HIOKI

PRECISION BATTERY TESTER
BT6065, BT6075

NEW

High capacity & low internal-resistance

Introducing the industry's most precise battery tester
Ideal for cell grading

Max. AC-IR resolution	***0.01 μΩ*** *5-1/2 digit*
Max. DCV resolution	***1 μV*** *7-1/2 digit*
Max. Ω and V test speed	***12 ms***

World Class

The precision battery tester BT6075 and BT6065 are designed for OCV/AC-IR testing of high-capacity EV battery cells with low internal resistance. The extremely high resolution enables these models to perform advance cell-grading. These testers powerfully facilitate the creation of reliable and efficient OCV/IR testing systems with their innovative features and capability of high-speed testing.

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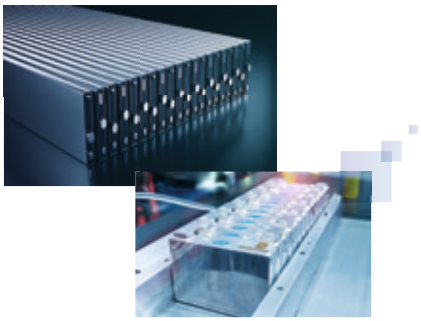
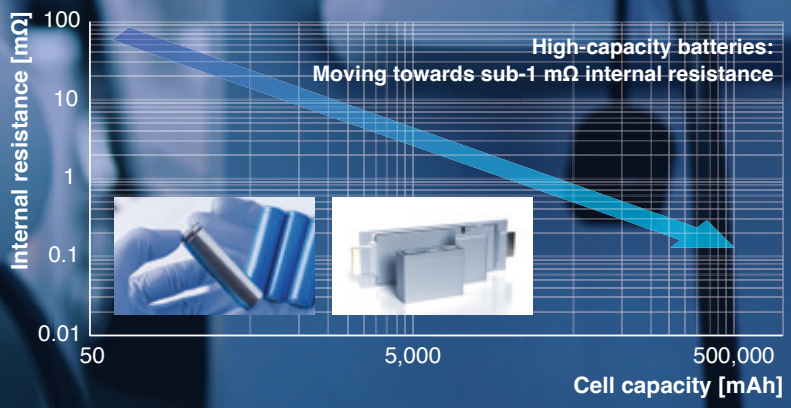
High-precision grading of high-capacity batteries

Next-gen battery testing



Measurement targets

High-capacity battery cells with extremely low internal resistance are important for electric vehicles (EVs) compatible with rapid charging and stationary energy storage systems (ESSs) that are low in loss.
High-precision battery testers play an essential role in precise cell testing to maximize battery pack performance and battery cell production.



Features

- Industry's most accurate & high-speed OCV/IR test performance
- Shorter testing times while maintaining exceptional reproducibility
- Two testers work in tandem without interference
- Channel-specific correction and optional multiplexer
- Supports seamless setup of inspection systems
- High durability and long-term stable system operation

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Top-tier battery measurement performance

Highest precision

Choose from 2 models depending on your testing process

World Class

Beginning- and end-of-line (BOL, EOL) test
For high-precision cell grading

BT6075

- Voltage display: 7-1/2 digits
- Max. DCV resolution: 1 µV
- Max. AC-IR resolution: 0.01 µΩ

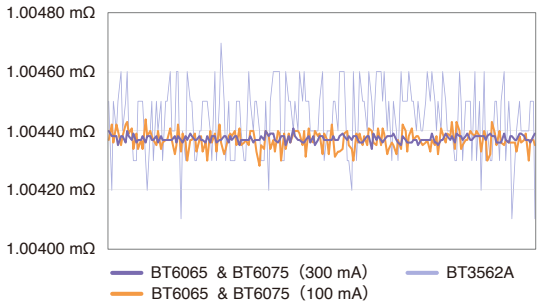
In-line test of formation and aging process
OCV/AC-IR test for cell screening

BT6065

- Voltage display: 6-1/2 digits
- Max. DCV resolution: 10 µV
- Max. AC-IR resolution: 0.01 µΩ

