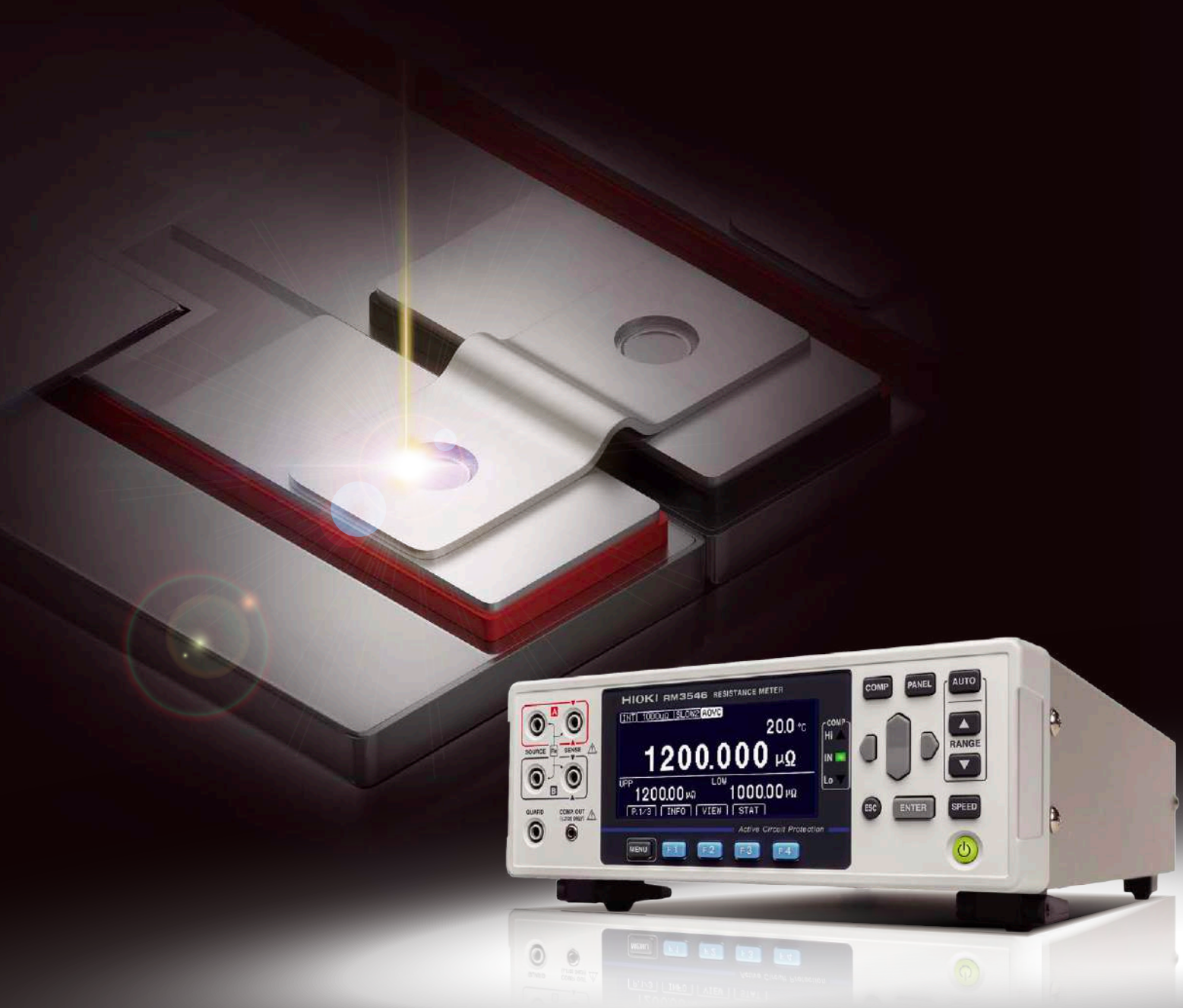


# HIOKI

## RESISTANCE METER RM3546

**NEW**

### Redefining Weld Quality Inspection



# Next-generation battery inspection creates a safe future

EVs (electric vehicles) and ESSs (energy storage systems) that support social infrastructure: The explosive growth of the battery market is creating unprecedentedly high-level demands such as design battery lifespans of over 20 years, ultra-fast charging, and high safety. To achieve the development and production of safer batteries, Hioki has developed the RM3546, which can perform high-precision inspections on welded areas where large currents flow.

## Frequently Asked Questions

## Answers

### 1. Is the inspection accurate?



To improve battery safety, I want to detect (potential) weld defects that could lead to accidents or fires. What kind of inspections can the RM3546 perform?

### It accurately determines pass/fail through electrical inspection

Weld defects are detected with a new method: running electricity through and measuring resistance. Tests can be done right after welding by effectively eliminating the influences of temperature.

### 2. Is installation difficult?



We are already using image inspection, optical process monitors, tensile strength tests, and destructive tests. We want to add the RM3546 to our equipment to raise the inspection level—can it be easily installed?

### Installation is easy with simple wiring and dedicated probes

Installation is easy because it solves issues such as wiring noise and jig-probe customization, which become barriers during implementation.

### 3. Isn't it expensive?



I'm concerned about costs related to maintenance of inspection equipment and downtime from malfunctions. I'm also worried about costs when increasing the number of measurement channels in the future. How is the RM3546's cost performance?

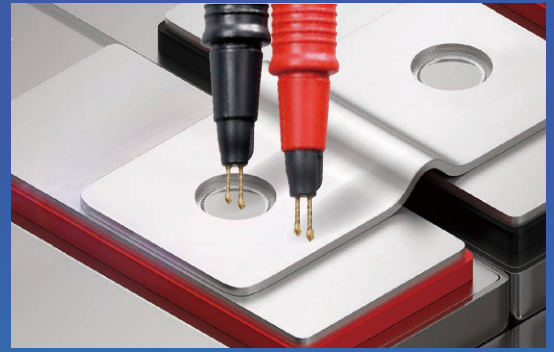
### Both long-term operation and channel expansion are low-cost

Its very long service life due to a protection function prevents failures (caused by overvoltage input), reducing downtime and maintenance costs. Furthermore, using the optional scanner enables easy expansion of up to 132 channels per unit.



