6. MAINTENANCE, CHECK, CALIBRATION

6.1 Before Asking for Repair

In case trouble occurs while using the R6871E/E-DC, always check the following check items before calling the reception desk of the sales division or agency nearest your place of business. The locations and phone numbers are given at the back of this manual. Once we are called, the repair will be charged, even if the repair is as simple as shown below. Please check the following check items well before calling.

Condition	Cause	Treatment
The display does not appear.	• The power fuse is broken.	• Replace the broken fuse with the attached fuse, referring to Section 1.3.3-(4).
The measurement value is unstable, or the value is abnormal.	• The setting of the function range, etc. is incorrect. • The setting of the frequency (50/60 Hz) is wrong.	• Check the function and range again. • Set the correct frequency matching the AC power source. [See Section 2.8.17.]
Measurement is not done even when input signal is applied.	• The cable is connected to the wrong input terminal • The key setting of the input terminal is wrong.	• Connect the input cable to the correct input terminal. • Set the key correctly.

6.2 Error Messages

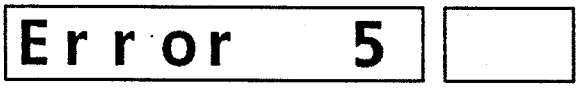
(1) Errors that may occur during normal operation

- Error occurred during measurement with this device. (hardware failure)

- Tried to execute calibration, but the EXT CAL switch on the rear panel is not ON.
- Tried to execute calibration, but the calibration value input via the panel or the GPIB is out of the setting range.

- Tried to execute calibration, but the calibration value is out of the allowable range.

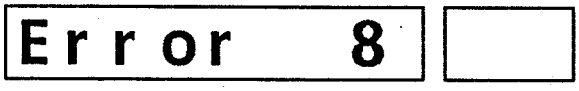
- Tried to set the parameter via the panel, but the setting value is out of the setting range.



- Tried to execute operation, but the setting of the constant is inappropriate.

- Operation error occurred.

- The RECALL key was pressed to enter the recall mode, but no stored data exists.



- The data number recalled from the data memory does not exist.

Error 10	• Data corresponding to the listener code sent from the GPIB is not found.
Error 11	• The string length of the listener code sent from the GPIB exceeded 50 characters.
Error 12	• Inappropriate use conditions or data for the listener code sent from the GPIB.

(2) Error that may occur during self test

Error RO	• Error occurred during program ROM test.
Error 1 CA	• Error occurred during calibration data test.
Error RA	• Error occurred during RAM test.
Error 1 AD	• Error occurred in the basic measurement operation test.

CAUTION

In case "Error 1", self test error or error except the above occurred, the R6871E/E-DC must be failing. Turn off the power, and call the service center shown at the end of this manual.

6.3 Storage

When not using the R6871E/E-DC for a considerable time, cover the device with vinyl cover, place it in a carton box, and store the box where there is little humidity and not affected by direct sun ray. The storage temperature range is –25°C to +70°C.

6.4 Calibration

This section gives explanation on how to calibrate the R6871E/E-DC. Calibration must be done once every guaranteed period (6 months) to satisfy the likelihood of measurement.
The R6871E/E-DC can perform calibration of each range of direct current/alternative current voltage and direct current/alternative current current measurement or resistance measurement via the front panel keys or by the GPIB program.

6.4.1 Preparation for Calibration

(1) Instruments necessary for calibration

The instruments necessary for calibration are as shown in Table 6-1.
Use instruments with performance as shown in the following table or equivalent.

Table 6-1 Instruments Necessary for Calibration

Calibration Instrument	Range	Likelihood
Standard direct current voltage generator	±20mV to ±1000V	±0.0005% or more
Standard direct current current generator	±1μA to ±2A	±0.01% or more
Standard alternating current voltage generator	10mVrms to 500Vrms Frequency 20Hz to 1MHz	±0.005% or more
Standard alternating current current generator	±1μA to ±2A	±0.01% or more
Standard resistor	10Ω 100Ω 1kΩ 10kΩ 100kΩ 1MΩ	±0.001% or more
	10MΩ	±0.003% or more
	100MΩ	±0.01% or more
	1000MΩ	±0.1% or more

(2) Tolerances of calibration data

The tolerances of calibration data to be set using each function and range are listed in Table 6-2. Any calibration can be made to the desired value provided that the calibration data stays within the appropriate tolerance.

Table 6-2 Tolerances of Calibration Data

Function	Range	Calibration point	Tolerance
VDC	200mV	Zero	–2mV to 2mV
		Full-scale	160mV to 200mV
	2000mV	Zero	–20mV to 20mV
		Full-scale	1600mV to 2000mV
	10V	Zero	–0.1V to 0.1V
		Full-scale	8V to 12V
	20V	Zero	–0.2V to 0.2V
		+ Full-scale	16V to 20V
		– Full-scale	–16V to –20V
	200V	Zero	–2V to 2V
		Full-scale	160V to 200V
	1000V	Zero	–10V to 10V
		Full-scale	800V to 1000V
VAC* V(AC + DC)*	200mV	1/10 Full-scale	16mV to 20mV
		Full-scale	160mV to 200mV
	2000mV	1/10 Full-scale	160mV to 200mV
		Full-scale	1600mV to 2000mV
	20V	1/10 Full-scale	1.6V to 2V
		Full-scale	16V to 20V

* : Only the R6871E is enabled.

Table 6-2 Tolerances of Calibration Data (cont'd)

Function	Range	Calibration point	Tolerance
VAC* V(AC + DC)*	200V	Zero	16V to 20V
		Full-scale	160V to 200V
	500V	1/10 Full-scale	46V to 50V
		Full-scale	460V to 500V
ADC*	2000μA	Zero	–20μV to 20μV
		Full-scale	1600μA to 2000μA
	20mA	Zero	–0.2mA to 0.2mA
		Full-scale	16mA to 20mA
	200mA	Zero	–2mA to 2mA
		Full-scale	160mA to 200mA
	2000mA	Zero	–20mA to 20mA
		Full-scale	1600mA to 2000mA
AAC* A(AC + DC)*	2000μA	1/10 full-scale	160μA to 200μA
		Full-scale	1600μA to 2000μA
	20mA	1/10 full-scale	1.6mA to 2mA
		Full-scale	16mA to 20mA
	200mA	1/10 full-scale	16mA to 20mA
		Full-scale	160mA to 200mA
	2000mA	1/10 full-scale	160mA to 200mA
		Full-scale	1600mA to 2000mA
2WΩ	10Ω to 1000MΩ	Zero	0Ω

* : Only the R6871E is enabled.

Table 6-2 Tolerances of Calibration Data (cont'd)

Function	Range	Calibration point	Tolerance
4WΩ	10Ω	Zero	0Ω
		Full-scale	8Ω to 12Ω
	100Ω	Zero	0Ω
		Full-scale	80Ω to 120Ω
	1000Ω	Zero	0Ω
		Full-scale	800Ω to 1200Ω
	10kΩ	Zero	0Ω
		Full-scale	8kΩ to 12kΩ
	100kΩ	Zero	0Ω
		Full-scale	80kΩ to 120kΩ
	1000kΩ	Zero	0Ω
		Full-scale	800kΩ to 1200kΩ
	10MΩ	Zero	0Ω
		Full-scale	8MΩ to 12MΩ
	100MΩ	Zero	0Ω
		Full-scale	80MΩ to 120MΩ
	1000MΩ	Zero	0Ω
		Full-scale	800MΩ to 1200MΩ

* : Only the R6871E is enabled.

(3) Power supply and frequency

The AC power supply must be within the specified voltage (100V ± 10%, 120V ± 10%, 220V ± 10%, 240V (+ 10V, –33V)).
The power supply frequency is 50Hz or 60Hz.