Exceptional reproducibility for AC-IR and DCV measurements

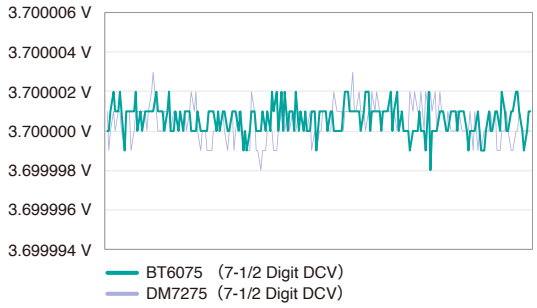
Excellent resistance measurement resolution and accuracy



BT6075 BT6065	±0.08% rdg. ±0.08 µΩ (measurement current: 300 mA) ±0.08% rdg. ±0.5 µΩ (measurement current: 100 mA)

AC-IR offers a 10 nΩ resolution.
At a measurement current of 300 mA, stable measurement data is obtained with an excellent SN ratio suitable for inspecting low-resistance batteries.

Voltage measurement accuracy comparable to a high-precision voltmeter



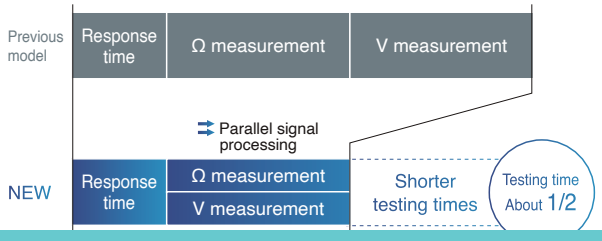
BT6075	±0.0012% rdg. ±11 µV
BT6065	±0.002% rdg. ±20 µV

No additional voltmeter is needed for OCV/IR testing.
Both models, one with 7-1/2 digits (resolution of 1 µV) and the other with 6-1/2 digits (resolution of 10 µV), feature unparalleled measurement accuracy.

Truly simultaneous Ω/V measurement

Fast testing without sacrificing precision

Simultaneously measure resistance and voltage with 1 instrument



6 sampling time settings

Measurement function		FAST1	FAST2	MEDIUM1	MEDIUM2	SLOW1	SLOW2
ΩV	50 Hz	4 ms	10 ms	20 ms	40 ms	100 ms	200 ms
	60 Hz			17 ms	33 ms		

The BT6065 and BT6075 deliver high-speed measurement that goes beyond conventional battery testers. With two A/D converters, the instruments can perform simultaneous resistance and voltage measurement in as little as 12 ms. As a result, they can be used to

HIOKI Original Technology

Optimizing plant productivity

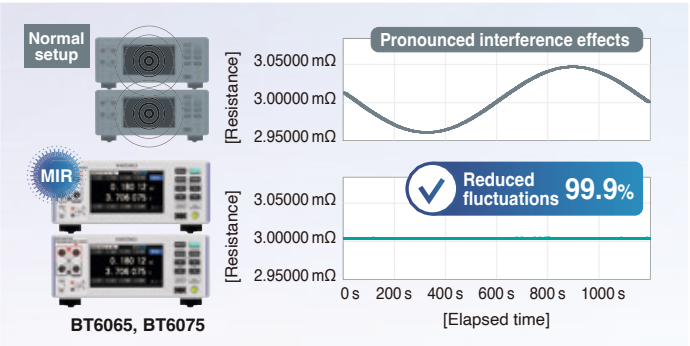
"We want to perform testing efficiently with two instruments."

Stable measurement with the MIR mode (mutual interference reduction)

Ordinarily, mutual interference causes measured values to fluctuate when making simultaneous measurements with two battery testers placed in close proximity. The MIR mode reduces mutual interference to ensure stable measurement. The feature makes possible accurate, high-speed parallel-testing with two testers.

Mutual interference reduction (MIR) technology features

- No need for additional accessories like sync cables
- Unlike an older technology known as pulse output functionality, the MIR mode facilitates reliable parallel testing.



Delivers easy, reliable parallel-testing

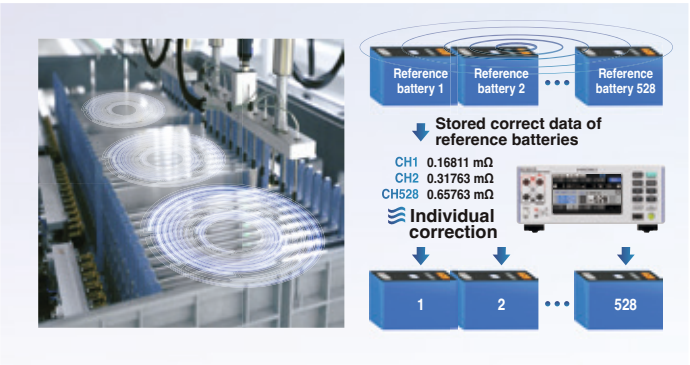
"We want to measure numerous channels accurately."

