps – Extra Fast, Fast, Medium or Slow
Response time	[BT3563(-01) and BT3562(-01)] Approx. 10 ms for measurements Note: Response time depends on reference values and the measurement object. [3561(-01)] Approx. 3 ms for 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 Save Frequently Used Settings in Memory: 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.
Analog Output	[BT3563-01 and BT3562-01 only] Measured resistance (displayed value, from 0 to 3.1 VDC)
External interface	External I/O, RS232C (9600, 19200 or 38400 bps), Printer RS-232C (all models), GP-IB (Model BT3563-01, BT3562-01 and 3561-01 only)
Other functions	Over-range display, measurement error detection, self-calibration, dual comparators, key-lock

BT3563,BT3562 and 3561 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 ±5˚C, 80% rh or less (non-condensating)
Operating conditions	Indoors, below 2000 m ASL
Rated supply voltage	100 to 240 VAC (auto-selecting)
Rated supply frequency	50/60 Hz
Rated power consumption	30 VA

Insulation withstand potential	[BT3563(-01), BT3562(-01)] 1.39 kV AC for 15 s (with 10 mA cut-off current) between all mains supply terminals and protective ground terminal 2.224 kV AC for 15 s (with 1 mA cut-off current) between all measurement jacks and interfaces 1.39 kV AC for 15 s (with 1 mA cut-off current) between all measurement jacks and protective ground terminal [3561(-01)] 1.69 kVAC for 15 s (with 10 mA cutoff current) between all mains supply terminals and protective ground, interfaces, and measurement jacks
Dimensions	Approx. 215W × 80H × 295D mm (without projections)
Mass	Approx. 2.4 kg
Accessories	Power Cord (1)
Applicable Standards	Safety EN61010-1 EMC EN61326 EN61000-3-2 EN61000-3-3

BT3563 and BT3562

[Sampling Times]

Function		EX.FAST	FAST	MEDIUM	SLOW
ΩV	(50 Hz)	8 ms	24 ms	84 ms	259 ms
	(60 Hz)			70 ms	253 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.

3561

Function		EX.FAST	FAST	MEDIUM	SLOW
ΩV	(50 Hz)	7 ms	23 ms	83 ms	258 ms
	(60 Hz)			69 ms	252 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.

■ Measurement Ranges and Accuracy (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

● BT3563,BT3562 and 3561 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.

● About Accuracy

Accuracy is calculated from the reading error (±% rdg.) determined by the measurement value and range, and the digit error (± dgt.).

Calculation Example

Measurement value: 1 Ω, Measurement range: 3 Ω
Specified accuracy (from table below): ±0.5% rdg., ±5 dgt.
(A) Reading error (±% rdg.): 1 [Ω] × 0.5% = ±0.005 [Ω]
(B) Digit error (± dgt.): ±5 dgt. = ±0.0005 [Ω] (at 0.0001 Ω resolution)
(C) Total error (A + B): ±0.0055 [Ω]
Applying total error (C) to the measurement value of 1 Ω gives an error limit of 0.9945 to 1.0055 Ω.

● BT3563 and BT3562

[Resistance Measurement]

Range	3 mΩ	30 mΩ	300 mΩ	3 Ω	30 Ω	300 Ω	3000 Ω
Maximum display Value	3.1000 mΩ	31.000 mΩ	310.00 mΩ	3.1000 Ω	31.000 Ω	310.00 Ω	3100.0 Ω
Resolution	0.1 μΩ	1 μΩ	10 μΩ	100 μΩ	1 mΩ	10 mΩ	100 mΩ
Measurement Current*1	100 mA	100 mA	10 mA	1 mA	100 μA	10 μA	10 μA
Measurement Current Frequency	1 kHz ±0.2 Hz						
Accuracy*2	±0.5% rdg. ±10 dgt.	±0.5% rdg. ±5 dgt.					
Temperature coefficient	(±0.05% rdg. ±1 dgt.) / ºC	(±0.05% rdg. ±0.5 dgt.) / ºC					
Open-Circuit Voltage	25 Vpeak		7 Vpeak	4 Vpeak			

*1 Measurement current accuracy is ±10%.
*2 30 mΩ to 3000 Ω ranges: Add ±3 dgt. for EX FAST, or ±2 dgt. for FAST and MEDIUM
3mΩ range: Add ±30 dgt. for EX FAST, or ±10 dgt. for FAST , or ±5 dgt. for MEDIUM

[Voltage Measurement]

