HIOKI

BATTERY INSULATION TESTER
BT5525

NEW

Detect contamination that could cause defects. Improve battery cell productivity through high-speed testing.

Product concept

To assure battery quality over the long term, it's necessary to detect the causes of latent defects in testing processes on production lines. Minuscule insulation defects can eventually degrade battery service life and cause fires. The principal causes of insulation defects are contamination (with metallic matter) and minuscule scratches occurring in production processes.

Market requirements

"We want to prevent shipment of batteries with latent defects that could lead to fires."
"We want to boost productivity by optimizing costs."

The BT5525 is an battery insulation tester that was developed to meet these battery market requirements.

C US
US UL standard compliant

3 year Warranty

Preventing the shipment of batteries with latent defects that could lead to fires.

Internal short-circuit detection

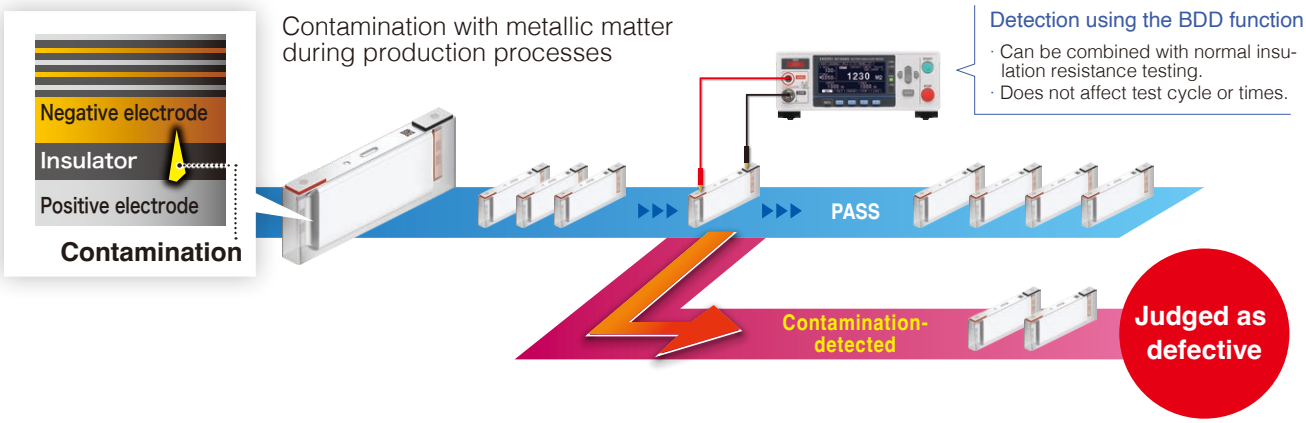
Noise resistance

Prevention of erroneous judgments

Break Down Detect function (BDD)

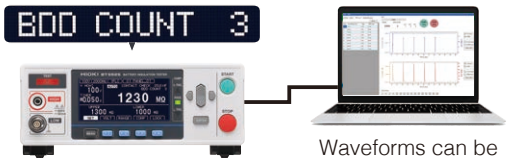
Detecting minuscule insulation defects caused by contamination

The BDD function is a proprietary testing function that can detect minuscule internal short-circuits caused by contamination (with metallic matter) at the stage before battery cells are filled with electrolyte. By identifying and eliminating defective parts at an early stage in the production process, the BDD function helps prevent the risk of hazards such as fires and accidents caused by heating after battery shipment. Eliminating latent accident causes such as these facilitates the production of batteries that resist degradation and function economically.

