HIOKI

New

BATTERY HiTESTER BT3563/BT3562/3561

Components measuring instruments

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

ISO 9001 JMI-0216

ISO14001 JQA-E-90091

www.hioki.com

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

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

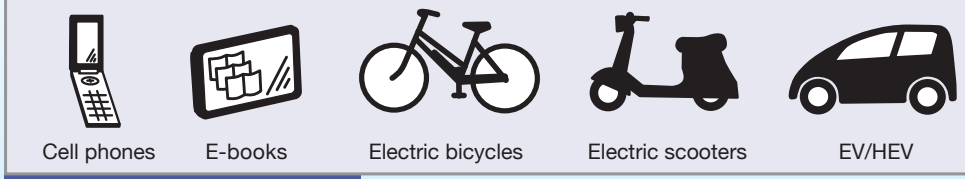
BT3563 Up to 300V

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



Cell phones | E-books | Electric bicycles | Electric scooters | EV/HEV

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

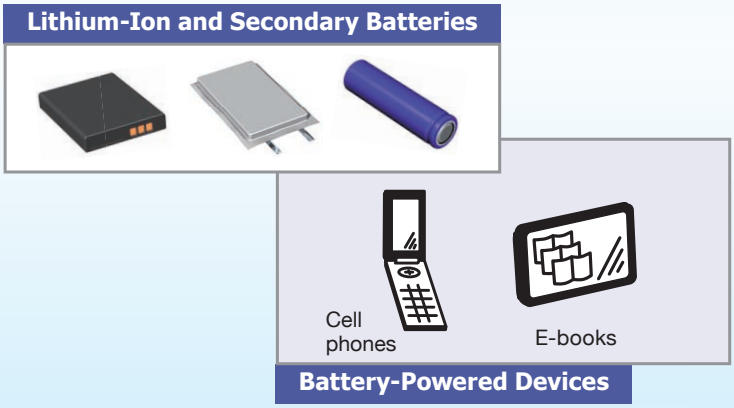
BATTERY HiTESTER 3561

- 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

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

3561
Up to
20V

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



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 (TRIG) • Print (PRINT) • Zero adjustment (0ADJ) • Calibrate (CAL) • Manual comparator (MANU) • Load panel settings (7 bits) (LOAD0 to LOAD6)	• End-of-Measurement (EOM) • Measurement-in-progress (INDEX) • Comparator results (R-Hi, R-IN, R-Lo, V-Hi, V-IN, V-Lo, PASS, FAIL*2) *2 FAIL is BT3563 and BT3562 only • Measurement error (ERR) • General-purpose output (OUT1 to OUT9) (only 3561)

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

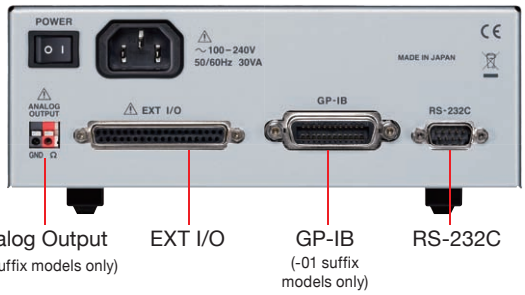
■ EXT I/O Connectors (BT3563 and BT3562, accessories not supplied)

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

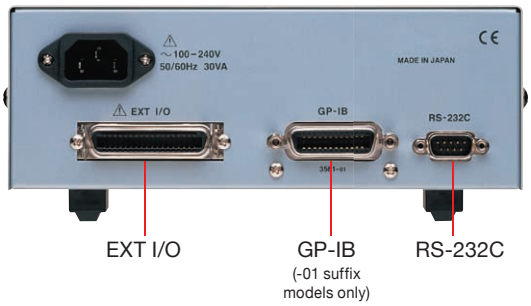
■ EXT I/O Connectors (3561, accessories not supplied)