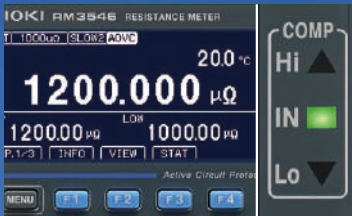


Ideal for battery busbar weld inspection



Judges connection quality by measuring resistance

### Product Features



Measures resistance to judge pass/fail



Equipped with temperature noise correction function



Long wiring is OK



Customizable probes

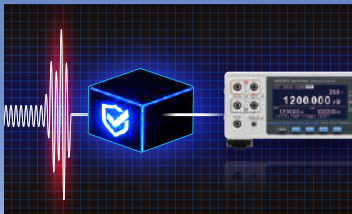


Resistance Meter

# RM3546

Concept video >

<https://youtu.be/Xtdy8aE7VEE>



Durable and reliable



Expandable to multiple channels



# Accurately Judges Pass/Fail Through Electrical Inspection



< Website

[https://www.hioki.com/global/products/resistance-meters/resistance/id\\_1383368](https://www.hioki.com/global/products/resistance-meters/resistance/id_1383368)



## Product overview

Current passes through the measurement target, such as the welded area, to measure electrical resistance. Good and defective products are sorted based on differences in resistance values. Weld resistance is as low as  $10 \mu\Omega$  to  $100 \mu\Omega$ . The RM3546 resistance meter is equipped with a  $1000 \mu\Omega$  range and can measure low resistance with high precision at  $1 \text{ n}\Omega$  resolution. If the weld is insufficient, the resistance value becomes larger than in good products. By detecting slight differences in resistance between good and defective products, it determines pass/fail. All weld quality can be managed numerically on the production line, ensuring traceability.

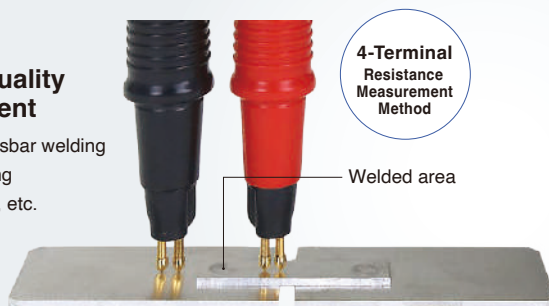
## Basic performance

|                                 |   |
|---------------------------------|---|
| Minimum resolution              | 1 n $\Omega$  |
| Measurement range               | 1000 $\mu\Omega$ to 1000 M $\Omega$                               |
| Basic accuracy                  | $\pm 0.006\%$ of reading $\pm 0.002\%$ of full scale              |
| Compensation functions          | A-OVC, A-TC   |
| Malfunction prevention function | ACP (DC 60 V)   |
| Path resistance tolerance       | 9 $\Omega$ (when measurement current is 500 mA and PR mode is on) |

## Welding Quality Measurement

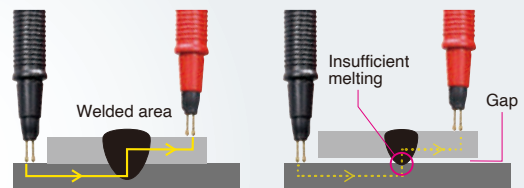
Battery pack busbar welding

- Current welding
- Laser welding, etc.



4-Terminal  
Resistance  
Measurement  
Method

Welded area



### Good weld

Low welding resistance allows electricity to pass through easily

### Defective weld

High welding resistance makes it harder for electricity to pass through

## No need for zero adjustment

Accuracy is guaranteed without the zero adjustment or instrument warmup. Simply power up the instrument and get to work.

## Temperature measurement function

When using the Temperature Sensor Z2001, the instrument can measure temperature with a high degree of precision ( $\pm 0.5^\circ\text{C}$ ). It can also accept analog input from a radiation thermometer (0 V to 2 V).

## Contact check function

This function detects erroneous measurement due to incomplete contact, reducing the risk of faulty judgments or mistaken inspection results.

## Temperature conversion ( $\Delta T$ ) function

This function calculates and displays temperature rise from the measured resistance value and ambient temperature.

## Command monitor function

This function displays queries and responses from communications commands. It can significantly reduce the number of debugging man-hours when building systems.

## Automatic input to PC

This function allows the instrument to automatically enter measurement results in Excel® or a text editor, freeing the operator from troublesome data entry work.

# Measures Low Resistance with High Precision Using Temperature Noise Compensation

Setup support with PC app



< Demo video  
<https://youtu.be/vugKQkbYn6Q>

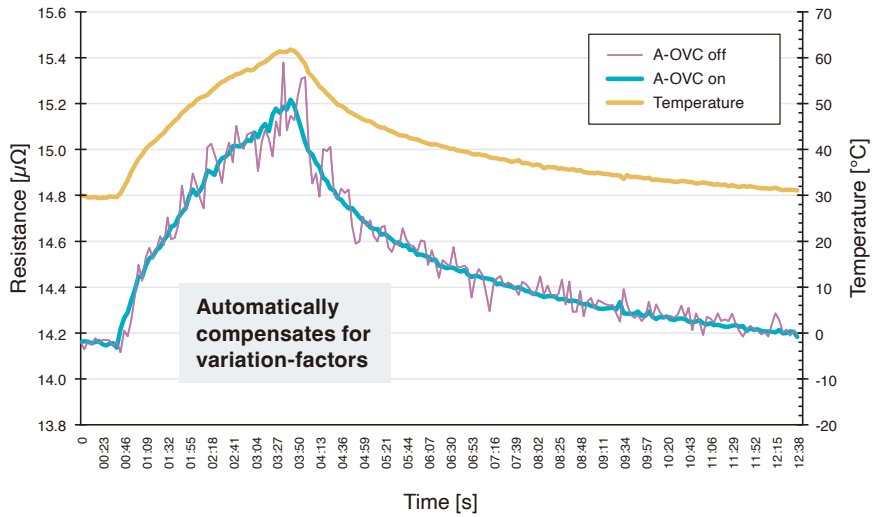
## A-OVC function for stable measurement

### Advanced Offset Voltage Compensation

The RM3546 is equipped with an A-OVC function that automatically compensates for thermoelectric power, offset voltage inside the instrument, etc., to make measurement errors as close to zero as possible. It suppresses variations in measured values and enables measurements that maximize the performance of its 1 nΩ resolution.



Stable inspection on the line

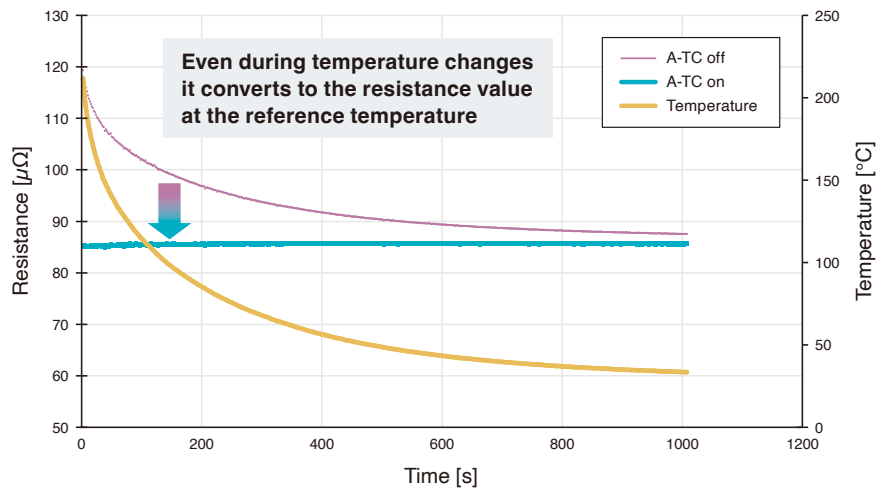
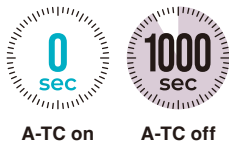


## A-TC function compensates for temperature effects

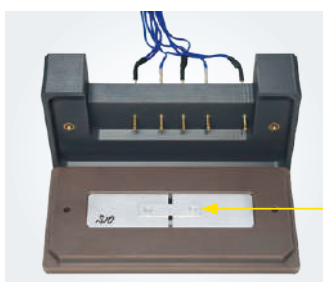
### Advanced Temperature Correction

There is a correlation between resistance values and temperature. The RM3546 is equipped with the A-TC function that simultaneously measures the temperature and resistance value of the measurement target and compensates it in real time to the resistance value at a reference temperature. Even immediately after welding (when the temperature changes rapidly), it compensates to the resistance value at room temperature for accurate pass/fail judgement.