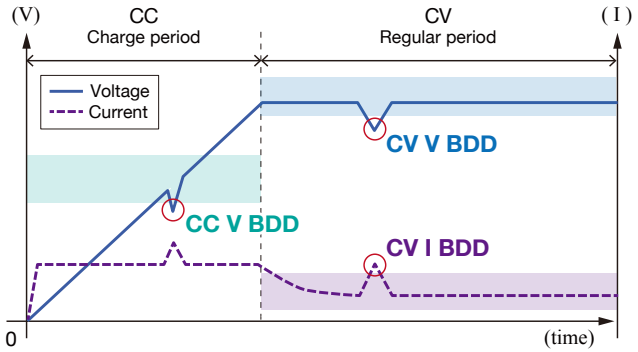


Proprietary method for reliably detecting contamination

The BDD function is a detection method that combines analog circuitry (peak hold) with digital sampling (at 5 MS/s). It detects minuscule changes by monitoring the amount of change in voltage during charging and the amount of change in steady-state voltage and current after charging.
In this way, it resolves the issue of incomplete detection due to sampling timing and resolution, which affects waveform measurement using conventional oscilloscopes or recorders.



Waveforms can be displayed on a PC



Judgment methods

CC V	Insulation defects are detected using the voltage value (V) during charging. Judgments are made using the voltage value immediately prior to the change. Setting range: 0.1 V to 500.0 V
CV V	Insulation defects are detected using the steady-state voltage value (V) after charging. Judgments are made using the steady-state voltage (voltage after stabilization). Setting range: 0.1 V to 500.0 V
CV I	Insulation defects are detected using the amount of change (%) in the steady-state current after charging. Judgments are made using the current value immediately prior to the change. Setting range: 0.6% to 999.9%

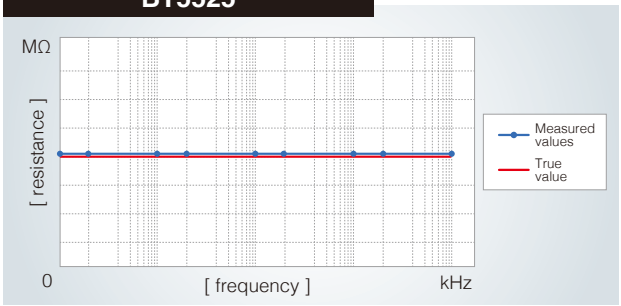
Noise resistance

Stable insulation resistance testing, even in noisy environments

Hioki succeeded in significantly reducing the effects of external noise by drawing on insulation resistance tester measurement technology and design expertise cultivated over many years.
As a result, the BT5525 can perform stable, variation-free insulation resistance testing at a level of quality that lets it detect internal short-circuits caused by contamination.

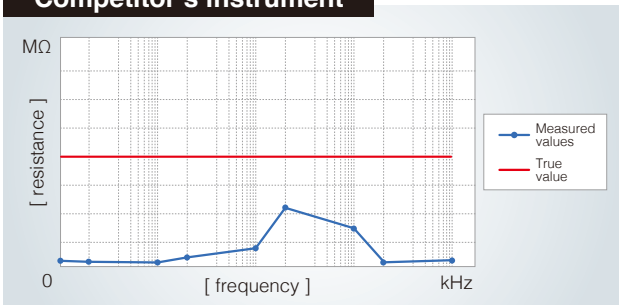
Common-mode noise application simulation

BT5525



Stable performance, even in noisy environments

Competitor's instrument

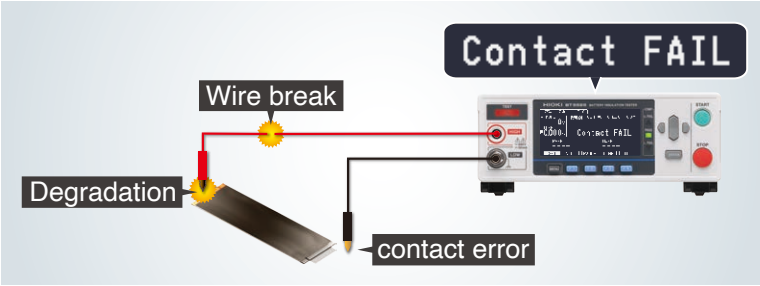


Noise causes variability in measured values

Contact check function

Preventing testing do-overs due to erroneous judgments

The BT5525 provides a contact check function to determine whether the instrument has made proper contact with the circuit under test by measuring the capacitance between the measurement terminals (stray capacitance and the capacitance of the circuit under test).



