HIOKI

Instruction Manual

SM-8213
SM-8215
SM-8220

SUPER MEGOHMMETER

HIOKI E. E. CORPORATION

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1. Safety Precautions

Operators of the SM-8200 Series super megohmmeter are requested to read this operation manual thoroughly before operation for safety and to obtain best performance.

Operators are also requested to strictly observe all the DANGER, WARNING, and CAUTION notices in this manual and on the instrument to prevent injury and damage.

1-1 Safety Warnings

This operation manual includes some DANGER!, WARNING!, and CAUTION! notice with a symbol. These must be observed for safety of the operator and other persons, as well as for protection of your super megohmmeter and samples from possible damage and destruction.

DANGER

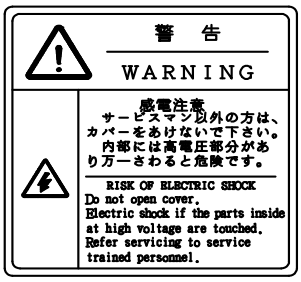
A "DANGER" CALLS ATTENTION TO A CONDITION OR POSSIBLE SITUATION THAT CAN CAUSE DEATH OR INJURY TO THE OPERATOR OR NEAR PESONS.

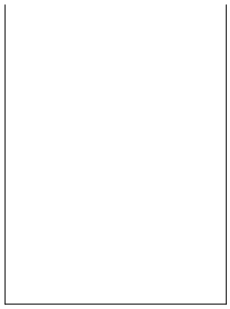
WARNING

A "WARNING" CALLS ATTENTION TO A CONDITION OR POSSIBLE SITUATION THAT COULD CAUSE DEATH OR INJURY TO THE OPERATOR OR NEAR PESONS.

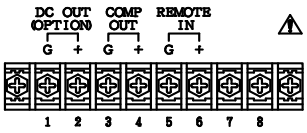
CAUTION

A "CAUTION" calls attention to a condition or possible situation that could cause injury to the operator or persons nearby and damage and destroy the super megohmmeter and samples.


警　告
WARNING
感電注意
サービスマン以外の方は、
カバーをあけないで下さい。
内部には高電圧部分があ
り万一さわると危険です。
RISK OF ELECTRIC SHOCK
Do not open cover.
Electric shock if the parts inside
at high voltage are touched.
Refer servicing to service
trained personnel.




RS-232C


DC OUT
(OPTION)
COMP
OUT
REMOTE
IN
G + G + G +
1 2 3 4 5 6 7 8

2. Operating Environmental Precautions

D DANGER

3. Installation Precaution

CAUTION

Do not install or place the super megohmmeter in a location which is not level, not stable or not sturdy enough to hold the instrument and other related items.

4. Instrument Handling Precautions

WARNING

BRIEF DESCRIPTION

About the SM-8200 Series Super Megohmmeters

The SM-8200 Series super megohmmeters are insulation resistance meters consisting of a constant voltage power supply and a high sensitive current measuring section. The super megohmmeters are designed to measure the electrical resistance of insulating materials with high insulation properties.

The resistance measuring ranges of the SM-8200 Series are as follows:

SM-8213: 2.5

Organization of This Operation Manual

This operation manual contains the following 10 sections.

1. PREPARATION BEFORE OPERATION

   This section describes precautions for unpacking and AC line voltage setting.

2. SPECIFICATIONS

   This section describes the specifications for the SM-8200 Series super megohmmeters and optional accessories.

3. OPERATING PRINCIPLE

   This section describes the operating principle with a block diagram of the SM-8200 Series.

4. FAMILIARIZATION WITH CONTROLS AND PARTS

   This section describes the functions of the controls and parts on the front and rear panels.

5. PREPARATION FOR MEASUREMENT

   This section describes the LCD display in detail for the measuring mode, setting mode and operations. A variety of measured value display methods are also given.

6. MEASUREMENT

   This section provides details for function setting, connection to the work to be measured, and usage of a variety of optional measuring jigs and electrodes.

7. RS-232C INTERFACE

   This section describes the application of the serial port interface.

8. REMOTELY CONTROLLED MEASUREMENT

   This section describes the remote measuring function.

9. INTRODUCTION OF OPTIONALS

   This section describes the optional accessories, including guard chips, DC signal outputs, and others.

10. MAINTENANCE AND MISCELANEOUS

    This section describes maintenance and calibration.

11. EXTERNAL APPEARANCE

    This section includes front, rear and side view illustrations of the instrument with dimensions.

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1. PREPARATION BEFORE OPERATION

1.1 Unpacking and Checking of the Contents

When you have received the carton of the SM-8200 Series super megohmmeter, carefully unpack it, and take out every thing from the carton.

Although the instrument and its accessories are severely inspected before shipment from factory, visually check the items and their quantities.

Keep the shipping carton for reuse at a later stage.

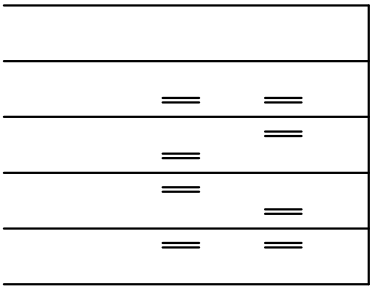
1) Visually check the external view of the instrument and its accessories.