Range	6 V	60 V	300 V (only BT3563)
Maximum display Value	±6.00000 V	±60.0000 V	±300.000 V
Resolution	10 μV	100 μV	1 mV
Accuracy*3	±0.01% rdg. ±3 dgt.		
Temperature coefficient	(±0.001% rdg. ±0.3 dgt.) / ºC		

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

● 3561

[Resistance Measurement]

Range	300 mΩ	3 Ω
Maximum display Value	310.00 mΩ	3.1000 Ω
Resolution	10 μΩ	100 μΩ
Measurement Current*4	10 mA	1 mA
Measurement Current Frequency	1 kHz ±0.2 Hz	
Accuracy*5	±0.5% rdg. ±5 dgt.	
Temperature coefficient	(±0.05% rdg. ±0.5 dgt.) / ºC	
Open-Circuit Voltage	7 Vpeak	

*4 Measurement current accuracy is ±10%.
*5 Add ±3 dgt. for EX FAST, or ±2 dgt. for FAST and MEDIUM
*6 Add ±3 dgt. for EX FAST, or ±2 dgt. for FAST and MEDIUM

● 3561

[Voltage Measurement]

Range	20V
Maximum display Value	±19.9999 V
Resolution	0.1 mV
Accuracy*6	±0.01% rdg. ±3 dgt.
Temperature coefficient	(±0.001% rdg. ±0.3 dgt.) / ºC

Option Configurations

Main unit

Model : BATTERY HiTESTER BT3563

Model No. (Order Code)	(Note)
BT3563	
BT3563-01	(with GP-IB and analog output)

Model : BATTERY HiTESTER 3561

Model No. (Order Code)	(Note)
3561	
3561-01	(with GP-IB interface)

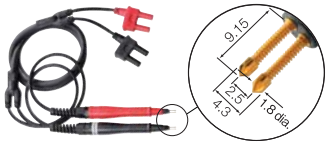
Model : BATTERY HiTESTER BT3562

Model No. (Order Code)	(Note)
BT3562	
BT3562-01	(with GP-IB and analog output)

- 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 (measurement leads)

Measurement lead (for measuring high voltage batteries with Models BT3563 and BT3562)



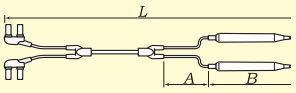
PIN TYPE LEAD L2100
A:300 mm, B:172 mm, L:1400 mm
for high voltage battery measurements,
600 VDC max., BT3563 and BT3562 only

Zero adjustment board (for L2100 only)

ZERO ADJUSTMENT BOARD 9454
for L2100 only

Cannot be used for zero adjusting the 9770 and 9771 Pin Type Leads

About probe length



A: between junction and probe
B: probe length
L: between connector and probe tip

Measurement leads (for measuring batteries up to 60 V with BT3563, BT3562, or 3561)

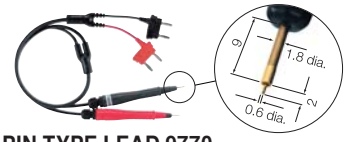
CLIP TYPE LEAD L2107
A:130 mm, B:83 mm, L:1100 mm, 70 VDC

FOUR TERMINAL LEAD 9453
A:280 mm, B:118 mm, L:1360 mm, 60 VDC

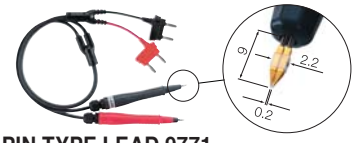
LARGE CLIP TYPE LEAD 9467
A:300 mm, B:116 mm, L:1360 mm, 50 VDC

Mainly for Small Secondary Batteries (with very small terminals)

1.8 mm dia. single-axis type for measuring small electrodes	0.2 mm parallel pyramid-type pins for measuring at thru holes and sub-millimeter objects



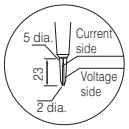
PIN TYPE LEAD 9770 9770 tip shape
A:260 mm, B:140 mm, L:850 mm,
70 VDC



PIN TYPE LEAD 9771 9771 tip shape
A:260 mm, B:138 mm, L:850 mm,
70 VDC

Measurement leads (3561 only)

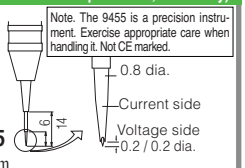
CLIP TYPE LEAD 9452
A:220 mm, B:197 mm, L:1360 mm



9452 tip shape

Measurement leads (for maximum precision, 3561 only)

PIN TYPE LEAD 9455
A:260 mm, B:136 mm, L:890 mm



9455 pin (enlarged)