Preventing erroneous judgments that classify defective parts as non-defective

- When the measurement leads become disconnected during testing
- When degradation of measurement leads results in increased resistance between test locations

Simple operation

- Simple wiring connections thanks to use of 2 terminals

Functionality

BT5525 provides a range of functionality to make insulation resistance testing safer and more convenient.

Current limit function

The charging current applied to cells can be limited to a user-specified value ranging from 50 µA to 50 mA. This function can shorten charging times when there is capacitance between test terminals or in the circuit under test.

Auto discharge function

Prevents damage to other devices during the next test by discharging any charge accumulated in the circuit under test within the instrument after testing. Discharging occurs at 40 mA or greater after measurement completes.

Measurement conditions memory function

Stores measurement conditions in the instrument's memory for future recall as necessary. Up to 15 sets of measurement conditions can be stored. Saved conditions persist even if the instrument is powered off.

Comparator function

Performs automatic pass/fail judgments based on judgment standard upper and lower limit values set by the user. A beep tone is used to notify the user of judgment results.
The setting range is 0.000 MΩ to 9999 MΩ.

Test time function

Allows the user to set the time during which the test voltage is applied from 0.050 s to 999.999 s. The time can be set in increments of 0.001 s.

Auto range function

Automatically selects the measurement range based on the measured insulation resistance value. The following measurement ranges are available: 2 MΩ, 20 MΩ, 200 MΩ, and 2000 MΩ.

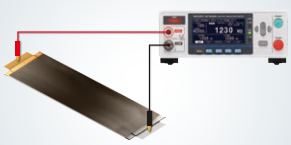
The standard model in Hioki's line of Battery insulation tester

High-speed | Compact | Reasonably priced

High-speed testing to increase production volume.
Easy to add instruments while saving space.
Invest in quality at a reasonable cost.

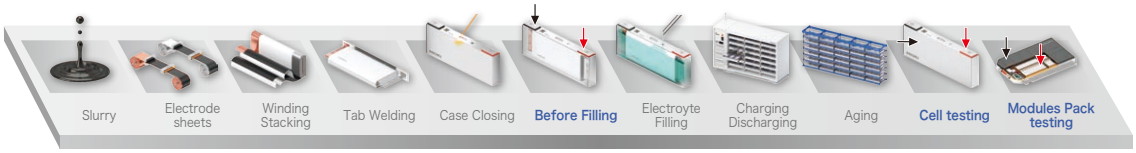
Ideal for insulation resistance testing before battery electrolyte filling

The BT5525 tests insulation between electrodes before cells are filled with electrolyte. The tester's maximum test voltage is 500 V. It can also perform insulation testing between module/pack electrodes and the enclosure.



Testing of cells' internal resistance state

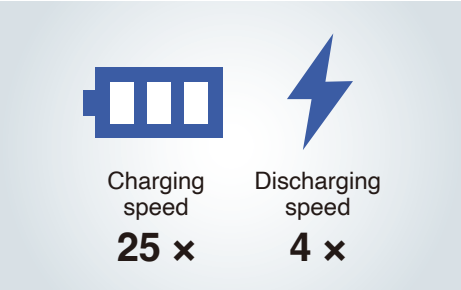
LIB production line processes



1 High-speed testing to increase production volume

Shorten cycle times with a maximum charging current of 50 mA

The BT5525 features high-speed charging at up to 50 mA and high-speed discharging of residual charge at 40 mA. The instrument's dramatically improved charging and discharging performance boosts testing speed, accelerating charging by about 25 times compared to previous models, and discharging by about 4 times. In this way, it can shorten insulation resistance testing times for batteries, which manufacturers are producing at ever-higher levels of capacity.
*Compared to Hioki's INSULATION TESTER ST5520.



2 Easy to add instruments while saving space

Compact footprint makes it easy to integrate the BT5525 into other systems

Drawing on many years of expertise in product design, Hioki has delivered high performance in a compact package. The instrument can be embedded in testing systems, allowing their size to be reduced. Manufacturers can deploy compact testing systems to make the most of limited production space.

