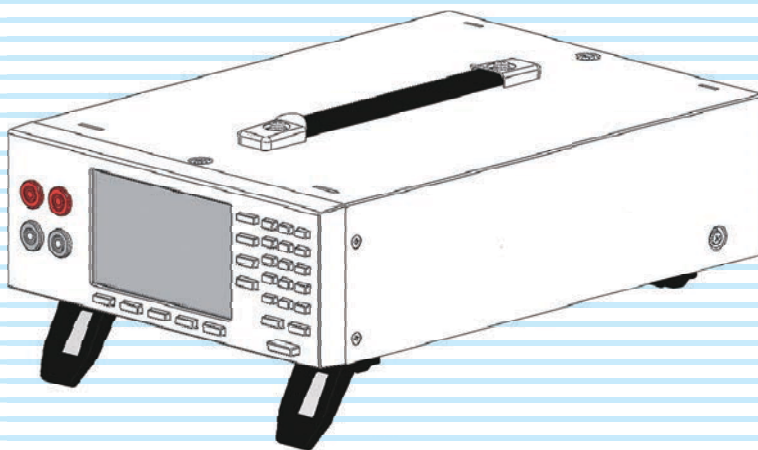


# User's Manual

Battery Impedance Meter  
BIM1000 Series

**BIM1030**

**BIM1100**



Contents **4**

Component Names **6**

Installation and Preparation **9**

Basic Operation **13**

Measurement **15**

Memory Function **25**

External Control **27**

System Settings **35**

Remote Control **45**

Maintenance **80**

Specifications **81**

Appendix **87**






## About Manuals

This manual provides an overview of the product and notes on usage. It also explains how to configure it, operate it, perform maintenance on it, and so on. Read this manual thoroughly before use, and use the product properly.

## Intended readers

These manuals are intended for users of this product and their instructors. The manuals assume that the reader has knowledge about electric safety testing.

## Manual construction

- User's manual  (this manual)  
This document is intended for first-time users of this product. It provides an overview of the product, notes on usage, and specifications. It also explains how to connect the product, configure the product, operate the product, perform maintenance on the product, and so on.
- Safety Information    
This document contains general safety precautions. Keep them in mind and make sure to observe them.
- Packing list    
The packing list shows the included accessories.

PDF files are included in the accompanying CD-ROM. You can view the PDF files using Adobe Reader.

## Software versions that this guide covers

This manual covers firmware versions 1.0X.  
The firmware version is shown in the top area of the system setting screen, which can be displayed by pressing SYSTEM.

When contacting us about the product, please provide us with:

- The model (marked in the top section of the front panel)
- The firmware version
- The serial number (marked on the rear panel)

## Trademarks

All company names and product names used in this manual are trademarks or registered trademarks of their respective companies.

## Copyright

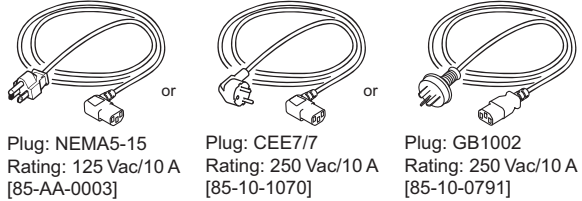
Reproduction and reprinting of this operation manual, whole or partially, without our permission is prohibited.

Both unit specifications and manual contents are subject to change without notice.

© Copyright 2019 Kikusui Electronics Corporation

## Accessories

The attached power cord varies depending on the shipment destination.



- Power cord (1 pc., length: approx. 2.5 m)
- Safety Information (1 copy)
- Packing list (1 copy)
- CD-ROM (1 disc)

## Product Overview

The BIM1000 Series Battery Impedance Meter can measure the internal resistance and voltage of motive power batteries quickly and accurately.

It can measure up to 1000 V and supports high-voltage, high-efficiency, low-resistance motive power batteries used in electric cars.

It is suitable for use in research and development and production sites for motive power batteries and other similar products.

## BIM1000 Series Lineup

Model	Maximum measurement voltage
BIM1030	300 V
BIM1100	1000 V

## Features

### Supports high-voltage measurements

The BIM1030 up to 300 V and the BIM1100 can measure up to 1000 V. The internal battery resistance and voltage are measured simultaneously.

### High-speed, high-accuracy measurement

The highest resolutions available are 0.1  $\mu\Omega$  and 10  $\mu\text{V}$ . When the resistance and voltage are measured simultaneously, the measurements can take as little as about 20 ms.

### Measurement result judgment

Upper and lower limits can be set for the resistance and voltage measurements. Shows pass/fail judgment results on the display.

### Interfaces for external devices

This product is standard equipped with a SIGNAL I/O connector, RS232C port, and USB port for controlling this instrument from a PC or other external devices. With RS232C, high-speed communication is possible at up to 115200 bps.

### Measurement logging and collective transfer function

Up to 500 pairs of resistance and voltage measurement logs can be stored. The logs can be transferred efficiently using the collective transfer function.

## Notations Used in This Manual

- In this manual, the BIM1030 and BIM1100 Battery Impedance Meters are sometimes referred to as “BIM1000 Series”.
- The term “PC” is used to refer generally to both personal computers and workstations.
- The screen captures and illustrations used in this text may differ from the actual items.
- The following markings are used in this manual.

### WARNING

Indicates a potentially hazardous situation which, if ignored, could result in death or serious injury.

### CAUTION

Indicates a potentially hazardous situation which, if ignored, may result in slight injury or damage to the product or other property.

### NOTE

Indicates information that you should know.

### SHIFT+key name (blue letters under the key)

Indicates an operation that requires you to press a key indicated in blue letters while holding down SHIFT.



Indicates the hierarchy of items you need to select. The item to the left of this symbol indicates a higher level item.

## Safety Precautions

When using this product, be sure to observe the precautions in the Safety Information manual. Items specific to this product are given below.

### WARNING

- **To prevent electric shock, be sure to observe the following instructions. An electric shock may lead to a potentially fatal accident.**
  - Do not operate incorrectly.
  - Do not touch the tip of the test lead connected to this product.

## Notes on Usage

- When installing this product, be sure to observe the temperature and humidity ranges indicated below.  
Spec guaranteed temperature range: 18 °C to 28 °C (64 °F to 82 °F)  
Spec guaranteed humidity range: 20 %rh to 80 %rh (no condensation)
- When storing this product, be sure to observe the temperature and humidity ranges indicated below.  
Storage temperature range: -10 °C to 60 °C (14 °F to 140 °F)  
Storage humidity range: 90 %rh or less (no condensation)

# Contents

About Manuals.....	2
Accessories .....	2
Product Overview .....	3
Notations Used in This Manual.....	3
Safety Precautions .....	3
Notes on Usage.....	3
Component Names.....	6

## Installation and Preparation

Connecting the Power Cord .....	9
Checking Whether the Power Is On or Off .....	10
Turning the power on .....	10
Turning the power off .....	10
Connecting the DUT .....	11
Connecting the test leads to the product.....	11
Examples of how to connect test leads to the DUT ..	11
Using the Stands .....	12

## Basic Operation

Basic Panel Operations .....	13
Switching menus .....	13
Selecting a function.....	13
Key lock.....	14
Showing or hiding function area.....	14
Switching the measurement display.....	14

## Measurement

Measurement and Judgment Settings.....	15
Sampling speed (SAMPLE) .....	15
Average function (AVERAGE) .....	16
Resistance measurement conditions .....	17
Voltage measurement conditions.....	18
Taking Measurements .....	19
Conditions for measuring accurately.....	19
Zero adjustment .....	20
Measurement example.....	22
Displaying Measurement Results .....	23

When measurements are abnormal.....	23
When the maximum value of the range is exceeded	23
Measurement Logging and Collective Transfer	24

## Memory Function

Saving Measurement Conditions .....	25
Recalling from Memory .....	26

## External Control

External Control Settings.....	27
Trigger source (TRIG).....	27
Delay (DELAY).....	28
Trigger input (SNGL TRG).....	29
SIGNAL I/O Connector.....	30
Pin arrangement .....	30
I/O signal circuit .....	31
Control and Monitor.....	32
Starting and monitoring measurements .....	32
Monitoring judgment results.....	33
Recalling memories .....	34

## System Settings

General Settings.....	36
Key operation sound (Beep) .....	36
SCPI error notification (SCPI Err) .....	36
Power supply frequency (Line Freq).....	37
Current pulse output (CurrPulse).....	38
Measurement end signal output (EOM) .....	39
Interface Setting .....	40
Measurement output (Value Out).....	40
RS232C settings .....	41
Initializing Settings.....	42
Returning all the settings to their defaults.....	42
Resetting the product.....	43
List of default settings .....	44

# Remote Control

- Communication Interface Specifications ..... 45
- Overview of Commands ..... 46
  - Command hierarchy ..... 46
  - Command Syntax ..... 46
  - Parameters ..... 48
- Registers ..... 50
  - Register structure ..... 50
  - Status byte register ..... 51
  - Event status register ..... 52
  - QUESTionable status register ..... 54
- List of Messages ..... 55
  - Common commands ..... 55
  - Specific commands ..... 55
- Message Reference ..... 59
  - Common commands ..... 59
  - Specific commands ..... 61
- Table of Initial Command Settings ..... 75
- Command Processing Time ..... 76
- Using Visual Basic 2017 ..... 77
  - Configuring a project ..... 77
  - Communicating through RS232C or USB ..... 77
  - Sample program ..... 79

# Maintenance

- Calibration ..... 80

# Specifications

- Basic specifications ..... 81
- Interface ..... 84
- General specifications ..... 85
- External dimensions ..... 86

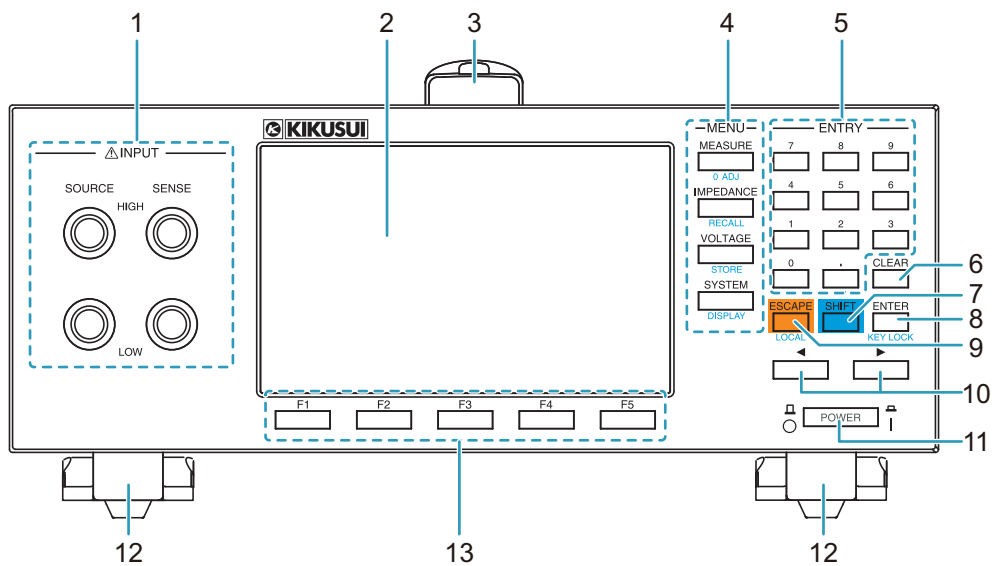
# Appendix

- Creating Test Leads ..... 87
  - Conditions for measuring accurately ..... 87
  - Creating test leads ..... 87
- Four-Terminal Measurement Method ..... 88
- Options ..... 89
  - TL01-BIM clip-type four-wire test lead ..... 89
  - TL02-BIM pin-type four-wire test lead ..... 89
  - OP01-BIM zero adjustment tool ..... 90
- Troubleshooting ..... 91



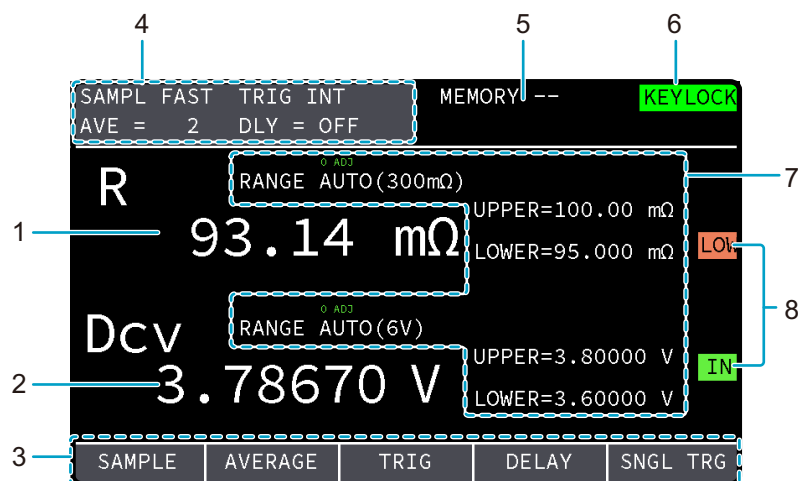
# Component Names

## Front panel



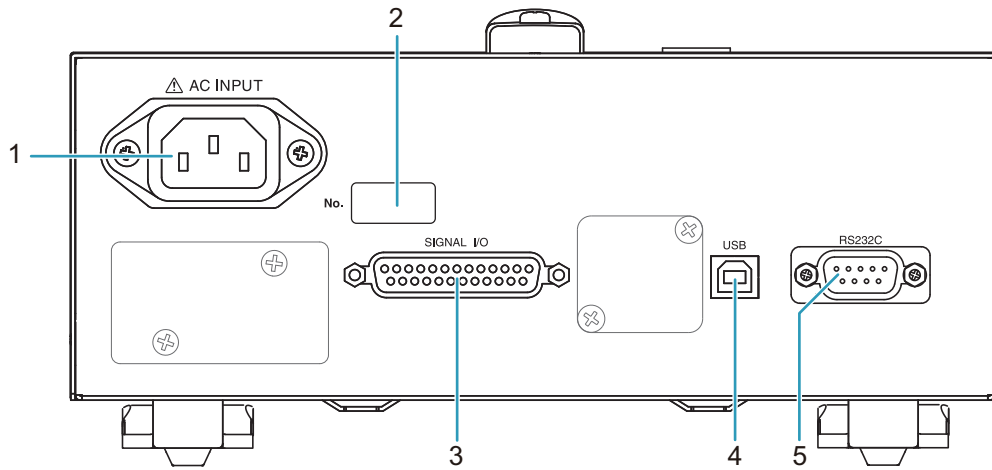
No.	Name	Function	See
1	INPUT terminal	–	–
	SOURCE terminals	Connects a test lead for applying voltage	<a href="#">p. 11</a>
	SENSE terminal	Connects a test lead for measuring voltage	<a href="#">p. 11</a>
2	Display	Displays the settings, measured values, and other information.	<a href="#">p. 7</a>
3	Handle	A carrying handle	–
4	MENU key	–	–
	MEASURE key	Displays the measurement setup screen	<a href="#">p. 15</a>
	0 ADJ key	Displays the zero adjustment screen	<a href="#">p. 20</a>
	IMPEDANCE key	Displays the resistance test condition setup screen	<a href="#">p. 17</a>
	RECALL key	Loads test conditions from internal memory	<a href="#">p. 26</a>
	VOLTAGE key	Displays the voltage test condition setup screen	<a href="#">p. 18</a>
	STORE key	Saves measurement conditions to internal memory	<a href="#">p. 25</a>
	SYSTEM key	Displays the system setting screen.	<a href="#">p. 35</a>
	DISPLAY key	Switches the measurement display	<a href="#">p. 14</a>
5	Numeric keypad	Enters values.	–
6	CLEAR key	Deletes numbers	–
7	SHIFT key	Recalls functions written in blue under each key	–
8	ENTER key	Confirms the entered value	–
	KEY LOCK key	key lock	<a href="#">p. 14</a>
9	ESCAPE key	Cancels numeric input and closes the dialog box	–
	LOCAL key	Returns remote control to panel operation.	<a href="#">p. 45</a>
10	◀ and ▶ keys	Move the cursor	–
11	POWER switch	Turns the power on ( I ) and off ( O )	<a href="#">p. 10</a>
12	Legs/stands	Adjust the front panel tilt	<a href="#">p. 12</a>
13	Function keys	Executes the item that is displayed above each key (function area).	–

## Display



No.	Name	Function	See
1	Resistance measurement	Displays the measured resistance	<a href="#">p. 23</a>
2	Measured voltage	Displays the measured voltage	<a href="#">p. 23</a>
3	function area	Indicates that execution is possible with the keys (function keys) at the bottom of the display.	<a href="#">p. 13</a>
4	Measurement conditions	–	–
	SAMPL	Sampling speed	<a href="#">p. 15</a>
	AVE	Number of measurements for calculating averages	<a href="#">p. 16</a>
	TRIG	Trigger source	<a href="#">p. 27</a>
	DLY	Delay until measurement is started after detecting a trigger	<a href="#">p. 28</a>
5	Memory number	Currently recalled memory number	<a href="#">p. 25</a>
6	Status icon	–	–
	REMOTE	Under remote control.	<a href="#">p. 45</a>
	KEYLOCK	Keys locked	<a href="#">p. 14</a>
	LOG	Measurement logging function enabled	<a href="#">p. 66</a>
	SYSTEM ERROR	System error occurred	<a href="#">p. 91</a>
7	Measurement and judgment settings	–	–
	RANGE	Displays the measurement range	<a href="#">p. 17</a> , <a href="#">p. 18</a>
	UPPER	Displays the upper judgment limit	
	LOWER	Displays the lower judgment limit	
	0 ADJ	Zero adjustment enabled	<a href="#">p. 20</a>
8	Judgment result	–	–
	UP	Measurement exceeded upper judgment limit (UPPER)	<a href="#">p. 23</a>
	IN	Measurement within upper and lower judgment limits	
	LOW	Measurement below lower judgment limit (LOWER)	

## Rear panel



No.	Name	Function	See
1	AC INPUT inlet	Connect a power cord for supplying power to this product.	<a href="#">p.9</a>
2	Serial number	Serial number.	—
3	SIGNAL I/O connector	A I/O signal connector for controlling this product from an external device.	<a href="#">p.30</a>
4	USB port	USB port for remote control.	<a href="#">p.45</a>
5	RS232C port	RS232C port for remote control.	<a href="#">p.45</a>



# Installation and Preparation

## Connecting the Power Cord

### **WARNING**

**Risk of electric shock.**

- **This product is IEC Safety Class I equipment (equipment with a protective conductor terminal). To prevent electric shock, be sure to connect the protective conductor terminal of the product to electrical ground (safety ground).**
- **The product is grounded through the power cord ground wire. Connect the protective conductor terminal to earth ground.**

### **NOTE**

- Use the supplied power cord to connect to the AC line. If the supplied power cord cannot be used because the rated voltage or the plug shape is incompatible, have a qualified engineer replace it with an appropriate power cord that is 3 m or less in length. If obtaining a power cord is difficult, contact your Kikusui agent or distributor.
- Do not use the supplied power cord with other instruments.
- The power cord with a plug can be used to disconnect the product from the AC power line in an emergency.
- Secure adequate space around the power plug. Do not insert the power plug to an outlet where accessibility to the plug is poor. And, do not place objects near the outlet that would result in poor accessibility to the plug.

This product is designed as an equipment of IEC Overvoltage Category II (energy-consuming equipment supplied from a fixed installation).

**1 Turn off (O) the POWER switch on the front panel.**

**2 Check that the AC power line meets the nominal input rating of the product.**

The product can receive a nominal line voltage in the range of 100 Vac to 240 Vac at 50 Hz or 60 Hz. (Frequency range: 47 Hz to 63 Hz)

**3 Connect the power cord to the AC INPUT inlet on the rear panel.**

**4 Connect the power cord plug to an outlet with a ground terminal.**

This completes the connections.