Options (Interface Cables)

Interface (RS-232C and GP-IB) Connection cables

RS-232C CABLE 9637
9- to 9-pin crossover, 1.8 m

RS-232C CABLE 9638
9- to 25-pin crossover, 1.8 m

GP-IB CONNECTOR CABLE 9151-02
2 m

HIOKI
HIOKI E.E. CORPORATION

HIOKI

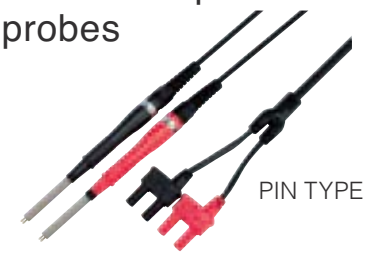
BATTERY HiTESTER BT3564

NEW Preview

Maximum input voltage 1000V

Internal resistance and voltage testing of increasingly high voltage EV battery packs

- ○Measure EV and PHEV battery packs
- ○0m Ω to 3k Ω internal resistance range
  (Pack total resistance, bus bar resistance)
- ○1000V-compliant measurement probes



PIN TYPE LEAD L2110
(option)

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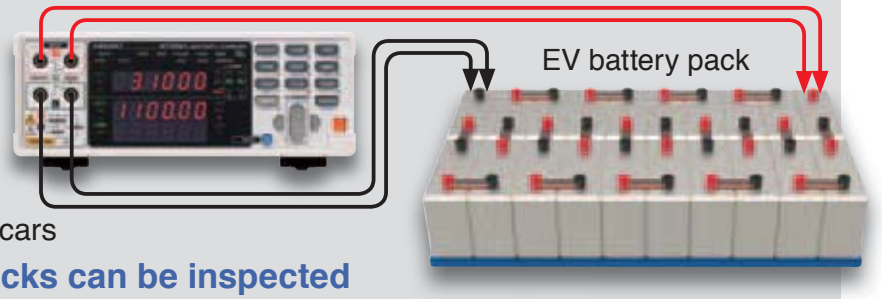
Shipping and acceptance inspections of EV, PHEV battery packs

Input voltage
1000V



EV buses, trucks and passenger cars

All EV and PHEV battery packs can be inspected

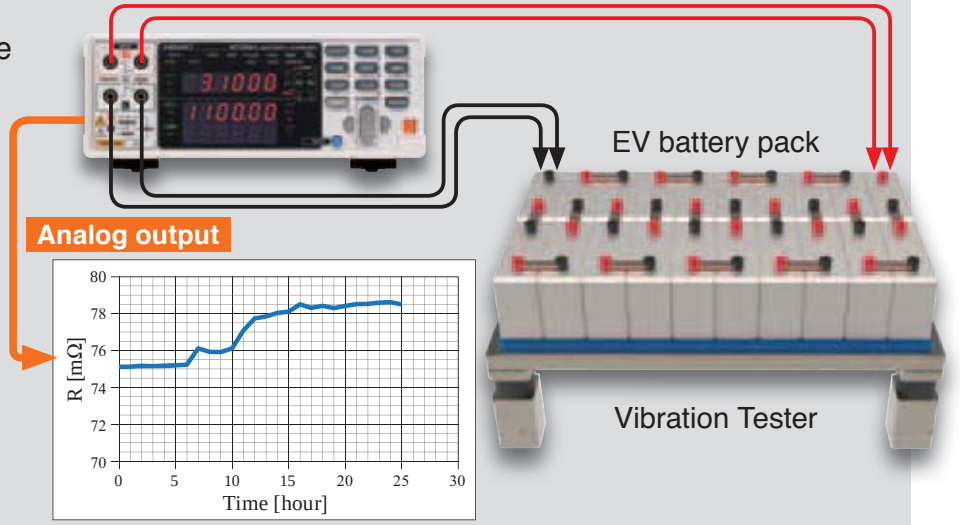
Monitor total resistance using analog output function

○Fluctuation of total resistance during vibration tests

To ensure the battery pack's stability against vibrations while driving EV or PHEV, proper testing is critical.

○Simultaneously record temperature captured by a recorder or logger

Record variations in total resistance caused by temperature or humidity changes in the environment.