3 Invest in quality at a reasonable cost

Boost productivity by minimizing cost

The BT5525's functionality and performance make it a cost-effective solution due to careful consideration given to the demands of battery insulation resistance testing. Fluctuations in voltage and current during insulation resistance testing can be viewed using a dedicated PC application.
The instrument can output a test voltage of up to 500 V. The instrument satisfies insulation resistance testing conditions for everything from the large batteries used in electric vehicles (EVs) to small battery cells.

Waveform analysis using the PC application

PC application for analyzing waveforms

A free PC application from Hioki can be used to review fluctuations in voltage and current.
The ability to review waveforms can be useful when analyzing test results and when determining judgment reference values for testing lines.
Since data can be output in the CSV format, waveforms can also be reviewed in other applications, for example Excel.

Start/stop control

Measurement on the BT5525 can be started and stopped using the application.

BDD judgment results list

The application displays BDD times and associated measured values.

Voltage monitor display

The application displays test voltage waveforms. You can review CC V and CV V BDD locations.

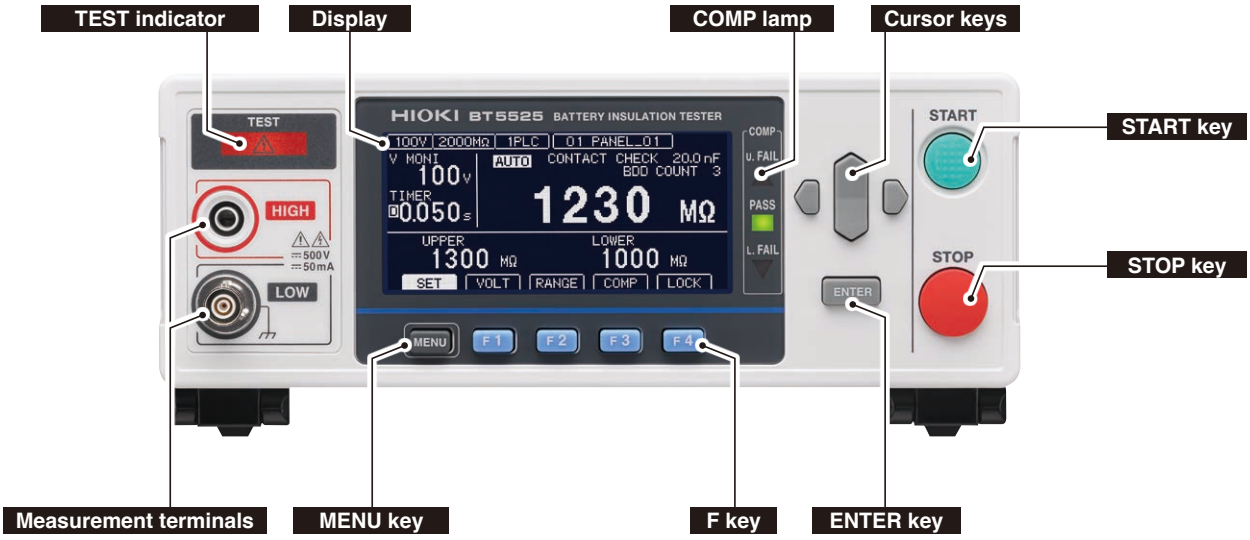
Current monitor display

The application displays current waveforms. You can review CV I BDD locations.