2) Check the quantities of the list in accordance with the following list:

1.2 Operating AC Line Voltage

The super megohmemeter can be operated from one of the following AC power source when the VOLTAGE SELECTOR switches are set accordingly.

AC Line Voltage	Frequency
100 V	



Fuse Replacement

The fuse is inserted in the FUSE holder (Fig. 1.2) on the rear of the unit.

Remove the cap, and replace the fuse with a new one with a correct amperage.

To remove the cap of the fuse holder, use a 4 mm Phillips screwdriver, and turn the cap counterclockwise.

To set the cap in position, insert the cap, holding the fuse into the holder, and turn it with the screwdriver.

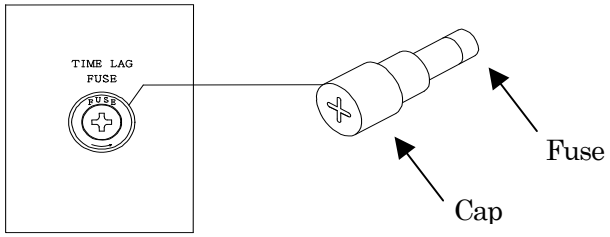


Fig. 1.2 Fuse Holder and Fuse Replacement

WARNING

To replace or check the fuse, make sure to disconnect the power cord from the AC line socket. If not, there is a fear of electrical shock.

1.5 Grounding the Chassis

To avoid an electrical shock accident, connect the GND terminal on the rear of the unit to the ground prong of the power cord to the ground post of the AC line system.

The round prong of the 3-prong plug of the power cord is the ground prong.

It is recommended to use an AC line socket with its third contact grounded for connection of the accessory 3-prong power cord.

To use the accessory 3-prong to 2-prong adapter to connect the power cord to a 2-contact AC line socket, make sure to ground the green tab of the adapter.

WARNING

To prevent an accident, connect the ground prong of the power cord Plug to the ground post of the AC line system. If it is impossible to ground the ground prong of the power cord plug, be sure to connect the GND terminal on the rear of the unit.

1.6 Warm-up Period

To obtain the performance of published specifications, allow the SM-8200 Series super megohmmeter to warm for a minimum of 30 minutes.

2. SPECIFICATIONS

2.1 Measuring Performance

1) Electrical Resistance Measurement

SM-8213(RANGE :

Note 1: The measurement output current may reach as high as approximately 1.4 times the maximum value. When a current in excess of the measurement output current's maximum value is output, the set measurement voltage may drop.

Note 2: The measurement accuracy is defined as ±10% of the indicated measured value displayed on the screen.

2) Measuring Time (Sampling Cycle)

Approx. 200 ms

2.2 Function Specifications

1) CHARGE Function

This function charges the sample to be measured by applying the Selected measuring voltage when the CHARGE switch is pushed.

Internal Resistance

SM-8213: Approx. 0

2.3 Other Electrical and Physical Data

1) Environmental temperature and Humidity

   Operation: 0 to 40

2.5 List of Measurement Ranges and Guaranteed Accuracy Ranges by Model

SM-8213

Range/measurement range (with guaranteed accuracy range in parentheses)[M

Range/measurement range (with guaranteed accuracy range in parentheses) Voltage [M

3. OPEARATING PRINCIPLE

The SM-8200 Series super megohmmeters consist of a constant voltage power supply and a high sensitive current measuring section to be combined to compose a resistance measuring circuit.

The current measuring section is composed of a current detective resistor, low drift voltage amplifier and an integrator-type A/D converter.

A measured resistance value is computation-processed by a CPU to display the result on a liquid crystal display (LCD).

Fig. 3.1 shows a circuit composition of the SM-8200 Series.

Fig. 3.1 Circuit Composition

4. FAMILIARIZATION WITH CONTROLS AND PARTS

4.1 Front Panel

The figure below shows the front panel of the SM-8200 Series. However, note that the values for the two knobs on the right are represented by those of the SM-8213.

Fig. 4.1 Front Panel

4.3 Measuring Display

In the measuring mode, the LCD display shows the resultant measured resistance value and its NO/GO judgment, as well as the measuring voltage and time.

Fig. 4.3

4.4 Measuring Condition Setting Display

The LCD display showing the measuring condition setting.

Fig. 4.4

4.5 Meanings of the Status and Mode Notices

This describes the meanings of the status and mode notice in the lower left corner of the LCD display.

1) LOCK (Interlocking): The test voltage applying circuit is interlocked, an measurement is not ready, yet. This notice is shown when the interlocking function is in use, but the HV-EN plug or measuring rod plug is not plugged into the connector.
   When the LOCK is shown, the MEASURE and CHARGE switches become inoperative.
2) CAL1 (Calibration-1): This is shown when the RANGE selector switch is set to the CAL position.
3) CAL2 (Calibration-2): This is shown when the SELECT switch is pushed

   while the CAL1 notice is shown.
4) C. SET (Measuring voltage charging time setting mode): The time can be adjusted within a range from 0 to 999 seconds.
5) M. SET (Measuring time setting mode): The time can be adjusted within a range from 0 to 999 seconds.
6) COMP (Comparison judgment value setting mode): The value can be set within a range from the minimum value for the range to 10 times the value.
7) BUZZ (Buzzer ON/OFF setting mode): The buzzer can be set ON or OFF when the resultant comparison judgment is NO.