BT3564 specifications (Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Measured signals	Impedance, voltage

Resistance measurement

Measurement range	3 mΩ, 30 mΩ, 300 mΩ, 3 Ω, 30 Ω, 300 Ω, 3 kΩ
Display Count	±31000
Accuracy *	±0.5% rdg. ±10 dgt. (3 mΩ) ±0.5% rdg. ±5 dgt. (others)
Measurement frequency	1kHz ±0.2Hz

Voltage measurement

Measurement range	10 V	100 V	1000 V
Display range	±9.99999 V	±99.9999 V	±999.999 V ±1100.00 V
Accuracy *	±0.01% rdg. ±3 dgt.		
Guaranteed accuracy range	±9.99999 V	±99.9999 V	±999.999 V

*Sampling rate : SLOW, Average : 4

Analog output

Output	Resistance measurement value (display value)
Output voltage	DC 0 V to DC 3.1 V (corresponding to the count value 0 to 31000)

Function	Comparator, self-calibration, trigger, delay, average, zero-adjust, statistical operations, data memory/mass send, key lock, power frequency setting, panel save, reset
Measurement error detection	SOURCE Connection anomaly between high-low SENSE Connection anomaly between high-low
Interface	RS-232C, GP-IB
EXT. I/O	TRIG, EOM, LOAD, Hi, IN, Lo, and others
Operating temperature and humidity range	0°C to 40°C, 80% RH or less (no condensation)
Storage temperature and humidity range	-10°C to 50°C, 80% RH or less (no condensation)
Power supplies	Rated supply voltage: 100 to 240 VAC Rated supply frequency: 50/60 Hz
Rated power	30 VA
Applicable standards	Safety : EN61010-1, EN61010-2 EMC : EN61326-1, Class A
Dimensions and mass	Approx. 215W × 80H × 329D mm (8.46W × 3.15H × 12.95D in), Approx. 2.6 kg (91.7 oz)
Accessories	Power cord ×1, instruction manual ×1

NEW

Maximum input voltage 1000V.
Measure battery packs for EV and PHEV.

Model : BATTERY HiTESTER BT3564

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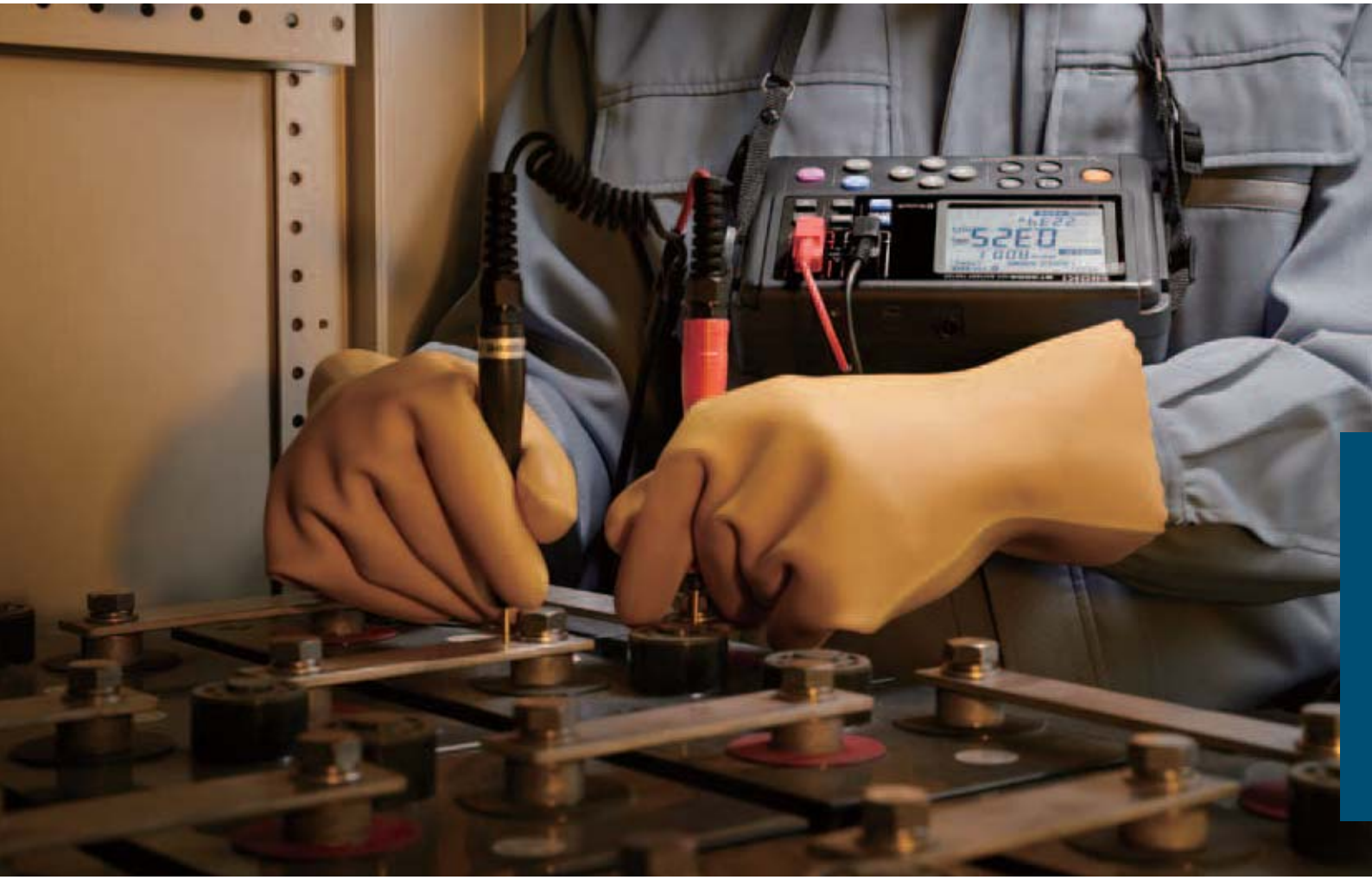
BATTERY TESTER BT3554