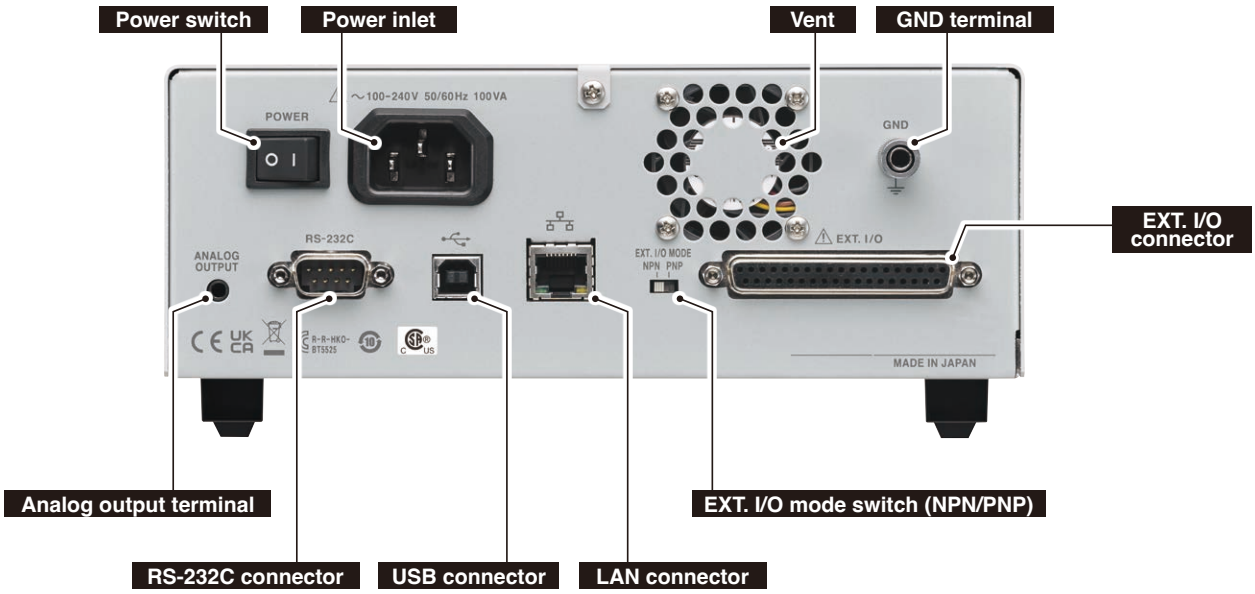
Data can be output in CSV format.

*Window layout remains under development.

Interfaces



*The LOW terminal is a dedicated HIOKI connector, so only our optional L2131 or L2133 can be connected.



Options

CLIP TYPE LEAD
L2130
For HIGH terminal, banana / alligator clip, red, cord length 1.5 m

CLIP TYPE LEAD
L2131
For LOW terminal, special triaxial / alligator clip, black, cord length 1.5 m

UNTERMINATED LEAD
L2132
For HIGH terminal, banana / cut wire, red, cord length 5 m

UNTERMINATED LEAD
L2133
For LOW terminal, special triaxial / cut wire, black, cord length 5 m

OUTPUT CORD
L9094
For analog output, banana plugs (red, black), cord length 1.5 m

RS-232C CABLE
L9637
For external control, double shielding, 9-pin / 9-pin, cord length 3 m

External control and other communications interfaces

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

The BT5525 ships standard with LAN, RS-232C, and USB interfaces, allowing it to be connected to a PC or programmable logic controller (PCL). This capability can be used to control the instrument and retrieve test results.
Furthermore, the instrument provides external I/O terminals to facilitate instrument control and retrieval of instrument status and judgment results.

EXT. I/O interface

The EXT. I/O connector on the rear of the instrument can be used to control the instrument by outputting TEST signals and judgment result signals and inputting START and STOP signals.

IN: Signal input to instrument OUT: Signal output from instrument

Signal name	Functionality	I/O
START	Measurement start	In
STOP	Measurement stop	In
TEST	From test start to discharge complete	Out
VON	Voltage monitor value is within 10% of set voltage value.	Out
BDD	BDD results	Out
C_CHECK_FAIL	Contact check judgment	Out
SYSTEM_ERR	Instrument error	Out
PASS	Comparator judgment	Out
UPPER FAIL	Comparator judgment	Out
LOWER FAIL	Comparator judgment	Out
ISO_5V	Insulated power supply ±5 V output	-
ISO_COM	Insulated power supply common	-
LOAD0	Panel number selection	In
LOAD1	Panel number selection	In
LOAD2	Panel number selection	In
LOAD3	Panel number selection	In
LOAD_VALID	Panel load execution	In
INTERLOCK	Interlock	In

About interlock functionality

Interlock functionality serves to shut off instrument output. When the interlock function operates, START key operation is disabled. Similarly, test operation cannot be started using the EXT. I/O START signal or communications commands.
To start testing, the included interlock cancellation jig is used to turn off the interlock function.