# Checking Whether the Power Is On or Off

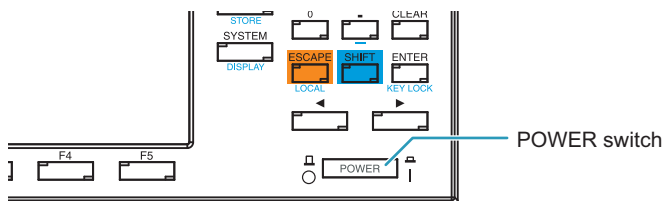
## Turning the power on

When you turn the power on, the product starts in the same state as it was in the last time the POWER switch was turned off.

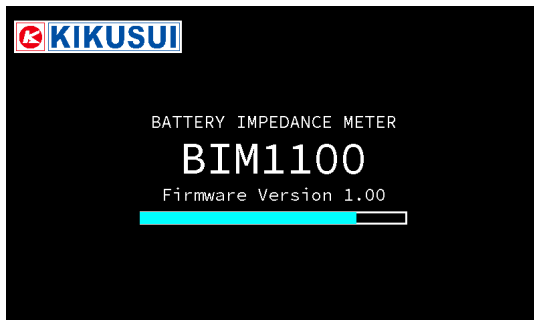
Warm up the product for at least 30 minutes before starting measurements.

**1** Check that the power cord is connected properly.

**2** Turn the POWER switch (I) on.



A startup screen appears showing the firmware version.



Example: BIM1100 startup screen

Then, a measurement screen appears.

The power is now on.

## Turning the power off

The panel settings that were in use immediately before the power was turned off are saved. When you change a setting, do not turn the power off immediately. Wait at least 5 seconds before doing so. Otherwise, the setting may not be saved.

**1** Turning the POWER switch off (O)

The power is turned off.

# Connecting the DUT

## Connecting the test leads to the product



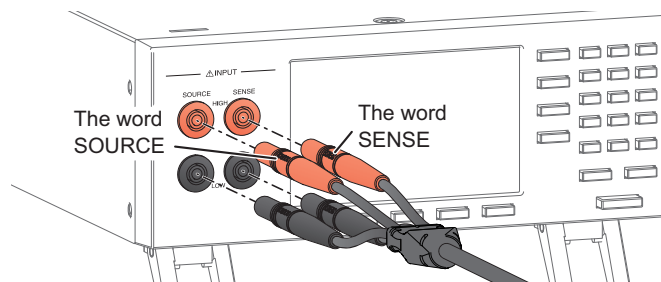
**WARNING** Risk of electric shock.

- Do not make measurements exceeding the rated voltage of the test leads.
- When you connect or disconnect test leads from the INPUT connectors, make sure that the tips of the test leads are not connected to the DUT.

**1** Check that the **POWER** switch is turned off.

**2** Connect the optional test leads (p. 89) to the **INPUT** terminals.

The words “SENSE” and “SOURCE” are written on the test leads, which correspond to the product’s terminals. Connect the test leads to the appropriate terminals.

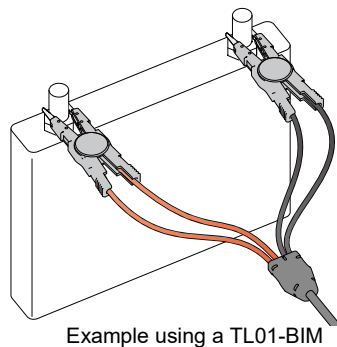


**3** Turn the **POWER** switch ( I ) on.

This completes the connections.

## Examples of how to connect test leads to the DUT

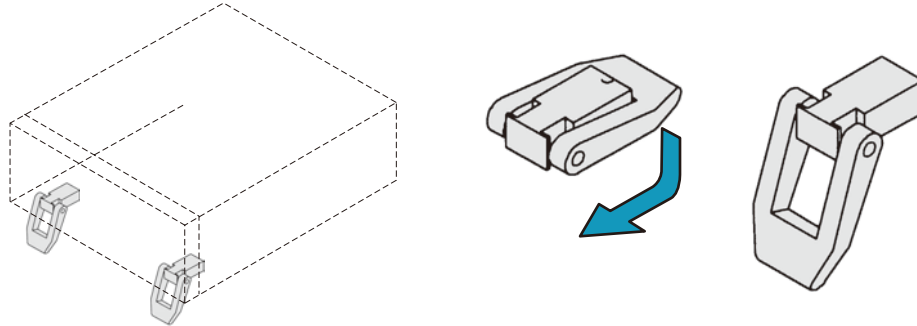
Connect the positive and negative probes to the DUT’s positive and negative terminals, respectively.



This completes the procedure for connecting the test leads.

# Using the Stands

The stands are used to tilt the front panel, which makes the screen easier to see and makes the keys easier to operate. To use the stands, pull out the two bottom-front legs until they click into place.



**⚠ CAUTION**

When using the stands, do not place anything on top of the product, or press down on the product from above. This can break the stands.

# Basic Operation

## Basic Panel Operations

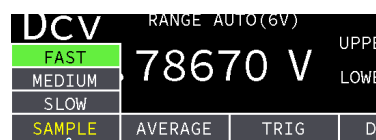
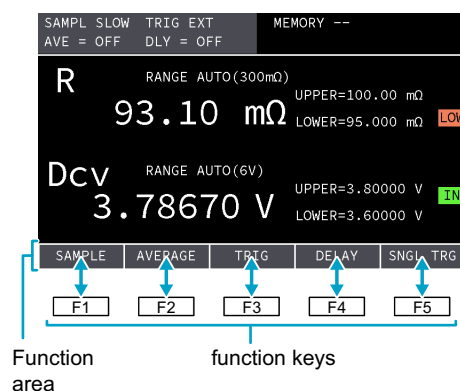
### Switching menus

You can switch between the following eight menus by pressing the menu keys.

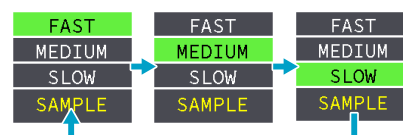
menu	keys	Description
Measurement settings	MEASURE	Sets the sampling speed, the number of measurements for calculating averages, the trigger source, and the delay until measurement is stated after detecting a trigger
Resistance measurement conditions	IMPEDANCE	Sets the range, the upper and lower limit judgment of measurements, and the unit of judgment values
Voltage measurement conditions	VOLTAGE	Sets the range and the upper and lower limit judgment of measurements
system settings	SYSTEM	Sets the key operation sound, SCPI error display, power supply frequency, current pulse output, EOM signal output, initialization of settings, reset, measurement output, RS232C, and USB
Zero adjustment	0 ADJ (SHIFT + MEASURE)	Reduces the errors that occur depending on the product and measurement environment
Measurement condition recall	RECALL (SHIFT + IMPEDANCE)	Recalls saved measurement conditions
Measurement condition saving	STORE (SHIFT + VOLTAGE)	Saves the present measurement conditions
Display switches	DISPLAY (SHIFT + SYSTEM)	Switches the measurement display

### Selecting a function

On the display, the available functions are shown in the function area. You can select the functions by pressing the corresponding function key.



When you press a function key, the settings are displayed. Each time you press the function key, the setting changes. The settings close about 2 seconds after you release the key.



## Key lock

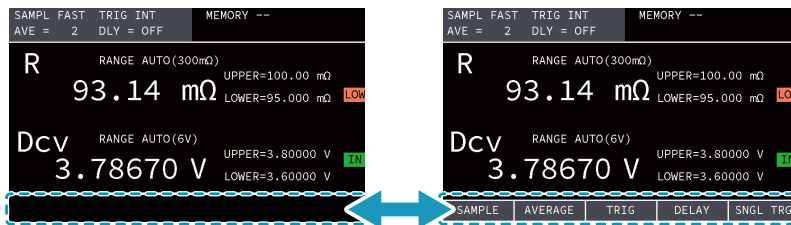
You can lock the operation of the keys to prevent changing the settings or overwriting memory by mistake. When keys are locked, a KEYLOCK icon is shown in the upper right of the display.

### 1 Press KEY LOCK (SHIFT+ENTER).

Key lock switches between enabled and disabled each time you press the key.

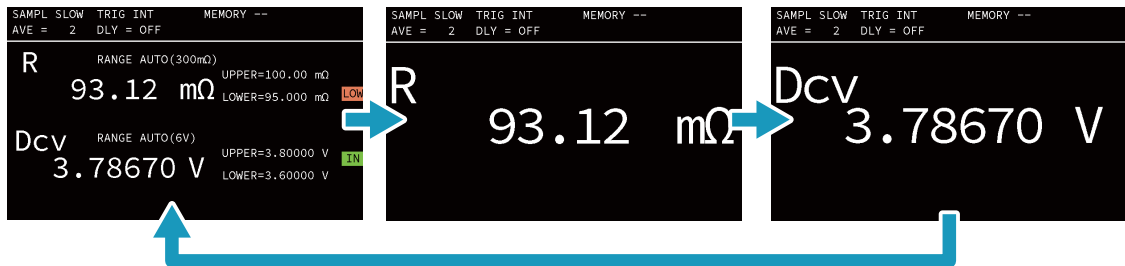
## Showing or hiding function area

Pressing VOLTAGE, IMPEDANCE, or MEASURE displays the corresponding function area. Pressing the same key again hides the function area.



## Switching the measurement display

You can switch the measurement display by pressing DISPLAY (SHIFT+SYSTEM).



# Measurement

## Measurement and Judgment Settings

You can configure the following measurement and judgment settings.

Setup	Description	See
Sampling speed (SAMPLE)	Measurement speed.	<a href="#">p. 15</a>
Average function (AVERAGE)	Number of measurements for calculating averages.	<a href="#">p. 16</a>
Resistance Measurement range (RANGE)	Resistance measurement range.	<a href="#">p. 17</a>
Resistance Upper judgment limit (UPPER)	“UP” is displayed when a value greater than or equal to the upper judgment limit is measured.	
Resistance Lower judgment limit (LOWER)	“LOW” is displayed when a value less than or equal to the lower judgment limit is measured.	
Resistance Unit ( $\Omega$ /m $\Omega$ )	Unit of the resistance’s upper judgment limit and lower judgment limit.	
Voltage Measurement range (RANGE)	Voltage measurement range.	<a href="#">p. 18</a>
Voltage Upper judgment limit (UPPER)	“UP” is displayed when a value greater than or equal to the upper judgment limit is measured.	
Voltage Lower judgment limit (LOWER)	“LOW” is displayed when a value less than or equal to the lower judgment limit is measured.	

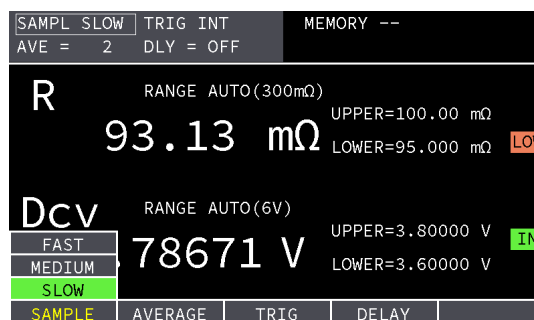
### Sampling speed (SAMPLE)

Select the measurement speed. Slower the sampling speed the better the measurement accuracy. The measurement time varies depending on the Power supply frequency (Line Freq) ([p. 37](#)).

Value	Measurement time	
	Frequency 50 Hz	Frequency 60 Hz
FAST	20 ms	20 ms
MEDIUM	50 ms	42 ms
SLOW	160 ms	150 ms

- 1 Press MEASURE.
- 2 Press SAMPLE (F1) to select the value.

The value switches each time you press the key.



This completes the setting.

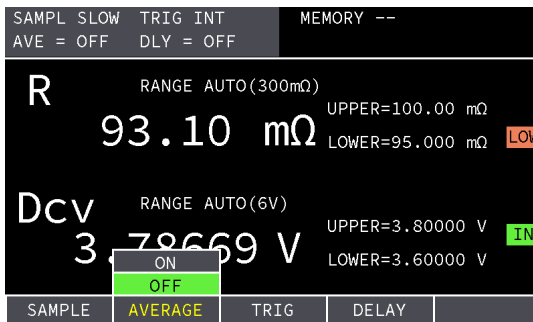
## Average function (AVERAGE)

Calculates measurement values by averaging several measurement results. If the trigger source (p. 27) is set to INTERNAL, moving average is used. If it is set to EXTERNAL, simple average is used.

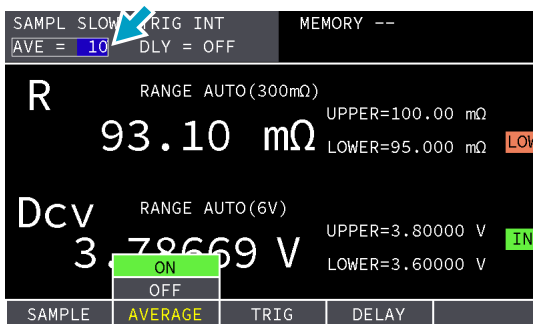
If you enable the average function, set the average count.

- 1 Press MEASURE.
- 2 Press AVERAGE (F2) to select ON or OFF.

The value switches between ON and OFF each time that you press the key.



- 3 If you select ON, enter the average count using the numeric keypad, and then press ENTER.



This completes the setting.



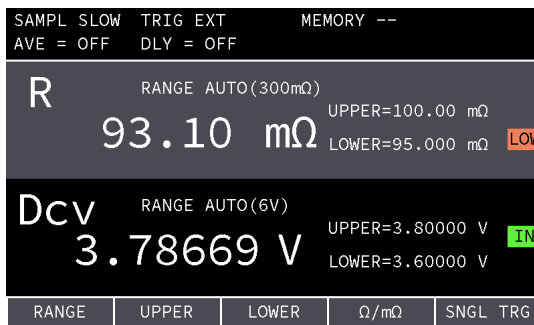
## Resistance measurement conditions

Set the measurement range, upper judgment limit, lower judgment limit, and judgment value unit.

**1 Press IMPEDANCE.**

**2 Press the function key for the measurement condition you want to set, and select the value.**

The value switches each time you press the key.



Measurement condition	keys	Value	Description
Measurement range (RANGE)	F1	AUTO, 3 mΩ, 30 mΩ, 300 mΩ, 3 Ω	Select the measurement range.
Upper judgment limit (UPPER)	F2	UPPER, OFF	If you specify UPPER, enter the upper judgment limit using the numeric keypad, and then press ENTER. When the measurement is greater than or equal to the upper judgment limit, "UP" appears in the display area.
Lower judgment limit (LOWER)	F3	LOWER, OFF	If you specify LOWER, enter the lower judgment limit using the numeric keypad, and then press ENTER. When the measurement is less than or equal to the lower judgment limit, "LOW" appears in the display area.
Unit (Ω/mΩ)	F4	Ω, mΩ	Select the unit of UPPER and LOWER judgment limits.

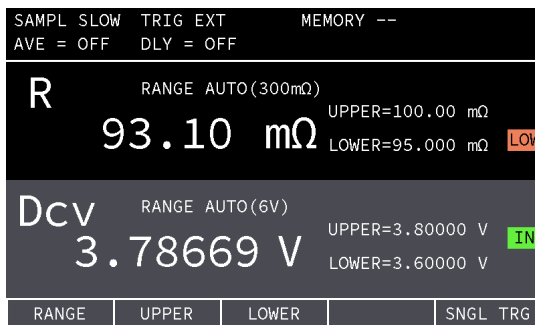
## Voltage measurement conditions

Set the measurement range, upper judgment limit, and lower judgment limit.

**1** Press **VOLTAGE**.

**2** Press the function key for the measurement condition you want to set, and select the value.

The value switches each time you press the key.



Measurement condition	keys	Value	Description
Measurement range (RANGE)	F1	AUTO, 6 V, 60 V, 300 V*1, 600 V*2, 1000 V*2	Select the measurement range.
Upper judgment limit (UPPER)	F2	UPPER, OFF	If you specify UPPER, enter the upper judgment limit using the numeric keypad, and then press ENTER. When the measurement is greater than or equal to the upper judgment limit, "UP" appears in the display area.
Lower judgment limit (LOWER)	F3	LOWER, OFF	If you specify LOWER, enter the lower judgment limit using the numeric keypad, and then press ENTER. When the measurement is less than or equal to the lower judgment limit, "LOW" appears in the display area.

\*1. BIM1030 only

\*2. BIM1100 only

# Taking Measurements

## WARNING

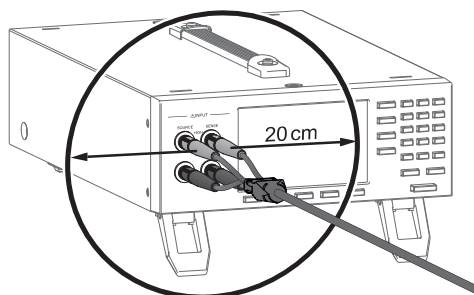
Risk of electric shock.

- Before making a measurement, check that the product and the test leads are not damaged.
- Check that the product's INPUT terminal and the DUT's positive and negative terminals are not exposed.
- Before making a measurement, check that the covering of the test leads are not torn and that the wires are not broken.
- Do not touch the probes or clips during a measurement and for 1 minute after measurement completion.
- Do not remove the probes or clips from the DUT for 1 minute after measurement completion.

## Conditions for measuring accurately

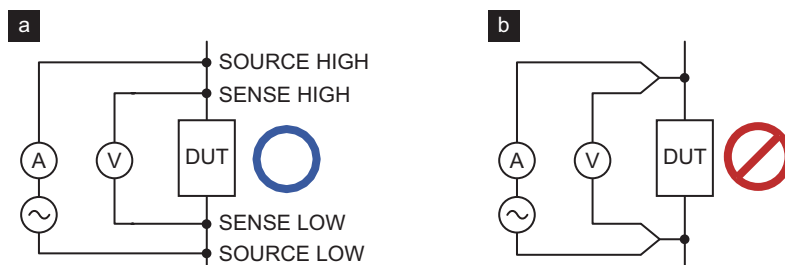
To measure accurately, the following conditions must be met.

- The stray capacitance of the test leads is no more than 1 nF.
- The resistance of the test leads is no more than 3  $\Omega$  (no more than 2  $\Omega$  when the measurement range is 3 m $\Omega$  or 30 m $\Omega$ ).
- There are no metals or enclosures with grounding properties within 20 cm of the test leads.



- In a four-terminal measurement, if you construct your own test leads, securely connect the end of each lead to the DUT, as shown in "a" in the following figure.

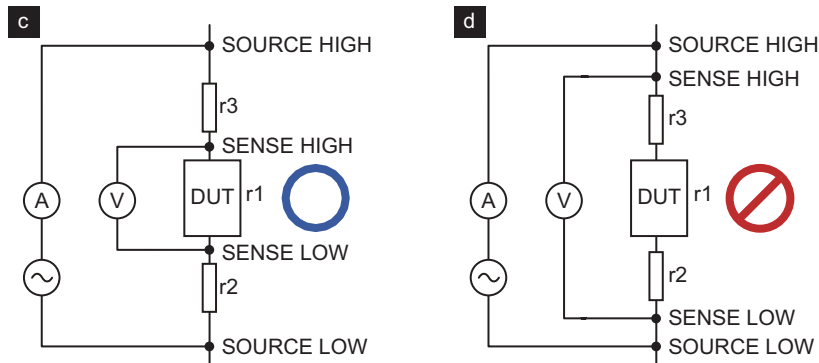
If you connect as shown in "b" in the following figure, two-terminal measurement will be conducted, and the measurement accuracy will degrade.



- Connect the test leads close to the DUT.

Because this product measures using a four-terminal AC measurement method (p. 88), measurements can be made with the resistance (no more than 2 Ω to 3 Ω) of the test leads removed. To further reduce the resistance from the tip of the test leads to the DUT, connect the test leads as close to the DUT as possible. In particular, for the 3 mΩ and 30 mΩ resistance measurement ranges, errors may occur depending on where on the DUT the clips or probes are connected.