(4) Environment for calibration

Calibration must be done under the following environment.
Temperature : + 23°C ± 5°C
Humidity : 70% or less
Also avoid dust, vibration, noise, etc.

(5) Pre-heating time

Although all functions activate upon power-on, 60 minutes or more should be allowed for warm-up to ensure the required accuracy.

(6) It is useful to log the date of calibration and the deadline for the next calibration on cards or stickers after each calibration ends.

CAUTION

When connecting the power cable, always check that the POWER switch is OFF.

6.4.2 Common Operation and Notes

(1) Perform the following before each measurement calibration.

① Set the EXT CAL switch on the rear side of the panel ON.

② Check that the ECAL lamp on the lower left of the front panel is on.

(2) The calibration of the direct current voltage measurement must be done first.

The remaining calibrations can be done in any order.

6.4.3 Calibration of DC Voltage Measurement

Instrument used : Standard direct current voltage generator

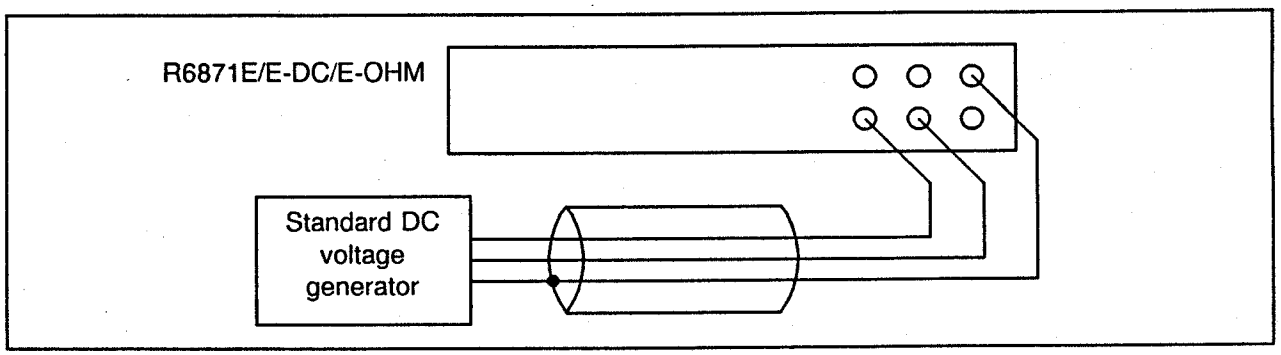
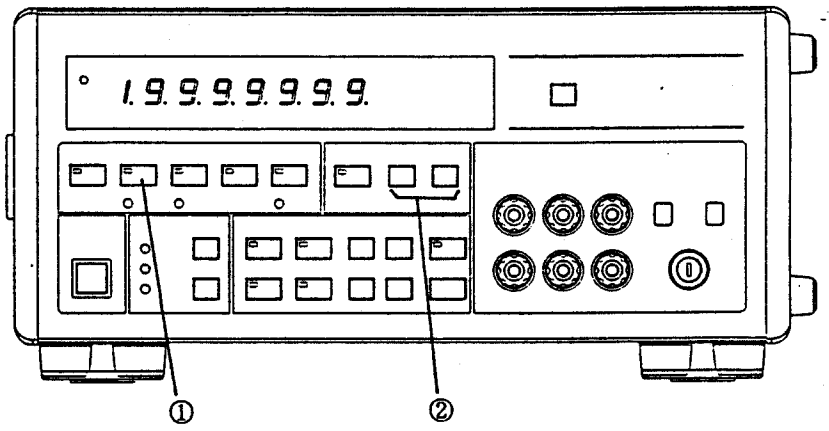


Figure 6-1 Calibration of DC Voltage Measurement

0-point calibration and full-scale calibration of each range is done as calibration of the DC voltage measurement.

[Calibration]



[These numbers indicate the following procedure numbers]

Setting the function

(1) Press [⎓ V DC] to set the function at DC voltage measurement.

Setting 20V-range

(2) Use the [UP] or [DOWN] key to set the measurement range at 20V. Check at this time that the HIGH lamp under the digital display section is lit.

Connecting the standard DC voltage generator

(3) As shown in Figure 6-1, connect the standard DC voltage generator with the attached cable (MI-37) between the HI-LO terminals of the lower input terminal.

20V-range 0-point calibration

(1) Set the measurement range at 20V.
(2) Set the output of the standard DC voltage generator at 0V.
(3) Press [SHIFT].
(4) Press 0.
(5) Press [ENTER].

20V-range + full-scale calibration

(1) Set the output of the standard DC voltage generator at 18V.

1 8 V

(2) Press SHIFT [ ] .

(3) Press 1 [ ] 8 [ ] , in this order.

(4) Press ENTER [ ] .

1 8.0 0 0 0 0 0 V

20V-range -full-scale calibration

(1) Set the output of the standard DC voltage generator at -18V.

- 1 8 V

(2) Press SHIFT [ ] .

(3) Press - [ ] 1 [ ] 8 [ ] , in this order.

(4) Press ENTER [ ] .

- 1 8.0 0 0 0 0 0 V

10V-range 0-point calibration

(1) Set the measurement range to the 10V range.
(The 10V range can be set at any time while the ECAL lamp stays lit.)
Check at this time that the LOW lamp under the digital display sectioin is lit.

(2) Set the output of the standard DC voltage generator at 0V.

0 V

(3) Press SHIFT .

(4) Press 0 .

(5) Press ENTER .

0.0 0 0 0 0 0 V

When there is offset voltage, 10V-rang 0-point calibration.

If there is offset voltage in the generator and it does not become 0V even if the standard DC voltage generator is set at 0V, operate as follows.

(Example)
When there is 20μV offset voltage

. 0 0 0 0 2 V

(1) Press SHIFT .

(2) Press . 0 0 0 0 2 ,
in this order.

(3) Press ENTER .

0.0 0 0 0 2 0 V

10V-range full-scale calibration

(1) Set the output of the standard DC voltage generator at 10V.

1 0 V

(2) Press SHIFT .

(3) Press 1 0 , in this order.

(4) Press ENTER .

1 0.0 0 0 0 0 0 0 V

When there is setting error, 10V-range 0-point calibration

When the standard DC voltage generator has set error of -0.0005%, perform the following steps.

(1) Set the output of the standard DC voltage generator at 10V.

9.9 9 9 9 5 V

(2) Press SHIFT .

(3) Press 9 . 9 9 9 9 5 , in this order.

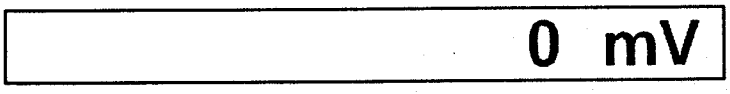
(4) Press ENTER .

9.9 9 9 9 5 0 V

200mV-range 0-point calibration

(1) Use the UP [ ] or DOWN [ ] key to set the measurement range at 200mV.

(2) Set the output of the standard DC voltage generator at 0V.



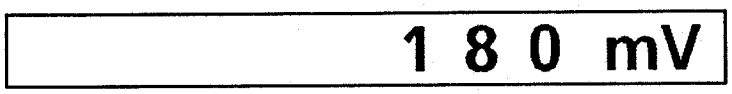
(3) Press SHIFT [ ] .

(4) Press 0 [ ] .

(5) Press ENTER [ ] .

200mV-range full-scale calibration

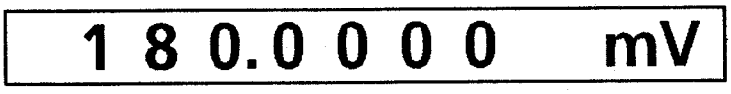
(1) Set the output of the standard DC voltage generator at 180mV.