Compensation of individual channels with referential adjustment

When measuring rows of batteries in a tray, eddy currents occurring in the metal enclosures of adjacent batteries cause measurement error. The referential adjustment function, which accurately compensates for the effects of eddy currents by using actual batteries as a reference, allows more accurate measurement.

Referential adjustment features

- Referential adjustment: up to 528 channels
- Adjustment data for up to six batteries (6 × 528 channels) can be saved on the instrument using its "panel save" feature.



Accurately compensating for the effects of eddy currents caused by adjacent batteries

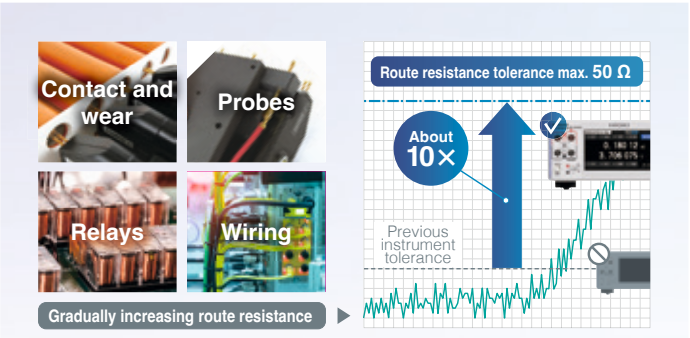
"We're concerned about abrupt system stoppages."

Significantly improving route resistance tolerance

Route resistance refers to the total value of wiring resistance and probe contact resistance in a given testing system. Since the BT6065/BT6075 has high route resistance tolerance, it provides high durability in the face of probe deterioration and increased relay contact resistance. This prevents abrupt testing system stoppages while improving up-time.

Route resistance tolerance

- 10 Ω: with measurement current of 300 mA (3 mΩ range only)
- 50 Ω: with measurement current of 100 mA or less (all ranges)



Improving the long-term reliability of testing systems

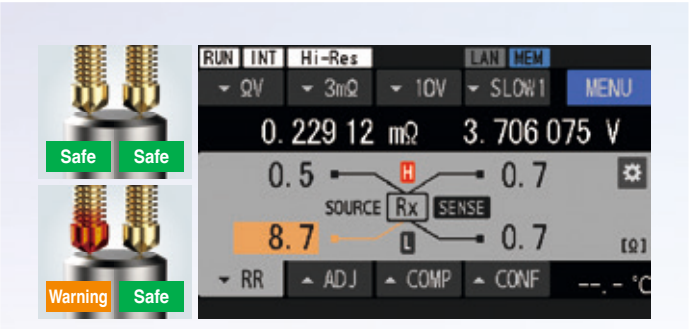
"We want to replace probes less frequently."

Continuously monitoring for errors with the route resistance monitor

The route resistance monitor displays individual wiring route resistance values for 4-terminal measurement. This feature lets you continuously watch for wiring errors like probe wear and wire breaks. The feature can predict maintenance needs and lower operating costs by helping you make numerically-based decisions as to which probe needs to be replaced.

Route resistance monitor features

- Dual threshold settings (WARNING, FAIL)



Monitoring route resistance and displaying a warning

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Standard functions

A resistive touch panel lets you operate the instrument precisely, even if you're wearing gloves.

AC four-terminal method

Resistance measurement, which is performed using the AC 4-terminal method at 1 kHz, is not affected by factors such as wiring resistance.

Comparator capability

The instrument's comparator judges resistance and DC voltage values, generating three possible results (Hi, IN, Lo).

Saving measurement conditions

Save and load up to six sets of measurement conditions, including referential adjustment values.

Averaging measured values

Minimal variability by averaging from 1 to 256 measured values makes measurement stable.

Temperature input (temp. sensor terminal)

The optional Temperature Sensor Z2005 can be used to measure ambient temperature.