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

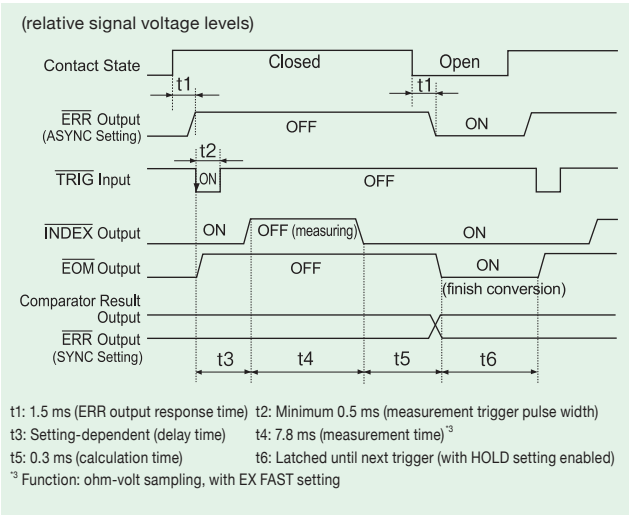
BT3563-01 and BT3562-01 Rear Panel



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

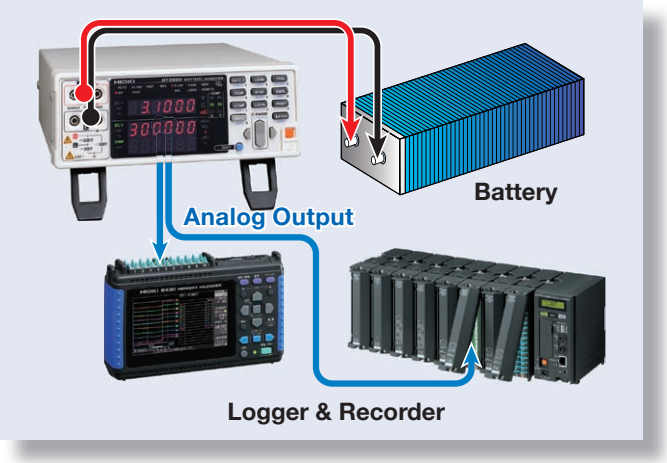
Different beep tones distinguish IN and Hi/Lo judgments. Both tones can be independently enabled or disabled.

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.

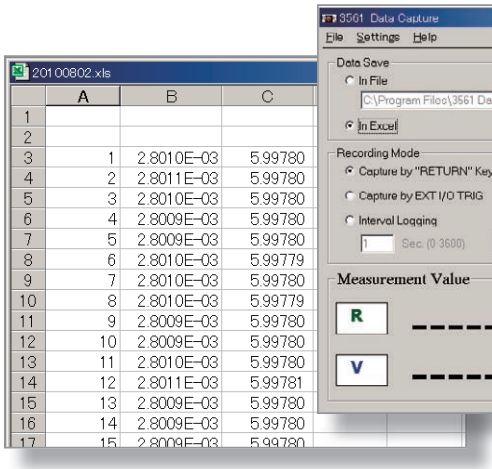
Output contents	Measured resistance (displayed value)
Output rate	0 to 3.1 V DC (corresponding to displayed value of 0 to 31000)
Resolution	12 bits
Response time	10 ms



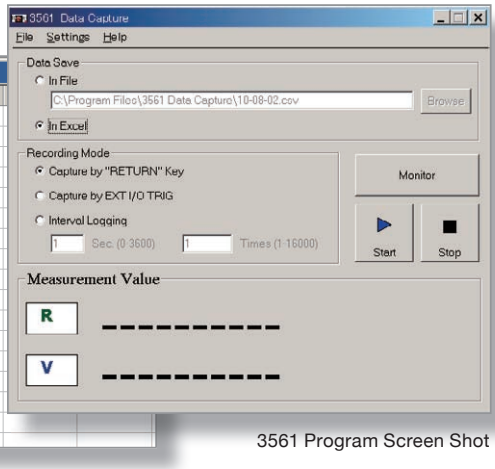
■ PC Application Program

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, judgment results, and statistical calculation results can be printed via RS-232C on the optional printer model 9670.

● 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.

Printing system	Thermal line-dot
Printout width	72 mm
Printing speed	47.5 mm/s
Power	AC Adapter Model 9671 or Battery Pack Model 9672
Size and weight	Approx. 119W × 77H × 174D mm, approx. 500 g

Printer operation requires AC Adapter 9671 and RS-232C Cable 9638.

Printout Examples

```
 1   2.5375mOhm, 4.70056 V
 2 - 0.9730mOhm, 4.70055 V
 3    0.F.     ,    0.F.
 4 --------    ,--------
 5   15.039 Ohm,- 50.254 V
 6  200.12 Ohm, 11.3176 V
 7  2.9984kOhm,-11.3099 V
 8  0.1615 Ohm,-4.70054 V
 9   0.166 Ohm,- 4.7006 V
10   0.16 Ohm,-  4.700 V
```

Measurement Values

```
*** RESISTANCE ***
Number        85
Valid         85
Average    13.06 Ohm
Max        13.78 mOhm(     74)
Min        12.10 mOhm(      3)
Sn          0.38mOhm
Sn-1        0.38mOhm
Cp          1.32
CpK         0.09
Comp Hi       40
Comp IN       45
Comp Lo        0

***  VOLTAGE   ***
Number        85
Valid         85
Average   10.0074 V
Max       10.0197 V  (     57)
Min        9.9938 V  (     31)
Sn          0.0068 V
Sn-1        0.0068 V
Cp          0.35
CpK         0.32
Comp Hi       10
Comp IN       59
Comp Lo       16
```

Statistical Calculations and Judgment Results

```
50  5.033  Ohm Hi, 1.60427 V
51  5.033  Ohm Hi,-0.00001 V
52  17.855mOhm IN
53  18.354mOhm Hi
54  15.322mOhm Lo
```