Significantly less time waiting for cooling

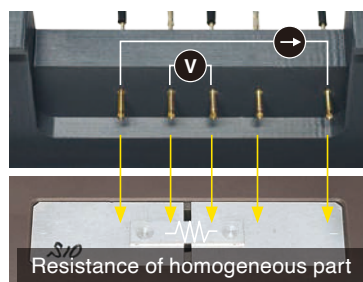


## Measurement Method

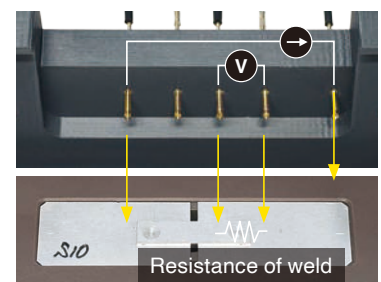


Measurement jig sample

Weld



Measures resistance value and converts to temperature

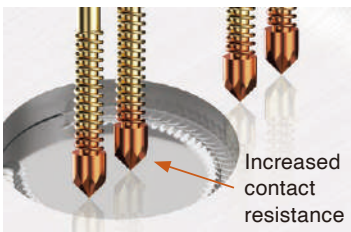


Compensates to resistance value at reference temperature

## Simple Installation with Easy Wiring and Dedicated Probes

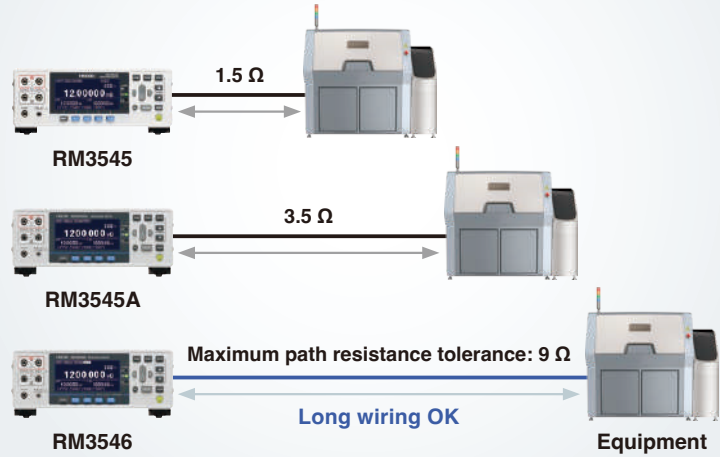
### Design systems without worrying about path resistance

The large tolerance for path resistance allows for design of installations without considering complicating factors such as cable resistance, contact probe resistance, object resistance, relay resistance, etc. High long-term measurement stability can be maintained even when path resistance increases due to cable extension or relay wear.



Measurement stability despite age degradation

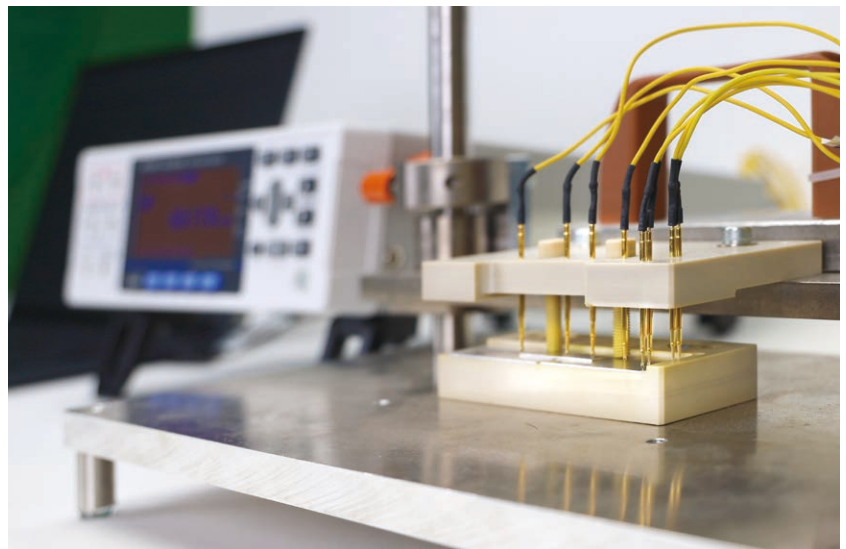
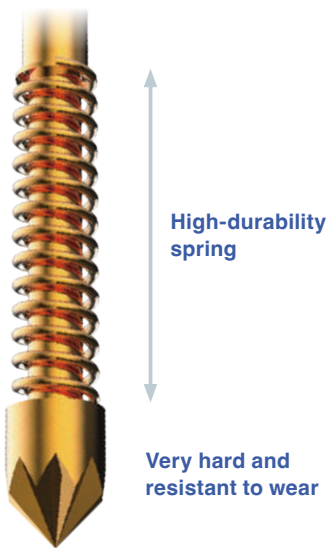
### Long wiring is OK, making implementation design easy



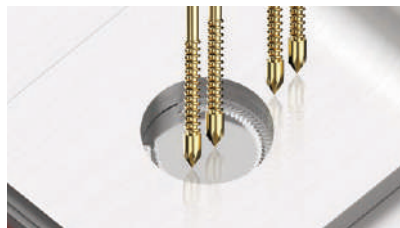
### Customizable probes

A challenge during installation is obtaining appropriate probe pins and designing the probe section.