Self-calibration (resistance and DC voltage)

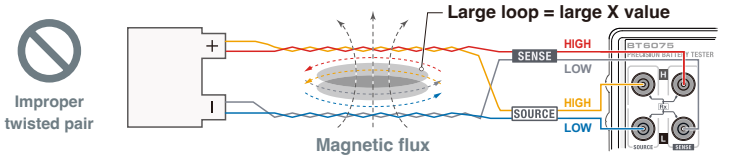
Maintain high precision by correcting for gain fluctuations and minuscule drift in internal measurement circuitry.

Seamless system integration

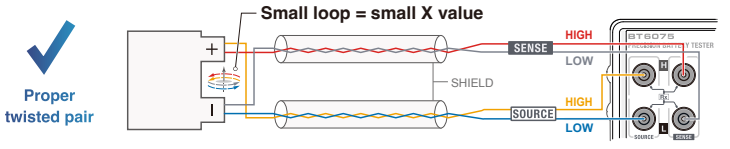
Boosting testing systems' durability

Function for displaying the wiring's reactance X and impedance Z

The instruments provide an advanced mode that can display reactance X and impedance Z. This capability is useful when troubleshooting issues at system startup and when optimizing wiring layouts.



Loops increase the effects of induction noise caused by eddy currents, mutual interference, and peripheral equipment.



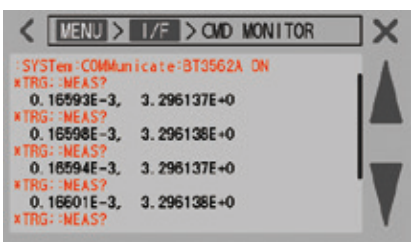
A more robust system can be attained by routing wires so as to minimize X values.

Command compatibility mode

Communication commands from the previous BT3562A model can be used without modification. As a result, you can replace just the battery

Ext. I/O monitor

In addition to checking EXT. I/O input signals on the screen, you can turn output signals on and off as desired. This capability also simplifies veri-



Commands monitor

Display communications data (received commands and sent data) on the screen. This capability is useful when checking PLC programming.

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Options

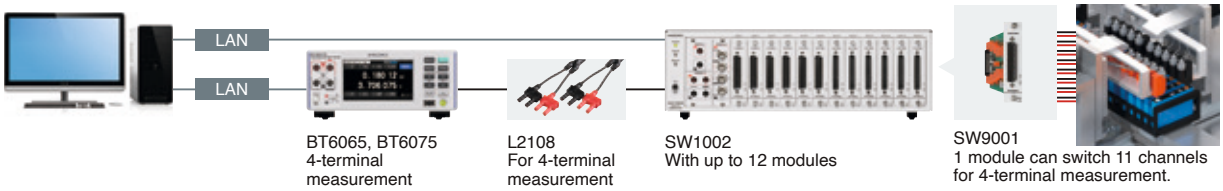
Dedicated multiplexer optimized for high-speed, high-precision measurement

Hioki's multiplexer can also be zero-adjusted, resulting in a more accurate system that corrects the effects of eddy currents.

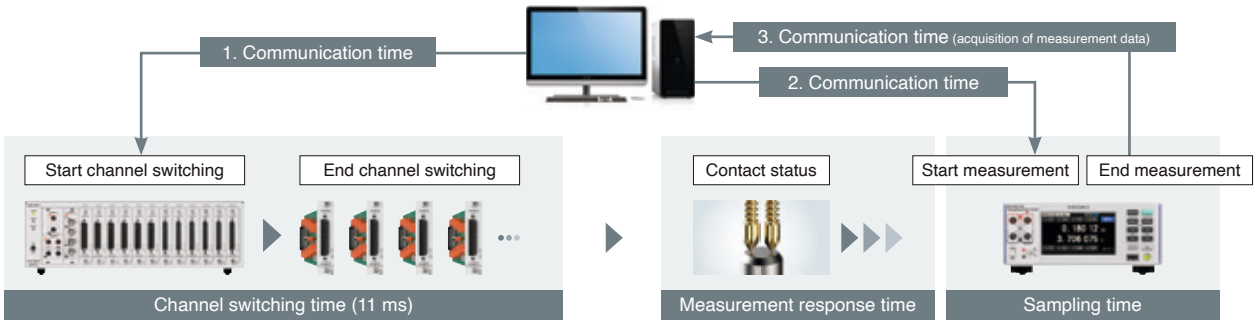
Switch Mainframe SW1002

Example setup using the SW1002

AC-IR measurement (1 kHz), OCV measurement, up to 132 channels



Measurement time



Cycle time = (Communication time + Channel switching time + Measurement response time + Sampling time) × Number of channels