(2) Press SHIFT [ ] .

(3) Press 1 [ ] 8 [ ] 0 [ ] , in this order.

(4) Press ENTER [ ] .



2000mV-range 0-point calibration

(1) Press UP key to set the measurement range at 2000mV.

(2) Set the output of the standard DC voltage generator at 0V.

(3) Press SHIFT .

(4) Press 0 .

(5) Press ENTER .

2000mV-range full-scale calibration

(1) Set the output of the standard DC voltage generator at 1.8V.

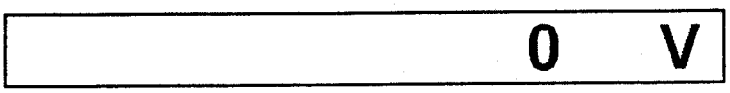
(2) Press SHIFT .

(3) Press 1 8 0 0 , in this order.

(4) Press ENTER .

200V-range 0-point calibration

(1) Set the measurement range at 200V.
(2) Set the output of the standard DC voltage generator at 0V.



(3) Press SHIFT [ ] .
(4) Press 0 [ ] .
(5) Press [ENTER] .

200V-range full-scale calibration

(1) Set the output of the standard DC voltage generator at 180V.

(2) Press SHIFT [ ] .
(3) Press 1 [ ] 8 [ ] 0 [ ] , in this order.
(4) Press [ENTER] .

1000V-range 0-point calibration

(1) Set the measurement range at 1000V.
(2) Set the output of the standard DC voltage generator at 0V.

0 V

(3) Press SHIFT .
(4) Press 0 .
(5) Press ENTER .

0.0000 V

1000V-range full-scale calibration

(1) Set the output of the standard DC voltage generator at 1000V.

1000 V

(2) Press SHIFT .
(3) Press 1 0 0 0 , in this order.
(4) Press ENTER .

1000.0000 V

Note : The internal electric parts will be heated by the 1000V-range calibration. Wait enough till the parts are well cooled, till performing the calibration of the next function.

CAUTION

[In case error was found after pressing the ENTER key]
For instance, when the 200V-range full-scale calibration was done with the wrong value, perform the 200V-range full-scale calibration from the beginning again.

6.4.4 Calibration of AC Voltage Measurement : Only the R6871E is enabled.

Instrument used : Standard AC voltage generator

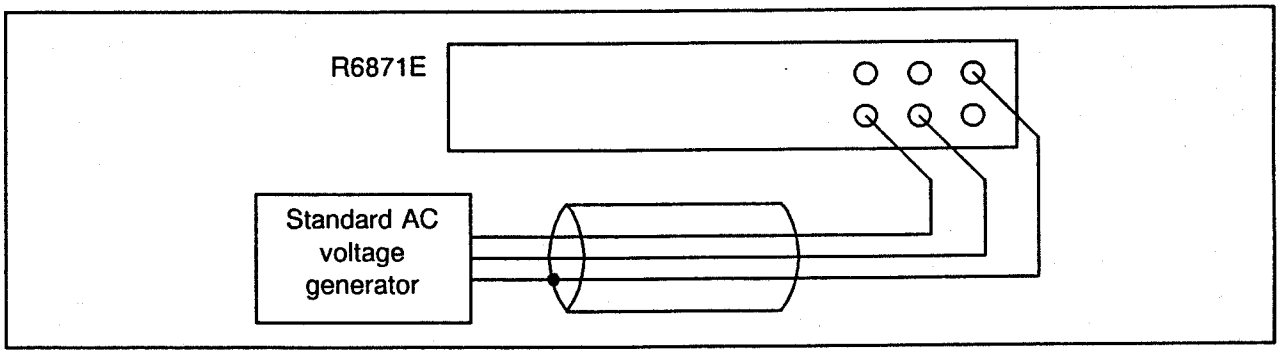
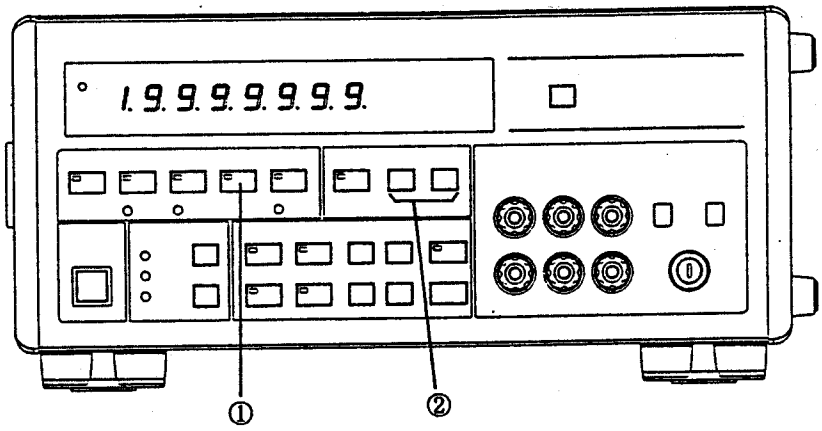


Figure 6-2 Calibration of AC Voltage Measurement

1/10 full-scale calibration and full-scale calibration of each range are done in the calibration of the AC voltage measurement.

[Calibration]



[These numbers indicate the following procedure numbers]

Setting the function

(1) Press [~V AC] to set the function at AC voltage measurement.

Setting 20V-range

(2) Use the [UP] or [DOWN] key to set the measurement range at 20V.

Connecting the standard AC voltage generator

(3) As shown in Figure 6-2, connect the standard AC voltage generator with the attached cable (MI-37) between the HI-LO terminals of the lower input terminal.

20V-range full-scale calibration

(1) Set the output of the standard AC voltage generator at 18V, 1kHz.

1 8 V

(2) Press [SHIFT].

(3) Press 1 [ ] 8 [ ], in this order.

(4) Press [ENTER].

1 8.0 0 0 0 V

20V-range 1/10 full-scale calibration

(1) Set the output of the standard AC voltage generator at 1.8V, 1kHz.

1.8 V

(2) Press SHIFT [ ] .

(3) Press 1 [ ] . [ ] 8 [ ] , in this order.

(4) Press ENTER [ ] .

1.8 0 0 0 V

200mV-range full-scale calibration

(1) Set the measurement range at 200mV.

(2) Set the output of the standard AC voltage generator at 180mV, 1kHz.

1 8 0 mV

(3) Press SHIFT [ ] .

(4) Press 1 [ ] 8 [ ] 0 [ ] , in this order.

(5) Press ENTER [ ] .

1 8 0.0 0 0 mV

200mV-range 1/10 full-scale calibration

(1) Set the output of the standard AC voltage generator at 18mV, 1kHz.

(2) Press SHIFT .

(3) Press 1 8 , in this order.

(4) Press ENTER .

2000mV-range full-scale calibration

(1) Set the measurement range at 2000mV.

(2) Set the output of the standard AC voltage generator at 1800mV, 1kHz.

(3) Press SHIFT .

(4) Press 1 8 0 0 , in this order.

(5) Press ENTER .

2000mV-range 1/10 full-scale calibration

(1) Set the output of the standard AC voltage generator at 180mV, 1kHz.

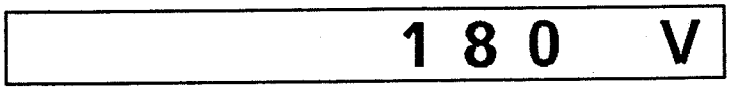
(2) Press SHIFT .

(3) Press 1 8 0 , in this order.

(4) Press ENTER .

200V-range full-scale calibration

(1) Set the measurement range at 200V.
(2) Set the output of the standard AC voltage generator at 180V, 1kHz.



(3) Press SHIFT .
(4) Press 1 8 0 , in this order.
(5) Press ENTER .