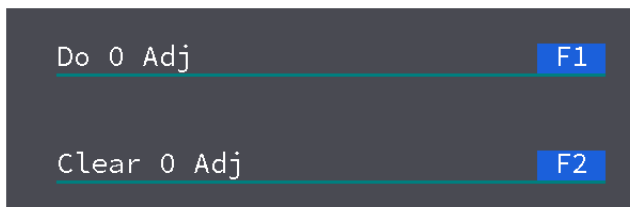
For example, by measuring as close to the DUT as possible as shown in “c” in the following figure, the sole internal resistance  $r_1$  of the DUT can be measured accurately. With the measurement method marked “d” in the following figure, not only the internal resistance  $r_1$  of the DUT is measured but also the resistances  $r_2$  and  $r_3$  between the SENSE test leads and the DUT.



## Zero adjustment

To reduce the errors that occur depending on the product and measurement environment, perform zero adjustment before starting measurements. If you use test leads other than those provided as options, make them twisted pairs (p. 87).

- 1 Short the ends of the test leads connected to the SOURCE HIGH and LOW connectors.**
- 2 Short the ends of the test leads connected to the SENSE HIGH and LOW connectors.**
- 3 Short the leads of Step 1 and Step 2.**
- 4 Press 0 ADJ (SHIFT+MEASURE).**  
A zero adjustment menu appears.



If you want to close the menu without making changes to the settings, press ESCAPE.

## 5 Press Do 0 Adj (F1).

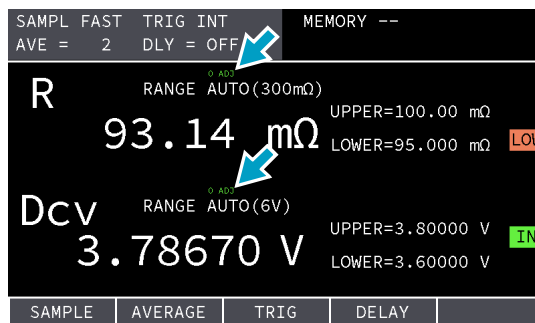
Zero adjustment starts. When zero adjustment is complete, a dialog appears showing the adjustment results of each range.

3mΩ... FAIL	6V... OK
30mΩ... OK	60V... OK
300mΩ... OK	600V... OK
3 Ω... OK	1000V... OK

If zero adjustment is successful, "OK" appears. If the allowable zero adjustment range is exceeded, "FAIL" appears.

## 6 Press OK (F5) to close the dialog box.

If zero adjustment has been performed, "0 ADJ" is displayed in green at the top area of the range display.



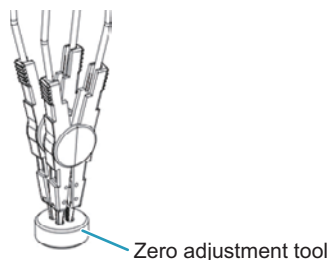
This completes the setting.

## If "FAIL" is displayed

Zero adjustment has a tolerance of up to 1,000 digits. If this tolerance is exceeded during zero adjustment, "FAIL" will be displayed in the adjustment result dialog box. Check that the cables are connected correctly, and perform zero adjustment again.

## Using the zero adjustment tool (option)

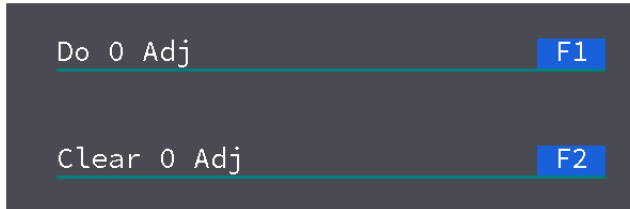
If you are performing zero adjustment using the optional clip-type four-wire test leads (p. 89), you can use the optional zero adjustment tool (p. 90). As shown in the following figure, insert the clips into the holes of the zero adjustment tool, and perform zero adjustment.



## Clearing zero adjustment

### 1 Press 0 ADJ (SHIFT+MEASURE).

A zero adjustment menu appears.



If you want to close the menu without making changes to the settings, press ESCAPE.

### 2 Press Clear 0 Adj (F2).

Zero adjustment will be cleared. "0 ADJ" disappears from the display.

This completes the setting.

## Measurement example

This section describes a measurement example using a Li-ion battery (3.7 V, internal resistance of approx. 1  $\Omega$ ) as the DUT.

### 1 Connect the test leads, and turn on the power.

See "Connecting the test leads to the product" (p. 11).

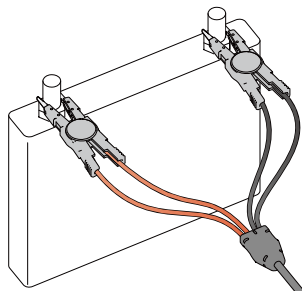
### 2 Press MEASURE > SAMPLE (F1) to set the sampling speed to SLOW.

When measuring small internal resistance, setting the speed to SLOW allows measurement of stable data.

### 3 Press IMPEDANCE > RANGE (F1) to set the resistance measurement range to 300 m $\Omega$ .

### 4 Press VOLTAGE > RANGE (F1) to set the voltage measurement range to 6 V.

### 5 Connect the positive and negative probes to the DUT's positive and negative terminals, respectively.



Example using a TL01-BIM

Measurements are shown on the display.

# Displaying Measurement Results

Measurements are shown on the display. If the upper judgment limit and lower judgment limit of resistance or voltage are set, the judgment result is displayed.

Measured value

Judgment result

UP: The measured value is greater than or equal to the upper judgment limit.

IN: The measured value within the upper and lower limits.

LOW: The measured value is less than or equal to the lower judgment limit.

## When measurements are abnormal

If the measurement display is “---” or a negative value, the measurement is not normal because the test leads are not connected correctly. Refer to the following, and check the test lead connections.

Resistance measurement display	Voltage measurement display	Possible cause
“---”	“---”	Poor contact to the DUT’s positive or negative terminal
“---”	This is normal behavior.	Poor contact to the SOURCE terminal
Negative value	This is normal behavior.	The SOURCE HIGH and LOW terminals are connected in reverse.
“---”	Negative value	The DUT’s positive and negative terminals are connected in reverse.

## When the maximum value of the range is exceeded

The following table shows the maximum values of each resistance and voltage range. If the maximum value is exceeded, the measurement is shown as “OVER”.

	Range	Maximum value
Resistance measurement	3 mΩ	3.1 mΩ
	30 mΩ	31 mΩ
	300 mΩ	310 mΩ
	3 Ω	3.1 Ω
Voltage measurement (BIM1030)	6 V	6.3 V
	60 V	63 V
	300 V	315 V
Voltage measurement (BIM1100)	6 V	6.3 V
	60 V	63 V
	600 V	630 V
	1000 V	1050 V

## Measurement Logging and Collective Transfer

---

If the measurement logging function is turned on using remote control, 500 pairs of resistance and voltage measurements will be stored in the product. The stored logs can be read collectively.

For details, see “Measurement logging and collective transfer function” ([p. 66](#)) in Remote Control.



# Memory Function

## Saving Measurement Conditions

Up to 100 sets (memory numbers 0 to 99) of the following measurement conditions can be saved to the internal memory.

- Sampling speed (SAMPLE)
- Average setting (AVERAGE)
- Trigger source (TRIG)
- Delay (DELAY)
- Resistance and voltage measurement ranges (RANGE)
- Resistance and voltage measurement upper judgment limit (UPPER) and lower judgment limit (LOWER)
- Unit of resistance judgment value ( $\Omega/m\Omega$ )
- Display state
- Key lock enabled/disabled
- Zero adjustment enabled/disabled

**1 Set the measurement conditions.**

**2 Press STORE (SHIFT+VOLTAGE).**

“STORE” appears in the top area of the display.

```
SAMPL SLOW TRIG EXT STORE 10
AVE = OFF DLY = OFF
```

**3 Use the numeric keypad to enter a memory number, and press ENTER.**

The test conditions are saved to memory, and the saved memory number appears in the top area of the display.

```
SAMPL SLOW TRIG EXT MEMORY 10
AVE = OFF DLY = OFF
```

This completes the setting.

# Recalling from Memory

You can recall measurement conditions saved to the internal memory.

## 1 Press **RECALL (SHIFT+IMPEDANCE)**.

"RECALL" appears in the top area of the display.

```
SAMPL SLOW TRIG EXT  RECALL 2
AVE = OFF  DLY = OFF
```

## 2 Use the numeric keypad to enter a memory number, and press **ENTER**.

The test conditions are recalled, and the recalled memory number appears in the top area of the display.

```
SAMPL SLOW TRIG EXT  MEMORY 02
AVE = OFF  DLY = OFF
```

This completes the setting.

# External Control

The following functions can be controlled and monitored from an external device using the SIGNAL I/O connector.

- Starting measurements
- Monitoring measurements
- Monitoring judgment results
- Recalling memories

## External Control Settings

Configure the external control settings.

Measurement condition	Description	See
Trigger source (TRIG)	Sets the measurement start trigger to internal or external.	<a href="#">p. 27</a>
Delay (DELAY)	Time until measurement is started after a trigger is detected.	<a href="#">p. 28</a>
Trigger input (SNGL TRG)	If you set the trigger source to external, you can apply triggers.	<a href="#">p. 29</a>

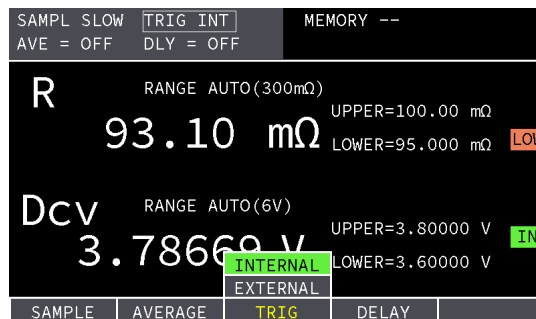
### Trigger source (TRIG)

Select whether to use the internal signal or an external signal for the measurement start trigger. To manually apply trigger signals, select EXTERNAL. You can apply triggers through the SIGNAL I/O connector ([p. 33](#)) or the front panel ([p. 29](#)).

**1 Press MEASURE.**

**2 Press TRIG (F3) to select the value.**

The value switches each time you press the key.



This completes the setting.

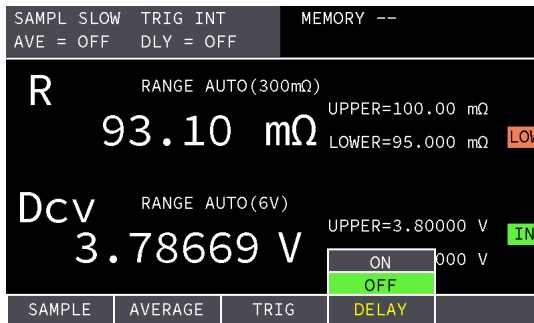
## Delay (DELAY)

Set the time until measurement is started after a trigger is detected. You can set the time down to 0 seconds, but the minimum delay is 0.005 seconds. (Example: Even if you specify 0.001 seconds, the actual delay will be 0.005 seconds.)

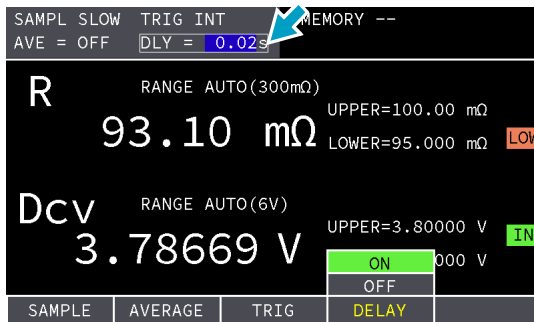
**1 Press MEASURE.**

**2 Press DELAY (F4) to select ON or OFF.**

The value switches between ON and OFF each time that you press the key.



**3 If you select ON, enter the delay time using the numeric keypad, and then press ENTER.**

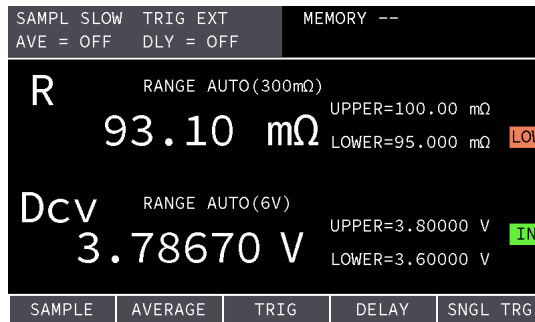


This completes the setting.

## Trigger input (SNGL TRG)

When the trigger source (p. 27) is EXTERNAL, you can apply triggers from the front panel.

- 1 Press MEASURE.
- 2 Press SNGL TRG (F5).



A trigger will be applied.

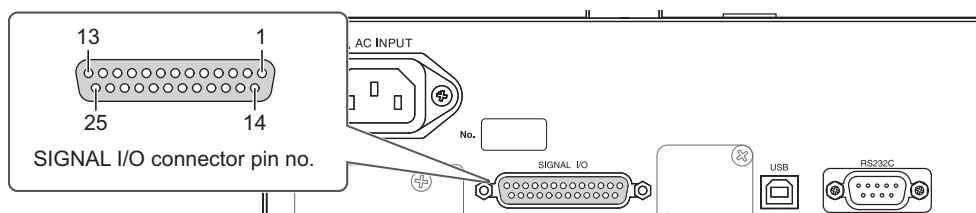
# SIGNAL I/O Connector

Check the SIGNAL I/O connector specifications, and connect the external device to the connector.

**NOTE**

If “:SYSTem:ELOCK” (p. 68) is set to ON through remote control, you cannot use the SIGNAL I/O connector. If you turn off the product and turn it back on, “:SYSTem:ELOCK” will be set to OFF and you will be able to use the SIGNAL I/O connector.

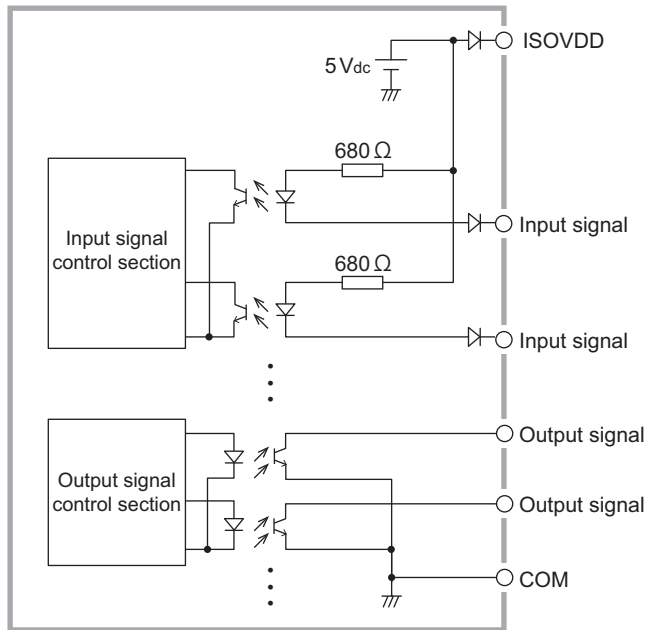
## Pin arrangement



No.	Signal name	IN/OUT	Description	See
1	PM0	IN	Enter the memory number (0 to 99) using a 2-digit BCD code	<a href="#">p. 34</a>
2	PM1	IN		
3	PM2	IN		
4	PM3	IN		
5	PM4	IN		
6	PM5	IN		
7	PM6	IN		
8	PM7	IN		
9	STB	IN	Recall memories selected with the PM0 to PM7 signals.	<a href="#">p. 34</a>
10	–	–	Not used	–
11	–	–	Not used	–
12	–	–	Not used	–
13	COM	–	SIGNAL I/O common Isolated from the internal circuit and chassis.	–
14	OHM-UP	OUT	Resistance measurement judgment result (UP)	<a href="#">p. 33</a>
15	OHM-LO	OUT	Resistance measurement judgment result (LOW)	<a href="#">p. 33</a>
16	–	–	Not used	–
17	V-UP	OUT	Voltage measurement judgment result (UP)	<a href="#">p. 33</a>
18	V-LO	OUT	Voltage measurement judgment result (LOW)	<a href="#">p. 33</a>
19	–	–	Not used	–
20	TRIG-IN	IN	External trigger input	<a href="#">p. 33</a>
21	EOM	OUT	Measurement end signal	<a href="#">p. 32</a> , <a href="#">p. 33</a>
22	INDEX	OUT	On while measuring	<a href="#">p. 32</a> , <a href="#">p. 33</a>
23	–	–	Not used	–
24	ISOVDD	–	Isolated power supply 5 V dc output	<a href="#">p. 31</a>
25	COM	–	SIGNAL I/O common Isolated from the internal circuit and chassis.	–

## I/O signal circuit

The input signal circuit and the output signal circuit share the same common. To set the input terminal to on, short the input terminal to the COM terminal, or set it to low level. To set the input terminal to off, open the input terminal, or set it to high level. To pull up the output terminal, the product's internal 5 V dc power supply or an external power supply delivering up to 30 V dc can be used.



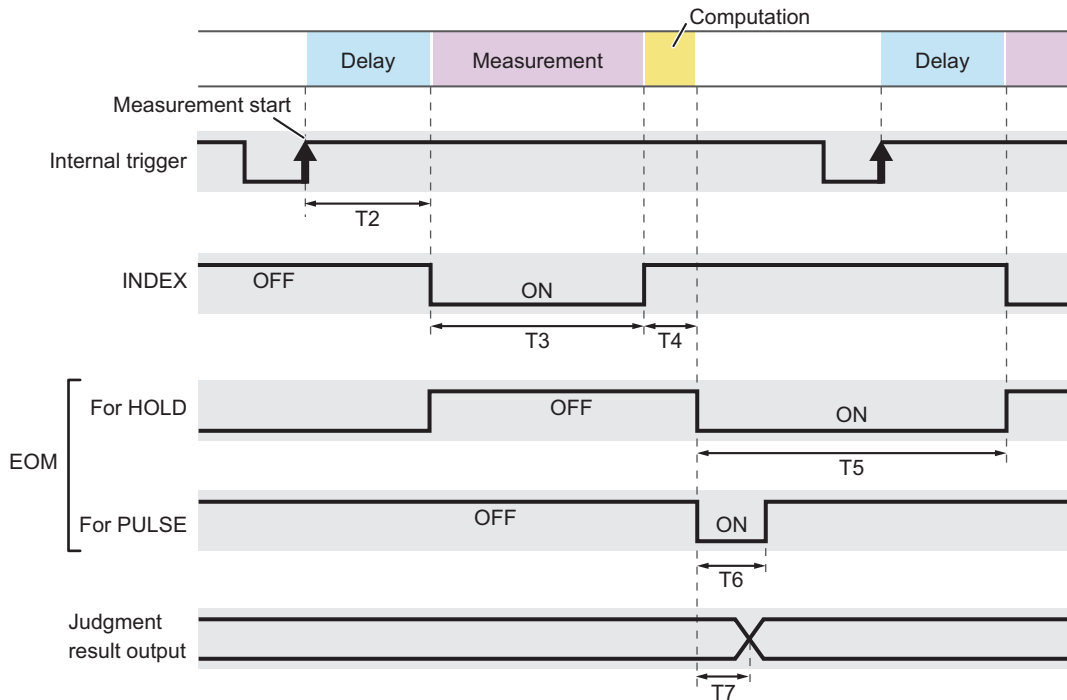
Input signal	Low-active control High-level input voltage: 4.5 V to 30 V Low-level input voltage: 1 V or less Low-level input current: 3 mA/pin Maximum applied voltage: 30 V
Output signal	Output format: NPN-type BJT open collector output Maximum load voltage: 30 V Maximum output current: 0.05 A/pin
Internally insulated power supply	Output voltage: 4.75 V to 5.25 V Maximum output current: 0.2 A (full load)

# Control and Monitor

## Starting and monitoring measurements

### When starting measurements with internal triggers

When a measurement is completed, the next measurement starts automatically. The following figure shows a timing chart including the INDEX (pin 22) and EOM (pin 21) signal outputs when the trigger source (p. 27) is set to INTERNAL.