Measurement Values 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)] ±300V DC rated input voltage ±300V DC maximum rated voltage to ground [BT3562(-01)] ±60V DC rated input voltage ±70V DC maximum rated voltage to ground [3561(-01)] ±22V DC rated input voltage ±70V DC maximum rated voltage to ground
Input resistance	[BT3563(-01) and BT3562(-01)] 3mΩ/30mΩ/300mΩ ranges: Approx.90kΩ 3Ω/30Ω/300Ω/3000Ω ranges: Approx.1MΩ [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 V DC)
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 V AC (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 kV AC 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	(50Hz)	8ms	24ms	84ms	259ms
	(60Hz)			70ms	253ms
Ω	(50Hz)	4ms	12ms	42ms	157ms
	(60Hz)			35ms	150ms
V	(50Hz)	4ms	12ms	42ms	157ms
	(60Hz)			35ms	150ms

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

● 3561

[Sampling Times]

Function		EX.FAST	FAST	MEDIUM	SLOW
ΩV	(50Hz)	7ms	23ms	83ms	258ms
	(60Hz)			69ms	252ms
Ω	(50Hz)	4ms	12ms	42ms	157ms
	(60Hz)			35ms	150ms
V	(50Hz)	4ms	12ms	42ms	157ms
	(60Hz)			35ms	150ms

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

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

*1 Measurement current accuracy is ±10%.
*2 30mΩ to 3000Ω 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	6V	60V	300V (only BT3563)
Maximum display Value	±6.00000V	±60.0000V	±300.000V
Resolution	10μV	100μV	1mV
Accuracy*3	±0.01%rdg. ±3dgt.		
Temperature coefficient	(±0.001%rdg. ±0.3dgt.) / ºC		

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

● 3561

[Resistance Measurement]

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

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

■ Option Configurations

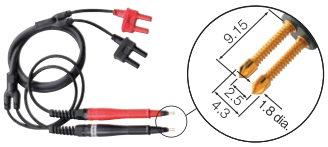
● Main unit

BATTERY HiTESTER BT3563
BT3563-01 (with GP-IB and analog output)
BATTERY HiTESTER BT3562
BT3562-01 (with GP-IB and analog output)
BATTERY HiTESTER 3561
3561-01 (with 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.*

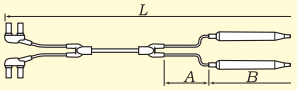
● Options (measurement leads)

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



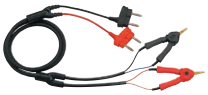
PIN TYPE LEAD L2100
A:300 mm, B:172 mm, L:1400 mm
for high voltage battery measurements, 600 V DC max., BT3563 and BT3562 only

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 9287-10
A:130 mm, B:83 mm, L:1100 mm, DC70V

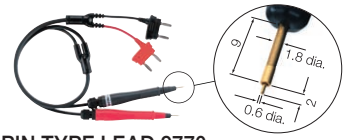
FOUR TERMINAL LEAD 9453
A:280 mm, B:118 mm, L:1360 mm, DC60V

Not CE marked.
29mm diameter

LARGE CLIP TYPE LEAD 9467
A:300 mm, B:116 mm, L:1360 mm, DC50V

Mainly for Small Secondary Batteries (with very small terminals)

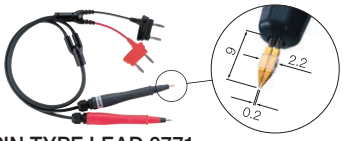
1.8 mm dia. single-axis type for measuring small electrodes



PIN TYPE LEAD 9770
A:260 mm, B:140 mm, L:850 mm, DC70V

9770 tip shape

0.2 mm parallel pyramid-type pins for measuring at thru holes and sub-millimeter objects

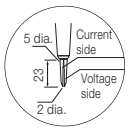


PIN TYPE LEAD 9771
A:260 mm, B:138 mm, L:850 mm, DC70V

9771 tip shape

Measurement leads (3561 only)

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

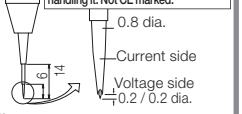


9452 tip shape

Measurement leads (for maximum precision, 3561 only)

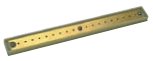
PIN TYPE LEAD 9455
A:260 mm, B:136 mm, L:890 mm

Note. The 9455 is a precision instrument. Exercise appropriate care when handling it. Not CE marked.



9455 pin (enlarged)

Zero adjustment board (for L2100 only)



ZERO ADJUSTMENT BOARD 9454
for L2100 only

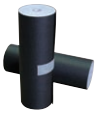
● Options (Printer and Interface Cables)

Printer options

PRINTER 9670
Requires AC Adapter Model 9671

AC ADAPTER 9671
For 9670, AC100 to 240V

RS-232C CABLE 9638
For Printer 9670, 9- to 25-pin crossover, 1.8m



RECORDING PAPER 9237
For 9670, 80 mm × 25 m, 4 rolls

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

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

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

GP-IB CONNECTOR CABLE 9151-02
2m

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