EXT. I/O mode switch (NPN/PNP)

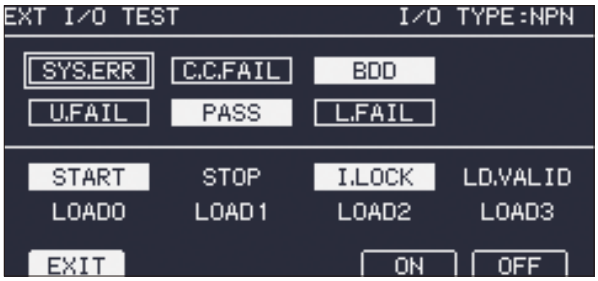
The EXT. I/O mode switch (NPN/PNP), which switches between current sink (NPN) and current source (NPN) operation, can be used to change the type of programmable logic controller (PLC) that the instrument supports.

LAN interface

The instrument provides an Ethernet 100Base-TX interface. A 10Base-T or 100Base-TX compatible LAN cable can be used to connect the instrument to a network so that it can be controlled by a PC or other device.

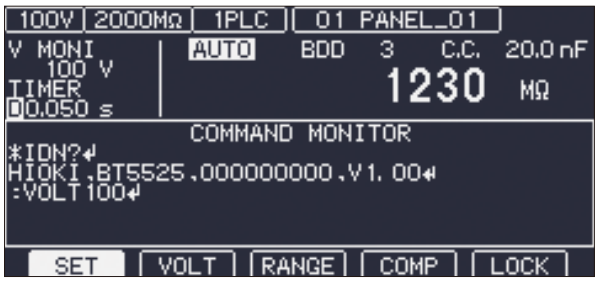
EXT. I/O test function

In addition to manually switching output signals on and off, this functionality can be used to view input signal status on the screen.



Command monitor function

This function, which displays commands and responses on the measurement screen, is a useful tool when creating programs. It can be used to display communications commands and query responses on the screen.



Specifications

(Accuracy guaranteed for 1 year)

Main functions		
Insulation resistance test		
Break Down Detect function (BDD)		
Contact check function		
Output specifications		
Output voltage	25 V to 500 V, Setting resolution 1 V	
Charging current (Current limit function)	50 µA to 50 mA*1*2*3, Minimum setting resolution 10 µA	
Short-circuit current	60 mA or less	
Discharge current	40 mA or greater	
Measurement specifications		
Resistance value display range	0.050 MΩ to 9999 MΩ	
Resistance range	2 MΩ, 20 MΩ, 200 MΩ, 2000 MΩ, AUTO	
Time specifications		
Test time	0.050 s to 999.999 s, OFF	
Comparator delay time	0.001 s to 999.999 s, AUTO	
Display update speed	1 PLC	
Sampling time	1 PLC to 100 PLC	
Memory functions		
Panel save function	Saves up to 15 sets of measurement conditions	
Measured value memory function	Saves up to 999 measured values in the instrument's internal memory	
judgment functions		
Test modes	Continuous test, PASS STOP, FAIL STOP	
Comparator function	UPPER_FAIL	: Measured value > upper limit value
	PASS	: Upper limit value ≥ measured value ≥ lower limit value
	LOWER_FAIL	: Measured value < lower limit value
Various functions		
Break Down Detect function (BDD)	Detecting minuscule insulation defects caused by contamination	
Contact check function	2-terminal capacitance measurement method	
Automatic data output function	Automatic output of measurement results via communication interface after completion of test	
Command monitor function	Screen display of commands being sent and received	
External I/O monitor function	Screen display of output signal ON/OFF and input signal status	
Analog output function	Converts measured values to 0 to 4 V DC and outputs	
Basic Specifications		
Operating temperature and humidity	0°C to 40°C, 80% RH or less (non-condensing)	
Standard compliance	Safety : IEC 61010	
	EMC : IEC 61326	
Power supply	100 V to 240 V AC	
Power consumption	Approx. 20 VA*4	
Maximum rated power	100 VA	
Interfaces	USB, LAN, RS-232C, EXT. I/O	
Outline dimension	215 mm (8.46 in) W × 80 mm (3.15 in) H × 306.5 mm (12.07 in) D (excluding protruding parts)	
Mass	2.8 kg (98.8 oz) ± 0.1 kg (3.5 oz)	
Product warranty period	3 years	
Accessories	Power cord, EXT. I/O male connector, EXT. I/O connector cover, EXT. I/O interlock cancellation jig, Startup Guide	