The RM3546 offers a lineup of recommended probe pins so that measurement jigs can be freely designed according to the measurement target. This removes implementation barriers for users and significantly reduces man-hours. Tip of Probe Kit L9773



Pin placement even in narrow spaces



Firm contact even with unlevel surfaces



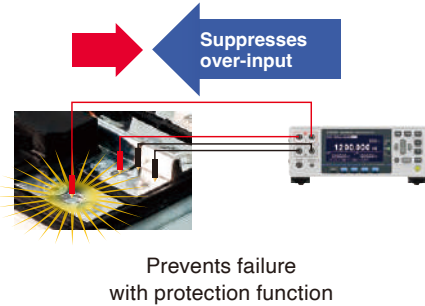
Probe Kit L9773

# Low-Cost Maintenance and Channel Expansion

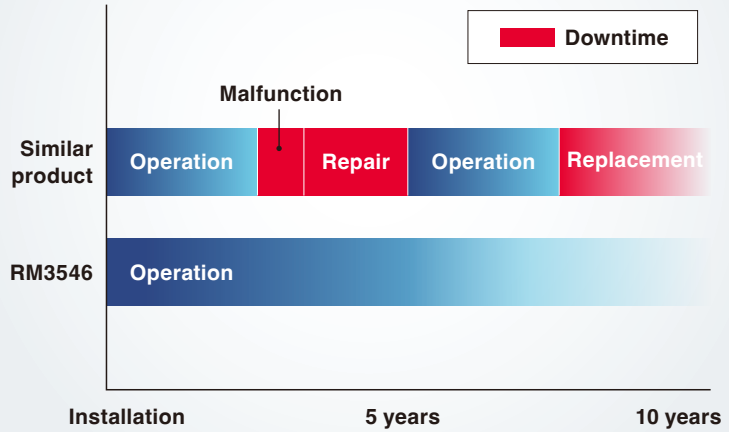
## Prevent sudden malfunctions with the ACP function

### Active Circuit Protection

The voltage protection circuit prevents malfunctions due to careless mistakes. Even if accidental contact is made with the battery's active terminal, the protection function automatically works to prevent damage. This not only reduces repair costs but also contributes to long-term stable operation of the line.

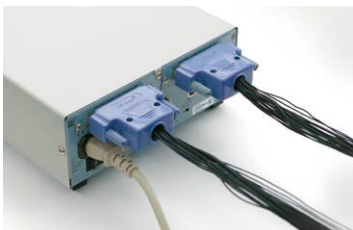


## High durability allows for long service-life



## Up to 132 channels per unit

Up to 20 channels (4-terminal method) are supported by equipping 2 multiplexer units (Z3003). Finally, a total of 132 channels (4-terminal method) are possible when combining the switch mainframe SW1002. This meets the demand for multi-channel measurement with low cost and space savings.

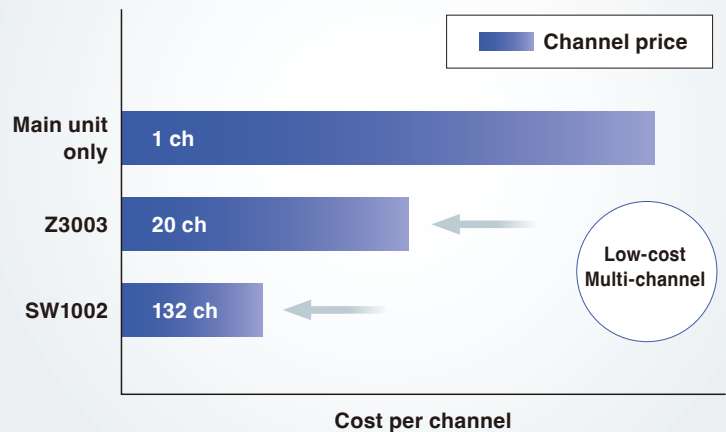


Z3003: up to 20 channels



SW1002: up to 132 channels

## Build mass production inspection systems with minimal equipment investment



# Dedicated Multiplexer Optimized for High-Speed, High-Precision Measurement

## Options

For multichannel measurement

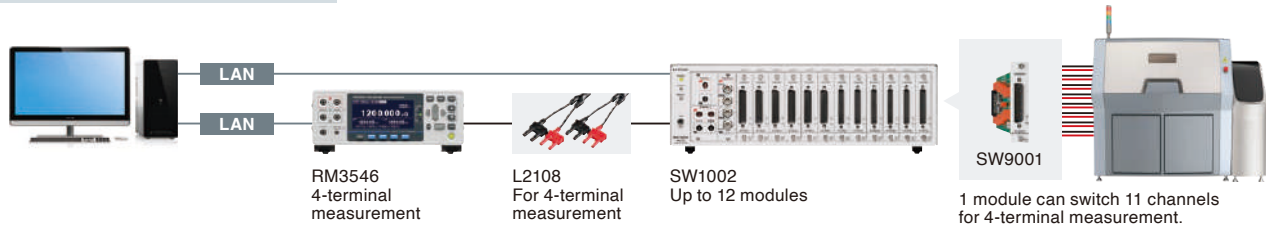


SW1002 web site >

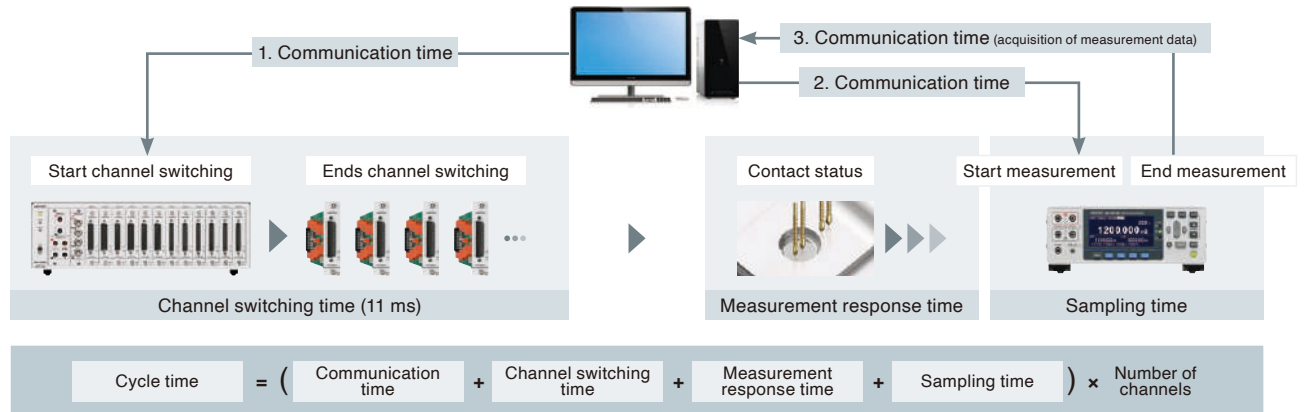
[https://www.hioki.com/global/products/resistance-meters/battery/id\\_6701](https://www.hioki.com/global/products/resistance-meters/battery/id_6701)