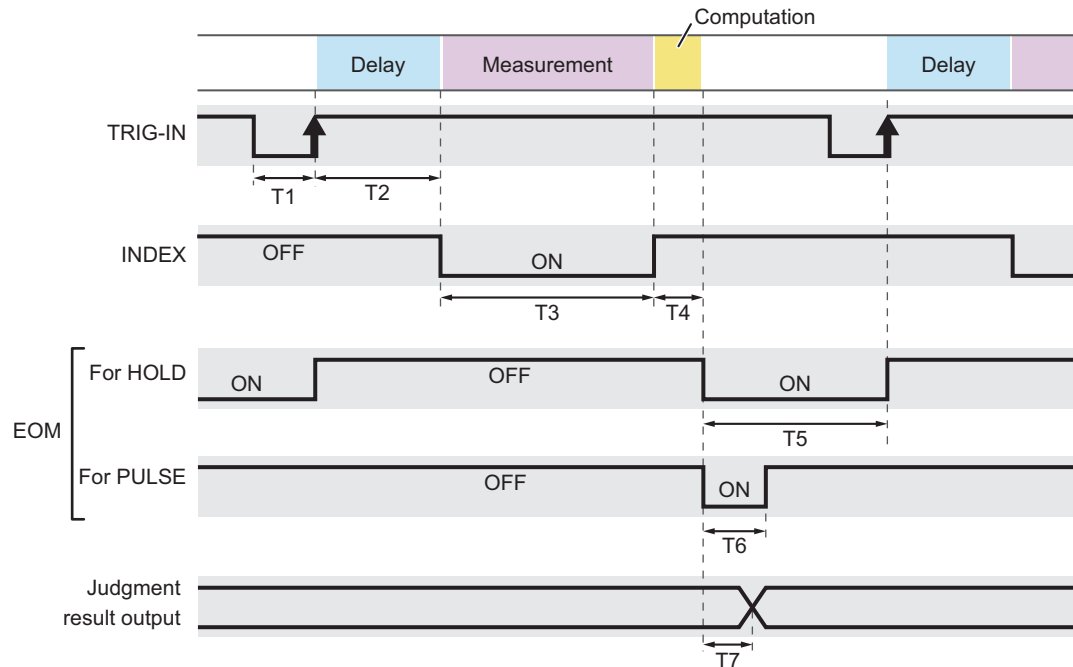


Item	Time
T2: Delay	The time set with delay (p. 28). 5 ms minimum.
T3: Measurement time	Measurement time × average count Measurement time: Time set with the sampling speed (p. 15). Average count: Average count set with the average function (p. 16).
T4: Computation time	0.3 ms
T5: EOM signal output (HOLD)	When EOM (p. 39) is set to HOLD. Holds low level until the next measurement.
T6: EOM signal output (PULSE)	When EOM (p. 39) is set to PULSE. Outputs a pulse for the specified time.
T7: Judgment delay	0.2 ms



## When starting measurements with external trigger input

When the trigger source (p. 27) is set to EXTERNAL, a measurement starts with a trigger input to TRIG-IN (pin 20). The following figure shows a timing chart including the INDEX (pin 22) and EOM (pin 21) signal outputs.



Item	Time
T1: Trigger input pulse width	1 ms or more
T2: Delay	The time set with delay (p. 28). 5 ms minimum.
T3: Measurement time	Measurement time × average count Measurement time: Time set with the sampling speed (p. 15). Average count: Average count set with the average function (p. 16).
T4: Computation time	0.3 ms
T5: EOM signal output (HOLD)	When EOM (p. 39) is set to HOLD. Holds low level until the next TRIG-IN is detected.
T6: EOM signal output (PULSE)	When EOM (p. 39) is set to PULSE. Outputs a pulse for the specified time.
T7: Judgment delay	0.2 ms

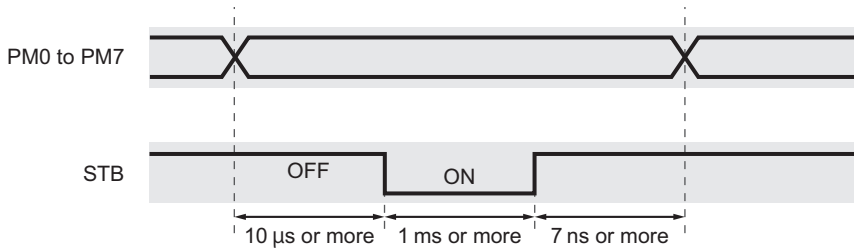
## Monitoring judgment results

In resistance measurement, OHM-UP (pin 14) is at low level when the judgment result is UP and OHM-LOW (pin 15) is at low level when the judgment result is LOW.

In voltage measurement, V-UP (pin 17) is at low level when the judgment result is UP and V-LOW (pin 18) is at low level when the judgment result is LOW.

## Recalling memories

You can recall memories by applying signals to PM0 (pin 1) to PM7 (pin 8) of the SIGNAL I/O connector according to the memory number you want to recall and setting STB (pin 9) to low level and then back to high level.



### 1 Apply the signals in the following table to PM0 to PM7 according to the memory number you want to recall.

Enter the memory number (0 to 99) using a 2-digit BCD code. Apply signals one bit at a time to PM7 to PM0 with 1 as low level (L) and 0 as high level (H).

Memory number	MSB				LSB			
	PM7	PM6	PM5	PM4	PM3	PM2	PM1	PM0
0	H	H	H	H	H	H	H	H
1	H	H	H	H	H	H	H	L
2	H	H	H	H	H	H	L	H
3	H	H	H	H	H	H	L	L
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.
97	L	H	H	L	H	L	L	L
98	L	H	H	L	L	H	H	H
99	L	H	H	L	L	H	H	L

### 2 Change STB from high level to low level and hold it for at least 1 ms. Then, set it back to high level.

The memory entry is recalled.

# System Settings

In system settings, you can set the following items.

Item	Description	See
General	–	–
Key Beeper	Key operation sound enabled/disabled	<a href="#">p. 36</a>
SCPI Error	SCPI error show/hide	<a href="#">p. 36</a>
AC Line Freq	Power supply frequency setting	<a href="#">p. 37</a>
Current Pulse	Current pulse output setting	<a href="#">p. 38</a>
EOM Signal	EOM signal output setting	<a href="#">p. 39</a>
Reset Function	–	–
System Reset	Reset to factory default	<a href="#">p. 42</a>
Reset	Reset settings to their factory defaults except the test conditions saved in memory and RS232C settings	<a href="#">p. 43</a>
Link Setting	–	–
Value Output	Output measurements via RS232C or USB	<a href="#">p. 40</a>
RS232	–	<a href="#">p. 41</a>
Baudrate	RS232C baud rate	
Flow Ctrl	RS232C flow control	
USB	–	–
PID	Product ID display	–
VID	Vendor ID display	–

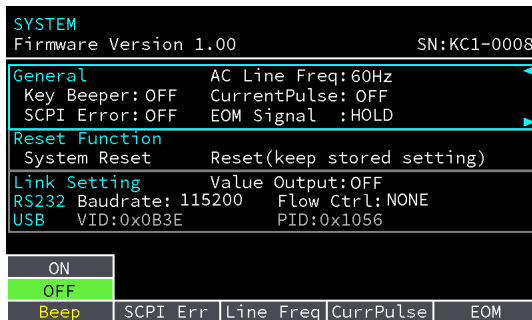
# General Settings

## Key operation sound (Beep)

Enable or disable the beeps generated when keys are pressed.

- 1 Press **SYSTEM**.
- 2 Press **Beep (F1)** to select **ON** or **OFF**.

The value switches between ON and OFF each time that you press the F1 key.



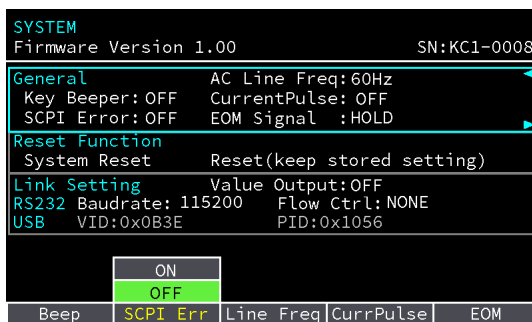
This completes the setting.

## SCPI error notification (SCPI Err)

Enable or disable the beeps generated when SCPI communication errors occur.

- 1 Press **SYSTEM**.
- 2 Press **SCPI Err (F2)** to select **ON** or **OFF**.

The value switches between ON and OFF each time that you press the F2 key.



This completes the setting.

# Power supply frequency (Line Freq)

Set the frequency of the power supply applied to the AC INPUT inlet to stabilize measurements.

- 1 Press SYSTEM.
- 2 Press Line Freq (F3) to select 50 Hz or 60 Hz.

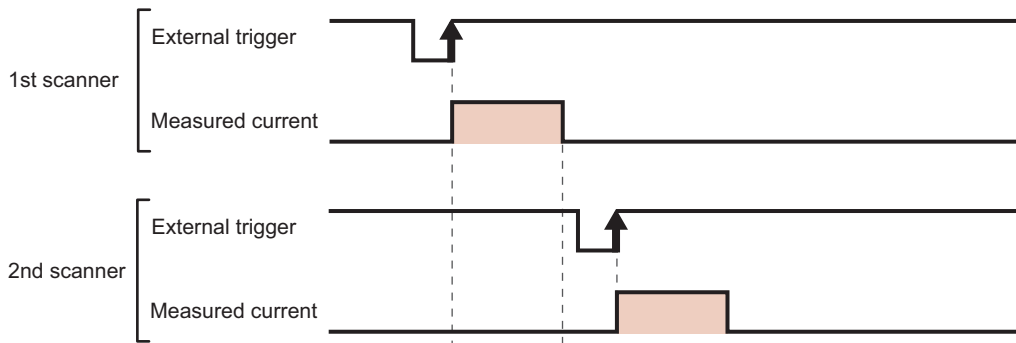
The value switches between 50 Hz and 60 Hz each time that you press the F3 key.

```
SYSTEM
Firmware Version 1.00          SN:KC1-0008
General
Key Beeper: OFF      AC Line Freq:50Hz
SCPI Error: ON      CurrentPulse: OFF
                   EOM Signal :HOLD
Reset Function
System Reset         Reset(keep stored setting)
Link Setting         Value Output:OFF
RS232 Baudrate: 115200 Flow Ctrl:NONE
USB VID:0x0B3E      PID:0x1056
                    50Hz
                    60Hz
Beep | SCPI Err | Line Freq | CurrPulse | EOM
```

This completes the setting.

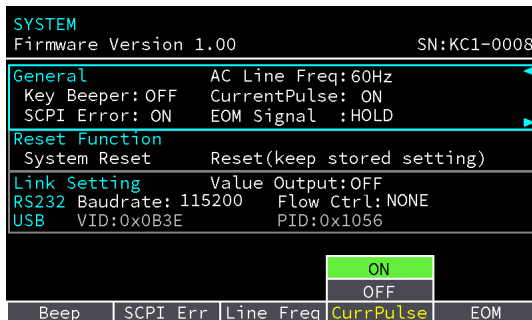
## Current pulse output (CurrPulse)

This function prevents measurement errors caused by mutual interference of measurement currents, such as when measurements are made using several of this product simultaneously. When Trigger source (TRIG) (p. 27) is set to EXTERNAL and CurrPulse is set to on, measurement current runs only during measurement. Current interference can be prevented by offsetting the trigger inputs between several instruments.



- 1 Press **SYSTEM**.
- 2 Press **CurrPulse (F4)** to select **ON** or **OFF**.

The value switches between ON and OFF each time that you press the F4 key.



This completes the setting.

## Measurement end signal output (EOM)

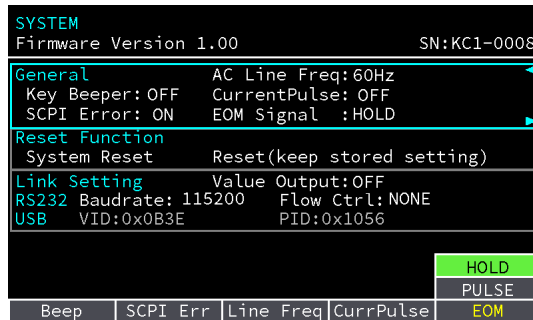
Set how to output the measurement end signal (EOM). EOM is output from the SIGNAL I/O connector. For timing charts, see “When starting measurements with internal triggers” (p. 32) or “When starting measurements with external trigger input” (p. 33).

Value	Description
HOLD	When Trigger source (TRIG) (p. 27) is set to INTERNAL, the signal is turned on after a measurement is completed until the next measurement starts. When the trigger source is set to EXTERNAL, the signal is turned on after a measurement is completed until the next trigger is detected.
PULSE	The signal turns on for the specified time when a measurement is completed.

**1 Press SYSTEM.**

**2 Press EOM (F5) to select the value.**

The value switches each time you press the F5 key.



**3 If you specify PULSE, enter the time using the numeric keypad, and then press ENTER.**

This completes the setting.

# Interface Setting

This section explains the RS232C and USB interface settings.

## Measurement output (Value Out)

If Value Out is set to on, when you apply TRIG-IN to SIGNAL I/O (p. 33) or press SNGL TRG on the front panel (p. 29), the measured value is output through the RS232C or USB interface. This is valid when the Trigger source (TRIG) (p. 27) is set to EXTERNAL. The output format is the same as “Setting the response format” (p. 74).

- 1** Press **SYSTEM**.
- 2** Use the **◀** and **▶** keys to select **Link Setting**.
- 3** Press **ValueOut (F1)** to select **ON** or **OFF**.

The value switches between ON and OFF each time that you press the F1 key.

```

SYSTEM
Firmware Version 1.00          SN:KC1-0008
-----
General          AC Line Freq:50Hz
Key Beeper: OFF  CurrentPulse: OFF
SCPI Error: OFF  EOM Signal :HOLD
-----
Reset Function
System Reset      Reset(keep stored setting)
-----
Link Setting      Value Output:OFF
RS232 Baudrate: 115200  Flow Ctrl: NONE
USB   VID:0x0B3E      PID:0x1056
-----
ON
OFF
ValueOut          Baudrate  FlowCtrl
  
```

This completes the setting.



## RS232C settings

Set the baudrate and flow control.

- 1 Press SYSTEM.**
- 2 Press the ◀ or ▶ key to select RS232.**  
Each time you press the key, the item changes.
- 3 Press the function key for the item you want to set, and select the value.**  
The value switches each time you press the function key.

Item	keys	Value
Baudrate	F1	9600, 19200, 38400, 57600, 115200
Flow control (FlowCtrl)	F2	NONE, Xon/Xoff

SYSTEM			
Firmware Version 1.00		SN:KC1-0008	
<b>General</b>			
Key Beeper: OFF	AC Line Freq: 50Hz	CurrentPulse: OFF	
SCPI Error: OFF	EOM Signal : HOLD		
<b>Reset Function</b>			
System Reset	Reset(keep stored setting)		
<b>Link Setting</b>		Value Output: ON	
RS232 Baudrate: 9600	9600	Ctrl: NONE	
USB VID: 0x0B3E	19200	x1056	
	38400		
	57600		
	115200		
ValueOut	Baudrate	FlowCtrl	

This completes the setting.

# Initializing Settings

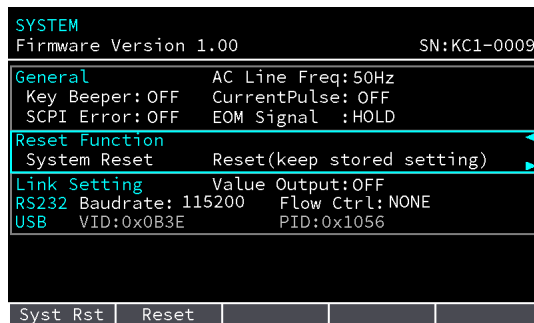
There are two methods to initialize this product. One method returns all the settings to their factory defaults, and the other returns a portion of the settings to their factory defaults (referred to as resetting). When you reset the product, the settings return to their factory defaults except the measurement conditions saved in memory and RS232C settings.

## Returning all the settings to their defaults

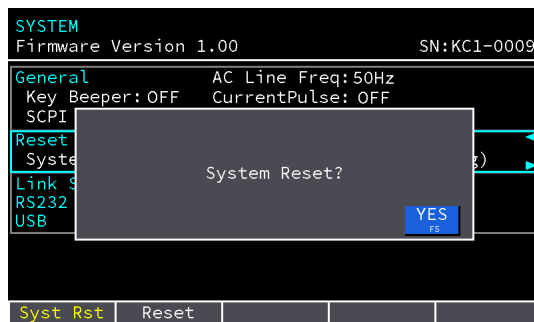
To return all the settings in this product to their factory defaults (p. 44), follow the procedure below.

- 1 Press SYSTEM.**
- 2 Press the ◀ or ▶ key to select Reset Function.**

Each time you press the key, the item changes.



- 3 Press Syst Rst (F1) > YES (F5).**

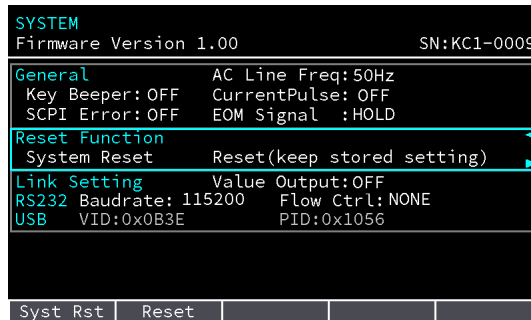


A single beep is generated, and the settings return to their factory defaults. To cancel, press ESCAPE.

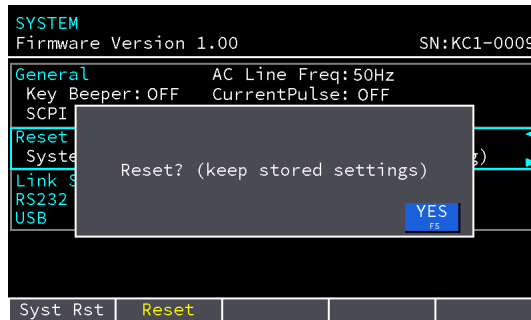
## Resetting the product

To reset the settings to their factory defaults (p. 44) except the measurement conditions saved in memory (p. 25) and RS232C settings (p. 41), follow the procedure below.

- 1 Press **SYSTEM**.
- 2 Press the **◀** or **▶** key to select **Reset Function**.  
Each time you press the key, the item changes.



- 3 Press **Reset (F2) > YES (F5)**.



A single beep is generated, and the product is reset.  
To cancel, press ESCAPE.

## List of default settings

All items that have “Yes” in their “Reset” column are returned to their factory defaults when the product is reset.

Item		Factory default	reset	
MEASURE settings	SAMPLE	SLOW	Yes	
	AVERAGE	OFF	Yes	
	TRIG	INTERNAL	Yes	
	DELAY	OFF	Yes	
IMPEDANCE settings	RANGE	AUTO	Yes	
	UPPER	OFF	Yes	
	LOWER	OFF	Yes	
	$\Omega/m\Omega$	$\Omega$	Yes	
VOLTAGE settings	RANGE	AUTO	Yes	
	UPPER	OFF	Yes	
	LOWER	OFF	Yes	
System settings	General	Key Beeper	OFF	Yes
		SCPI Error	OFF	Yes
		AC Line Freq	50 Hz	Yes
		Current Pulse	OFF	Yes
		EOM	HOLD	Yes
	LinkSetting	Value Output	OFF	Yes
	RS232	Baudrate	115200	–
		Flow Ctrl	NONE	–

# Remote Control

All the functions of this product except for the power switch and key lock can be remotely controlled from an external device. SCPI commands are used to control this product through the RS232C or USB interface.

## ■ Switching between remote and local

During remote control, the product is in remote mode (no panel operations accepted), and a REMOTE icon is shown in the display. To change to local mode (panel operations accepted), press ESCAPE (LOCAL) while holding down SHIFT. When the product enters local mode, the REMOTE icon disappears.