Model:
BATTERY INSULATION TESTER BT5525

Model No. (Order code): **BT5525**

The instrument is not able to perform measurement by itself. Please purchase optional test leads separately as appropriate for your measurement application. The LOW terminal is a dedicated HIOKI connector, so only our optional L2131 or L2133 can be connected.

*1: Constraints involving the output generator will result in an error, making measurement impossible, if a capacitive load of approximately 50 µF or greater is connected while using a current limit setting of 5.1 mA or greater.

*2: When using a current limit setting of 5.1 mA or greater, measurement will be forcibly stopped if the output voltage is not at least 20 V at 200 ms after the start of measurement. Measurement will be possible 1 s after forcibly stopped.

*3: If the set current limit value is from 5.1 mA to 50.0 mA, the current will be limited to 5 mA after the output voltage reaches the set voltage.

*4: Power supply conditions are 220 V supply voltage, 50, 60 Hz supply frequency, 200 V test voltage, 2 mA current limit, and load (1 GΩ resistor and 0.1 µF capacitor connected in parallel).

Set voltage	Resistance range	Resistance value display range	Resolution	Guaranteed accuracy range	Basic accuracy
25 V ≤ V ≤ 100 V	2 MΩ	0.050 MΩ to 9.999 MΩ	0.001 MΩ	0.050 MΩ to 2.000 MΩ	±1.5% rdg. ±2 dgt.
				2.001 MΩ to 9.999 MΩ	±15% rdg.
	20 MΩ	1.80 MΩ to 99.99 MΩ	0.01 MΩ	1.80 MΩ to 20.00 MΩ	±1.5% rdg. ±2 dgt.
				20.01 MΩ to 99.99 MΩ	±5% rdg.
	200 MΩ	18.0 MΩ to 999.9 MΩ	0.1 MΩ	18.0 MΩ to 200.0 MΩ	±2.5% rdg.
				200.1 MΩ to 999.9 MΩ	±5% rdg.
100 V ≤ V ≤ 500 V	2 MΩ	0.200 MΩ to 9.999 MΩ	0.001 MΩ	0.200 MΩ to 2.000 MΩ	±1.5% rdg. ±2 dgt.
				2.001 MΩ to 9.999 MΩ	±10% rdg.
	20 MΩ	1.00 MΩ to 99.99 MΩ	0.01 MΩ	1.00 MΩ to 20.00 MΩ	±1.5% rdg. ±2 dgt.
				20.01 MΩ to 99.99 MΩ	±15% rdg.
	200 MΩ	10.0 MΩ to 999.9 MΩ	0.1 MΩ	10.0 MΩ to 200.0 MΩ	±2.5% rdg.
				200.1 MΩ to 999.9 MΩ	±5% rdg.
	2000 MΩ	100 MΩ to 9999 MΩ	1 MΩ	100 MΩ to 2000 MΩ	±2.5% rdg.
				2001 MΩ to 9999 MΩ	±5% rdg.

*Display indicates Over.F or Under.F when the display range is exceeded.

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