## Example setup using the SW1002



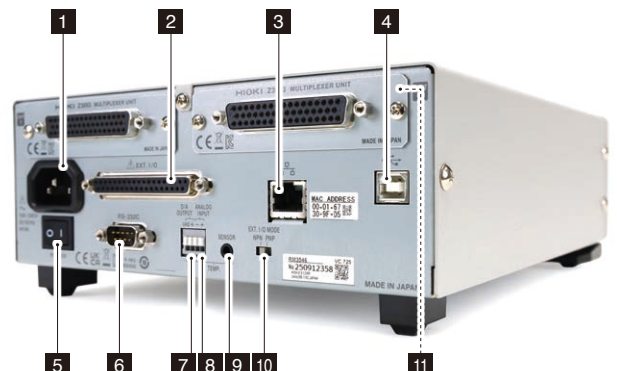
## Measurement time



| Instrument | Function   | Measurement speed    | Number of channels | Measurement response time (delay time) | Switching time (all channels) | Conditions  |
|------------|--|----------------------|--------------------|--|-------------------------------|---|
| RM3546     | 1000 $\mu\Omega$ range (PR mode: on; A-OVC: on; measurement current: high) | FAST (83 ms)         | 11                 | 0                                      | 1.04 s (approx.94 ms/CH)      | RM3546 communicates via LAN<br>After normal reset<br>Fixed range<br>Self-calibration: manual<br>External trigger (self-calibration done while idle) |
|            |  | MED (60 Hz) (149 ms) | 11                 | 0                                      | 1.76 s (approx.160 ms/CH)     |   |
|            |  | SLOW1 (482 ms)       | 11                 | 0                                      | 5.43 s (approx.493 ms/CH)     |   |
|            |  | SLOW2 (882 ms)       | 11                 | 0                                      | 9.83 s (approx.893 ms/CH)     |   |

## Interfaces (RM3546)

- 1 Power inlet
- 2 EXT. I/O connector
- 3 LAN connector
- 4 USB connector
- 5 Main power switch
- 6 RS-232C connector
- 7 D/A OUTPUT terminal
- 8 TEMP. ANALOG INPUT terminal
- 9 TEMP. SENSOR
- 10 EXT. I/O MODE NPN/PNP switch
- 11 Multiplexer unit slot



## Switch Mainframe SW1001, SW1002



| Switch Mainframe S1001, SW1002 |   |
|--------------------------------|---|
| Number of slots                | 3 slots (SW1001), 12 slots (SW1002)                                   |
| Supported RM3546 module        | Multiplexer module SW9001 (2-wire, 4-wire)                            |
| Maximum input voltage          | DC 60 V, AC 30 V RMS, 42.4 V peak                                     |
| Interfaces                     | LAN, USB, RS-232C (host use), RS-232C (command transfer function use) |
| EXT. I/O                       | SCAN input, SCAN_RESET input, CLOSE output (scan control use)         |

| Multiplexer Module SW9001   |  |
|-----------------------------|--|
| Wiring method               | 2-wire or 4-wire   |
| Number of channels          | 22 channels (2-wire method), 11 channels (4-wire method) |
| Contact method              | Mechanical relay   |
| Channel switching time      | 11 ms (not including measurement time)                   |
| Maximum permissible voltage | DC 60 V, AC 30 V RMS, 42.4 V peak                        |
| Maximum permissible current | DC 1 A, AC 1 A RMS                                       |
| Connectors used             | D-sub 50-pin pin header                                  |

## Influence by range/setting (A-OVC on)

| Range            | Measurement speed setting<br>Add to accuracy $\pm(x\% \text{ rdg.} + y\% \text{ f.s.})$ |               |               |       | Measurement current setting |
|------------------|---|---------------|---------------|-------|-----------------------------|
|                  | FAST  | MED           | SLOW1         | SLOW2 |                             |
| 1000 $\mu\Omega$ | 0.005 + 0.050   | 0.005 + 0.010 | 0.005 + 0.005 |       | High                        |
| 10 m $\Omega$    | 0.005 + 0.007   | 0.005 + 0.002 | 0.005 + 0.001 |       | High                        |
| 100 m $\Omega$   | 0.024 + 0.012   |               | 0.024 + 0.004 |       | High                        |
| 1000 m $\Omega$  | 0.005 + 0.012   |               | 0.005 + 0.004 |       | High                        |
| 10 $\Omega$      | 0.004 + 0.012   |               | 0.004 + 0.003 |       | High                        |
| 100 $\Omega$     | 0.003 + 0.020   |               | 0.003 + 0.003 |       | High                        |
| 1000 $\Omega$    | 0.003 + 0.020   |               | 0.003 + 0.004 |       | High                        |
| 10 k $\Omega$    | 0.006 + 0.020   |               | 0.005 + 0.008 |       | High                        |
| 100 k $\Omega$   | 0.024 + 0.020   |               | 0.023 + 0.008 |       | High                        |

(When the internal thermoelectromotive force is stable)

## Maximum number of channels

| Equipment used               | Maximum number of channels |
|------------------------------|----------------------------|
| main unit only               | 1 ch                       |
| Main unit + Z3003 $\times$ 1 | 10 ch                      |
| Main unit + Z3003 $\times$ 2 | 20 ch                      |
| Main unit + SW1001           | 33 ch                      |
| Main unit + SW1002           | 132 ch                     |

Conditions: measurement using 4 terminals and all channels



SW1001



SW1002



SW9001

## Multiplexer Unit Z3003



|                               |   |
|-------------------------------|---|
| Measurement targets           | 4-wire method: 10 locations (if using 2 units, 20 locations)<br>2-wire method: 21 locations (if using 2 units, 42 locations)  |
| Measurement current/frequency | Measurement current:<br>When equipped with Z3003, $\leq 1$ A DC<br>When externally connected, $\leq 1$ A DC or $\leq 100$ mA AC<br>Measurement frequency: DC, 10 Hz to 1 kHz  |
| Contact specifications        | Contact type: mechanical relay<br>Maximum permissible voltage: AC 33 V rms (46.7 V peak) or DC 70V<br>Maximum permissible power: 30 W (DC, resistive load)<br>Contact service life:<br>50 million cycles for 4-wire method (reference value)*<br>5 million cycles for 2-wire method (reference value) |
| Channel switching time        | 30 ms (without switching range or LP mode)  |
| External dimensions           | Approx. 92W $\times$ 24.5H $\times$ 182D mm (3.62W $\times$ 0.96H $\times$ 7.17D in.) (excluding protruding parts)  |
| Connectors used               | D-sub 50-pin receptacle   |
| Accessories                   | Instruction manual, D-sub 50-pin connector (pin header, solder cup)   |

\*If used 24 hours a day on a production line moving at the rate of 1 unit per second, the approximate service life would be 1.5 years.

## Example scan times

| Range           | Number of channels | Measurement speed | Delay  | Time from TRIG input to judgment results output (if measurement current is high) |
|-----------------|--------------------|-------------------|--------|--|
| 1000 m $\Omega$ | 10                 | FAST              | 0 ms   | Approx. 300 ms   |
| 1000 m $\Omega$ | 10                 | FAST              | Preset | Approx. 800 ms   |

Total scan time: (switching time + measurement time, including delay)  $\times$  number of channels

## Additional accuracy specifications

|  |   |  |
|--|---|--|
| Effects of leak current                  | Add the reading (rdg.) error shown on right based on the measurement current (when using guarding). (With humidity of less than 70% RH [If the humidity is greater than or equal to 70% RH, add the rdg. error on the right $\times 5$ ]) | $\frac{1 \times 10^{-9} [\text{A}]}{I_{\text{MEAS}} [\text{A}]} \times 100 [\% \text{ rdg}]$ |
| Effect of measurement speed              | Add the f.s. error component shown on right when the integration time is not a whole-number multiple of the power supply cycle  | $A_{\text{fs}} \times 0.5 [\% \text{ rdg}]$  |
| Effect of offset voltage                 | Add the resistance shown on right to the error when OVC is off  | $\frac{10 \times 10^{-6} [\text{V}]}{I_{\text{MEAS}} [\text{A}]} [\Omega]$                   |
| Effect of offset resistance fluctuations | When using a 2-wire setup, add the wiring resistance shown on right to the error component  | 0.1 $\Omega$   |
| Temperature coefficient                  | From 0°C to 18°C (32°F to 64.4°F) and 28°C to 40°C (82.4°F to 104°F), add a temperature coefficient of $\pm(1/10$ of additional accuracy) / °C.   |  |

 $I_{\text{MEAS}}$  measurement current  $A_{\text{fs}}$  full scale error component for main unit with the Z3003

Measurement cables for multichannel measurement must be prepared by the user based on each application's needs.