200V-range 1/10 full-scale calibration

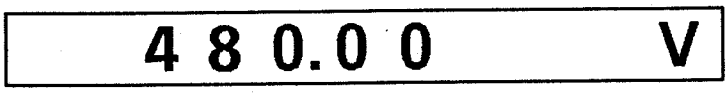
(1) Set the output of the standard AC voltage generator at 18V, 1kHz.

(2) Press SHIFT .
(3) Press 1 8 , in this order.
(4) Press ENTER .

500V-range full-scale calibration

(1) Set the measurement range at 500V.
(2) Set the output of the standard AC voltage generator at 480V, 1kHz.

(3) Press SHIFT .
(4) Press 4 8 0 , in this order.
(5) Press ENTER .



500V-range 1/10 full-scale calibration

(1) Set the output of the standard AC voltage generator at 48V, 1kHz.

(2) Press SHIFT .
(3) Press 4 8 , in this order.
(4) Press ENTER .

CAUTION

[In case error was found after pressing the ENTER key]
For instance, when the 200V-range full-scale calibration was done with the wrong value, perform the 200V-range full-scale calibration from the beginning again.

6.4.5 Calibration of DC Current Measurement: Only the R6871E is enabled.

Instrument used : Standard DC current generator

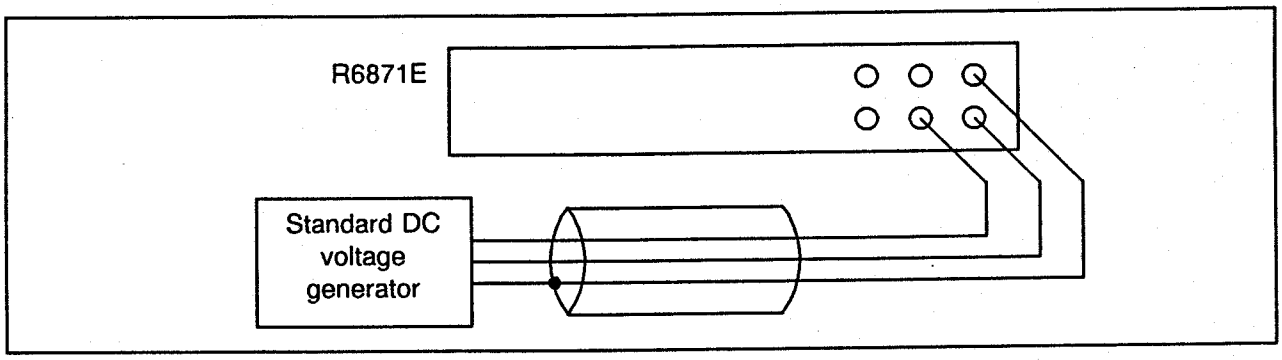
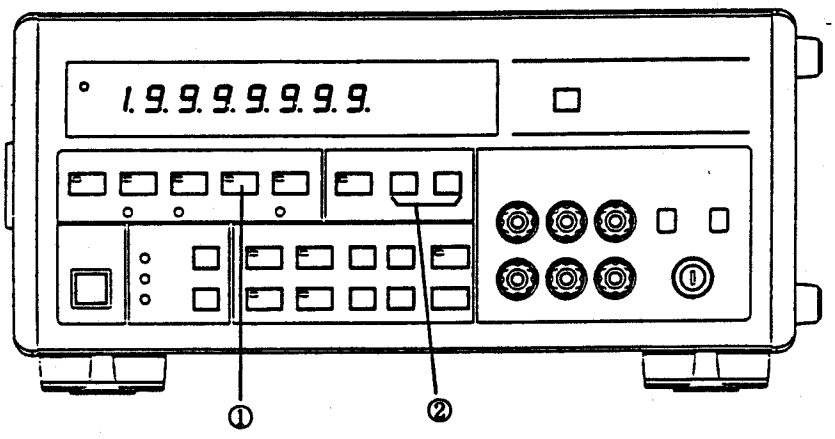


Figure 6-3 Calibration of DC Current Measurement

0-point calibration and full-scale calibration of each range are done as calibration of the DC current measurement.

[Calibration]



[These numbers indicate the following procedure numbers]

Setting the function

(1) Press [⎓ A DC] to set the function at DC voltage measurement.

Setting 200mA-range

(2) Use the [UP] or [DOWN] key to set the measurement range at 200mA.

Connecting the standard DC current generator

(3) As shown in Figure 6-3, connect the standard DC current generator with the attached cable (MI-37) between the HI-LO terminals of the lower input terminal.

200mA-range 0-point calibration

(1) Open the input of the R6871E.

0 mA

(2) Press [SHIFT].

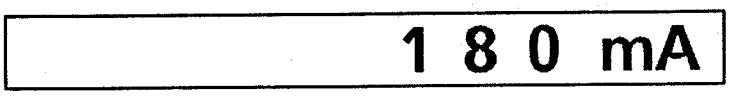
(3) Press 0.

(4) Press [ENTER].

0.0 0 0 0 mA

200mA-range full-scale calibration

(1) Connect the input cable and set the output of the reference DC current generator to the 180mA range.



(2) Press SHIFT .

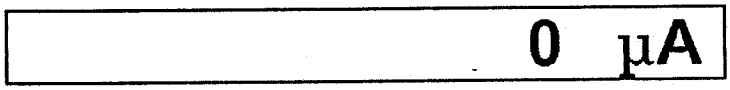
(3) Press 1 8 0 , in this order.

(4) Press ENTER .

2000μA-range 0-point calibration

(1) Set the measurement range at 2000μA.

(2) Open the input of the R6871E.



(3) Press SHIFT .

(4) Press 0 .

(5) Press ENTER .

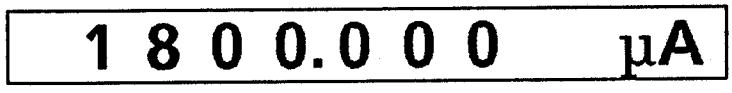
2000μA-range full-scale calibration

(1) Set the output of the standard DC current generator at 1800μA by connecting the input cable.

(2) Press SHIFT .

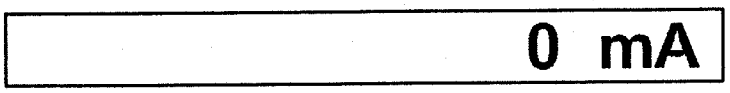
(3) Press 1 8 0 0 , in this order.

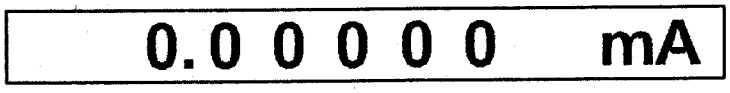
(4) Press ENTER .



20mA-range 0-point calibration

(1) Set the measurement range at 20mA.
(2) Open the input of the R6871E.
(3) Press SHIFT .
(4) Press 0 .
(5) Press ENTER .





20mA-range full-scale calibration

(1) Set the output of the standard DC current generator at 18mA by connecting the input cable.
(2) Press SHIFT .
(3) Press 1 8 , in this order.
(4) Press ENTER .

2000mA-range 0-point calibration

(1) Set the measurement range at 2000mA.
(2) Open the input of the R6871E.
(3) Press SHIFT .
(4) Press 0 .
(5) Press ENTER .

2000mA-range full-scale calibration

(1) Set the output of the standard DC current generator at 1800mA by connecting the input cable.

1 8 0 0 mA

(2) Press SHIFT .

(3) Press 1 8 0 0 , in this order.

(4) Press ENTER .

1 8 0 0.0 0 0 mA

CAUTION

[In case error was found after pressing the ENTER key]
For instance, when the 200mA-range full-scale calibration was done with the wrong value, perform the 200mA-range full-scale calibration from the beginning again.