Instrument	Function	Measurement speed	Number of channels	Measurement response time (delay time)	Switched measurement time (all channels)	Conditions
BT6065 BT6075	ΩV	FAST1 (4 ms)	11	8 ms	0.26 s (approx. 23 ms/channel)	· Communication with BT6065 via LAN · After normal reset · Fixed range · Manual DCV calibration performed before measurement · External trigger · Trigger reception relay mode off
		MEDIUM2 (33 ms, 60 Hz)	11	8 ms	0.58 s (approx. 52 ms/channel)	
		SLOW2 (200 ms)	11	8 ms	2.5 s (approx. 227 ms/channel)	

The measurement times presented above are examples for reference. The times can change based on many factors such as communication methods. For more information about how the measurement accuracy for each measurement range is affected when the Precision Battery Testers are used in combination with the multiplexer, see "Effects of using the instrument with the SW9001."

Multiplexer specifications

Switch Mainframe SW1001, SW1002

Number of slots	3 slots (SW1001) 12 slots (SW1002)
Supported BT6065/ BT6075 module	Multiplexer Module SW9001 (2-wire, 4-wire)
Max. input voltage	DC 60 V, AC 30 V rms, 42.4 V peak
Interfaces	LAB, USB, RS-232C (host), RS-232C (command transfer function)
EXT. I/O	SCAN input, SCAN_RESET input, CLOSE output (scan control)

Multiplexer Module SW9001

Wiring method	2-wire or 4-wire
Number of channels	22 channels (2-wire method) or 11 channels (4-wire method)
Contact method	Mechanical relay
Channel switching time	11 ms (not including measurement time)
Max. allowable voltage	DC 60 V, AC 30 V rms, 42.4 V peak
Max. allowable current	DC 1 A, AC 1 A rms

Effects of using the instrument with the SW9001*1

Range	Effect
R 3 mΩ (300 mA)	0.1% f.s.
R 3 mΩ (100 mA)	0.1% f.s.
R 30 mΩ	0.03% f.s.
R 300 mΩ	0.03% f.s.
R 3 Ω	0.03% f.s.
R 30 Ω	0.03% f.s.
All V ranges	5 μV

30 Ω range: source contact check operation not available

*1. Effect before zero adjustment

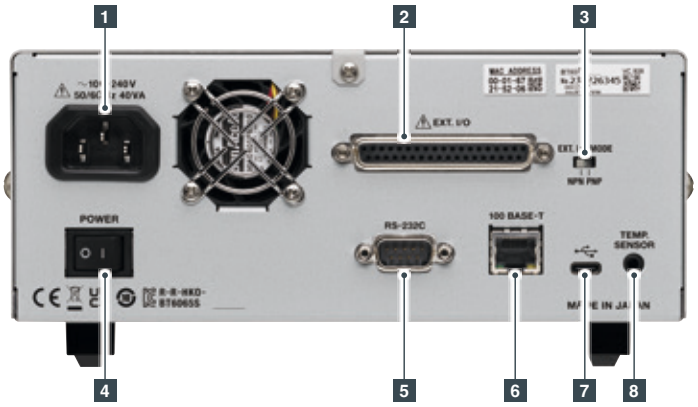
Appearance

SW1001 SW1002 SW9001

Interfaces

EXT. I/O | RS-232C | LAN | USB

1. Power inlet
2. Ext. I/O connector
3. Ext. I/O mode switch
4. Power switch
5. RS-232C connector
6. LAN connector
7. Type-C USB connector
8. Temp. sensor terminal



Specifications

General specifications

Accuracy guaranteed: 1 year

Operating temperature and humidity range	0°C to 40°C (32°F to 104°F), 80% RH or less (non-condensing)
Standard compliance	Safety: EN 61010 EMC: EN 61326 Class A
Power supply	Rated supply voltage: 100 V to 240 V AC (assuming voltage fluctuations of ±10% of the rated supply voltage) Rated power supply frequency: 50 Hz, 60 Hz Maximum rated power: 40 VA
Interfaces	LAN (10BASE-T/100BASE-T, TCP/IP) USB (COM mode, C-type receptacle) USB (MEM mode*1, A-type receptacle, for Z4006 USB Drive) RS-232C (9600 bps, 19200 bps, 38400 bps) EXT. I/O
Dimensions and weight	Approx. 215W × 88H × 313D mm (8.5W × 3.5H × 12.3D in.) (excluding protruding parts) Approx. 3.1 kg (6.8 lb.)
Included accessories	Power cord × 1, Startup Guide × 1, Operating Precautions × 1

*1. Only screenshots can be saved.