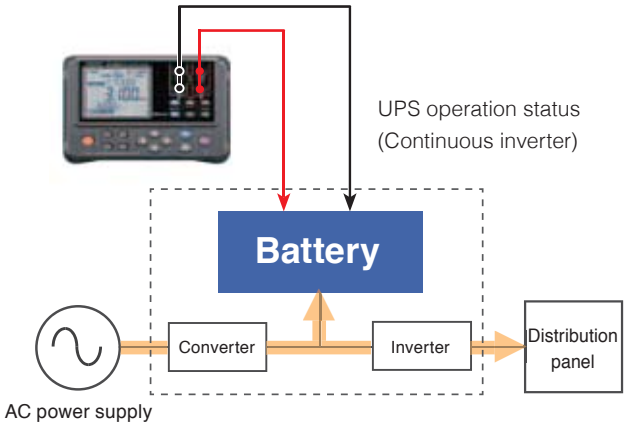
Even Speedier Diagnosis of the Deterioration of Lead-acid Batteries

Measure and save data in as fast as 2 seconds, a 60% improvement from the legacy 3554
Easily create reports on your tablet or smartphone



Use Noise Reduction Technology to Reliably Measure UPS Operation

Voltage | Resistance | Temperature



CE

Bluetooth®
Please see www.hioki.com for list of supported regions.
For BT3554-01

3 year Guarantee

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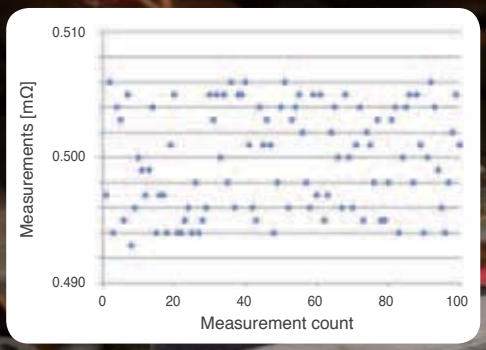
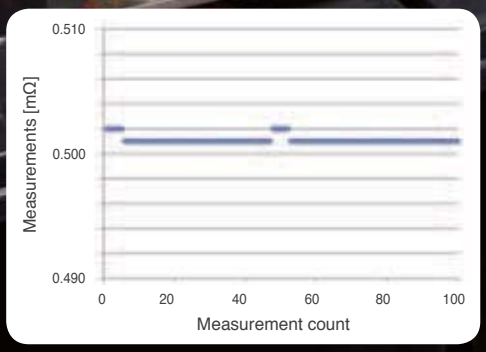
Improved Noise Resistance

Comparison of superimposed noise



Without noise reduction technology



With noise reduction technology

Use the New Test Lead for the Back of Distribution Panels and Other Hard-to-reach Places

The innovative L-shape design makes it easier to connect the test lead to electrode terminals, decreasing time spent measuring batteries.