5. PREPARATION FOR A MEASUREMENT

WARNING

Make sure, before turning the instrument on, that the VOLTAGE SELECTOR switches on the rear of the unit are properly set to the positions in agreement with the local AC line voltage. If the agreement is failed, the unit may break a fire or burning.

WARNING

Be sure to connect the ground prong of the power cord plug to prevent danger. If grounding of the ground prong is impossible, connect GND terminal to the ground post of the power line system.

Note: For safety, the measuring voltage cannot be output unless otherwise the accessory shorting plug is plugged into the HV-EN connector on the rear of the unit. During measurement, the shorting plug must be kept plugged in.

WARNING

Before trying to plug the shorting plug into the HV-EN connector, be sure to turn the POWER switch OFF.

5.1 Preparation

Confirm the setting of the instrument in the order shown below.

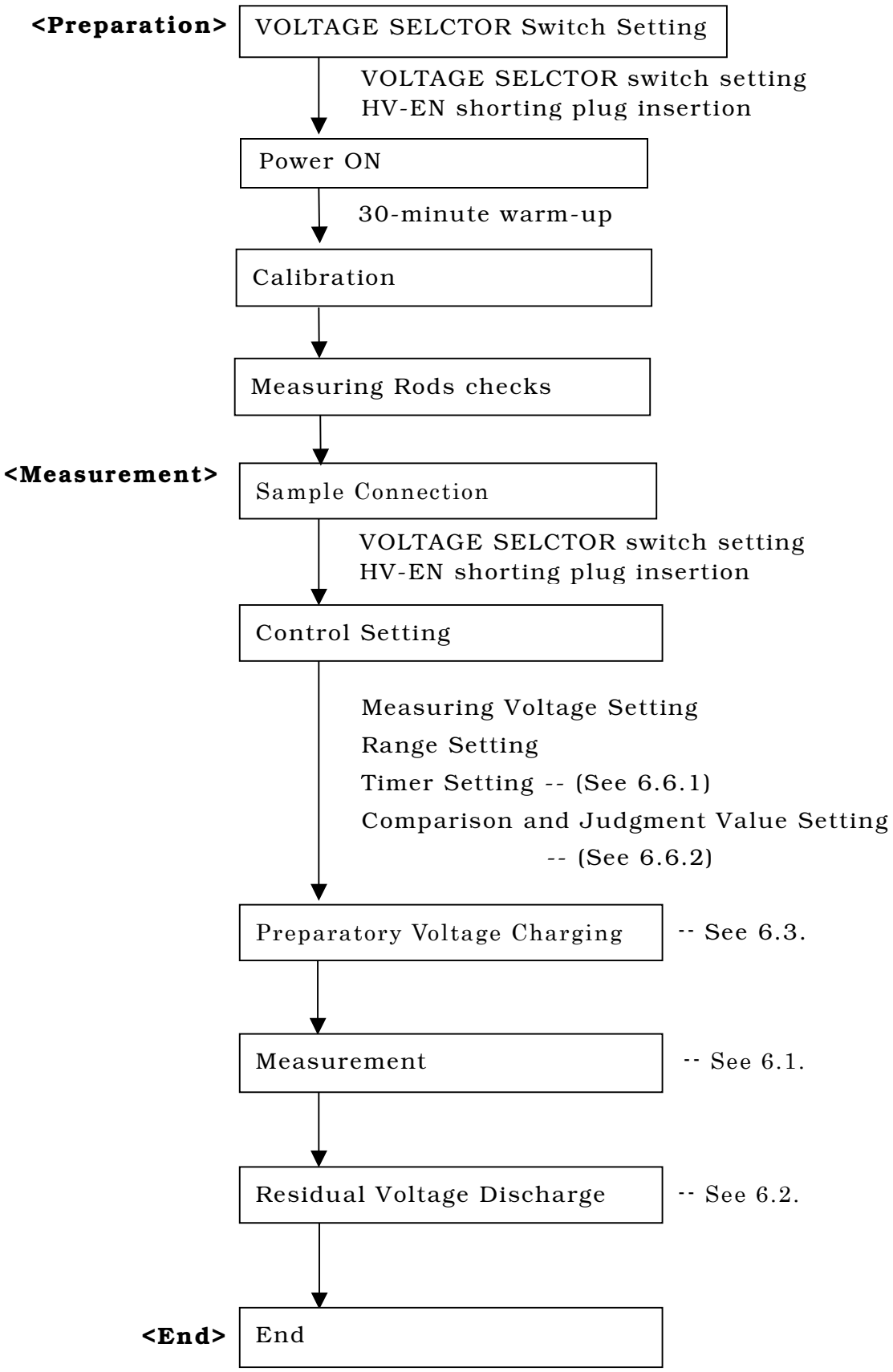
1) Confirm that the VOLTAGE SELECTOR switches on the rear of the unit are set to the positions in accordance with the local AC line voltage from which the unit is powered (See 1.3 Setting the VOLTAGE SELECTOR Switches.).
2) Confirm that the POWER switch of the unit is positioned at the OFF (released) position. Note that if the switch is in the ON position, it is depressed.
3) Plug the accessory power cord into the AC LINE receptacle on the rear of the unit. Also, plug the plug on the other end of the cord into the commercial AC line socket.