6.4.6 Calibration of AC Current Measurement: Only the R6871E is enabled.

Instrument used : Standard AC current generator

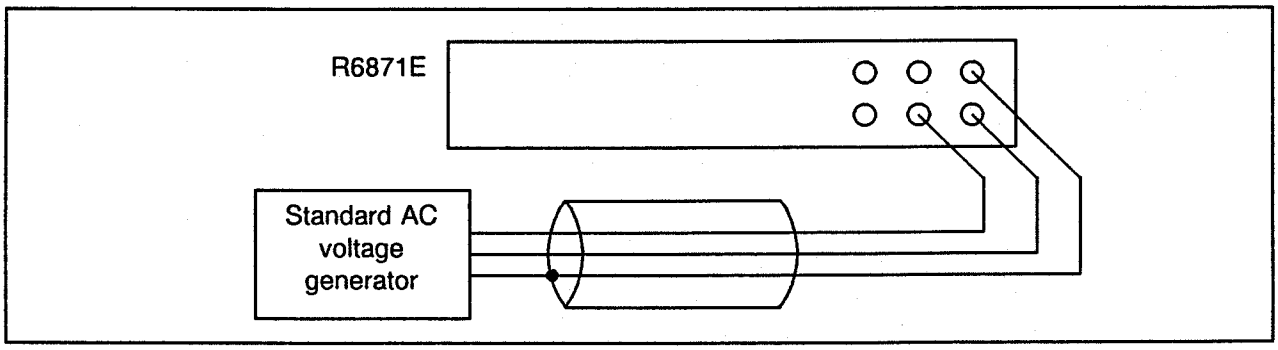
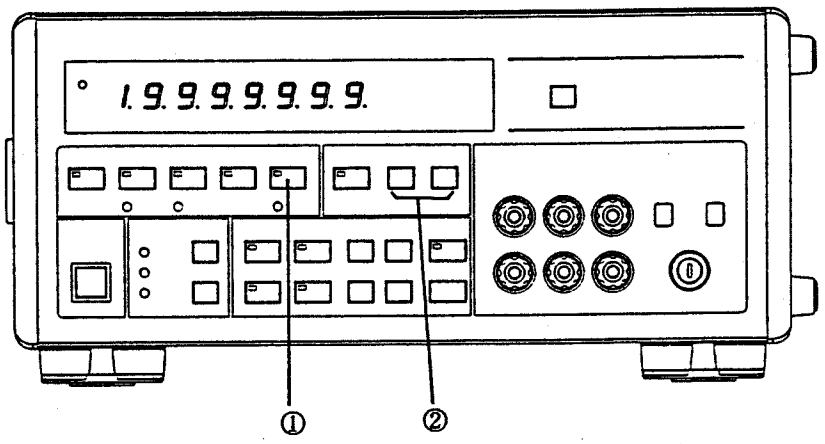


Figure 6-4 Calibration of AC Current Measurement

1/10 full-scale calibration and full-scale calibration of each range are done as calibration of the AC current measurement.

[Calibration]



[These numbers indicate the following procedure numbers]

Setting the function

(1) Press [~A AC] to set the function at AC current measurement.

Setting 200mA-range

(2) Use the [UP] or [DOWN] key to set the measurement range at 200mA.

Connecting the standard AC current generator

(3) As shown in Figure 6-4, connect the standard AC current generator with the attached cable (MI-37) to the lower input terminal.

200mA-range full-scale calibration

(1) Set the output of the standard AC current generator at 180mA, 1kHz.

1 8 0 mA

(2) Press [SHIFT].

(3) Press 1 [ ] 8 [ ] 0 [ ], in this order.

(4) Press [ENTER].

1 8 0.0 0 0 mA

200mA-range 1/10 full-scale calibration

(1) Set the output of the standard AC current generator at 18mA, 1kHz.

1 8 mA

(2) Press SHIFT [ ] .

(3) Press 1 [ ] 8 [ ] , in this order.

(4) Press ENTER [ ] .

1 8.0 0 0 mA

2000μA-range full-scale calibration

(1) Set the measurement range at 2000μA.

(2) Set the output of the standard AC current generator at 1800μA, 1kHz.

1 8 0 0 μA

(3) Press SHIFT [ ] .

(4) Press 1 [ ] 8 [ ] 0 [ ] 0 [ ] , in this order.

1 8 0 0.0 0 μA

(5) Press ENTER [ ] .

2000μA-range 1/10 full-scale calibration

(1) Set the output of the standard AC current generator at 180μA.

1 8 0 μA

(2) Press SHIFT [ ] .

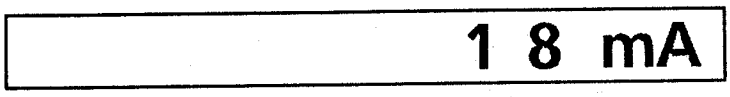
(3) Press 1 [ ] 8 [ ] 0 [ ] , in this order.

(4) Press ENTER [ ] .

1 8 0.0 0 μA

20mA-range full-scale calibration

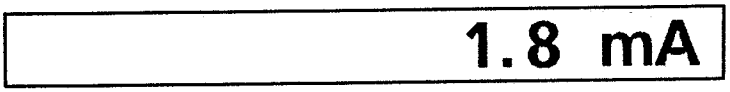
(1) Set the measurement range at 20mA.
(2) Set the output of the standard AC current generator at 18mA, 1kHz.



(3) Press SHIFT .
(4) Press 1 8 , in this order.
(5) Press ENTER .

20mA-range 1/10 full-scale calibration

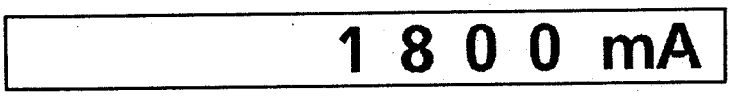
(1) Set the output of the standard AC current generator at 1.8mA, 1kHz.



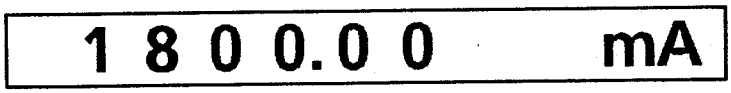
(2) Press SHIFT .
(3) Press 1 . 8 , in this order.
(4) Press ENTER .

2000mA-range full-scale calibration

(1) Set the measurement range at 2000mA.
(2) Set the output of the standard AC current generator at 1800mA, 1kHz.



(3) Press SHIFT .
(4) Press 1 8 0 0 , in this order.
(5) Press ENTER .



2000mA-range 1/10 full-scale calibration

(1) Set the output of the standard AC current generator at 180mA, 1kHz.

1 8 0 mA

(2) Press SHIFT .

(3) Press 1 8 0 , in this order.

(4) Press ENTER .

1 8 0.0 0 mA

CAUTION

[In case error was found after pressing the ENTER key]
For instance, when the 200mA-range full-scale calibration was done with the wrong value, perform the 200mA-range full-scale calibration from the beginning again.