## Measurement time, temperature measurement specifications (RM3546)

## Representative value

| Range              | Measurement current | A-OVC   | Measurement speed (unit: ms) |                  |       |       |     |
|--------------------|---------------------|---------|------------------------------|------------------|-------|-------|-----|
|                    |                     |         | FAST                         | MED<br>50Hz 60Hz | SLOW1 | SLOW2 |     |
| PR1000 $\mu\Omega$ | High                | On      | 83                           | 162              | 149   | 482   | 882 |
|                    |                     | Off     | 83                           | 162              | 149   | 482   | 882 |
| PR10 m $\Omega$    | High                | On(OVC) | 42                           | 81               | 74    | 241   | 441 |
|                    |                     | Off     | 21                           | 61               | 54    | 221   | 421 |
| PR100 m $\Omega$   | N/A                 | Off     | 21                           | 61               | 54    | 221   | 421 |
| 1000 m $\Omega$    | High                | Off     | 3.7                          | 43               | 37    | 203   | 403 |
| 10 $\Omega$        | High                | Off     | 2.9                          | 42               | 36    | 202   | 402 |
| 100 $\Omega$       | High                | Off     | 3.0                          | 42               | 36    | 202   | 402 |

Tolerance:  $\pm 10\% \pm 0.2$  ms PR: pure resistance

## Add to accuracy when used with Z2001

| Temperature range | Accuracy                             |
|-------------------|--------------------------------------|
| -10.0°C to 9.9°C  | $\pm(0.55 + 0.009 \times  t-10 )$ °C |
| 10.0°C to 30.0°C  | $\pm 0.50$ °C                        |
| 30.1°C to 59.9°C  | $\pm(0.55 + 0.012 \times  t-30 )$ °C |
| 60.0°C to 99.9°C  | $\pm(0.92 + 0.021 \times  t-60 )$ °C |

Standalone accuracy:  $\pm 0.2$ °C  
t: measurement temperature [°C]

## Temperature Sensor Z2001 specifications


|                   |                   |
|-------------------|-------------------|
| Measurement range | -10.0°C to 99.9°C |
| Measurement speed | Approx. 2 s       |



## Analog temperature measurement input

|                           |                                  |
|---------------------------|----------------------------------|
| Accuracy guaranteed range | 0 V to 2 V                       |
| Maximum permissible input | 2.5 V                            |
| Resolution                | 1 mV                             |
| Display range             | -99.9°C to 999.9°C               |
| Measurement cycle (speed) | Approx. 50 ms, no moving average |
| Accuracy                  | $\pm 1\% \text{ rdg.} \pm 3$ mV  |

These specifications provide representative values. Actual performance will vary with measurement conditions. For more information, please see the instruction manual.