PIN TYPE LEAD L2020
(Optional accessory sold separately)

New innovation

Test Leads to Fit your Application

PIN TYPE LEAD L2020

New innovation

TIP PIN 9465-90
(For the L2020, 9465-10)

A: 70 mm (2.76 in) (Red), 150 mm (5.91 in) (Black, up to 630 mm (24.8 in))
B: 164 mm (6.46 in), L: 1941 mm (76.42 in) (Red)

PIN TYPE LEAD 9465-10 (Bundled accessory)

TIP PIN 9465-90
(For the L2020, 9465-10)

A: 45 mm (1.77 in) (Red), 105 mm (4.13 in) (Black, up to 515 mm (20.28 in))
B: 176 mm (6.93 in), L: 1883 mm (74.13 in)(Red)

PIN TYPE LEAD 9772

TIP PIN 9772-90
(For the 9772)

A: 45 mm (1.77 in) (Red), 105 mm (4.13 in) (Black, up to 515 mm (20.28 in))
B: 173 mm (6.81 in), L: 1880 mm (74.02 in)(Red)

REMOTE CONTROL SWITCH 9466

Press the key to hold or save the measurement.
Cable length: Approx. 2 m

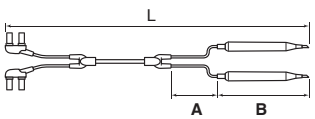
CLIP TYPE LEAD WITH TEMPERATURE SENSOR 9460

A: 300 mm (11.81 in)
B: 106 mm (4.17 in)
L: 2268 mm (89.29 in)

LARGE CLIP TYPE LEAD 9467

A: 300 mm (11.81 in)
B: 116 mm (4.57 in)
L: 1360 mm (53.54 in)
Large clip diameter: Approx. φ29 mm (1.14 in)

Regarding probe length



A: Between split to probe, **B**: Probe length, **L**: Total length

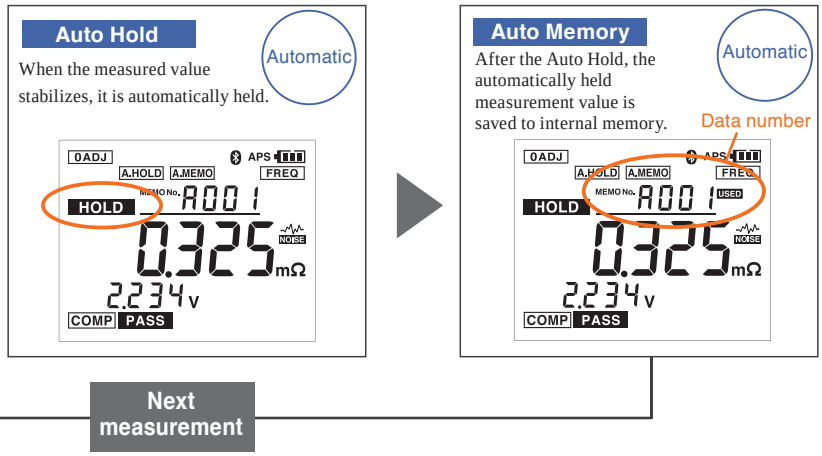
Quickly Save Data and Create Reports Right in the Field

Just connect the test lead to the terminal

Easily save data

When the measured value stabilizes, save it automatically without having to operate the switch. Wait time can be as short as only 2 seconds to auto-save from when the test leads make contact with the battery terminals, **cutting time by 60%** compared to the legacy product .

Connect to the voltage terminal and measure



Instantly submit loaded data

Create reports on-site

Dedicated application available

Not only can you view the data you loaded from the BT3554 into a tablet, smartphone, or PC in ledger format, you can also graph the data to display it by cubicle (up to 500 data sets). Then, instantly create reports on-site.

Data transfer

Transfer the data saved in the BT3554's internal memory to your tablet or PC via USB/Bluetooth®

Graph display

Report display

How to download the application:

● Tablet or smartphone

Download it from the App Store® for iPhone® or iPad®, or download it from the Google Play™ Store for Android™ devices.
Just search for "GENNECT Cross".

■ Data can be downloaded to tablets and smartphones using Hioki's dedicated apps available from the Google Play or App Store. Search for "HIOKI" and download the "GENNECT Cross" app.

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Download on the App Store

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*For the latest information about countries and regions where wireless operation is currently supported, please visit the Hioki website.

● PC

Bundled CD-R, Download from our homepage.