4) Confirm that the accessory shorting plug is inserted into HV-EN connector on the rear the unit.
5) Leave the Rx

5.4 Check the Measuring Rods

1) Confirm that V.OUT indicator turns off and that the Rx

5.5 Basic Procedures for a Measurement



6. MEASUREMENT

6.1 Measuring Method

1) Plug the accessory measuring rods to the Rx

becomes a significant parameter for the measuring conditions. In most cases, the value of 1 minute after voltage charging is read as a 1 minute rate value. The integrated timer can determine the value at 1 minute after voltage charging. For details, see 6.6.

Note 3: When a measuring jig is used, it is recommended to provide an interlocking switch with it for safety. For the interlocking, utilize the HV-EN (high voltage enable) socket on the rear of the unit. This makes it possible to disarm the jig when the cover of the jig is opened. For details, see 6.4.

6.2 Discharge Function

This function is intended to discharge the change on the sample connected to the Rx

6.4 Interlocking Function – Using the HV-EN Connector

The super megohmmeter generates a high voltage to be used as a testing power source. It is dangerous if this measuring voltage is output to the sample not ready for measurement, yet. To protect the operator from a hazard of electrical shock, the HV-EN (high voltage enable) connector is provided on the rear of the unit to provide an interlocking function in combination with a measuring jig.

If a measurement does not use a jig with an interlocking mechanism, keep the HV-EN connector plugged with the accessory shorting plug.

Usage of the HV-EN Connector for Interlocking

Connect the HV-EN connector to a switch to be actuated by the interlocking mechanism of a measuring jig via an optionally available HV-EN plug connected with a cord. Fig. 6.4.1 shows an example interlocking circuit.

The optional accessories shown below have a safety interlocking switch.

SME-8310 – Electrode for plate samples

SME-8311 – Electrode for plate samples

SME-8350 – Shield box

Connect the plug at the end of the measuring cord of the optional accessory to the HV-EN connector on the rear of the unit.

For connection of a customer designed measuring jig to the HV-EN connector, use an optional HV-EN plug.

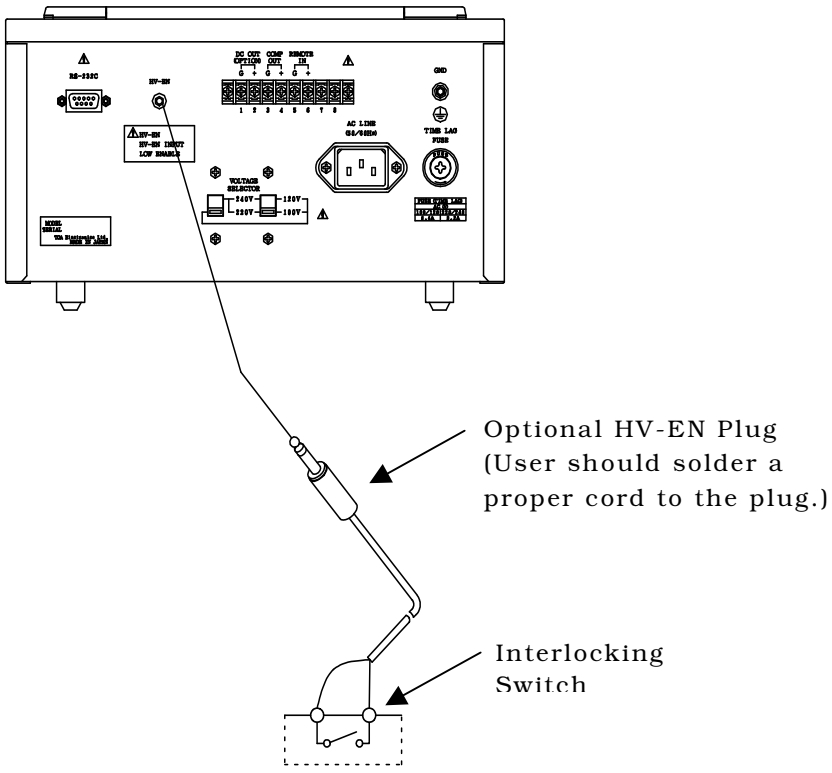


Fig. 6.4.1

6.5 Comparison and Judgment Function

This function is provided to sound a built-in buzzer, and turn on the COMP OUT G/+ terminals when the measured insulation resistance is lower than the preset judgment value and make the COMP OUT G/+ terminals are of open collector as shown as an equivalent circuit in Fig. 6.5.3. Use this circuit within the conditions shown below:

Voltage: 50 V or less

Current: 50 mA or less

Fig. 6.5.1 shows a circuit diagram for connection with the COMP OUT terminals.

Fig. 6.5.2 shows the external input/output terminal block, including the COMP OUT G/+ terminals.