## Basic specifications (resistance meter lineup comparison chart)

|  |  |   |                                   |                 |                                 |
|--|--|---|-----------------------------------|-----------------|---------------------------------|
| Model  |  | RM3546  |                                   |                 |                                 |
|  |  |  |                                   |                 |                                 |
| Measurement  | Measurement method   | DC 4-terminal method (constant-current)   |                                   |                 |                                 |
|  | Maximum display, Resolution, Measurement current [high/low]    | Resistance measurement ranges   | Maximum display                   | Resolution      | Measurement current [high, low] |
|  |  | 1000 $\mu\Omega$  | 1200.000 $\mu\Omega$              | 1 n $\Omega$    | 1 A, 500 mA                     |
|  |  | 10 m $\Omega$   | 12.00000 m $\Omega$               | 10 n $\Omega$   | 1 A, 500 mA                     |
|  |  | 100 m $\Omega$  | 120.0000 m $\Omega$               | 100 n $\Omega$  | 1 A, 100 mA                     |
|  |  | 1000 m $\Omega$   | 1200.000 m $\Omega$               | 1 $\mu\Omega$   | 100 mA, 10 mA                   |
|  |  | 10 $\Omega$   | 12.00000 $\Omega$                 | 10 $\mu\Omega$  | 10 mA, 1 mA                     |
|  |  | 100 $\Omega$  | 120.0000 $\Omega$                 | 100 $\mu\Omega$ | 10 mA, 1 mA                     |
|  |  | 1000 $\Omega$   | 1200.000 $\Omega$                 | 1 m $\Omega$    | 1 mA                            |
|  |  | 10 k $\Omega$   | 12.00000 k $\Omega$               | 10 m $\Omega$   | 1 mA                            |
|  |  | 100 k $\Omega$  | 120.0000 k $\Omega$               | 100 m $\Omega$  | 100 $\mu\text{A}$               |
|  |  | 1000 k $\Omega$   | 1200.000 k $\Omega$               | 1 $\Omega$      | 10 $\mu\text{A}$                |
|  |  | 10 M $\Omega$   | 12.00000 M $\Omega$               | 10 $\Omega$     | 1 $\mu\text{A}$                 |
|  |  | 100 M $\Omega$ (high-precision mode on)   | 120.0000 M $\Omega$               | 100 $\Omega$    | 100 nA                          |
|  |  | 100 M $\Omega$ (high-precision mode off)  | 120.00 M $\Omega$                 | 10 k $\Omega$   | 1 $\mu\text{A}$ or less         |
| 1000 M $\Omega$  | 1200.0 M $\Omega$  | 100 k $\Omega$  | 1 $\mu\text{A}$ or less           |                 |                                 |
| Representative accuracy (high mode, A-OVC function enabled, SLOW2, no zero adjustment)                                     | 1000 $\mu\Omega$   | $\pm(0.045\% \text{ rdg} + 0.010\% \text{ f.s.})$                                   |                                   |                 |                                 |
|  | 10 m $\Omega$  | $\pm(0.045\% \text{ rdg} + 0.001\% \text{ f.s.})$                                   |                                   |                 |                                 |
|  | 100 m $\Omega$   | $\pm(0.045\% \text{ rdg} + 0.001\% \text{ f.s.})$                                   |                                   |                 |                                 |
|  | 1000 m $\Omega$  | $\pm(0.012\% \text{ rdg} + 0.001\% \text{ f.s.})$                                   |                                   |                 |                                 |
|  | 1000 $\Omega$  | $\pm(0.006\% \text{ rdg} + 0.001\% \text{ f.s.})$                                   |                                   |                 |                                 |
| Measurement times  |  | See table on bottom-right of p. 9   |                                   |                 |                                 |
| Path resistance tolerance (reference values)   |  | Range: 10 m $\Omega$ or less, PR mode off<br>Max. 6.1 $\Omega$                      |                                   |                 |                                 |
| Path resistance between SOURCE B and SOURCE A (other than measurement target)  |  | Range: 10 m $\Omega$ or less, PR mode on<br>Max. 9.0 $\Omega$                       |                                   |                 |                                 |
| Maximum open-terminal voltage  |  | Range: 1000 $\Omega$ or less, 10 k $\Omega$ or more<br>8.0 V, 20 V                  |                                   |                 |                                 |
| Interfaces   | Multiplexer unit Z3003 (built-in option)                       | Max. number of installable units  | 2 units                           |                 |                                 |
|  |  | Number of channels [4-wire method, 2-wire method]                                   | 20 channels, 42 channels          |                 |                                 |
|  |  | Switching time (reference value)  | 30 ms                             |                 |                                 |
|  | LAN  | TCP/IP, 10BASE-T/100BASE-TX   | ✓                                 |                 |                                 |
|  | RS-232C  | Max. 115,200 bps, also used as printer interface                                    | ✓                                 |                 |                                 |
|  | USB  | CDC class (COM mode)  | ✓                                 |                 |                                 |
|  |  | HID class (keyboard mode)   | ✓                                 |                 |                                 |
|  | GP-IB  | -   |                                   |                 |                                 |
|  | EXT I/O  | 37-pin handler interface  | ✓                                 |                 |                                 |
|  | Analog output  | Resistance measurement value  | 0 V to 1.5 V DC                   |                 |                                 |
| Functionality  | ACP (Active Circuit Protection) function                       | Maximum allowable voltage   | $\pm 60$ V DC (between terminals) |                 |                                 |
|  | Contact check  |   | ✓                                 |                 |                                 |
|  | Zero adjustment *Not possible with range $\geq 100$ M $\Omega$ | Adjusts within $\pm 50\%$ f.s. of each range  | ✓                                 |                 |                                 |
|  | Zero-adjustment-free accuracy guaranteed                       |   | ✓                                 |                 |                                 |
|  | OVC function   | Offset Voltage Compensation   | ✓                                 |                 |                                 |
|  | A-OVC function   | Advanced Offset Voltage Compensation  | ✓                                 |                 |                                 |
|  | Contact improvement function                                   |   | ✓                                 |                 |                                 |
|  | Low-power mode   | Maximum open voltage: 20 mV   | -                                 |                 |                                 |
|  | Auto-hold function   |   | ✓                                 |                 |                                 |
|  | Absolute value display function                                |   | ✓                                 |                 |                                 |
|  | Comparator function  | Mode  | Hi, IN, Lo                        |                 |                                 |
|  |  | L2105 LED Comparator Attachment output  | ✓                                 |                 |                                 |
|  | Temperature measurement function                               | Thermistor sensor (Z2001)   | -10.0 to 99.9 $^{\circ}\text{C}$  |                 |                                 |
|  |  | Analog input (e.g., radiation thermometer)  | 0 V to 2.0 V DC                   |                 |                                 |
|  | TC function  | Temperature Correction  | ✓                                 |                 |                                 |
|  | A-TC function  | Advanced Temperature Correction   | ✓                                 |                 |                                 |
|  | Temperature conversion ( $\Delta T$ ) function                 |   | ✓                                 |                 |                                 |
|  | Statistical calculation function                               |   | Up to 30,000 data sets            |                 |                                 |
| Delay function   |  | 0 ms to 9999 ms   |                                   |                 |                                 |
| Averaging function   | Average out of   | 2 to 100 times  |                                   |                 |                                 |
| Panel Save   | Saving of measurement conditions                               | 30 sets (MUX: 8 sets)   |                                   |                 |                                 |
| Data memory function   |  | 50 data sets  |                                   |                 |                                 |
| Command monitor function   | Display of send/receive status of commands and queries         | ✓   |                                   |                 |                                 |
| LabVIEW <sup>®</sup> Driver compatibility (LabVIEW Driver is a trademark or registered trademark of National Instruments.) |  | ✓   |                                   |                 |                                 |
| Standards compliance   |  | Safety: EN61010; EMC: EN61326 Class A   |                                   |                 |                                 |
| CE marking   |  | ✓   |                                   |                 |                                 |
| UL/CSA (Canadian Standards Association) standard compliance  |  | ✓   |                                   |                 |                                 |
| Dimensions   |  | 215W × 80H × 306.5D mm (8.46W × 3.15H × 12.07D in.)                                 |                                   |                 |                                 |
| Weight   |  | 3.4 kg (7.5 lb.)  |                                   |                 |                                 |