## Communication Interface Specifications

Item	Specifications	
RS232C	–	
Hardware	D-SUB 9-pin connector (male fitting screws #4-40) Input and output connectors are of terminal (DTE) specifications. EIA-232-D compliant	
Transmission system	Start-stop synchronization	
Baudrate	9600, 19200, 38400, 57600, 115200 bps	
Data length	8 bit	
Parity	None	
Stop bits	1 bit	
Message terminator	During reception and transmission: LF	
Flow control	None, Xon/Xoff	
Electric specifications	Input voltage level	ON: 5 V to 15 V, OFF: -15 V to -5 V
	Output voltage level	ON: 5 V to 9 V, OFF: -9 V to -5 V
USB	–	
Hardware	Complies with USB Specification 2.0 Complies with USBTMC Specification 1.0 and USBTMC-USB488 Specification 1.0	
Data rate	12 Mbps max. (Full Speed)	
VID (vendor ID)	0x0B3E	
PID (product ID)	0x1056	
Message terminator	During reception: LF or EOM During transmission: LF + EOM	
Device class	USBTMC-USB488	

# Overview of Commands

The information that is transferred between the controller (the PC) and the product is referred to as *messages*.

This product uses the SCPI language for these messages. The messages that the PC sends to the product are commands. The messages that the product sends to the PC are responses.

## Command hierarchy

SCPI is an ASCII-based command language that was designed for test and measuring equipment. The command structure is composed of the common roots and nodes that are the building blocks of the SCPI subsystem. A command consists of a program header, parameters, and punctuation marks.

Nodes have the following hierarchy.

Program header	Parameter	Node level
:SENSe		Root node
:judgement		2nd level
:RESistance		3rd level
:UPPer	<NR2>	4th level
:CALCulate		Root node
:AVERage		2nd level
:STATe	<bool>	3rd level

A colon (:) separates a higher node from a lower node.

## Command Syntax

In this manual, SCPI commands are expressed in the following format.

```
:SENSe:AVERage:STATe <bool>
:SENSe:JUDGment:RESistance:STATe {BOTH|OFF|UPPer|LOWer}
:INITiate[:IMMEDIATE]
```

### Basic Notation

- You can use long form and short form.
  - Long form: SCPI commands are written with all the characters.
  - Short form: SCPI commands are written by omitting the lowercase characters.
- No distinction is made between uppercase and lowercase.
  - SYSTEM, System, system are all acceptable as long form notations.
  - SYST, Syst, syst are all acceptable as short form notations.
- A space separates a program header and its parameters.
- Multiple parameters are separated by commas.
  - :DATA:FORMat RESistance,VOLTage

- Multiple commands are separated by semicolons.  
:SENSe:JUDGment:RESistance:STATe UPPer;UPPer 2  
Input of the following two commands is equivalent to input of the above command.  
:SENSe:JUDGment:RESistance:STATe UPPer  
:SENSe:JUDGment:RESistance:UPPer 2  
By using colons and semicolons, you can concatenate commands of different subsystems.  
:FUNction RV;:SENSe:JUDGment:STATe ON
- The colon at the beginning of the program header can be omitted.
- The maximum length of a command that you can transmit on a single line is 256 bytes.

## Special symbols

The special symbols that are used in SCPI commands are explained below.

- Characters and numbers enclosed by { and } and delimited by “|” indicate that one of the delimited items is to be selected.  
Do not include the { and } symbols in the actual program.
- <> denotes a parameter.  
Do not include the < and > symbols in the actual program.
- [ ] denotes optional data.  
The data enclosed in square brackets ( [ ] ) can be omitted. If omitted, the default value is applied.  
Do not include the [ and ] symbols in the actual program.

## Query

You can query the device settings and status.

To make a query, append a question mark to the end of the program header section. If the query has parameters, insert a space after the question mark, and then write the parameters.

```
:SENSe:JUDGment:RESistance:UPPer?
```

### ■ Response

This is the response to a query. It is a message always sent from the product to the host PC. They inform the PC about the status and measured values of the product.

#### NOTE

If you want to send two queries on separate lines, send the second query after you have received the response to the first one.

## Message terminator

All commands must be terminated with a valid terminator according to the communication interface (p. 45).

## Common commands

There are commands that are common to the IEEE-488.2 and SCPI standards for functions such as resetting devices and performing self-diagnoses. These common commands start with an asterisk (“\*”). These commands may have one or multiple parameters.

## Parameters

---

The SCPI parameter format is derived from the program parameter format that is defined in IEEE 488.2. The program data expression format that the this product uses is shown below.

### Non-numeric parameters

#### ■ Character data (Character)

Character data is used when only a limited number of values are available for a program setting. Responses are returned in long form with uppercase letters.

:SAMPle:RATE {SLOW|MEDIum|FAST}

#### ■ Boolean data (Boolean)

Boolean data is used to express a condition of 1 or 0, or ON or OFF. Responses are returned using ON or OFF.

:CALCulate:AVERage:STATe {1|0|ON|OFF}

### Numeric parameters

#### ■ NR1

Represents an integer value.

Details are given in the “IEEE 488.2 Standard Digital Interface for Programmable Instrumentation.”

#### ■ NR2

Represents a real number in floating-point format.

Details are given in the “IEEE 488.2 Standard Digital Interface for Programmable Instrumentation.”



**■ NR3**

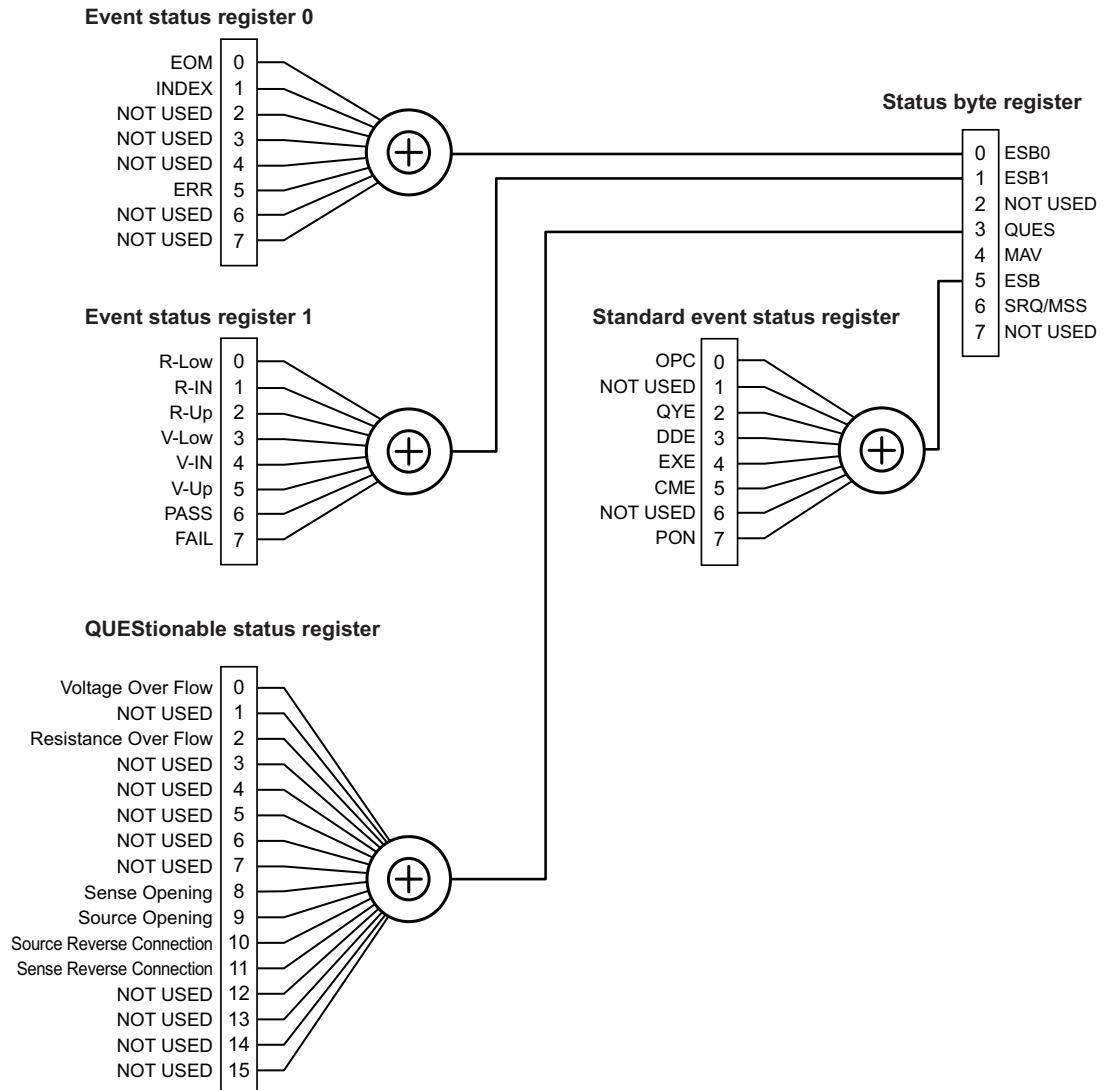
Represents a real number in scientific notation.

Details are given in the "IEEE 488.2 Standard Digital Interface for Programmable Instrumentation." If 380 is returned in the response data, it is returned as +3.80000E+02. Five decimal places are used.

# Registers

## Register structure

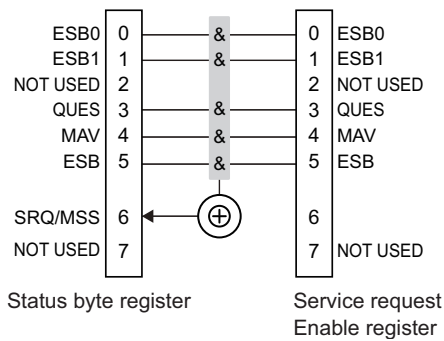
A "+" represents the logical OR of the register bits.



## Status byte register

This register is used to determine the product status. The product employs a status model defined by IEEE488.2. When the product status changes, the corresponding bit in the status byte register is set to 1. If the bit set to 1 is enabled, the SRQ/MSS bit is set to 1, and a service request is generated.

To enable the bits in the status byte register, use the \*SRE (p. 60) command to set the corresponding bits in the service request enable register.



Bit	Bit weight	Bit name	Description
0	1	ESB0	This bit is set to true when event status register bit 0 is set and the bit corresponding to event status enable register 0 is true.
1	2	ESB1	This bit is set to true when event status register bit 1 is set and the bit corresponding to event status enable register 1 is true.
2	4	–	Not used
3	8	QUES	This bit is set to true when a bit is set in the QUESTIONable status register and the corresponding bit in the QUESTIONable status enable register is true.
4	16	MAV	This bit is set to true when a request is received from the digital programming interface and the product is ready to generate the data byte.
5	32	ESB	This bit is set to true when the standard event status register bit is set and the bit corresponding to standard event status enable register is true.
6	64	SRQ MSS	This bit is set to true when a bit is set in the service request enable register and the corresponding bit exists in the status byte.
7	128	–	Not used

## Event status register

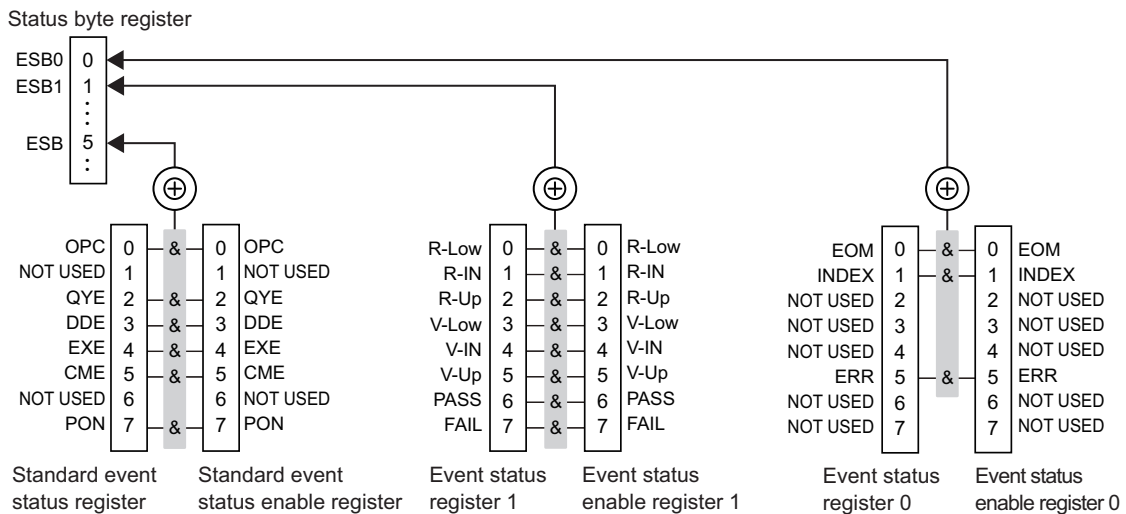
This register notifies the status byte register of the product's status. There are three types of event status registers: standard event status register, event status register 0, and event status register 1. When the product's status changes, the corresponding bit in the event status register is set to 1. If the bit set to 1 is enabled, the corresponding bit (ESB, ESB0, ESB1) in the status byte register is set to 1.

To enable the bits in the event status byte register, use the following commands to set the corresponding bits in the enable register.

Standard event status enable register: \*ESE (p. 60)

Event status enable register 0: :ESE0 (p. 61)

Event status enable register 1: :ESE1 (p. 61)



### Standard event status register (SESR)

Bit	Bit weight	Bit name	Description
0	1	OPC	Set when an *OPC command is received and all operations in standby have been completed.
1	2	–	Not used
2	4	QYE	Set when an attempt is made to read data from the output queue when there is no data or when the output queue is not in the wait state. This indicates that there is no data in the output queue.
3	8	DDE	Set when there is a device-specific error.
4	16	EXE	Set when the product evaluates that the program data after the header is outside the formal input range or does not match the specifications of the product. This indicates that a valid SCPI command may not be executed correctly depending on the state of the product.
5	32	CME	Set when an IEEE 488.2 syntax error is detected by the parser, when an unidentifiable header is received, or when a group execution trigger enters the internal IEEE 488.2 SCPI command input buffer.
6	64	–	Not used
7	128	PON	Set when the power is turned on.

### Event status register 0 (ESR0)

Bit	Bit weight	Signal name	Description
0	1	EOM	Set when a measurement is completed.
1	2	INDEX	Set while a measurement is being performed.
2	4	–	Not used
3	8	–	Not used
4	16	–	Not used
5	32	ERR	Set when a measurement error occurs.
6	64	–	Not used
7	128	–	Not used

### Event status register 1 (ESR1)

Bit	Bit weight	Signal name	Description
0	1	R-Low	Set when the resistance measurement judgment result is LOW.
1	2	R-IN	Set when the resistance measurement judgment result is IN.
2	4	R-Up	Set when the resistance measurement judgment result is UP.
3	8	V-Low	Set when the voltage measurement judgment result is low.
4	16	V-IN	Set when the voltage measurement judgment result is IN.
5	32	V-Up	Set when the voltage measurement judgment result is UP.
6	64	PASS	Set when the resistance and voltage measurement judgment results are both IN.
7	128	FAIL	Set when resistance and voltage measurement judgment results include LOW or UP.

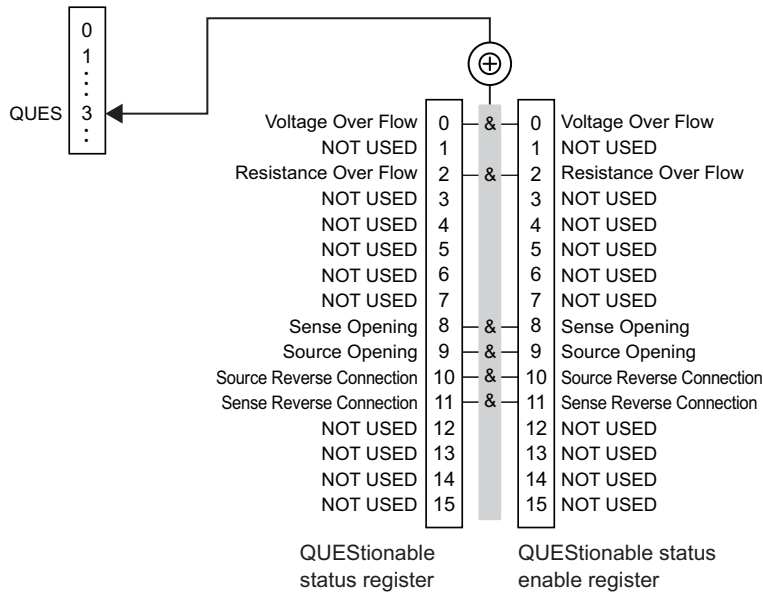
## QUEStionable status register

This register notifies the status byte register of the product's status.

If there is a problem in the measurement data of this product, the corresponding bit in the QUEStionable status register is set to 1. If the bit set to 1 is enabled, the corresponding bit (QUES) in the status byte register is set to 1.

To enable the bits in the event status byte register, use the :STATus:QUEStionable:ENABLE command (p. 62) to set the corresponding bits in the QUEStionable status enable register.

Status byte register



Bit	Bit weight	Bit name	Description
0	1	Voltage Over Flow	Exceeding the voltage measurement range
1	2	–	Not used
2	4	Resistance Over Flow	Exceeding the resistance measurement range
3	8	–	Not used
4	16	–	Not used
5	32	–	Not used
6	64	–	Not used
7	128	–	Not used
8	256	Sense Opening	Positive or negative SENSE terminal open or no contact
9	512	Source Opening	Positive or negative SOURCE terminal open or no contact
10	1024	Source Reverse Connection	Positive and negative SOURCE terminals reversed
11	2048	Sense Reverse Connection	Positive and negative SENSE terminals reversed
12	4096	–	Not used
13	8192	–	Not used
14	16384	–	Not used
15	32768	–	Not used

# List of Messages

## Common commands

Program header	Parameter* <sup>1</sup>	Description
*IDN?	<Manufacturer>, <Model>, <Serial number>, <Software version>	Queries the product information.
*RST	–	Resets the product to factory default settings except the test conditions saved to memory and RS232C settings
*TST?	0 to 3	Executes a self-test and queries the result
*OPC	–	Generates an operation completion message in the event status register when the commands that are in standby have been processed
*OPC?	1	Operation complete query
*WAI	–	Prevents execution of subsequent commands or queries until all operations that are in standby have completed
*CLS	–	Clears all event status registers
*ESE	0 to 255	Sets the standard event status enable register
*ESE?	0 to 255	Queries the standard event status enable register
*ESR?	0 to 255	Queries and clears the standard event status register
*SRE	0 to 255	Sets the service request enable register
*SRE?	0 to 255	Queries the service request enable register
*STB?	0 to 255	Queries the status byte register
*TRG	–	Trigger command.