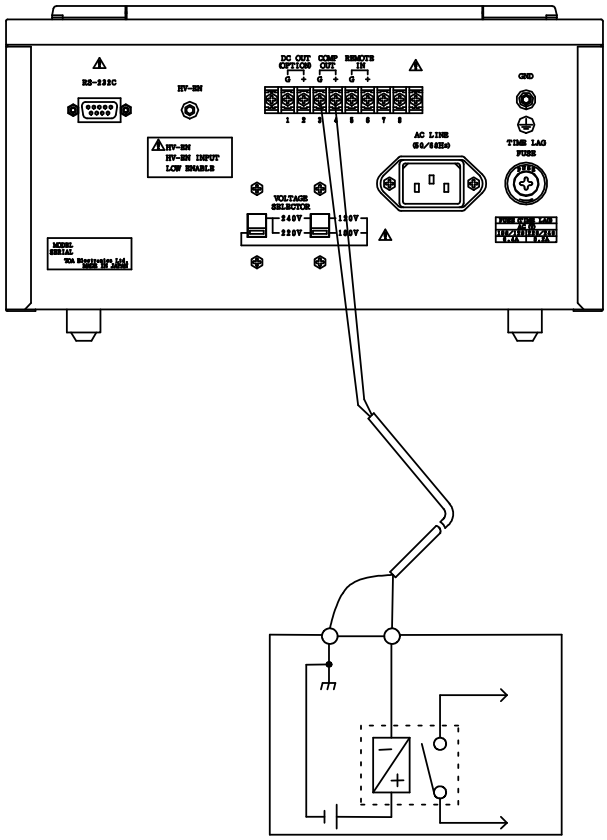


Fig. 6.5.1

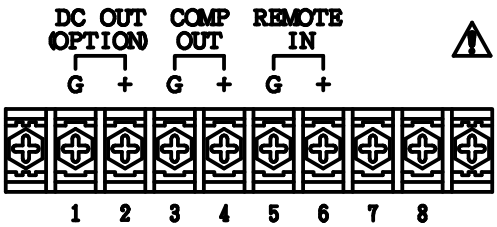


Fig. 6.5.2

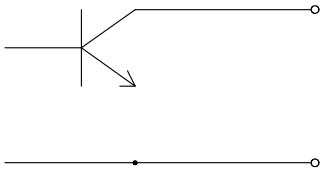


Fig. 6.5.3

6.6 Setting a Variety of Functions

A variety of useful functions can be set when the RANGE selector switch is set to any position other than the CAL , and by using the SELECT, UP and DOWN switches.

Each time the SELECT switch is pushed, the LCD display is changed in the order of the Measuring Display

1) Set the VOLTAGE selector switch to 100 V.
2) Set the RANGE selector switch to

Fig. 6.6.4

1) Set the VOLTAGE selector switch to 100 V .
2) Set the RANGE selector switch to

. . . .

. . . .

Have series resistors R_0, R_1, R_2,...R_n. Therefore, a measurement of R_0 only is very difficult. It is said that, with some insulation resistance measurements, it takes several hours to a few days for the leakage current to stabilize. This is not practical.
To avoid this problem, a method is customarily used in the insulation resistance measurement for convenience to read the resistance value one minute after charging the test voltage to the sample. This value is called minute rate value for the resistance value of an insulator, and is widely employed among a variety of electrical standards.
In the 1-minute rate insulation resistance measurement, the measured values may vary when a measurement is repeated once or twice with the same sample. To minimize such a deviation, it is important to completely discharge the sample before the start of each measurement. The required discharge time mainly depends upon the charging voltage and the size of C_0 in Fig. 6.7.1, but, generally it can be said to be 5 to 6 times longer than the time of test voltage charging.

6.8 Connectivity Precautions

6.8.1 When the Screen Shows LOCK and Measurement Cannot Be Started

The super megohmmeter can output measurement voltages of up to 1,000 V. Consequently, failure to wire the instrument correctly may pose hazards such as electric shock. The instrument provides an interlock function in order to prevent these risks. An HV-EN (high-voltage enable) connector is provided for interlock function use on the rear of the instrument.

When using the measuring rods (red/black) that come with the instrument, insert the shorting plug into the HV-EN connector on the rear of the instrument. If LOCK is displayed at the bottom left of the instrument's screen, check the following:

(1) Has the measuring rod (black) been properly inserted into the Rx+ terminal?
(2) Has the shorting plug been properly inserted into the HV-EN connector on the rear of the instrument?

Display of the LOCK indicator at the bottom left of the screen indicates that the instrument has detected an issue with the measuring rod or shorting plug wiring.

6.8.2 When Using an Optional Electrode for Plate Samples or Shield Box

When using an electrode for plate samples (for example the SME-8310; or the SME-8350 shield box, etc.), which is an option designed specifically for use with the megohmmeter, the following guidelines should be observed when wiring the instrument and performing measurements:

1) To prevent the hazard of electric shock, be sure to ground either the ground pin of the 3-pin power cable or the ground terminal on the rear of the instrument before use. When using a power plug conversion adapter (3-pin to 2-pin conversion adapter), be sure to ground the ground lead from the adapter.
2) Connect the option's red cable to the instrument's Rx- terminal and the option's black cable to the instrument's Rx+ terminal.
3) Remove the shorting plug from the HV-EN connector on the rear of the instrument.
4) Connect the interlock (HV-EN) plug from the electrode for plate samples or the shield box to the HV-EN connector on the rear of the instrument.
5) When using the SME-8350 shield box, directly ground the shield box's ground terminal or connect it to the ground terminal on the megohmmeter.
   *When using a shield box, failure to ground the ground terminal may cause measured values to oscillate.
6) Completely close the electrode for plate samples and shield box lid. (Starting measurement without first closing the lid completely will trigger the hazard prevention interlock.)