Basic specifications

Measurement range	• Resistance ranges: 3 mΩ, 30 mΩ, 300 mΩ, 3 Ω, 30 Ω • Voltage ranges: 10 V, 100 V
Measurement functions	ΩV, Ω, V
DC input resistance (10 V range)	Measurement functions: ΩV/Ω — 10 MΩ ±10% — HIGH Z: 1 GΩ or greater Measurement functions: V — 10 MΩ ±10% — HIGH Z: 10 GΩ or greater (Fixed at 10 MΩ setting when using the 100 V range)
Max. input voltage	DC ±120 V
Max. rated line-to-ground voltage	DC ±120 V

Sampling time

Measurement function		FAST1	FAST2	MEDIUM1 (MED1)	MEDIUM2 (MED2)	SLOW1	SLOW2
ΩV	50 Hz	4 ms	10 ms	20 ms	40 ms	100 ms	200 ms
	60 Hz			17 ms	33 ms		
Ω	50 Hz	4 ms	10 ms	20 ms	40 ms	100 ms	200 ms
	60 Hz			17 ms	33 ms		
V	50 Hz	4 ms	10 ms	20 ms	40 ms	100 ms	200 ms
	60 Hz			17 ms	33 ms		

Temperature measurement: approx. 2 s

Time added for MIR resistance measurement	With resistance measurement MIR mode enabled: 6 ms to 12 ms
Response time	Approx. 8 ms (when measuring only resistance and voltage of a 4 V battery)
Accuracy guarantee conditions	Accuracy guaranteed temperature and humidity range: 23°C ±5°C (73°F ±9°F), 80% RH or less Warm-up time: 60 min. or more Resistance self-calibration: performed after warm-up time DC voltage self-calibration: performed after warm-up time Adjustment processing • Resistance measurement: after zero adjustment or after referential adjustment is enabled • DC voltage measurement: after zero adjustment
Functions	Averaging (up to 256 times), contact check, resistance self-calibration, DC voltage self-calibration, zero adjustment (528 channels), referential adjustment (528 channels), route resistance monitor, resistance measurement MIR mode,

Resistance measurement accuracy

		Range (measurement current)*1					
SLOW2 (sampling speed)		3 mΩ (300 mA)	3 mΩ (100 mA)	30 mΩ (100 mA)	300 mΩ (10 mA)	3 Ω (1 mA)	30 Ω (100 µA)
		±0.08% rdg.				±0.10% rdg.	±0.15% rdg.
HIGH RESOLUTION	OFF	±0.1 µΩ	±0.5 µΩ	±1 µΩ	±10 µΩ	±100 µΩ	±1 mΩ
	ON	±0.08 µΩ	±0.50 µΩ	±0.5 µΩ	±5 µΩ	±50 µΩ	±0.5 mΩ
Max. display value							
HIGH RESOLUTION	OFF	5.1000 mΩ	5.1000 mΩ	51.000 mΩ	510.00 mΩ	5.1000 Ω	51.000 Ω
	ON	5.10000 mΩ	5.10000 mΩ	51.0000 mΩ	510.000 mΩ	5.10000 Ω	51.0000 Ω
Resolution							
HIGH RESOLUTION	OFF	0.1 µΩ	0.1 µΩ	1 µΩ	10 µΩ	100 µΩ	1 mΩ
	ON	0.01 µΩ	0.01 µΩ	0.1 µΩ	1 µΩ	10 µΩ	100 µΩ
Measurement current frequency		1 kHz ±0.2 Hz					

*1. Rms value, measurement current error within ±10%
Additional accuracy deterioration
Temperature coefficient: add the following value to the measurement accuracy if the temperature is 0°C to 18°C or 28°C to 40°C: (measurement accuracy × 0.1) / °C
Addition when resistance measurement MIR mode is enabled: add ±0.01% rdg. to the resistance measurement accuracy.