Interface specifications

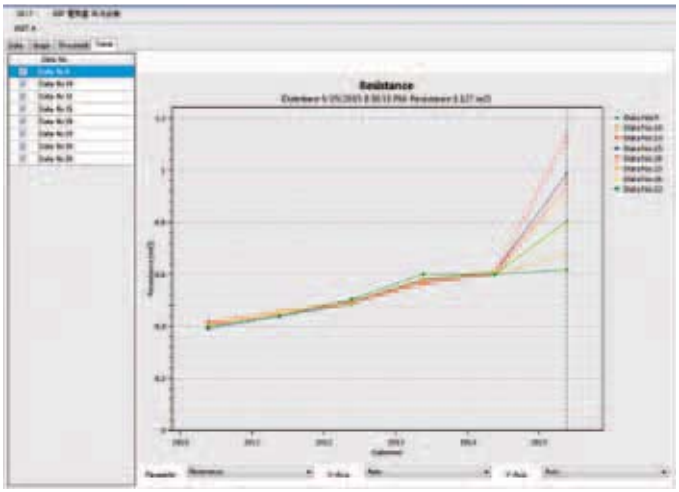
USB	Transmission speed: USB 2.0, Connector: USB mini-B
Bluetooth® (BT3554-01 only)	*Bluetooth*® 4.0LE
	Transmission distance: Approx. 10 m (32.81 ft), line-of-sight
	Supported OS: Android™ 4.3 or later, iOS 10 or later
	Supported Android™ devices: *Bluetooth*® low energy enabled devices Supported iOS devices: *Bluetooth*® low energy enabled devices

Trend display for past data*

Analyze in the office

Graphically display the trend of one cubical (max. 500 batteries) or the condition of selected batteries.

[Example of data displayed for selected batteries]



*Trend display is only available with a PC application.

Product Name: BATTERY TESTER BT3554

Model No. (Order code)	Wireless transmission
BT3554	—
BT3554-01	Built in Bluetooth® Wireless technology

Accuracy specifications

Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year

Temperature and humidity for guaranteed accuracy: 23°C ±5°C (73°F ±9°F), 80% RH or less, Warm-up time: None (Unnecessary), after zero-adjustment

Resistance measurement accuracy

Measurement current frequency: 1 kHz ±30 Hz, With function for avoiding noise frequency enabled: 1 kHz ±80 Hz
Measurement current accuracy: ±10%

Range	Max. display	Resolution	Measurement accuracy	Measurement Current
3 mΩ	3.100 mΩ	1 μΩ	±1.0% rdg. ±8 dgt.*	160 mA
30 mΩ	31.00 mΩ	10 μΩ	±0.8% rdg. ±6 dgt.	160 mA
300 mΩ	310.0 mΩ	100 μΩ		16 mA
3 Ω	3.100 Ω	1 mΩ		1.6 mA

* If zero-adjustment was not performed, add the following values:
When model L2020 is used: ±5 dgt.
When model 9465-10 is used: ±6 dgt.
When model 9772 is used: ±1 dgt.
When model 9460 is used: ±16 dgt.
When model 9467 is used: ±5 dgt.

When using test leads that are not listed above, or test leads whose length has been extended, accuracy is guaranteed only after zero-adjustment is performed.

Voltage measurement accuracy

Range	Max. display	Resolution	Measurement accuracy
6 V	±6.000 V	1 mV	±0.08% rdg. ±6 dgt.
60 V	±60.00 V	10 mV	

Temperature measurement accuracy

Measurement range	Max. display	Resolution	Measurement accuracy
-10 to 60°C	60°C	0.1°C	±1.0°C

Comparator function

Compares setting values (Resistance: 2 levels, Voltage: 1 level) and measured values
Determination method: Following chart, beeping sound, red backlight lights up with beeping sound
Savable settings: 200 tables

Value for warning ▼ Value for failure ▼

Value for warning ▶	Resistance (low)	Resistance (medium)	Resistance (high)
Voltage (high)	PASS	WARNING	FAIL
Voltage (low)	WARNING	WARNING	FAIL

General specifications

Measurement types		Internal resistance measurement for batteries (AC four-terminal method) Terminal voltage measurement for batteries (DC voltage) Temperature measurement (when using the 9460)
Display update rate		Approx. 3 times/s
Absolute maximum input voltage		±60 V DC max (No AC input allowed)
Operating environment		Indoors, pollution degree 2, altitude up to 2000 m (6562 ft)
Operating temperature and humidity		0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation)
Storage temperature and humidity		-10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation)
Power supply		AA (LR6) Alkaline Batteries x 8
Continuous operating time		Approx. 8.5 hours (When using alkaline batteries)
Auto power save		Auto power off after 10 minutes unless during data transmission
Dielectric strength		1.5 kV AC for 1 minute, between all measurement terminals and the USB terminal
Applicable standards	Safety	EN 61010
	EMC	EN 61326
Dimensions		Approx. 192 mm (7.56 in) W x 121 mm (4.76 in) H x 55 mm (2.17 in) D
Mass		Approx. 790 g (27.9 oz) (including batteries) BT3554 Approx. 800 g (28.2 oz) (including batteries) BT3554-01
Accessories		PIN TYPE LEAD 9465-10, ZERO ADJUSTMENT BOARD, PC Software Application CD, Power-on option sticker, Neck strap, AA (LR6) alkaline batteries x 8, Fuse, USB cable, Carrying case, Instruction manual, Cautions for using radio waves (BT3554-01 only)