7. RS-232C INTERFACE

7.1 RS-232C Communication Commands

Mnemonic	Contents	Format
R	Measuring Data Output	Format: R^{C_R} ^{L_F} Response: ****E*, Judgment [GO] 0 or [NO] 1 Example: 10.0E4, 0 ^{C_R} ^{L_F}
M	Starting a Measurement	Format: M^{C_R} ^{L_F} Response: 0 (valid) or 1 (invalid)
C	Starting a Charging	Format: C^{C_R} ^{L_F} Response: 0 (valid) or 1 (invalid)
S	Stopping Forcedly	Format: S^{C_R} ^{L_F} Response: 0 (valid) or 1 (invalid)
T	Measuring Time Setting	Format: T *** (000 to 999) ^{C_R} ^{L_F} Example: T 60 ^{C_R} ^{L_F} Response: 0 (valid) or 1 (in valid)
G	Charging Time Setting	Format: G *** (000 to 999) ^{C_R} ^{L_F} Example: G 120 ^{C_R} ^{L_F} Response: 0 (valid) or 1 (in valid)
P	Judgment Level Setting	Format: P *** (000 to 999) ^{C_R} ^{L_F} Example: P . 100 ^{C_R} ^{L_F} Response: 0 (valid) or 1 (in valid)
B	Judgment Buzzer Setting	Format: B [OFF] 0 or [ON) 1 ^{C_R} ^{L_F} Example: B 1 Response: 0 (valid) or status
U	Measuring Condition Output	Format: U^{C_R} ^{L_F} Response: Range, Voltage, inter-locking, Status Example: 4, 1000, 0, 2 ^{C_R} ^{L_F} Range: 0 to 8 Voltage: 5 to 1000 Interlocking: 0[OFF]/1[ON] Status: Stand-by – 2 Under measurement – 3 Charging – 4 On setting – 5 Under calibration – 6 Timer in operation – 7
I	Instrument ID	Format: I^{C_R} ^{L_F} Response: Model, Version Example:SM-8215V1.00 ^{C_R} ^{L_F}

Baud Rate	9600 bps
Data Bit	8 bit
Parity Bit	None
Stop Bit	1 bit
Flow Control	RTS/CTS possible

7.2 Applications of Commands

1) After each command transmission, make sure to receive the response.
2) For R command, a state only response will be received, depending upon the conditions at such a time.
   Even during measurement, a state 7 only response will be received when the timer is functioning.
   During stand-by, measured data are transmitted once. A command invalid will be transmitted except for after re-measurement.
3) If a charging time is set upon receipt of a C command, a measurement is started as soon as the charging is completed.
4) For a P command, if a value out of the specified measuring range is received without an actual setting.

7.3 Connector Specifications

Type of Connector: HDBE-9PF (05) [Hirose]

Type of Lock Fitting – HD-LNA (4-40), inch type

Pin Arrangement:

Pin No.	Signal Line	Direction of Signal Flow		Application
		Megohmmeter	External Unit	
1	NC			No connection
2	TD			Transmission data
3	RD			Receiving data
4	NC			No connection
5	SG			Signal ground
6	ER			Data peripheral ready
7	CS			Send ready signal
8	RS			Send request signal
9	NC			No connection

Example of Connections

1) For connection with a DOS/V personal computer, use a straight 9-pin to 9-pin cable.

2) For connection with an NEC PC-9801 Series personal computer, use a straight 9-pin to 25-pin cable.

8. REMOTELY CONTROLLED MEASUREMENT

A measurement can be remotely controlled by shorting the “G” and “+” terminals of the REMOTE IN of the External Input/Output terminal block on the rear of the unit. When the terminals are shorted by a remote switch, a measurement will start, and when opened the measurement is ended.

Fig. 8.1.1 shows an example wiring and the signal timing.

Fig. 8.1.2 shows the external input/output terminal block.

Start of Measurement

End of Measurement

8. Remotely controlled measurement — **Supplement** —

Indication of numeric and GO/NO judgement are conducted after converting analog input to digital signal.
Since it takes approx. 200mS to process analog/digital conversion, measuring result does not come out actually, if the remote signal is input in a shorter time than it.

In the process of detecting the remote signal, if the signal does not keep for approx. 60ms or more from the variation point of remote signal in order to cancel the noises and chattering, it is not treated as effective one.

As a result, it will take approx. 260ms from the remote signal ON to output of measuring result and during this time it is needed to keep remote signal ON.
When measurement is completed by turning remote signal off, it is not treated as normal OFF input signal if it is not kept approx. 60 ms or more.
When remote signal ON or OFF time is less than 60ms, it will be not received or lead to miss-operation.

When remote signal is used, care must be taken to input the signal for 260ms or more at ON, while 60ms or more at OFF.

Note 1: When the measuring time is set with the incorporated timer, the timer has a priority over a remotely controlled switch actuation.

When the REMOTE IN "G" and "+" terminals are closed, a measurement will start. The measurement will automatically end when the time set with the timer is up.

Note that when the closed "G" and "+" terminals are opened before the time-up of the timer, the opening of the "G" and "+" terminals has a priority over the time set with the timer.

Note 2: When the charging time is set with the incorporated timer, the timer has a priority over a remotely controlled switch actuation.