\*1. Response data for queries

## Specific commands

### Event status register

Program header	Parameter* <sup>1</sup>	Description
:ESE0	0 to 255	Sets event status enable register 0
:ESE0?	0 to 255	Queries event status enable register 0
:ESE1	0 to 255	Sets event status enable register 1
:ESE1?	0 to 255	Queries event status enable register 1
:ESR0?	0 to 255	Queries event status register 0
:ESR1?	0 to 255	Queries event status register 1

\*1. Response data for queries

## Queries the QUEStionable status register

Program header	Parameter*1	Description
:STATus:QUEStionable[:EVENT]?	0 to 3845	Queries the event of the QUEStionable status register. A query clears the contents of the register.
:STATus:QUEStionable:CONDition?	0 to 3845	Queries the condition of the QUEStionable status register. A query does not clear the contents of the register.
:STATus:QUEStionable:ENABle	0 to 3845	Sets the QUEStionable status enable register
:STATus:QUEStionable:ENABle?	0 to 3845	Queries the QUEStionable status enable register

\*1. Response data for queries

## Measurement function

Program header	Parameter*1	Description
:FUNction	RV RESistance VOLTage	Sets the measured value that is shown on the front panel
:FUNction?	RV RESISTANCE VOLTAGE	Queries the measured value that is shown on the front panel
:RESistance:RANGe	0 to 3.1	Sets the resistance measurement range
:RESistance:RANGe?	3.000E-3 to 3.0000E+0	Queries the resistance measurement range
:VOLTage:RANGe	0 to 1050	Sets the voltage measurement range
:VOLTage:RANGe?	6.00000E+0 to 1.00000E+3	Queries the voltage measurement range
:AUTorange	1 0 ON OFF RESistance VOLTage	Sets the auto measurement range
:AUTorange?	ON OFF RESISTANCE VOLTAGE	Queries the auto measurement range
:ADJust?	0 1	Executes zero adjustment and queries the result
:ADJust:CLEAr	–	Clears zero adjustment
:SAMPle:RATE	FAST MEDIUm SLOW	Sets the sampling speed
:SAMPle:RATE?	FAST MEDIUM SLOW	Queries the sampling speed
:SENSe:AVERage:STATe	1 0 ON OFF	Sets the average function
:SENSe:AVERage:STATe?	ON OFF	Queries the average function
:SENSe:AVERage	2 to 99	Sets the average count
:SENSe:AVERage?	2 to 99	Queries the average count

\*1. Response data for queries

## Judgment function

Program header	Parameter*1	Description
:SENSe:JUDGment:STATe	1 0 ON OFF	Sets the judgment function
:SENSe:JUDGment:STATe?	ON OFF	Queries the judgment function
:SENSe:JUDGment:RESistance:STATe	BOTH OFF UPPer LOWer	Sets the resistance judgment function
:SENSe:JUDGment:RESistance:STATe?	BOTH OFF UPPER LOWER	Queries the resistance judgment function
:SENSe:JUDGment:VOLTage:STATe	BOTH OFF UPPer LOWer	Sets the voltage judgment function
:SENSe:JUDGment:VOLTage:STATe?	BOTH OFF UPPER LOWER	Queries the voltage judgment function
:SENSe:JUDGment:RESistance:UPPer	<NR2>	Sets the upper resistance judgment limit



Program header	Parameter*1	Description
:SENSe:JUDGment:RESistance:UPPer?	<NR2>	Queries the upper resistance judgment limit
:SENSe:JUDGment:RESistance:LOWer	<NR2>	Sets the lower resistance judgment limit
:SENSe:JUDGment:RESistance:LOWer?	<NR2>	Queries the lower resistance judgment limit
:SENSe:JUDGment:VOLTag:e:UPPer	<NR2>	Sets the upper voltage judgment limit
:SENSe:JUDGment:VOLTag:e:UPPer?	<NR2>	Queries the upper voltage judgment limit
:SENSe:JUDGment:VOLTag:e:LOWer	<NR2>	Sets the lower voltage judgment limit
:SENSe:JUDGment:VOLTag:e:LOWer?	<NR2>	Queries the lower voltage judgment limit
:SENSe:JUDGment:RESistance:RESult?	UP IN LO OFF ERR	Resistance judgment result
:SENSe:JUDGment:VOLTag:e:RESult?	UP IN LO OFF ERR	Voltage judgment result

\*1. Response data for queries

## Measurement logging and collective transfer function

Program header	Parameter*1	Description
:LOG:STATe	1 0 ON OFF	Sets the logging function
:LOG:STATe?	ON OFF	Queries the logging function
:LOG:CLEAR	–	Clears the log data
:LOG:COUNT?	0 to 500	Queries the number of log data entries
:LOG:DATA?	<Save number (NR1)>,<Resistance measurement (NR3)>,<Voltage measurement (NR3)>	Queries the log data

\*1. Response data for queries

## System settings

Program header	Parameter*1	Description
:SYSTem:DATAout	1 0 ON OFF	Sets the measurement output for when triggers are received
:SYSTem:DATAout?	ON OFF	Queries the measurement output setting for when triggers are received
:SYSTem:BEEPPer:STATe	1 0 ON OFF	Sets the key operation sound
:SYSTem:BEEPPer:STATe?	ON OFF	Queries the key operation sound setting
:SYSTem:SCPI:ERRor	1 0 ON OFF	Sets the alarm sound for SCPI command errors
:SYSTem:SCPI:ERRor?	ON OFF	Queries the alarm sound setting for SCPI command errors
:SYSTem:LFRequency	50 60	Sets the power supply frequency
:SYSTem:LFRequency?	50 60	Queries the power supply frequency setting
:SYSTem:KLOCK	1 0 ON OFF	Sets the key lock
:SYSTem:KLOCK?	ON OFF	Queries the key lock setting
:SYSTem:ELOCK	1 0 ON OFF	Locks the SIGNAL I/O
:SYSTem:ELOCK?	ON OFF	Queries the SIGNAL I/O lock state
:SYSTem:LOCAL	–	Switches to local mode
:SYSTem:SAVE	0 to 99	Saves measurement conditions
:SYSTem:LOAD	0 to 99	Recalls measurement conditions
:SYSTem:BACKup	–	Saves the measurement conditions that are loaded at the next startup

Program header	Parameter <sup>*1</sup>	Description
:SYSTem:EOM:MODE	HOLD PULSe	Sets the EOM output mode
:SYSTem:EOM:MODE?	HOLD PULSE	Queries the EOM output mode setting
:SYSTem:EOM:PULSe	0.001 to 0.099	Sets the EOM pulse width
:SYSTem:EOM:PULSe?	0.001 to 0.099	Queries the EOM pulse width
:SYSTem:CURRent	CONTInuous PULSe	Sets the current pulse output
:SYSTem:CURRent?	CONTINUOUS PULSE	Queries the current pulse output setting
:SYSTem:ERRor?	See <a href="#">p. 70</a> .	Queries errors
:SYSTem:RESet	–	Resets the settings to their factory defaults

\*1. Response data for queries

## Trigger source

Program header	Parameter <sup>*1</sup>	Description
:INITiate:CONTInuous	1 0 ON OFF	Sets the continuous measurement
:INITiate:CONTInuous?	ON OFF	Queries the continuous measurement setting
:INITiate[:IMMediate]	–	Switches to trigger wait state
:TRIGger:SOURce	INTernal EXTernal	Sets the trigger source
:TRIGger:SOURce?	INTERNAL EXTERNAL	Queries the trigger source setting
:TRIGger:DELay:STATe	1 0 ON OFF	Sets the trigger delay
:TRIGger:DELay:STATe?	ON OFF	Queries the trigger delay setting
:TRIGger:DELay	0 to 9.999	Sets the trigger delay time
:TRIGger:DELay?	0 to 9.999	Queries the trigger delay time

\*1. Response data for queries

## Measurement value acquisition

Program header	Parameter <sup>*1</sup>	Description
:FETCh?	When measuring resistance and voltage: <Resistance measurement (NR3)>,<Voltage measurement (NR3)> When measuring resistance: <Resistance measurement (NR3)> When measuring voltage: <Voltage measurement (NR3)>	Reads the most recent measured value
:READ?	When measuring resistance and voltage: <Resistance measurement (NR3)>,<Voltage measurement (NR3)> When measuring resistance: <Resistance measurement (NR3)> When measuring voltage: <Voltage measurement (NR3)>	Executes a measurement and reads the measured value
:DATA:FORMat	RESistance VOLTage RESistance,VOLTage	Sets the response format
:DATA:FORMat?	RESISTANCE VOLTAGE RESISTANCE,VOLTAGE	Queries the response format

\*1. Response data for queries

## Other

Program header	Parameter <sup>*1</sup>	Description
:IO:IN?	0 to 33	Reads the SIGNAL I/O input

\*1. Response data for queries

# Message Reference

## Common commands

### \*IDN?

Queries the product information.

Program header	*IDN?
Response	<Manufacturer>, <Model>, <Serial number>, <Software version>
Example	KIKUSUI,BIM1100,KCC-0001,V1.00

### \*RST

Resets the product to factory default settings ([p. 75](#)) except the test conditions saved to memory and RS232C settings

### \*TST?

Executes a self-test and queries the result.

Program header	*TST?
Response	<0 to 3 (NR1)>
	0: No error
	1: RAM error
	2: EEPROM error
	3: RAM error, EEPROM error

### \*OPC

Sets the OPC bit (bit 0) of the standard event status register (SESR) when the execution of all operations is complete. When a query is made, 1 is returned when the execution of all operations is complete.

Program header	*OPC *OPC?
Response	1

### \*WAI

Prevents the product from executing subsequent commands until all operations that are in standby have completed. When a product-specific command is in use, the \*WAI command may not operate properly.

**\*CLS**

Clears all status byte registers and event status registers.

**\*ESE**

Sets or queries the standard event status enable register (SESER). Set using a total value of the weight ([p. 52](#)) of the bits you want to set.

Program header	*ESE *ESE?
Value/Response	<0 to 255 (NR1)>
Example	ESE 96 Set SESER bit 6 (bit weight 64) and bit 5 (bit weight 32) to 1.

**\*ESR?**

Queries and then clears the standard event status register (SESR). The set bits are returned using a bit weight ([p. 52](#)).

Program header	*ESR?
Value/Response	<0 to 255 (NR1)>
Example	ESR? 32 SESR bit 5 (bit weight 32) is 1.

**\*SRE**

Sets or queries the service request enable register (SRER). Set using a total value of the weight ([p. 51](#)) of the bits you want to set.

Program header	*SRE *SRE?
Value/Response	<0 to 255 (NR1)>
Example	SRE 17 SESR bit 0 (bit weight 1) and bit 4 (bit weight 16) are 1.

**\*STB?**

Queries the contents of the status byte register (STB) and the MSS message. The set bits are returned using a bit weight ([p. 51](#)).

Program header	*STB?
Response	<0 to 255 (NR1)>
Example	32 STB bit 5 (bit weight 32) is 1.

**\*TRG**

Measures once when :TRIGger:SOURce (p. 72) is set to EXternal. To execute TRG after changing the measurement conditions, insert an interval of 100 ms.

## Specific commands

### Event status enable register

Sets or queries event status enable register 0 (ESER0) or event status enable register 1 (ESER1). Set using a total value of the weight (p. 53) of the bits you want to set.

Program header	:ESE0 :ESE0? :ESE1 :ESE1?
Value/Response	<0 to 255 (NR1)>
Example	<ul style="list-style-type: none"> <li>• :ESE0 34 Set ESER0 bit 1 (bit weight 2) and bit 5 (bit weight 32) to 1.</li> <li>• :ESE1? 34 ESER1 bit 1 (bit weight 2) and bit 5 (bit weight 32) are 1.</li> </ul>

### Event status register

Queries event status register 0 (ESE0) or event status register 1 (ESE1). The set bits are returned using a bit weight (p. 53).

Program header	:ESR0? :ESR1?
Response	<0 to 255 (NR1)>
Example	:ESR1? 34 ESER1 bit 1 (bit weight 2) and bit 5 (bit weight 32) are 1.

### QUESTionable status register

#### ■ Queries events

Queries the event of the QUESTionable status register. A query clears the contents of the register.

Program header	:STATus:QUESTionable[:EVENT]?
Response	<0 to 3845 (NR1)>
Example	:STATus:QUESTionable? 4 QUESTionable status register bit 2 (bit weight 4) is 1.

### ■ Queries the status

Queries the condition of the QUESTionable status register. A query does not clear the contents of the register.

Program header	:STATus:QUESTionable:CONDition?
Value/Response	<0 to 3845 (NR1)>

## QUESTionable status enable register

Sets or queries the QUESTionable status enable register. Set using a total value of the weight (p. 54) of the bits you want to set.

Program header	:STATus:QUESTionable:ENABLE :STATus:QUESTionable:ENABLE?
Value/Response	<0 to 3845 (NR1)>
Example	:STATus:QUESTionable:ENABle 1536 Set QUESTionable status enable register bit 9 (bit weight 512) and bit 10 (bit weight 1024) to 1.

## Switching the measurement display

Switches the measured value that is shown on the front panel

Program header	:FUNction :FUNction?
Value	{RV RESistance VOLTage}
	RV:                Displays the resistance and voltage
	RESistance:    Displays the resistance
	VOLTage:        Displays the voltage
Response	{RV RESISTANCE VOLTAGE}

## Resistance measurement range

When you send a resistance value you want to measure, the range is set appropriately for measuring that resistance.

Program header	:RESistance:RANGe :RESistance:RANGe?
Value	<0 to 3.1 (NR2)>
Unit	$\Omega$
Response	<NR3>
Example	Send “: RES: RANG 0.12” The range is set to 300 m $\Omega$ , which allows 120 m $\Omega$ to be measured. Send “: RES: RANG?” The present range setting “3.00000E-01” (300 m $\Omega$ ) is returned.
Note	If :AUTorange is set to ON (1) or RES, the value changes automatically.

## Voltage measurement range

When you send a voltage value you want to measure, the range is set appropriately for measuring that voltage.

Program header		:VOLTage:RANGe :VOLTage:RANGe?
Value	BIM1030	<0 to 315 (NR2)>
	BIM1100	<-1050 to 1050 (NR2)>
Unit		V
Response		<NR3>
Example		Send ": VOLT: RANG 500" The range is set to 600 V, which allows 500 V to be measured. Send "VOLT: RANG?" The present range setting "6.00000E+02" (600 V) is returned.
Note		If :AUTorange is set to ON (1) or VOLT, the value changes automatically.

## Auto measurement range

Program header		:AUTorange :AUTorange?
Value		{1 0 ON OFF RESistance VOLTage}
	{1 ON}:	Sets the resistance and voltage measurement range to auto
	{0 OFF}:	Sets the resistance and voltage measurement range to manual
	RESistance:	Sets the resistance measurement range to auto
	VOLTage:	Sets the voltage measurement range to auto
Response		{ON OFF RESISTANCE VOLTAGE}

## Zero adjustment

Executes a zero adjustment and queries the result. Zero adjustment takes time. About 10 seconds are required to the next process.

Program header		:ADJust?
Response		{0 1}
	0:	Zero adjustment complete
	1:	Zero adjustment failure

### ■ Clears zero adjustment

Program header		:ADJust:CLEAr
----------------	--	---------------

## Sampling speed

Program header	:SAMPle:RATE :SAMPle:RATE?
Value	{SLOW MEDIUm FAST}
Response	{SLOW MEDIUM FAST}

## Average function

Program header	:SENSe:AVERAge:STATe :SENSe:AVERAge:STATe?
Value	{1 0 ON OFF}
Response	{ON OFF}

### ■ Average count

Program header	:SENSe:AVERAge :SENSe:AVERAge?
Value/Response	<2 to 99 (NR1)>

## Judgment function

### ■ Resistance and voltage measurement judgment function

Turns on or off the upper and lower resistance and voltage limit judgment functions.

Program header	:SENSe:JUDGment:STATe :SENSe:JUDGment:STATe?
Value	{1 0 ON OFF}
Response	{ON OFF}
Note	The setting may change when a :SENSe:JUDGment:RESistance:STATe or :SENSe:JUDGment:VOLTage:STATe is received.

### ■ Resistance judgment function

Program header	:SENSe:JUDGment:RESistance:STATe :SENSe:JUDGment:RESistance:STATe?
Value	{BOTH OFF UPPER LOWER}
	BOTH: Turns on the upper and lower resistance limit judgment functions simultaneously
	OFF: Turns off the upper and lower resistance limit judgment functions simultaneously
	UPPER: Turns on only the upper resistance limit judgment
	LOWER: Turns on only the lower resistance limit judgment
Response	{BOTH OFF UPPER LOWER}
Note	If :SENSe:JUDGment:STATe is set to ON (1), the value changes to BOTH.



### ■ Voltage judgment function

Program header	:SENSe:JUDGment:VOLTagE:STATe :SENSe:JUDGment:VOLTagE:STATe?
Value	{BOTH OFF UPPER LOWER} BOTH: Turns on the upper and lower voltage limit judgment functions simultaneously OFF: Turns off the upper and lower voltage limit judgment functions simultaneously UPPER: Turns on only the upper voltage limit judgment LOWER: Turns on only the lower voltage limit judgment
Response	{BOTH OFF UPPER LOWER}
Note	If :SENSe:JUDGment:STATe is set to ON (1), the value changes to BOTH.

### ■ Upper resistance judgment limit

Program header	:SENSe:JUDGment:RESistance:UPPer :SENSe:JUDGment:RESistance:UPPer?
Value/Response	<NR2>
Unit	$\Omega$
Note	Set a value greater than the lower judgment limit.

### ■ Lower resistance judgment limit

Program header	:SENSe:JUDGment:RESistance:LOWer :SENSe:JUDGment:RESistance:LOWer?
Value/Response	<NR2>
Unit	$\Omega$
Note	Set a value less than the upper judgment limit.

### ■ Upper voltage judgment limit

Program header	:SENSe:JUDGment:VOLTagE:UPPer :SENSe:JUDGment:VOLTagE:UPPer?
Value/Response	<NR2>
Unit	V
Note	Set a value greater than the lower judgment limit.

### ■ Lower voltage judgment limit

Program header	:SENSe:JUDGment:VOLTagE:LOWer :SENSe:JUDGment:VOLTagE:LOWer?
Value/Response	<NR2>
Unit	V
Note	Set a value less than the upper judgment limit.

### ■ Resistance judgment result

Program header	:SENSe:JUDGment:RESistance:RESult?
Response	{UP IN LO OFF ERR}
	UP: The measurement exceeded the upper judgment limit.
	IN: The measurement is within the lower judgment limit and the upper judgment limit.
	LO: The measurement is less than the lower judgment limit.
	OFF: The judgment function is off.
	ERR: An error occurred.

### ■ Voltage judgment result

Program header	:SENSe:JUDGment:VOLTagE:RESult?
Response	{UP IN LO OFF ERR}
	UP: The measurement exceeded the upper judgment limit.
	IN: The measurement is within the lower judgment limit and the upper judgment limit.
	LO: The measurement is less than the lower judgment limit.
	OFF: The judgment function is off.
	ERR: An error occurred.

## Measurement logging and collective transfer function

When the measurement logging function is turned on, "LOG" is displayed in the upper right of the display. With the function turned on, when you apply a SIGNAL I/O TRIG-IN signal or \*TRG, a log of the measurement will be saved in the product. The log saves up to 500 sets of the save number (STEP), resistance measurement, and voltage measurement. Logs exceeding 500 sets are not saved. The log is cleared when the power is turned off.

Program header	:LOG:STATe :LOG:STATe?
Value	{1 0 ON OFF}
Response	{ON OFF}

### ■ Log clear

Program header	:LOG:CLEAR
----------------	------------

### ■ Log count

Program header	:LOG:COUNT?
Response	<1 to 500 (NR1)>

### ■ Collective log transfer

Program header	:LOG:DATA?
Response	<Save number (NR1)>,<Resistance measurement (NR3)>,<Voltage measurement (NR3)>
Note	All the logs are read consecutively. An "END" character is sent at the end of the log.
Example	When :LOG:DATA? is sent 1,1.8348E-1,3.5685E+0 2,1.8354E-1,3.5685E+0 3,1.8360E-1,3.5685E+0 END

### Measurement output for when triggers are received

When \*TRG is received or TRIG-IN is received through SIGNAL I/O, the measurement is output to the external device. This eliminates the need to send a measurement query command from the external device. For details on the measurement that is output, see "Setting the response format" ([p. 74](#)).

Program header	:SYSTem:DATAout :SYSTem:DATAout?
Value	{1 0 ON OFF}
Response	{ON OFF}

### Key operation sound

Program header	:SYSTem:BEEPer:STATe :SYSTem:BEEPer:STATe?
Value	{1 0 ON OFF}
Response	{ON OFF}

### SCPI command error sound

Program header	:SYSTem:SCPI:ERRor :SYSTem:SCPI:ERRor?
Value	{1 0 ON OFF}
Response	{ON OFF}

### Frequency

Program header	:SYSTem:LFRrequency :SYSTem:LFRrequency?
Value/Response	{50 60}

## key lock

Program header	:SYSTem:KLOCK :SYSTem:KLOCK?
Value	{1 0 ON OFF}
Response	{ON OFF}

## SIGNAL I/O lock

When the SIGNAL I/O lock is set to on, control through SIGNAL I/O will be disabled. This is automatically turned off when the product is started.