6.4.7 Calibration of (DC + AC) Voltage Measurement : Only the R6871E is enabled.

Instrument used : Standard DC voltage generator

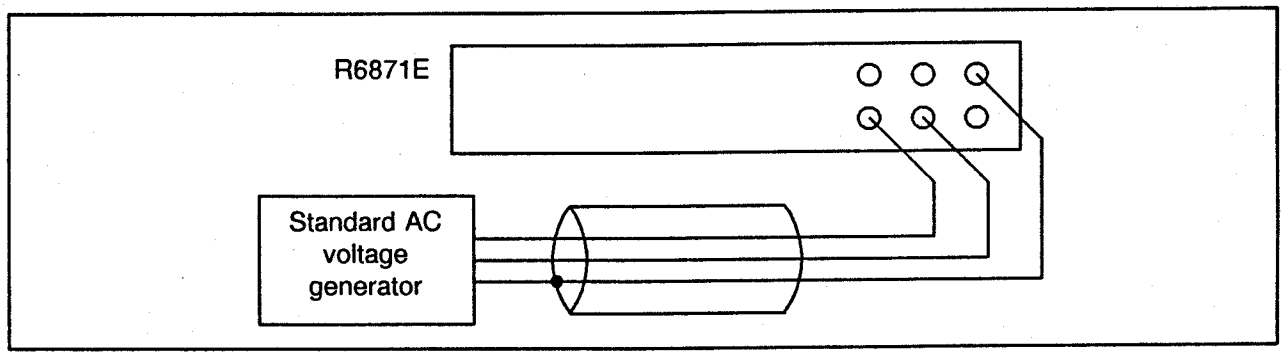
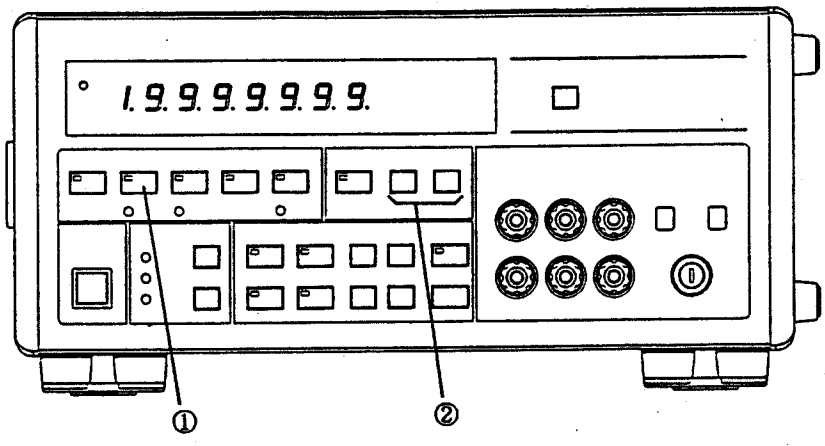


Figure 6-5 Calibration of (DC + AC) Voltage Measurement

AC voltage 1/10 full-scale calibration and full-scale calibration of each AC voltage range are done as calibration of the (DC + AC) voltage measurement.

[Calibration]



[These numbers indicate the following procedure numbers]

Setting the function

(1) Press ~V AC ~V AC to light the AC + DC lamp, and to set the function at (DC + AC) voltage measurement.

Setting 20V-range

(2) Use the UP or DOWN key to set the measurement range at 20V.

Connecting the standard AC voltage generator

(3) As shown in Figure 6-5, connect the standard AC voltage generator with the attached cable (MI-37) between the HI-LO terminals of the lower input terminal.

20V-range 1/10 full-scale calibration

(1) Set the measurement range at 20V.

1.8 V

(2) Set the output of the standard AC voltage generator at 1.8V and 1kHz.

(3) Press SHIFT .

(4) Press 1 . 8 , in this order.

(5) Press ENTER .

1.8000 V

20V-range full-scale calibration

(1) Set the output of the standard AC voltage generator at 18V and 1kHz.

1 8 V

(2) Press SHIFT [ ] .

(3) Press 1 [ ] 8 [ ] , in this order.

(4) Press ENTER [ ] .

1 8.0 0 0 0 V

200mV-range 1/10 full-scale calibration

(1) Use the UP [ ] or DOWN [ ] key to set the measurement range at 200mV.

(2) Set the output of the standard AC voltage generator at 18mV and 1kHz.

1 8 mV

(3) Press SHIFT [ ] .

(4) Press 1 [ ] 8 [ ] , in this order.

(5) Press ENTER [ ] .

1 8.0 0 0 mV

200mV-range full-scale calibration

(1) Set the output of the standard AC voltage generator at 180mV and 1kHz.

1 8 0 mV

(2) Press SHIFT .

(3) Press 1 8 0 , in this order.

(4) Press ENTER .

1 8 0.0 0 0 mV

2000mV-range 1/10 full-scale calibration

(1) Set the measurement range at 2000mV.

(2) Set the output of the standard AC voltage generator at 180mV and 1kHz.

1 8 0 mV

(3) Press SHIFT .

(4) Press 1 8 0 , in this order.

(5) Press ENTER .

1 8 0.0 0 mV

2000mV-range full-scale calibration

(1) Set the output of the standard AC voltage generator at 1.8V and 1kHz.

1 8 0 0 mV

(2) Press SHIFT .

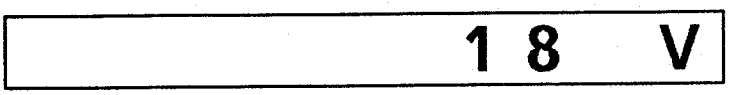
(3) Press 1 8 0 0 , in this order.

(4) Press ENTER .

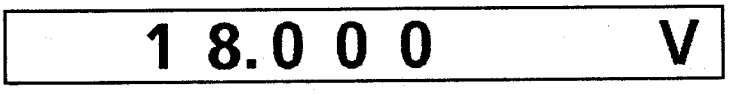
1 8 0 0.0 0 mV

200V-range 1/10 full-scale calibration

(1) Set the measurement range at 200V.
(2) Set the output of the standard AC voltage generator at 18V and 1kHz.



(3) Press SHIFT .
(4) Press 1 8 , in this order.
(5) Press ENTER .



200V-range full-scale calibration

(1) Set the output of the standard AC voltage generator at 180V and 1kHz.

(2) Press SHIFT .
(3) Press 1 8 0 , in this order.
(4) Press ENTER .

500V-range 1/10 full-scale calibration

(1) Set the measurement range at 500V.
(2) Set the output of the standard AC voltage generator at 48V and 1kHz.

(3) Press SHIFT [ ] .
(4) Press 4 [ ] 8 [ ] , in this order.
(5) Press ENTER [ ] .

500V-range full-scale calibration

(1) Set the output of the standard AC voltage generator at 480V and 1kHz.

(2) Press SHIFT [ ] .
(3) Press 4 [ ] 8 [ ] 0 [ ] , in this order.
(4) Press ENTER [ ] .

CAUTION

[In case error was found after pressing the ENTER [ ] key]
For instance, when the 200V-range full-scale calibration was done with the wrong value, perform the 200V-range full-scale calibration from the beginning again.