Functions

HOLD	(1) Hold measured value by pressing the HOLD key or when shorting the EXT. HOLD terminal (2) Automatically hold measured value after it stabilizes
Memory storage	Saving, loading, and deleting measured values Saved items: Date, resistance, voltage, temperature, comparator threshold, judgment Storable data: 6000 sets (500 data sets per unit) Memory structure: 500 data sets per unit (12 units)
Auto-Memory function	Automatically saves measured values to memory when they are held
Memory loading	Load stored data on instrument or with PC application in order

*The thresholds for determining the pass/fail condition of a battery depend on the specifications and standards of the battery manufacturer, battery type, capacity, etc. It is important and necessary to always conduct battery testing against the internal resistance and terminal voltage of a new or reference battery.

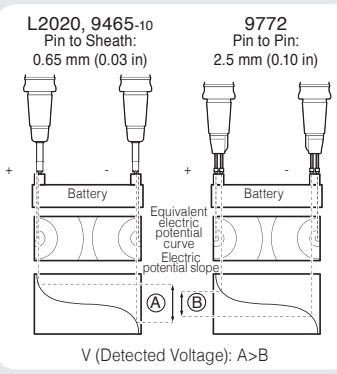
In some cases, it may be difficult to determine the deterioration state of traditional open type (liquid) lead-acid or alkaline batteries, which demonstrate smaller changes in internal resistance than sealed lead acid batteries.

The Advantages of 4-Terminal Measurement
The Quality of Your Test Lead CAN Make a Difference

-Explanation-

When measuring certain batteries such as lead-acid cells, the resulting measurement value may differ depending on the test leads used to conduct the measurement. This difference is due to the shape of the probe tip as well as the dimensions of the 4-terminal test leads used for measurement. However, despite a difference in value given by different test leads, it is safe to assume that each specific value reflects the correct value obtainable by the respective test leads.
Based on this principle, when diagnosing battery deterioration in a time series, it is particularly important to use test leads having the same tip shape and dimensions in order to maintain measurement consistency.

The difference in the measurement values obtained by different test leads is a physical phenomenon caused by the difference in distance between the SOURCE and SENSE pins of the test leads. This is more significant when the battery terminal contains a resistance higher than the internal resistance of the battery under test. The figure on the right demonstrates how even minute physical differences between the SOURCE and SENSE pins for two types of test leads can affect the detected voltage level of the battery.



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Il provabatterie*

*** BT3554-01**

Nuovo tester prova batterie, con interfaccia Bluetooth®, ideale per verifiche in campo.

Tecnologia HIOKI

Misura la tensione a vuoto e la resistenza interna delle batterie
senza scollegarle dal circuito di mantenimento.

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TECNOLOGIE DI MISURA

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Le tecnologie di misura Hioki sono ampiamente e globalmente utilizzate per manutenzione, controllo qualità, ricerca e sviluppo, in ambito industriale, aziendale e delle infrastrutture, contribuendo alla sicurezza ed alla protezione del nostro vivere quotidiano.
L'azienda supporta inoltre lo sviluppo delle tecnologie di nuova generazione nei settori automotive ed energie rinnovabili, favorendo la diffusione di prodotti di elevata qualità a prezzi competittivi.
La mission di Hioki è di pordurre e divulgare tecnologie di misura volte a proteggere la sicurezza delle persone e consentire, attraverso il supporto alla ricerca, il progresso della scienza e della tecnica.

I numeri:

10% del fatturato investito in R&S
250 ingegneri impiegati nella ricerca
30 nuovi prodotti all'anno
100 brevetti depositati all'anno
1200 prodotti a catalogo
800.000 pezzi venduti all'anno
50 ppm (pezzi per milione) indice di difettosità
10.000 prove di apertura e chiusura per testare la durata dei toroidi
1 metro di caduta per testare la resistenza degli strumenti

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