Program header	:SYSTem:ELOCK :SYSTem:ELock?
Value	{1 0 ON OFF}
Response	{ON OFF}

## Switches to local mode

During remote control, the product is in remote mode (no panel operations accepted), and a REMOTE icon is shown in the display. To change to local mode (panel operations accepted), send the following command. When the product enters local mode, the REMOTE icon disappears.

Program header	:SYSTem:LOCAl
----------------	---------------

## Saving and recalling measurement conditions

### ■ Saving measurement conditions

When you send a command with a designated memory number, measurement conditions is saved to the specified memory number. Up to 100 entries can be saved to memory.

Program header	:SYSTem:SAVE
Value	<0 to 99 (NR1)>
Note	Note that there is a limit to the number of times the conditions can be saved (1 million).

### ■ Recalling measurement conditions

When you send a command with a designated memory number, measurement conditions is recalled from the specified memory number.

Program header	:SYSTem:LOAD
Value	<0 to 99 (NR1)>
Note	If you specify an unsaved memory number, an execution error will occur.

## Measurement conditions for the next startup

Saves the present measurement conditions and recalls them at the next startup.

Program header	:SYSTem:BACKup
Note	Note that there is a limit to the number of times the conditions can be saved (1 million).

## EOM signal output setting

Sets or queries the SIGNAL I/O EOM signal output method.

### ■ EOM signal output mode

Program header	:SYSTem:EOM:MODE :SYSTem:EOM:MODE?
Value	{HOLD PULSe} HOLD: When :TRIGger:SOURce (p. 72) is set to INTernal, EOM is turned on after a measurement is completed until the next measurement starts. When :TRIGger:SOURce is set to EXTernal, EOM is turned on after a measurement is completed until the next trigger is detected. PULSe: Outputs an EOM signal at the pulse width set with :SYSTem:EOM:PULSe.
Response	{HOLD PULSE}

### ■ EOM signal pulse width

Sets the pulse width when :SYSTem:EOM:MODE is set to PULSe.

Program header	:SYSTem:EOM:PULSe :SYSTem:EOM:PULSe?
Value/Response	<0.001 to 0.099 (NR2)>
Unit	Seconds

## Sets the current pulse output

When the current pulse output is set to PULSE, measurement current flows only during measurements. By offsetting the trigger inputs, this function prevents measurement errors caused by mutual interference of measurement currents, such as when measurements are made using several of this product instruments simultaneously. This is valid when :INITiate:CONTinuous (p. 72) is set to OFF or :TRIGger:SOURce (p. 72) is set to EXTernal.

Program header	:SYSTem:CURREnt :SYSTem:CURREnt?
Value	{CONTinuous PULSe} CONTinuous: Runs measurement current continuously. PULSe: Runs measurement current only during measurements. If continuous measurement (p. 72) is set to on, the operation will be the same as when CONTinuous is specified.
Response	{CONTINUOUS PULSE}

## Reading errors

Retrieves the oldest error from the error queue. Errors that have been read are cleared. The error/event queue can hold up to 16 errors. If the 17th error occurs, the 16th error changes to “-350 Queue overflow,” and subsequent errors are not stored.

The error queue is cleared when the product is turned off, when the last entry in the queue is read, or when a \*CLS command is received.

Program header	:SYSTem:ERRor?	
Response (Errors)	+0, No error	There are no errors.
	-100, Command error	There is a command error.
	-310, System error	There is a system error.
	-350, Queue overflow	The error could not be placed in the queue because the queue is full.

## Restoring the factory default settings

Resets the product settings to their factory defaults ([p. 75](#)).

Program header	:SYSTem:RESet
Note	If you do not want to delete the measurement conditions saved to memory and RS232C settings, use *RST.

## Trigger system

When triggers are used to make measurements, the product operation varies depending on the continuous measurement function (:INITiate:CONTinuous) and trigger source (:TRIGger:SOURce).

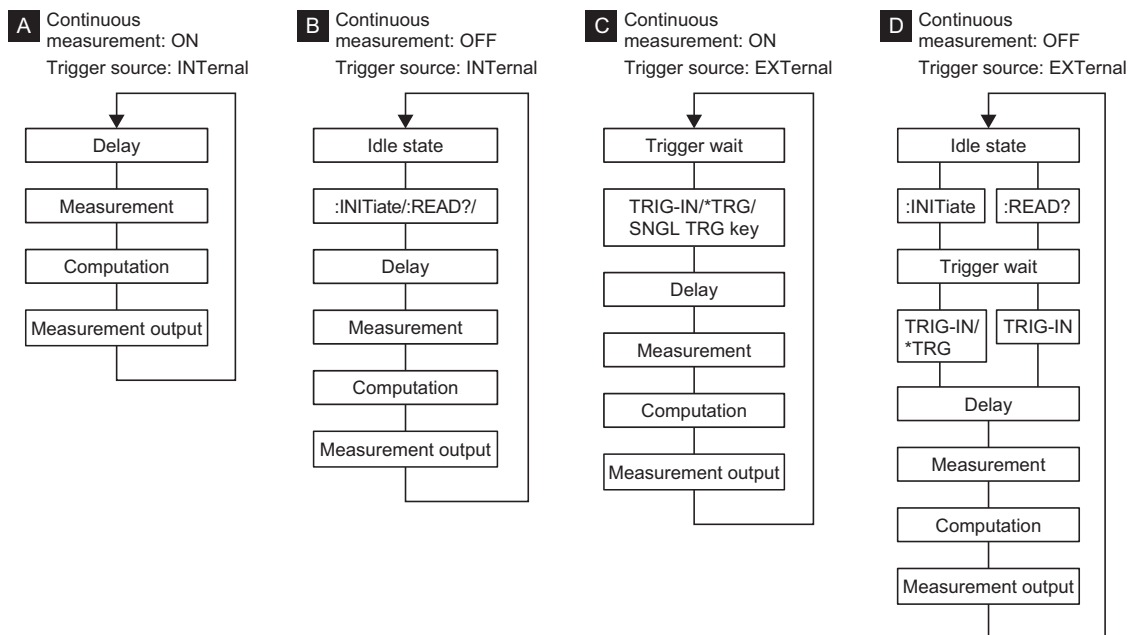
		Continuous measurement (:INIT:CONT) <sup>*1</sup>	
		ON	OFF
Trigger source (:TRIG:SOUR)	INT	Performs continuously measurement. (Trigger flow chart A)	Sending :INITiate or :READ? in the idle state <sup>*2</sup> applies a trigger. After outputting the measured value, the product returns to the idle state. (Trigger flow chart B)
	EXT	Sending *TRG or a TRIG-IN signal to the SIGNAL I/O connector or pressing SNGL TRG on the front panel applies a trigger. After the measurement is completed, the product changes to the trigger wait state. (Trigger flow chart C)	Sending :INITiate or :READ? in the idle state <sup>*2</sup> causes the product to change to the trigger wait state. Sending *TRG <sup>*3</sup> or a TRIG-IN signal to the SIGNAL I/O connector applies a trigger. After outputting the measured value, the product returns to the idle state. (Trigger flow chart D)

\*1. This can only be set using a command.

\*2. Trigger input is not accepted.

\*3. If you send :READ? and the product changes to the trigger wait state, \*TRG cannot be used.

### ■ Trigger flow chart



### ■ Continuous measurement

The product performs continuous measurement and trigger wait even when :INITiate or READ? is not sent.

Program header	:INITiate:CONTInuous :INITiate:CONTInuous?
Value	{1 0 ON OFF}
Response	{ON OFF}
Note	This is automatically set to on when the power is turned on or when the product changes to local mode.

### ■ Trigger wait

Switches from the idle state to the trigger wait state.

Program header	:INITiate[:IMMediate]
Note	When continuous measurement (:INIT:CONT) is on, an execution error occurs.

### ■ Trigger source

Selects whether to use the internal signal or an external signal for triggering.

Program header	:TRIGger:SOURce :TRIGger:SOURce?
Value	{INTernal EXTernal} INTernal: Uses the internal signal for triggering. EXTernal: Uses the SIGNAL I/O TRIG-IN signal, *TRG, or the SNGL TRG key on the front panel for triggering.
Response	{INTERNAL EXTERNAL}

### ■ Turning the delay on or off

Sets whether a delay will be inserted from when a trigger is detected until the measurement starts.

Program header	:TRIGger:DELay:STATe :TRIGger:DELay:STATe?
Value	{1 0 ON OFF}
Response	{ON OFF}

### ■ Delay

Sets the delay when :TRIGger:DELay:STATe is set to on.

Program header	:TRIGger:DELay :TRIGger:DELay?
Value/Response	<0 to 9.999 (NR2)>
Unit	Seconds



## Retrieving the most recent measured value

Queries the most recent measured value.

Program header	:FETCh?
Response	Any of the following responses will be returned depending on the :DATA:FORMat (p. 74) setting. Resistance only: <Resistance measurement (NR3)> Voltage only: <Voltage measurement (NR3)> Resistance and voltage: <Resistance measurement (NR3)>,<Voltage measurement (NR3)>
Unit	$\Omega$ , V
Note	When the measurement overflows, "+1.00000+E08" is returned. When a measurement error occurs, "+1.00000+E09" is returned.

### ■ Example of retrieving measured values using :FETCh?

If :INITiate:CONTInuous (p. 72) is set to ON and :TRIGger:SOURce (p. 72) is set to EXTernal, when you send "\*\*TRG" or SIGNAL I/O TRIG-IN signal or press SNGL TRG on the front panel, the product makes a single measurement. When you send :FETCh?, the measured value is read.

## Executing a measurement and retrieving the measured value

When continuous measurement (:INITiate:CONTInuous) is off, a query for the measured value is made after executing a measurement once.

When the trigger source (:TRIGger:SOURce) is set to EXT, a measurement is not executed by this command alone. To execute a measurement, use SNGL TRG on the front panel or the SIGNAL I/O TRIG-IN signal (a measurement cannot be performed using \*TRG).

Program header	:READ?
Response	Any of the following responses will be returned depending on the :DATA:FORMat (p. 74) setting. Resistance only: <Resistance measurement (NR3)> Voltage only: <Voltage measurement (NR3)> Resistance and voltage: <Resistance measurement (NR3)>,<Voltage measurement (NR3)>
Unit	$\Omega$ , V
Note	When continuous measurement (:INITiate:CONTInuous) is on, an execution error occurs. The next command is not executed until the measurement is completed. To execute this command after changing the measurement conditions, insert an interval of 100 ms. When the measurement overflows, "+1.00000+E08" is returned. When a measurement error occurs, "+1.00000+E09" is returned.

### ■ Example of retrieving measured values using :READ?

If :INITiate:CONTInuous (p. 72) is set to OFF and :TRIGger:SOURce (p. 72) is set to INTernal, sending :READ? causes the measured value to be read after a measurement is made.

If :INITiate:CONTInuous (p. 72) is set to OFF and :TRIGger:SOURce (p. 72) is set to EXTernal, sending :READ? causes the product to switch to a trigger wait state. If you send a SIGNAL I/O TRIG-IN signal, the product makes a single measurement, and the measured value is read.

## Setting the response format

Sets the :FETCh? and :READ? response format to resistance, voltage, or both.

Program header	:DATA:FORMat :DATA:FORMat?
Value	{RESistance VOLTage RESistance,VOLTage}
	RESistance:           Resistance only
	VOLTage:               Voltage only
	RESistance,VOLTage: Resistance and voltage
Response	{RESISTANCE VOLTAGE RESISTANCE,VOLTAGE}
Example	:DATA:FORMat RESistance,VOLTage

## Reading the SIGNAL I/O input status

Reads the input status of SIGNAL I/O STB and TRIG IN.

Program header	:IO:IN?
Response	{32 33 1 0}
	32:   STB is on.
	33:   STB and TRIG IN are on.
	1:     TRIG IN is on.
	0:     STB and TRIG IN are off.

# Table of Initial Command Settings

Program header	Factory default
Common commands	–
*ESE	0
*SRE	0
Event register	–
:ESE0	0
:ESE1	0
QUESTIONable status register	–
:STATus:QUEStionable:ENABle	0
Measurement function	–
:FUNCTion	RV
:RESistance:RANGe	0.003
:VOLTage:RANGe	6
:AUTorange	ON
:SAMPle:RATE	SLOW
:SENSe:AVERage:STATe	OFF
:SENSe:AVERage	2
Judgment function	–
:SENSe:JUDGment:STATe	OFF
:SENSe:JUDGment:RESistance:STATe	OFF
:SENSe:JUDGment:VOLTage:STATe	OFF
:SENSe:JUDGment:RESistance:UPPer	0
:SENSe:JUDGment:RESistance:LOWer	0
:SENSe:JUDGment:VOLTage:UPPer	0
:SENSe:JUDGment:VOLTage:LOWer	0
Measurement logging and collective transfer function	–
:LOG:STATe	OFF
System settings	–
:SYSTem:DATAout	OFF
:SYSTem:BEEPPer:STATe	OFF
:SYSTem:SCPI:ERRor	OFF
:SYSTem:LFRequency	50
:SYSTem:KLOCK	OFF
:SYSTem:ELock	OFF
:SYSTem:EOM:MODE	HOLD
:SYSTem:EOM:PULSe	0.001
:SYSTem:CURRent	CONTInuous
Trigger source	–
:INITiate:CONTInuous	ON
:TRIGger:SOURce	INTernal
:TRIGger:DELay:STATe	OFF
:TRIGger:DELay	0
Response format	–
:DATA:FORMat	RESistance,VOLTage

# Command Processing Time

A certain amount of time is required before the commands shown in the following table are received by the product.

The processing times indicated here are standard values. They are not guaranteed. The processing times vary depending on the settings and the measurement conditions. The values shown below do not include hardware response times.

Command	Processing time (ms)	
	RS232C* <sup>1</sup>	USB
:RESistance:RANGe* <sup>2</sup>	270	250
:SENSe:JUDGment:RESistance:UPPer	270	250
:FETCh?* <sup>3</sup>	540	500
*IDN?	540	500

\*1. Baudrate: 115200bps, flow control: Xon/Xoff

\*2. Excluding the time required to switch the relay

\*3. When resistance and voltage are measured

# Using Visual Basic 2017

This appendix will explain how to use Visual Basic 2017 and the VISA library to communicate with the product through its RS232C or USB interface.

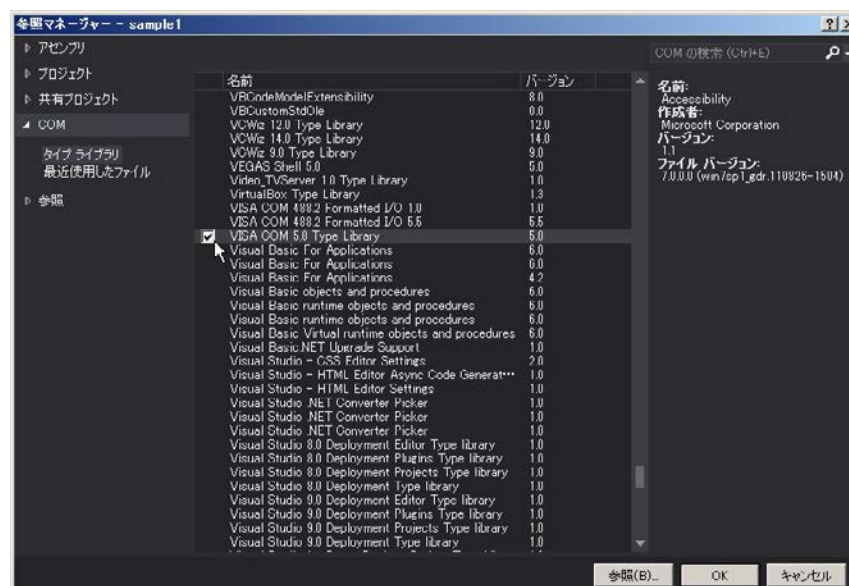
## Configuring a project

First, add the communication middleware (VISA library) to the project.

Click References on the Project menu to open the Reference Manager window. On the navigation pane, click COM and then Type Libraries.

From the list in the center of the window, select "VISA COM \*.\* Type Library" (where \*.\* is the VISA library version number), and select the check box.

Click OK to close the dialog box.



## Communicating through RS232C or USB

### Opening VISA

Before you can use the VISA library to communicate with RS232C and USB devices, you have to open VISA. Specify an I/O resource to open VISA.

Example: Opening VISA when using USB on the BIM1000 series

```
Set rm = CreateObject("VISA.GlobalRM")
```

```
Set msg = rm.Open("USB::0x0B3E::0x1056::00000001::INSTR", NO_LOCK, 0, "")
```

"USB::0x0B3E::0x1056::00000001::INSTR" is an I/O resource.

The I/O resource syntax is shown below. The parts surrounded by square brackets ( [ ] ) can be omitted. Enter the appropriate values in the parts written in italics.

Serial (RS232C)	ASRL[ <i>board</i> ][:INSTR] Example: A measuring instrument connected to serial port COM1 ASRL1::INSTR
USB	USB[ <i>board</i> ][: <i>VendorID</i> :: <i>ProductID</i> :: <i>SerialNumber</i> ][: <i>InterfaceNumber</i> ][:INSTR] Example: A USBTMC measuring instrument whose vendor ID (VID) is 2878, product ID (PID) is 4182, and serial number is 00000001 USB0::0x0B3E::0x1056::00000001::INSTR

In VISA, you can use aliases for I/O resources.

If you use an alias for an I/O resource, even if the alias name is hard-coded in the application, the I/O resource name can still be changed to an appropriate value when the application runs.

Example: Using an alias (MYDEV1) for an I/O resource

```
Set msg = rm.Open("MYDEV1", NO_LOCK, 0, "")
```

When you use aliases, specify the actual I/O resources through an external configuration table or similar tool. Refer to the VISA manual.

## Controlling the instrument

Next, we will use commands such as read and write commands to control the instrument. You must include line-feed codes in the command strings.

Examples:

```
msg.WriteString ("TRIG:SOUR INT" & vbLf) ' Set the trigger source to internal trigger.
```

## Closing VISA

Finally, close VISA.

In a sequence of operations, you only have to open and close VISA once.

```
msg.Close
```

## Sample program

```
Imports Ivi.Visa.Interop

Public Class Form1

    Dim rm As ResourceManager
    Dim msg As IMessage

    Sub Form1_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles MyBase.Load
        rm = CreateObject("VISA.GlobalRM")
        msg = rm.Open("USB0::0x0B3E::0x1056::00000001::INSTR", AccessMode.NO_LOCK, 0, "")

        'Version using a VISA alias
        'msg = rm.Open("MYDEV1", AccessMode.NO_LOCK, 0, "")

        msg.TerminationCharacterEnabled = True
    End Sub

    'Query the ID
    Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Button1.Click
        msg.WriteString("***IDN?" & vbCrLf)
        TextBox1.Text = msg.ReadString(256)
    End Sub

    'Set measurement conditions
    Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Button2.Click
        msg.WriteString("AUT 1" & vbCrLf)
        msg.WriteString("INIT:CONT 0" & vbCrLf)
        msg.WriteString("TRIG:SOUR INT" & vbCrLf)
        msg.WriteString("DATA:FORM RES,VOLT" & vbCrLf)
    End Sub

    'Measure
    Private Sub Button3_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Button3.Click
        msg.WriteString("READ?" & vbCrLf)
        TextBox1.Text = msg.ReadString(256)
    End Sub

    Private Sub Form1_Disposed(ByVal sender As Object, ByVal e As System.EventArgs) Handles Me.Disposed
        msg.Close()
    End Sub

End Class
```

# Maintenance

---

## Calibration

---

The product is calibrated before shipment. To maintain long-term performance, we recommend the product be calibrated once a year. To have your product calibrated, contact your Kikusui agent or distributor.



# Specifications

Unless specified otherwise, the specifications are for the following settings and conditions.

- The product is warmed up for at least 60 minutes.
- After the warm-up, a zero adjustment needs to have been made (p. 20).
- TYP: These are typical values that are representative of situations where the product operates in an environment with an ambient temperature of 23 °C (73.4 °F). These values do not guarantee the performance of this product.
- setting: Indicates a setting.
- range: Indicates the rated value of each range.
- reading: Indicates a readout value.