6.4.8 Calibration of (DC + AC) Current Measurement : Only the R6871E is enabled.

Instrument used : Standard AC current generator

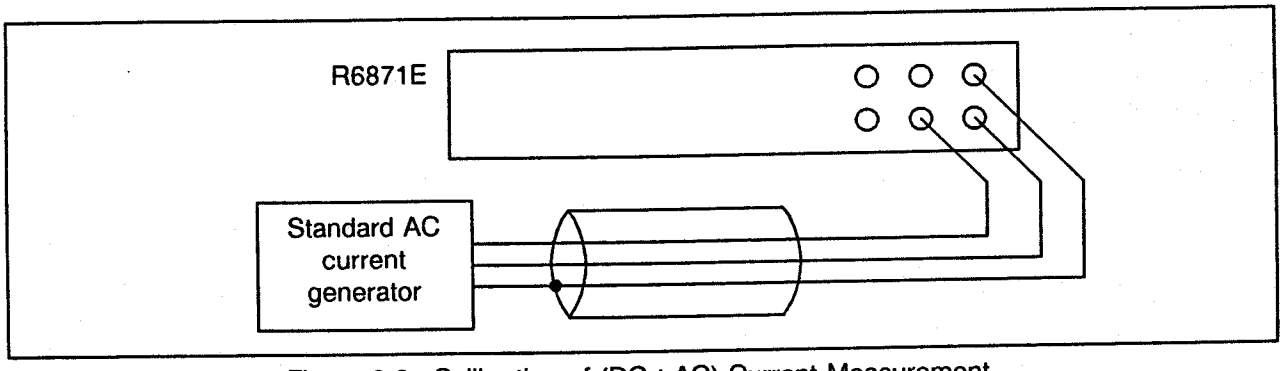
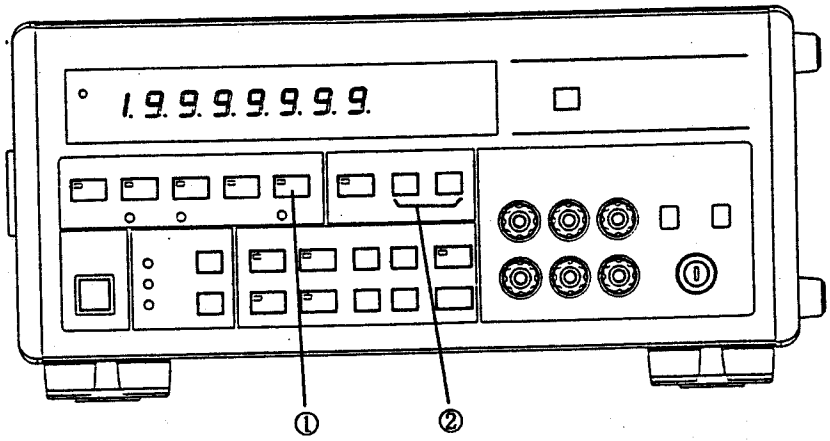


Figure 6-6 Calibration of (DC + AC) Current Measurement

1/10 full-scale calibration and full-scale calibration of each AC range are done as calibration of the (DC + AC) current measurement.

[Calibration]



[These numbers indicate the following procedure numbers]

Setting the function

(1) Press ~A AC ~A AC and light the AC + DC lamp to set the function at (DC + AC) current measurement.

Setting 200mA-range

(2) Use the UP or DOWN key to set the measurement range at 200mA.

Connecting the standard AC current generator

(3) As shown in Figure 6-6, connect the standard AC current generator with the attached cable (MI-37) between the HI-LO terminals of the lower input terminal.

200mA-range 1/10 full-scale calibration

(1) Set the output of the standard AC current generator at 18mA and 1kHz.

1 8 mA

(2) Press SHIFT .

(3) Press 1 8 , in this order.

(4) Press ENTER .

1 8.0 0 0 mA

200mA-range full-scale calibration

(1) Set the output of the standard AC current generator at 180mA and 1kHz.

1 8 0 mA

(2) Press SHIFT [ ] .

(3) Press 1 [ ] 8 [ ] 0 [ ] , in this order.

(4) Press ENTER [ ] .

1 8 0.0 0 0 mA

2000μA-range 1/10 full-scale calibration

(1) Set the measurement range at 2000μA.

(2) Set the output of the standard AC current generator at 180μA and 1kHz.

1 8 0 μA

(3) Press SHIFT [ ] .

(4) Press 1 [ ] 8 [ ] 0 [ ] , in this order.

(5) Press ENTER [ ] .

1 8 0.0 0 μA

2000μA-range full-scale calibration

(1) Set the output of the standard AC current generator at 1800μA and 1kHz.

1 8 0 0 μA

(2) Press SHIFT .

(3) Press 1 8 0 0 , in this order.

(4) Press ENTER .

1 8 0 0.0 0 μA

20mA-range 1/10 full-scale calibration

(1) Set the measurement range at 20mA.

(2) Set the output of the standard AC current generator at 1.8mA and 1kHz.

1.8 mA

(3) Press SHIFT .

(4) Press 1 . 8 , in this order.

(5) Press ENTER .

1.8 0 0 0 mA

20mA-range full-scale calibration

(1) Set the output of the standard AC current generator at 18mA and 1kHz.

1 8 mA

(2) Press SHIFT .

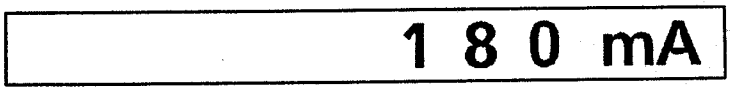
(3) Press 1 8 , in this order.

(4) Press ENTER .

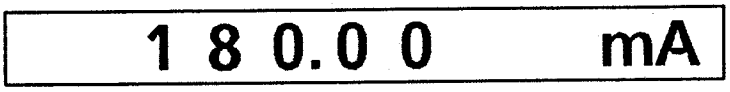
1 8.0 0 0 0 mA

2000mA-range 1/10 full-scale calibration

(1) Set the measurement rage at 2000mA.
(2) Set the output of the standard AC current generator at 180mA and 1kHz.



(3) Press SHIFT .
(4) Press 1 8 0 , in this order.
(5) Press ENTER .



2000mA-range full-scale calibration

(1) Set the output of the standard AC current generator at 1800mA and 1kHz.

(2) Press SHIFT .
(3) Press 1 8 0 0 , in this order.
(4) Press ENTER .

CAUTION

[In case error was found after pressing the ENTER key]
For instance, when the 200mA-range full-scale calibration was done with the wrong value, perform the 200mA-range full-scale calibration from the beginning again.

6.4.9 Calibration of Resistance Measurement

Calibration of 2-wire resistance measurement, 4-wire resistance measurement, and network resistance measurement is done by a single process.