When the REMOTE IN "G" and "+" terminals are closed, a charging will start. The measurement will automatically start when the charging time set with the timer is up.

Note that when the closed "G" and "+" terminals are opened before the time-up of the timer, the opening of the "G" and "+" terminals has a priority over the time set with the timer.

Note 3: When both the charging time and measuring time are set with the incorporated timer, the timer has a priority over a remote control.

When the REMOTE IN "G" and "+" terminals are closed, a charging will start.

When the set charging time is up, a measurement automatically starts. However, note that when the "G" and "+" terminals are opened before the set measuring time is up, the remote control has a priority over the time set with the timer.

When the set measuring time is up, a measurement automatically ends. However, note that when the "G" and "+" terminals are opened before the set measuring time is up, the remote control has a priority over the time set with the timer.

9. INTRODUNTION OF OPTIONS

With the SM-8200 Series super megohmmeters, any of the following options can be provided as needed. However, note that some of them can be installed at factory.

9.1 DC Signal Outputs

Either one of two different types of DC signal outputs can be optionally installed with the unit at factory. The output can be used to make a permanent record of measured data by connecting a chart recorder.
One of the outputs provides a linear DC signal directly proportional to the measured resistance (RP-8000), and the other outputs a 1/R DC signal which is inversely proportional to the measured resistance (RI-8000).

9.1.1 DC Output, RP-8000 – Directly proportional or linear to resistance

An insulation resistance can be obtained when the measuring voltage is divided by the current flowing through the circuit. When the measuring voltage is constant, if the insulation resistance is doubled, the current flowing through the circuit is halved. The RP-8000 DC output is designed to convert the measured insulation resistance into a DC signal directly proportional to the resistance.

1) Specifications

Output Range: From minimum value of each range of super megohmmeter to 10 times minimum value(see 2.1)
Output Voltage: 1V/minimum value , 10 V/10 times minimum value
Output Accuracy: Within 10% of displayed value in the range from minimum value to 10 times minimum value

2) Usage

Measure the insulation resistance of a sample with the method designed in 6.1 Measuring Method. There is no limitation in the applications in relation with the provision of the RP-8000 DC output.

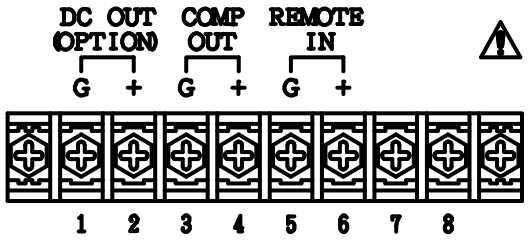


Fig. 9.1.1

Fig. 9.1.1 shows the DC OUT (OPTION) "G"/"+" terminals on the external input/output terminal block on the rear of the unit.

A DC measuring instrument like a HIOKI chart recorder can be connected to these terminals. For permanent data recording, a HIOKI chart recorder is recommended for better technical follow-up, including a supply of a variety of recording charts and technical service.

3) Output voltage

These tables show the relations between displayed value of super megohmmeter and output voltage of RP-8000.

Target voltage 5V

Displayed value	0.025 →	0.125 →	0.25
Output voltage	1V →	5V →	10V

Target voltage 10V

Displayed value	0.05 →	0.25 →	0.5
Output voltage	1V →	5V →	10V

Target voltage 15V

Displayed value	0.075 →	0.375 →	0.75
Output voltage	1V →	5V →	10V

Target voltage 25V

Displayed value	0.125 →	0.625 →	1.25
Output voltage	1V →	5V →	10V

Target voltage 50V

Displayed value	0.25 →	1.25 →	2.5
Output voltage	1V →	5V →	10V

Target voltage 100V

Displayed value	0.5 →	2.5 →	5
Output voltage	1V →	5V →	10V

Target voltage 250V

Displayed value	1.25	6.25	12.5
Output voltage	1V	5V	10V

Target voltage 500V

Displayed value	2.5	12.5	25
Output voltage	1V	5V	10V

Target voltage 1000V

Displayed value	5	25	50
Output voltage	1V	5V	10V

Example

A DC measuring instrument like a HIOKI chart recorder whose input impedance is greater than 10 M

Target voltage 1000V

Displayed value	5	10	50
Output voltage	10V	5V	1V

Example

10. MAINTENANCE AND MISCELANEOUS

Periodical maintenance, including checking and calibration is required for the MS-8200 super megohmmeter to perform reliable measurements and prevent a trouble and accident.

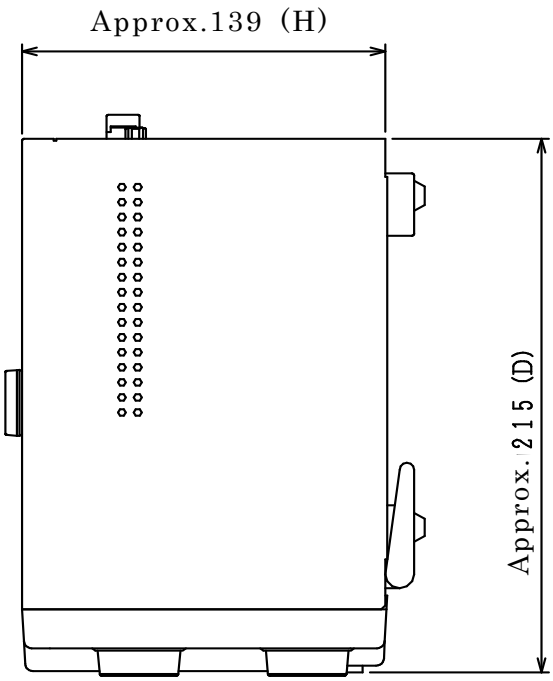
If necessary, ask your dealer or Hioki representative to do such a service as periodical checking, calibration and routine maintenance.