## Basic specifications

### Voltmeter

Item	BIM1030	BIM1100
Rated input	±300 V	±1000 V
Range	6 V, 60 V, 300 V, AUTO	6 V, 60 V, 600 V, 1000 V, AUTO
Maximum display value <sup>*1</sup>	6 V range	±6.30000 V
	60 V range	±63.0000 V
	300 V range	±315.000 V
	600 V range	–
	1000 V range	–
Resolution	6 V range	10 µV
	60 V range	100 µV
	300 V range	1 mV
	600 V range	–
	1000 V range	–
Accuracy <sup>*2</sup>	±(0.01 % of reading + 3 digit)	
Temperature coefficient	±(0.001 % of reading + 0.3 digit) /°C	
Response time <sup>*3</sup>	Approx. 1 ms	

\*1. Displays OVER when the measurement range is exceeded.

\*2. Add ±2 digit when the sampling speed is set to FAST or MID.

\*3. The time for the product's measurement circuit to stabilize when a probe in an open state is connected to the DUT.

## Resistance meter

Item		Specifications
Measurement method		Four-terminal measurement method
Range		3 mΩ, 30 mΩ, 300 mΩ, 3 Ω, AUTO
Maximum display value*1	3 mΩ range	3.1000 mΩ
	30 mΩ range	31.000 mΩ
	300 mΩ range	310.00 mΩ
	3 Ω range	3.1000 Ω
Resolution	3 mΩ range	0.1 μΩ
	30 mΩ range	1 μΩ
	300 mΩ range	10 μΩ
	3 Ω range	100 μΩ
Measured current*2	3 mΩ range	100 mA
	30 mΩ range	100 mA
	300 mΩ range	10 mA
	3 Ω range	1 mA
Measurement frequency		1 kHz ±0.2 Hz
Accuracy*3		±(0.5 % of reading + 5 digit)
Temperature coefficient	3 mΩ range	±(0.05 % of reading + 1 digit) /°C
	30 mΩ range	±(0.05 % of reading + 0.5 digit) /°C
	300 mΩ range	±(0.05 % of reading + 0.5 digit) /°C
	3 Ω range	±(0.05 % of reading + 0.5 digit) /°C
Response time*4		Approx. 2 ms

\*1. Displays OVER when the measurement range is exceeded.

\*2. Within error ± 10 %.

\*3. Add ±3 digit when the sampling speed is set to FAST and ±2 digit when the sampling speed is set to MID.

\*4. The time for the product's measurement circuit to stabilize when a probe in an open state is connected to the DUT.

## Sampling time

Item		Specifications
Sampling speed	Power supply frequency 50 Hz	FAST: 20 ms, MID: 50 ms, SLOW: 160 ms
	Power supply frequency 60 Hz	FAST: 20 ms, MID: 42 ms, SLOW: 150 ms

## Judgment function

Item		BIM1030	BIM1100
Judgment method		Window comparator method. Judgment made with software.	
Resistance	Setting range	0.0000 Ω to 3.1000 Ω	
	Resolution	100 μΩ	
Voltage	Setting range	0.000 V to 315.000 V	0.00 V to 1050.00 V
	Resolution	1 mV	10 mV

## Other functions

Item	Specifications
Trigger Function	Select external trigger (EXTERNAL) or internal trigger (INTERNAL).
INTERNAL	Measures at the sampling speed (FAST, MID, SLOW) interval.
EXTERNAL	Starts measurement with a SIGNAL I/O connector signal, *TRG, or the SNGL TRG key on the front panel.
Trigger delay	0 to 9.999 s, OFF
Accuracy	±0.2 ms
Average function	The average count can be set between 2 and 99. OFF setting available.
Memory function	Saves up to 100 sets of measurement conditions.
key lock	Locks the key operation.
Zero adjustment	Zero adjustment of the voltmeter and resistance meter. OFF setting available. Zero point clear function available.
Adjustment range	1 000 digit
Measurement logging and collective transfer function	Records up to 500 sets of measurement logs. Logs can be read collectively.
EOM function	Outputs an EOM signal from the SIGNAL I/O connector when a measurement is completed.
HOLD	When the trigger source is set to INTERNAL, the signal is turned on after a measurement is completed until the next measurement starts. When the trigger source is set to EXTERNAL, the signal is turned on after a measurement is completed until the next trigger is detected.
PULSE	Outputs a pulse when a measurement is completed. Pulse width: 1 ms to 99 ms
Accuracy	±0.2 ms

## Interface

Item		Specifications	
RS232C	Hardware	D-SUB 9-pin connector, EIA-232-D compliant	
	Transmission system	Start-stop synchronization	
	Baudrate	9600, 19200, 38400, 57600, 115200 bps	
	Data length	8 bit	
	Parity	None	
	Stop bits	1 bit	
	Flow control	None, Xon/Xoff	
USB	Hardware	Complies with USB Specification 2.0.	
	Data rate	12 Mbps max. (Full Speed)	
	Device class	Complies with USBTMC Specification 1.0 and USBTMC-USB488 Specification 1.0	
SIGNAL I/O	Hardware	D-SUB 25-pin connector. For the pin arrangement, see <a href="#">p.30</a> .	
	Output specifications	Output method	Open collector output (4.5 Vdc to 30 Vdc)
		Output withstanding voltage	30 Vdc
		Output saturation voltage	Approx. 1.1 V (approx. 25 °C)
		Output current	400 mA(TOTAL)
	Input specifications	High-level voltage	4.5 V to 30 V
		Low-level voltage	1 V or less
		Low-level current	3 mA max.
Input time width		5 ms min.	

## General specifications

Item		BIM1030	BIM1100
Environment	Installation location	Indoors, 2000 m or less	
	Spec guaranteed range	Temperature	18 °C to 28 °C (-4 °F to 158 °F)
		Humidity	20 %rh to 80 %rh (no condensation)
	Operating range	Temperature	0 °C to 40 °C (32 °F to +122 °F)
		Humidity	20 %rh to 80 %rh (no condensation)
	Storage range	Temperature	-10 °C to 60 °C (-4 °F to 158 °F)
Humidity		90 %rh or less (no condensation)	
Power supply	Input voltage range	85 Vac to 264 Vac (100 Vac to 240 Vac)	
	Input frequency range	47 Hz to 63 Hz	
	Rated power	30 VA	
Isolation voltage		±300 V max	±1000 V max
Insulation resistance (between AC LINE and chassis)		30 MΩ or more (500 Vdc)	
Withstanding voltage	Between the AC LINE and the chassis	1500 Vac for 1 minute, 10 mA or less	
	Between all the measurement terminals and the chassis	2000 Vdc for 1 minute, 1 mA or less	
	Between all the measurement terminals and SIGNAL I/O	2000 Vdc for 1 minute, 1 mA or less	
External dimensions		See <a href="#">p. 86</a> .	
Weight		Approx. 3 kg (6.6 lbs)	
Accessories		See <a href="#">p. 2</a> .	
Electromagnetic compatibility (EMC) <sup>*1 *2</sup>		<p>Complies with the requirements of the following directive and standards.</p> <p>EMC Directive 2014/30/EU</p> <p>EN 61326-1 (Class A<sup>*3</sup>)</p> <p>EN 55011 (Class A<sup>*3</sup>, Group 1<sup>*4</sup>)</p> <p>EN 61000-3-2</p> <p>EN 61000-3-3</p> <p>Applicable under the following conditions</p> <p>The maximum length of all cabling and wiring connected to the product must be less than 2.5 m.</p> <p>Shielded cables are used to connect to SIGNAL I/O.</p> <p>TL01-BIM clip-type four-wire test leads are used.</p> <p>Electrical discharges are applied only to the DUT.</p>	
Safety <sup>*1</sup>		<p>Complies with the requirements of the following directive and standards.</p> <p>Low Voltage Directive 2014/35/EU<sup>*2</sup></p> <p>EN 61010-1 (Class I<sup>*5</sup>, Pollution Degree 2<sup>*6</sup>)</p> <p>EN 61010-2-030</p> <p>EN 61010-031</p>	

\*1. Does not apply to specially ordered or modified products.

\*2. Limited to products that have a CE mark.

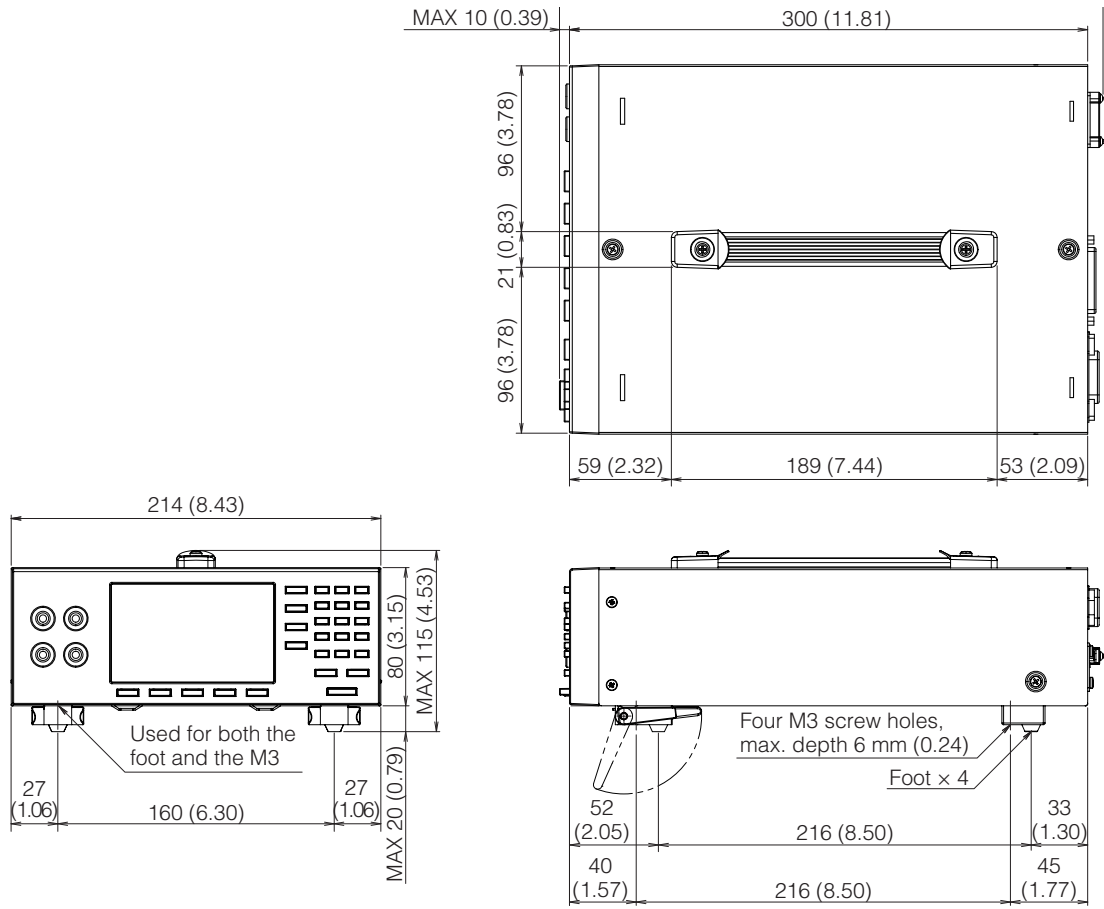
\*3. This is a Class A instrument. This product is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

\*4. This is a Group 1 instrument. This product does not generate and/or use intentionally radio-frequency energy, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purpose.

\*5. This is a Class I instrument. Be sure to ground this product's protective conductor terminal. The safety of this product is guaranteed only when the product is properly grounded.

\*6. Pollution is addition of foreign matter (solid, liquid or gaseous) that may produce a reduction of dielectric strength or surface resistivity. Pollution Degree 2 assumes that only non-conductive pollution will occur except for an occasional temporary conductivity caused by condensation.

## External dimensions



Unit: mm (inches)

# Appendix

## Creating Test Leads

### Conditions for measuring accurately

To measure accurately, the following conditions must be met.

- The stray capacitance of the test leads is no more than 1 nF.
- The resistance of the test leads is no more than 3  $\Omega$  (no more than 2  $\Omega$  when the measurement range is 3 m $\Omega$  or 30 m $\Omega$ ).

### Creating test leads

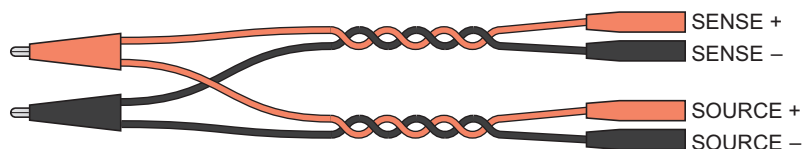


**WARNING** Risk of electric shock.

- Use test leads with a voltage rating that meets or exceeds the product's isolation voltage. For details on the product's isolation voltage, see "Specifications" (p. 85).
- Use wires with the following withstanding voltages for the test leads.  
BIM1030: 1700 V or more  
BIM1100: 2600 V or more

To minimize errors between leads, make the leads as short as possible, and make twisted pairs with the positive and negative SENSE wires and with the positive and negative SOURCE wires. The shorter the untwisted section, the more stable the measurement.

Connect the ends of SENSE + and SOURCE + to a single clip and the ends of SENSE - and SOURCE - to another clip.

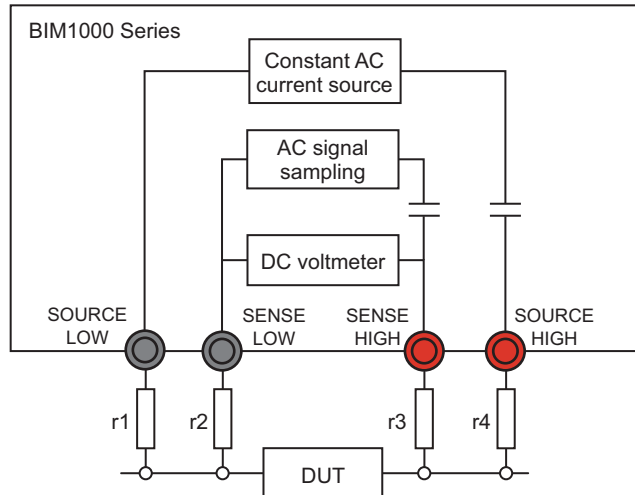


Example of test lead construction

# Four-Terminal Measurement Method

This product uses a four-terminal measurement method to eliminate unnecessary resistance and measure the actual internal resistance of batteries. At the same time, it also measures DC voltage.

The following figure shows the inner measurement structure of the product.



Because hardly any current flows through the test leads connected to the SENSE connector,  $r_2$  and  $r_3$  can be ignored. The resistances  $r_1$  and  $r_4$  of the test leads connected to the SOURCE connector does not affect the voltage measurement of the DUT, so they can be ignored. This makes it possible to ignore the test lead resistances and measure the voltage across the DUT, which allows the internal resistance to be measured accurately.



# Options

This product has the following options.

For information about options, contact your Kikusui agent or distributor.

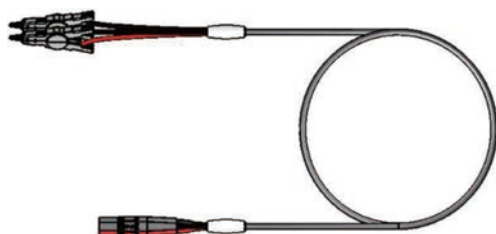
- TL01-BIM clip-type four-wire test lead
- TL02-BIM pin-type four-wire test lead
- OP01-BIM zero adjustment tool

## TL01-BIM clip-type four-wire test lead

This is a clip-type test lead designed for AC four-terminal measurement.

Maximum input voltage: 1000 Vdc Branch length (DUT side): 395 mm  $\pm$  10 mm

Total length: 1200 mm  $\pm$  50 mm Branch length (BIM side): 120 mm  $\pm$  10 mm

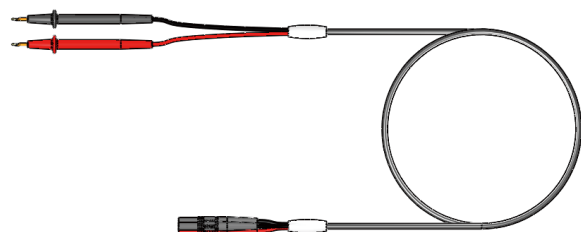


## TL02-BIM pin-type four-wire test lead

This is a pin-type test lead designed for AC four-terminal measurement.

Maximum input voltage: 1000 Vdc Branch length (DUT side): 440 mm  $\pm$  10 mm

Total length: 1200 mm  $\pm$  50 mm Branch length (BIM side): 120 mm  $\pm$  10 mm



## OP01-BIM zero adjustment tool

---

This tool can be used during zero adjustment with the clip-type test leads.



# Troubleshooting

This section introduces troubleshooting measures. Typical symptoms are listed. Check whether any of the items listed below apply to your case. In some cases, the problem can be solved quite easily.

If none of the items apply to your case, we recommend that you initialize the product to its factory default settings ([p. 42](#)). If following the remedy does not solve your problem, contact your Kikusui agent or distributor.

Condition	Possible cause	Remedy	See
Nothing appears on the display when the POWER switch is turned on.	Rated voltage is not applied to AC INPUT.	Check that the power cord is not broken and that the connection at the AC INPUT inlet is secure.	<a href="#">p. 9</a>
“SYSTEM ERROR” is shown in the display.	A system error is occurring.	Turn the POWER switch off and then turn it back on.	–
Keys do not work.	Key lock is activated.	Press KEY LOCK (SHIFT + ENTER) to release the key lock.	–
	The product is under remote control. (“REMOTE” is shown in the display.)	Press LOCAL (SHIFT+ESCAPE) to switch to local mode allowing you to control the product from the front panel.	–
Measurement is not possible.	The trigger source is set to EXTERNAL.	If you do not want to apply trigger signals manually, set the trigger source to INTERNAL.	<a href="#">p. 27</a>

# Index

<b>A</b>		
accessories .....	2	
<b>C</b>		
commands .....	46	
component names .....	6	
<b>D</b>		
default settings.....	42, 44, 75	
delay .....	28	
display.....	7	
<b>F</b>		
factory default settings.....	42, 44	
frequency .....	37	
function keys.....	13	
<b>I</b>		
initialization .....	42, 43	
<b>J</b>		
judgment.....	23	
<b>K</b>		
key lock.....	14	
<b>L</b>		
lower judgment limit.....	17, 18	
<b>M</b>		
measurement conditions.....	15, 25	
memory.....	25, 34	
Menu keys .....	13	
<b>O</b>		
operation sound.....	36	
options .....	89	
<b>P</b>		
power cord .....	9	
power on/off.....	10	
POWER switch .....	10	
<b>R</b>		
Range .....	17, 18, 23	
reset.....	43	
resistance measurement .....	17	
RS-232C.....	41, 45	
<b>S</b>		
sampling .....	15	
SIGNAL I/O connector .....	30	
specifications.....	81	
stand .....	12	
<b>T</b>		
The firmware version.....	10	
Timing Charts.....	32, 33	
trigger .....	27	
troubleshooting.....	91	
<b>U</b>		
upper judgment limit.....	17, 18	
USB.....	45	
<b>V</b>		
version.....	10	
voltage measurement.....	18	
<b>Z</b>		
zero adjustment.....	20	



If you find any misplaced or missing pages in the manuals, they will be replaced. If the manual gets lost or soiled, a new copy can be provided for a fee. In either case, please contact your Kikusui agent or distributor. At that time, inform your agent or distributor of the "Part No." written on the front cover of this manual.

Every effort has been made to ensure the accuracy of this manual. However, if you have any questions or find any errors or omissions, please contact your Kikusui agent or distributor.

After you have finished reading this manual, store it so that you can use it for reference at any time.

## **KIKUSUI ELECTRONICS CORP.**

---

1-1-3 Higashiyamata, Tsuzuki-ku, Yokohama,  
224-0023, Japan

Phone: +81-45-482-6353

Facsimile: +81-45-482-6261

**[www.kikusui.co.jp/en/](http://www.kikusui.co.jp/en/)**