Instrument used : Standard resistor

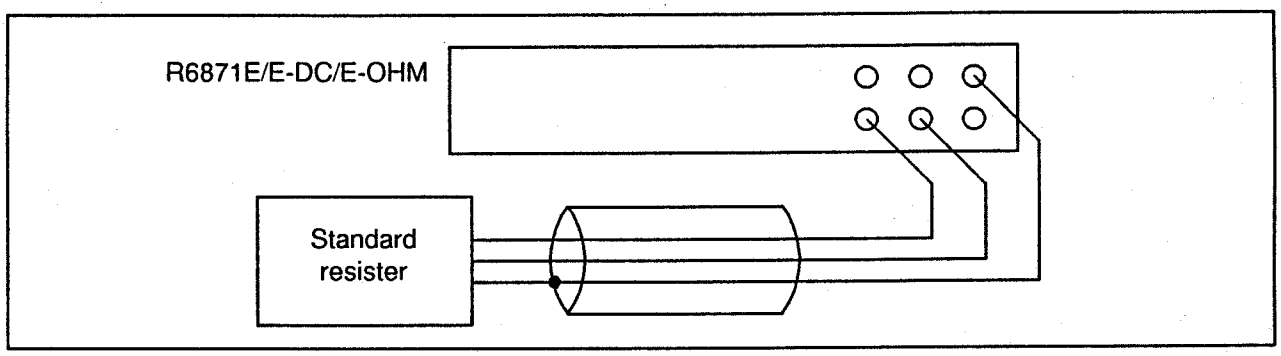


Figure 6-7 0-point Calibration of 2-wire Resistance Measurement

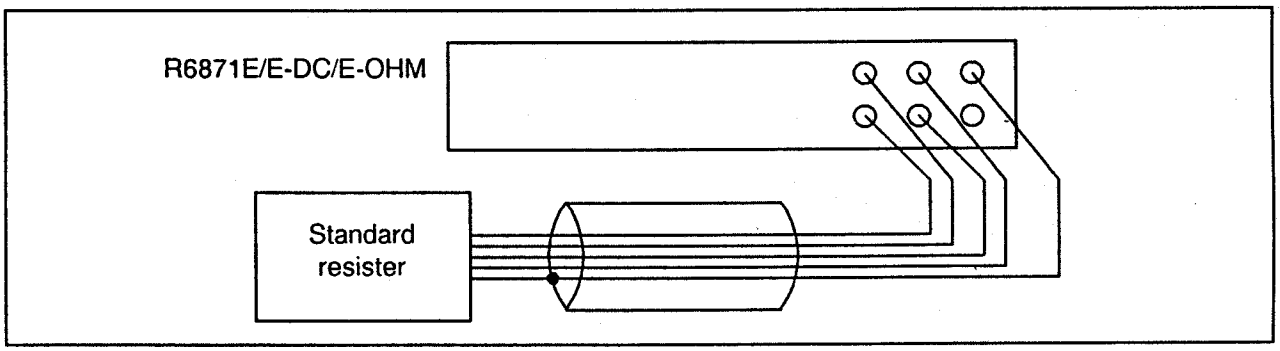
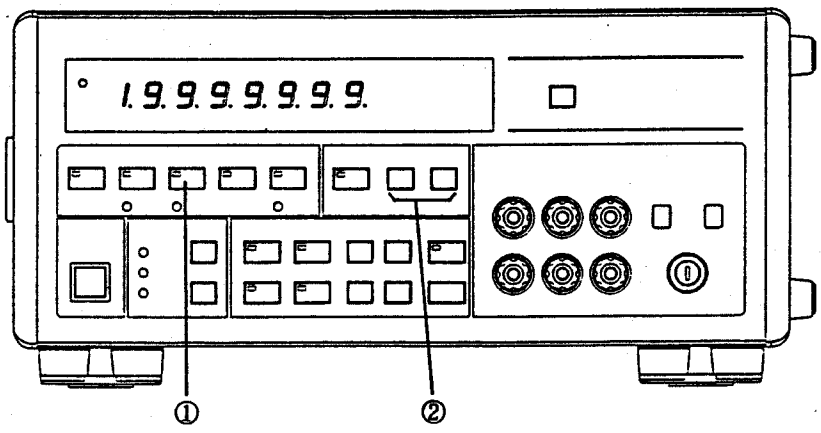


Figure 6-8 Full-scale Calibration of 4-wire Resistance Measurement

0-point calibration of 2-wire resistance measurement and 0-point calibration and full-scale calibration of 4-wire resistance measurement of each range is done in calibration of the resistance measurement.
Network resistance measurement is executed by calibrating of 4-wire resistance measuremnt.

[Calibration]

0-point calibration of 2-wire resistance is first performed, and then, 0-point and full-scale calibration of 4-wire resistance is performed.



[These numbers indicate the following procedure numbers]

Setting the function

(1) Press [2WΩ] to set the function at 2-wire resistance measurement.

Setting the 10β range

(2) Use the [UP] or [DOWN] key to set the measurement range at 10β.

Connection of the standard resistor

(3) As shown in Figure 6-7, connect the attached cable (MI-37) between the HI-LO terminals of the lower input terminal.

(4) Calibration of all the 2-wire resistance range is executed at once by performing 0-point calibration of a single range.

10Ω-range 0-point calibration

(1) Set the measurement range at 10Ω.
(2) Short-circuit the clip at the end of the cable.

(3) Press SHIFT .
(4) Press 0 .
(5) Press ENTER .

Next, as shown in Figure 6-8, connect the attached cable (A01005) between the HI - LO terminals of the input terminal, to perform 0-point and full-scale calibrations for 4-wire resistance measurement. Set the measurement function at 4WΩ (light the 4WΩ lamp.)

10Ω-range 0-point calibration

The 0-point calibration of 4-wire resistance is performed on all the range, once executed on a single range. This is the same as with the 2-wire resistance.

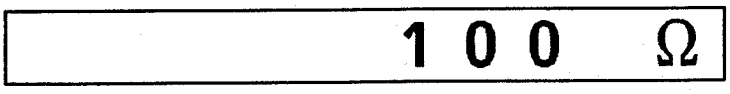
10Ω-range full-scale calibration

(1) Set the measurement range at 10Ω.
(2) Connect the 10Ω standard resistor.

(3) Press SHIFT .
(4) Press 1 0 , in this order.
(5) Press ENTER .

100Ω-range full-scale calibration

(1) Set the measurement range at 100Ω.
(2) Connect the 100Ω standard resistor.



(3) Press SHIFT [ ] .
(4) Press 1 [ ] 0 [ ] 0 [ ] , in this order.
(5) Press ENTER [ ] .

1000Ω-range full-scale calibration

(1) Set the measurement range at 1000Ω.
(2) Connect the 1000Ω standard resistor.

(3) Press SHIFT [ ] .
(4) Press 1 [ ] 0 [ ] 0 [ ] 0 [ ] , in this order.
(5) Press ENTER [ ] .

10kΩ-range full-scale calibration

(1) Set the measurement range at 10kΩ.
(2) Connect the 10kΩ standard resistor.

(3) Press SHIFT [ ] .
(4) Press 1 [ ] 0 [ ] , in this order.
(5) Press ENTER [ ] .

100kΩ-range full-scale calibration

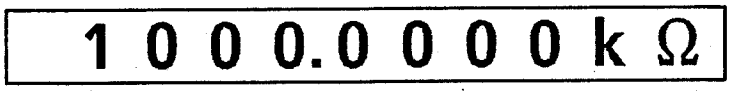
(1) Set the measurement range at 100kΩ.
(2) Connect the 100kΩ standard resistor.

(3) Press SHIFT [ ] .
(4) Press 1 [ ] 0 [ ] 0 [ ] , in this order.
(5) Press ENTER [ ] .

1000kΩ-range full-scale calibration

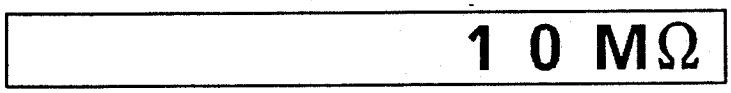
(1) Set the measurement range at 1000kΩ.
(2) Connect the 1000kΩ standard resistor.

(3) Press SHIFT [ ] .
(4) Press 1 [ ] 0 [ ] 0 [ ] 0 [ ] , in this order.
(5) Press ENTER [ ] .



10MΩ-range full-scale calibaration

(1) Set the measurement range at 10MΩ.
(2) Connect the 10MΩ standard resistor.



(3) Press SHIFT [ ] .
(4) Press 1 [ ] 0 [ ] , in this order.
(5) Press ENTER [ ] .

100MΩ-range full-scale calibaration

(1) Set the measurement range at 100MΩ.
(2) Connect the 100MΩ standard resistor.

1 0 0 MΩ

(3) Press SHIFT [ ] .
(4) Press 1 [ ] 0 [ ] 0 [ ] , in this order.
(5) Press ENTER [ ] .

1 0 0.0 0 0 0 0 MΩ

1000MΩ-range full-scale calibaration

(1) Set the measurement range at 1000MΩ.
(2) Connect the 1000MΩ standard resistor.

1 0 0 0 MΩ

(3) Press SHIFT [ ] .
(4) Press 1 [ ] 0 [ ] 0 [ ] 0 [ ] , in this order.
(5) Press ENTER [ ] .

1 0 0 0.0 0 0 0 MΩ

CAUTION

1. [In case error was found after pressing the [ENTER] key]
   For instance, when the 1000Ω-range full-scale calibration was done with the wrong value, perform the 1000Ω-range full-scale calibration from the beginning again.
2. The GUARD terminal must always be short-circuited with the Lo terminal at the cable end, and the front panel Lo-G SHORT switch must be set at Lo-G OPEN.
3. When calibrating ranges of 1MΩ or more, the display value will change if the input cable vibrates. Fix the input cable firmly. If it is affected by external noise, shield the standard resistor.

MEMO