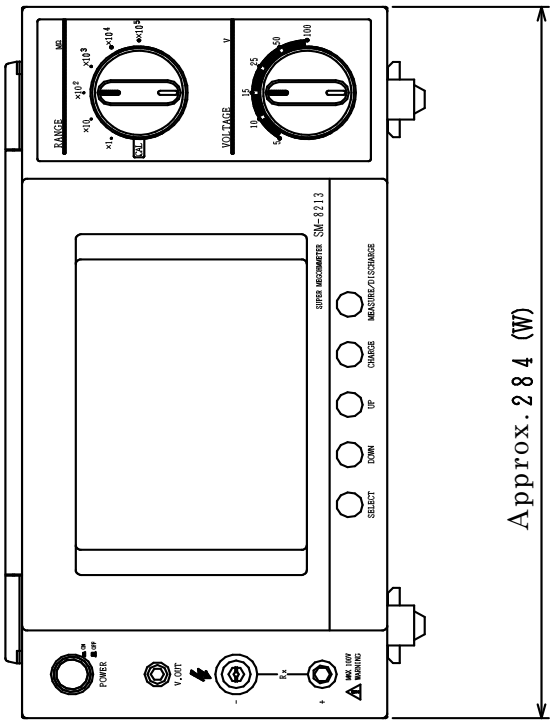
10.1 Periodical Checking

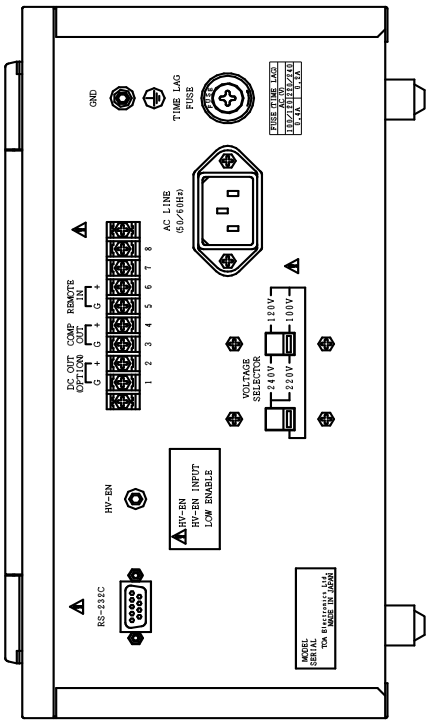
To keep your instrument its at best condition, the following checking is required at monthly periods.

1) Check the Rx measuring terminals and input/output terminal block for integrity.
   As the Rx measuring terminals carry a high voltage (100 V to 1000 V, maximum, depending upon the model and set-up, visually check the terminals for any crack, loose connection, etc.
   Crack and loose connection will lead a trouble and accident.
2) Clean the panels, Rx measuring terminals, and input/output terminal board with soft cloth.
3) Visually check the LCD display for brightness and clearness.
4) Check the action of the switches and pushbutton switches for smooth and trouble-free operation.
5) Measure the measuring voltage across the Rx

11. EXTERNAL APPEARANCE







Unit: mm

HIOKI

HIOKI E. E. CORPORATION

Headquarters
81 Koizumi, Ueda, Nagano 386-1192, Japan
TEL +81-268-28-0562 FAX +81-268-28-0568 E-mail: os-com@hioki.co.jp
URL http://www.hioki.com/
(International Sales and Marketing Department)

HIOKI USA CORPORATION
6 Corporate Drive, Cranbury, NJ 08512, USA
TEL +1-609-409-9109 FAX +1-609-409-9108 E-mail: hioki@hiokiusa.com
URL http://www.hiokiusa.com

HIOKI (Shanghai) Sales & Trading Co., Ltd.
1608-1610, Shanghai Times Square Office 93 Huaihai Zhong Road Shanghai,
P.R.China POSTCODE: 200021
TEL +86-21-63910090 FAX +86-21-63910360 E-mail: info@hioki.com.cn
URL http://www.hioki.cn

HIOKI INDIA PRIVATE LIMITED
Khandela House, 24 Gulmohar Colony Indore 452 018 (M.P.), India
TEL +91-731-6548081 FAX +91-731-4020083 E-mail: info@hioki.in
URL http://www.hioki.in

HIOKI SINGAPORE PTE. LTD.
33 Ubi Avenue 3, #03-02 Vertex Singapore 408868
TEL +65-6634-7677 FAX +65-6634-7477 E-mail: info@hioki.com.sg

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- For regional contact information, please go to our website at http://www.hioki.com.
- The Declaration of Conformity for instruments that comply to CE mark requirements may be downloaded from the HIOKI website.
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- In the interests of product development, the contents of this manual are subject to revision without prior notice.
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