DC voltage measurement accuracy

BT6065

	Range	
SLOW2 (sampling speed)	10 V	100 V
	±0.002% rdg. ±20 µV	±0.004% rdg. ±0.6 mV
Max. display value	±12.00000 V	±120.0000 V
Resolution	10 µV	100 µV

BT6075

	Range	
SLOW2 (sampling speed)	10 V	100 V
	±0.0012% rdg. ±11 µV	±0.003% rdg. ±0.60 mV
Max. display value	±12.000000 V	±120.00000 V
Resolution	1 µV	10 µV

Additional accuracy deterioration
Temperature coefficient: add the following value to the measurement accuracy if the temperature is 0°C to 18°C or 28°C to 40°C: (measurement accuracy × 0.1) / °C

Temperature measurement accuracy

Range	-10.0°C to 60.0°C (14°F to 140°F)
Accuracy (instrument + Z2005)	±0.5°C (measurement temperature of 10.0°C to 40.0°C) ±1.0°C (measurement temperature of -10.0°C to 9.9°C, 40.1°C to 60.0°C)

Route resistance measurement accuracy

Resistance range	3 mΩ		30 mΩ	300 mΩ	3 Ω	30 Ω
Measurement current	300 mA	100 mA	100 mA	10 mA	1 mA	100 µA
Accuracy	3.0% rdg. ±0.5 Ω (3 mΩ, 30 mΩ, 300 mΩ, or 3 Ω resistance range) 3.0% rdg. ±3 Ω (30 Ω resistance range)					
Max. display value	10.0 Ω		50.0 Ω	50.0 Ω	50.0 Ω	500 Ω

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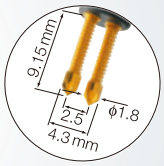
Options

Test leads

NEW PIN TYPE LEAD L2120

Rated voltage: 1000 V DC
Rated current: 2 A DC
Approx. length:
L: 1.4 m (4.6 ft.)
A: 300 mm (11.8 in.)
B: 172 mm (6.8 in.)

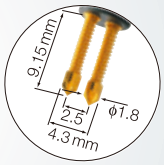


NEW CLIP TYPE LEAD L2121

Rated voltage: 60 V DC
Rated current: 2 A DC
Approx. length:
L: 1.2 m (3.9 ft.)
A: 130 mm (5.1 in.)
B: 83 mm (3.3 in.)

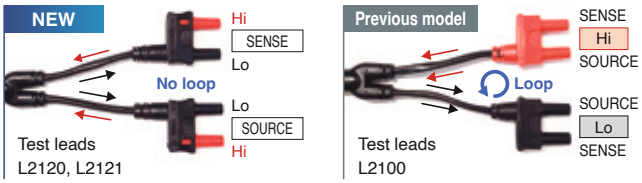
PIN TYPE LEAD L2100

Rated voltage: 1000 V DC
Rated current: 2 A DC
Approx. length:
L: 1.4 m (4.6 ft.)
A: 300 mm (11.8 in.)
B: 172 mm (6.8 in.)



Test leads featuring a new design that minimizes the effects of eddy currents

Internal twisted-pair wiring right up to the tip of the test lead minimizes magnetic noise and reduces measurement variability.



Conventional test leads may also be used

Conventional test leads may also be used by changing the orientation in which the test leads are connected. Making measurements with the test leads connected improperly will not damage the instrument.

When using L2120, L2121

When using L2100

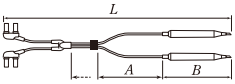
PC connectivity

RS-232C CABLE L9637
9-pin/9-pin, 3 m (9.8 ft.)

USB CABLE L9510
USB A-C type

USB DRIVE Z4006
16 GB

LAN CABLE 9642
Straight Ethernet cable, supplied with straight-to-cross conversion adapter, 5 m (16.4 ft.)



Lead length
L: overall length
A: from junction to probe
B: probe length

Other

TEMPERATURE SENSOR Z2005
1 m (3.3 ft.)

0 ADJ BOARD Z5038
For L2120, L2100

TIP PIN 9772-90
To replace the tip on the pin-type lead L2120/ L2100 (one pin)

Using multiplexers

SWITCH MAINFRAME SW1002
12 slots, max. 132 channels (4-wire)

SWITCH MAINFRAME SW1001
3 slots, max. 33 channels (4-wire)

MULTIPLEXER MODULE SW9001
Max. 11 channels (4-wire), 2-wire/4-wire

CONNECTION CABLE L2108
4-terminal banana, 0.84 m (2.8 ft.)

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