| RM3545A-1<br>RM3545A-2  |            |                                 | RM3545*<br>RM3545-01<br>RM3545-02*<br><small>*Discontinued</small>                |            |                                 |
|---|------------|---------------------------------|---|------------|---------------------------------|
|  |            |                                 |  |            |                                 |
| DC 4-terminal method (constant-current)   |            |                                 | DC 4-terminal method (constant-current)   |            |                                 |
| Maximum display   | Resolution | Measurement current [high, low] | Maximum display   | Resolution | Measurement current [high, low] |
| 1200.000 μΩ   | 1 nΩ       | 1 A, N/A                        | N/A   | N/A        | N/A                             |
| 12.00000 mΩ   | 10 nΩ      | 1 A, N/A                        | 12.00000 mΩ   | 10 nΩ      | 1 A, N/A                        |
| 120.0000 mΩ   | 100 nΩ     | 1 A, 100 mA                     | 120.0000 mΩ   | 100 nΩ     | 1 A, 100 mA                     |
| 1200.000 Ω  | 1 μΩ       | 100 mA, 10 mA                   | 1200.000 Ω  | 1 μΩ       | 100 mA, 10 mA                   |
| 12.00000 Ω  | 10 μΩ      | 10 mA, 1 mA                     | 12.00000 Ω  | 10 μΩ      | 10 mA, 1 mA                     |
| 120.0000 Ω  | 100 μΩ     | 10 mA, 1 mA                     | 120.0000 Ω  | 100 μΩ     | 10 mA, 1 mA                     |
| 1200.000 Ω  | 1 mΩ       | 1 mA                            | 1200.000 Ω  | 1 mΩ       | 1 mA                            |
| 12.00000 kΩ   | 10 mΩ      | 1 mA                            | 12.00000 kΩ   | 10 mΩ      | 1 mA                            |
| 120.0000 kΩ   | 100 mΩ     | 100 μA                          | 120.0000 kΩ   | 100 mΩ     | 100 μA                          |
| 1200.000 kΩ   | 1 Ω        | 10 μA                           | 1200.000 kΩ   | 1 Ω        | 10 μA                           |
| 12.00000 MΩ   | 10 Ω       | 1 μA                            | 12.00000 MΩ   | 10 Ω       | 1 μA                            |
| 120.0000 MΩ   | 100 Ω      | 100 nA                          | 120.0000 MΩ   | 100 Ω      | 100 nA                          |
| 120.0000 MΩ   | 100 Ω      | 100 nA                          | 120.0000 MΩ   | 100 Ω      | 100 nA                          |
| 1200.0 MΩ   | 100 kΩ     | 1 μA or less                    | 1200.0 MΩ   | 100 kΩ     | 1 μA or less                    |
| ±(0.045% rdg + 0.010% f.s.)   |            |                                 | N/A   |            |                                 |
| ±(0.045% rdg + 0.001% f.s.)   |            |                                 | ±(0.060% rdg + 0.001% f.s.)   |            |                                 |
| ±(0.045% rdg + 0.001% f.s.)   |            |                                 | ±(0.060% rdg + 0.001% f.s.)   |            |                                 |
| ±(0.012% rdg + 0.001% f.s.)   |            |                                 | ±(0.012% rdg + 0.001% f.s.)   |            |                                 |
| ±(0.006% rdg + 0.001% f.s.)   |            |                                 | ±(0.006% rdg + 0.001% f.s.)   |            |                                 |
| See product specifications for RM3545A  |            |                                 | See product specifications for RM3545   |            |                                 |
| 2.6 Ω   |            |                                 | 1.5 Ω   |            |                                 |
| 3.5 Ω   |            |                                 | N/A   |            |                                 |
| 8.0 V, 20 V   |            |                                 | 5.5 V, 20 V   |            |                                 |
| 2 units (RM3545A-2 only)  |            |                                 | 2 units (RM3545-02 only)  |            |                                 |
| 20 channels, 42 channels (RM3545A-2 only)   |            |                                 | 20 channels, 42 channels (RM3545-02 only)   |            |                                 |
| 30 ms (RM3545A-2 only)  |            |                                 | 30 ms (RM3545-02 only)  |            |                                 |
| ✓   |            |                                 | -   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| -   |            |                                 | ✓ (RM3545-01 only)  |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| 0 V to 1.5 V DC   |            |                                 | 0 V to 1.5V DC  |            |                                 |
| -   |            |                                 | -   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| -   |            |                                 | -   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| Hi, IN, Lo  |            |                                 | Hi, IN, Lo  |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| -10.0 to 99.9°C   |            |                                 | -10.0 to 99.9°C   |            |                                 |
| 0 V to 2.0 V DC   |            |                                 | 0 V to 2.0 V DC   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| -   |            |                                 | -   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| Up to 30,000 data sets  |            |                                 | Up to 30,000 data sets  |            |                                 |
| 0 ms to 9999 ms   |            |                                 | 0 ms to 9999 ms   |            |                                 |
| 2 to 100 times  |            |                                 | 2 to 100 times  |            |                                 |
| 30 sets (MUX: 8 sets)   |            |                                 | 30 sets (MUX: 8 sets)   |            |                                 |
| 50 data sets  |            |                                 | 50 data sets  |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| Safety: EN61010; EMC: EN61326 Class A   |            |                                 | Safety: EN61010; EMC: EN61326 Class A   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| ✓   |            |                                 | ✓   |            |                                 |
| 215W × 80H × 306.5D mm (8.46W × 3.15H × 12.07D in.)                               |            |                                 | 215W × 80H × 306.5D mm (8.46W × 3.15H × 12.07D in.)                               |            |                                 |
| 2.7 kg (6.0 lb.) (RM3545A-1), 3.4 kg (7.5 lb.) (RM3545A-2)                        |            |                                 | 3.2 kg (7.1 lb.)  |            |                                 |



<https://www.hioki.com/global/download/47907>

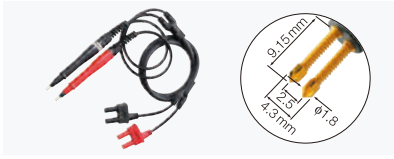
**Datasheet**  
RM3546  
RM3545A-1  
RM3545A-2

For detailed specifications, see here.

# Options

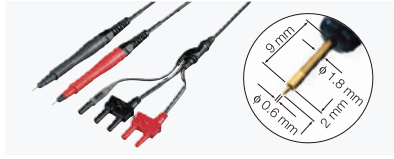
Measurement cables for multichannel measurement must be prepared by the user based on each application's needs.

## Measurement probes



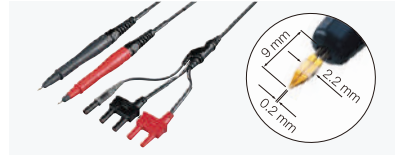
### PIN TYPE LEAD L2100

A: 300 mm (11.81 in.); B: 172 mm (6.77 in.); L: 1.4 m (4.59 ft.); 1000 V DC; for low-resistance measurement



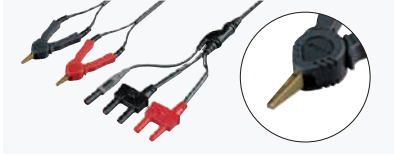
### PIN TYPE LEAD L2102

A: 250 mm (9.84 in.); B: 178 mm (7.01 in.); L: 1.5 m (4.92 ft.); 60 V DC



### PIN TYPE LEAD L2103

A: 250 mm (9.84 in.); B: 176 mm (6.93 in.); L: 1.5 m (4.92 ft.); 60 V DC



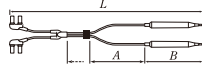
### CLIP TYPE LEAD L2101

A: 250 mm (9.84 in.); B: 84 mm (3.31 in.); L: 1.5 m (4.92 ft.); 60 V DC



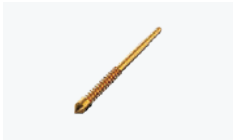
### PROBE KIT L9773

Set of L9773-01, L9773-01, and L9773-03



### About lead length

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



### PROBE TIPS L9773-01

10 pieces



### PROBE TIP SOCKETS L9773-02

10 pieces



### PROBE TIP SOCKET ADAPTERS L9773-03

10 pieces



### Measurement Lead Selection Guide

Download link

<https://www.hioki.com/global/download/40985>

## Scanners



### MULTIPLEXER UNIT Z3003

Two usable in RM3546, max. 10 channels (4-wire)



### SWITCH MAINFRAME SW1001

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



### SWITCH MAINFRAME SW1002

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



### MULTIPLEXER MODULE SW9001

For SW1001/SW1002, max. 11 channels (4-wire), 2-wire/4-wire



### CONNECTION CABLE L2108

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

## Other



### TEMPERATURE SENSOR Z2001

Included accessory, 1.75 m (5.74 ft.)



### LED COMPARATOR ATTACHMENT L2105

2 m (6.56 ft.)



### USB CABLE (A-B) L1002

1 m (3.28 ft.)



### RS-232C CABLE L9637

9-pin/9-pin, 3 m (9.84 ft.)



### LAN CABLE 9642

5 m (16.40 ft.), supplied with straight-through-to-crossover conversion adapter

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# HIOKI

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