

## F-109

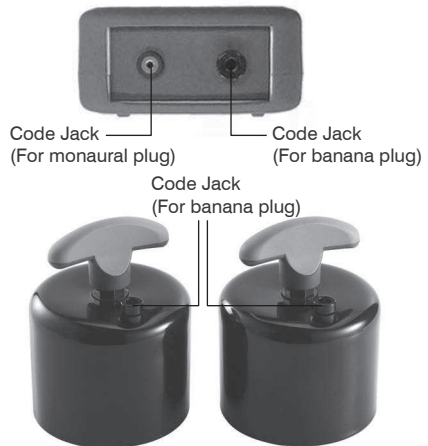
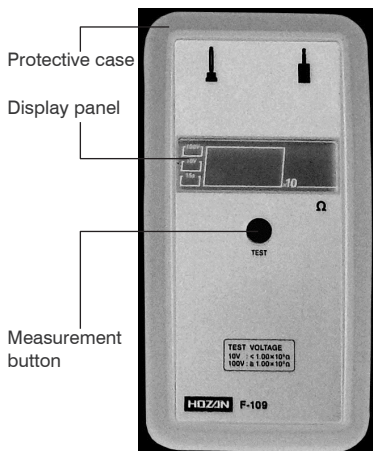
## SURFACE RESISTANCE CHECKER

## F-109-1

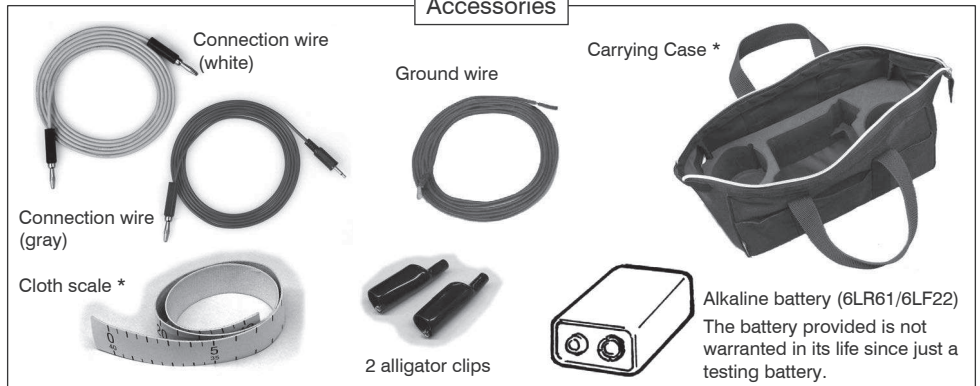
## SURFACE RESISTANCE CHECKER (NO ELECTRODE)

Thank you for purchasing the HOZAN F-109 SURFACE RESISTANCE CHECKER / F-109-1 SURFACE RESISTANCE CHECKER (NO ELECTRODE). With proper care and handling, this fine instrument will provide years of trouble-free operation. Please read this entire instruction manual carefully before attempting to place this instrument in service. Please keep this instruction manual available for reference.

### Identification of parts and contents



### Accessories



\* Included only with F-109

# Specifications

## Body

Measuring range	9.00×10 <sup>2</sup> Ω or over, less than 2.00×10 <sup>12</sup> Ω
Accuracy guarantee range	1.00×10 <sup>3</sup> Ω or over, less than 1.00×10 <sup>12</sup> Ω
Applied voltage	When less than 1.00 × 10 <sup>6</sup> Ω ...10 V ± 5% When 1.00 × 10 <sup>6</sup> Ω or over ...100 V ± 5% (switched automatically)
Accuracy	± 10% (± 20% for 1.00 × 10 <sup>11</sup> Ω or higher) *1
Power source	Alkaline battery 6LR61 or 6LF22 *Always use alkaline batteries.
Battery durability	1000 times or more (in constant measurement mode)
Usage environment	60% RH or less (without dew condensation on this machine)
Dimensions	85(W) x 40(H) x 170(D) mm (without projections)
Weight	300 g (without battery)

\*1 [Reference] RCJS-5-1 Requirements Accuracy used in acceptance test: ± 20%

- Accompanied with the continuous energizing limiter.  
When you press the measurement switch, the power turns off automatically in about 35 seconds (about 20 seconds by switching mode).

## Electrode


Quantity	2 pieces
Dimensions	79 mmφ 110 mm Conductive pad 63.5 mmφ
Resistance *	400 Ω or less
Weight	2.3 kg (1 piece)


\* Code Jack - resistance between conductive pads

This product was designed based upon the Japanese standard for ESD measures.

## Warning and caution symbols

These symbols are used throughout the instruction manual to alert the user to potential safety hazards as follows:

 **Warning** ... Notice when incorrect handling could cause the user's death or serious injury.

 **Caution** ... Notice when incorrect handling could cause injury to the user or material damage.

Even if the instructions do not have  **Caution** mark, there are some possibilities for a serious situation. Follow the instructions.

# Precautions

## ⚠ Warning

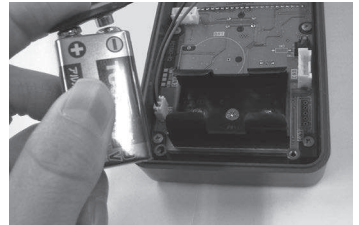
1. Do not touch the electrodes during measurement . This could cause a shock.
2. Do not operate with wet hands. This could cause a shock.
3. Do not plug objects other than the provided connection wires into the jacks on this device. Wiring earphones to listen could not only break the device but also dangerously damage user's hearing ability.

## ⚠ Caution

1. This product is for measuring surface resistance of solid matters. Do not use for any other purpose.
2. Please keep in mind that the power switch may be inadvertently turned on by pushing the measuring switch when turning the main unit upside down. The power supply automatically turns off in about 35 seconds (about 20 seconds with mode switching).
3. Note that precise measurement can not done under these conditions;
  - + The electrodes are soiled.
  - + Human bodies are coming into contact with the wires or alligator clips or electrode.
  - + Not in a specified environment.
  - + Under noisy environments such as electromagnetic waves
4. Do not disassemble this device. This could cause malfunction.
5. When the device will not used for an extended period, store without the battery.
6. For this is a precision device, avoid strong impact, vibration and high temperature.

# Preparation

- 1 Install the battery. Remove the protective case and remove the 4 screws on the back side, the main case opens. Connect alkaline batteries (6LR61 / 6LF22) correctly. Press the measuring switch, confirm that the numerical value is displayed on the display panel, and then attach the main unit case and protective case in reverse order.

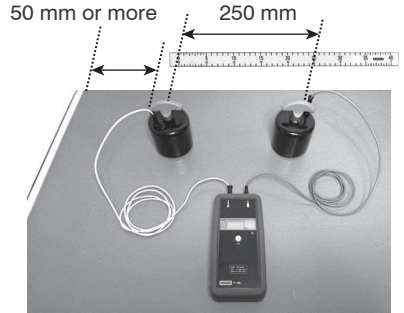


- \* Please be careful not to touch the board. Touching the board unnecessarily may cause failure.
  - \* Since this machine consumes large power, be sure to use alkaline dry batteries.
  - \* If the screw is tightened too much, the screw thread may be damaged. Please be careful with over tightening.
- 2 Bring it from a place with a low temperature to a place with a high temperature, if condensation occurs on the main body, wipe out moisture and leave it in the measurement environment for about 30 minutes before conducting measurement. We recommend that you leave the object to be measured and this machine in the measuring environment beforehand and get used to it so that condensation does not occur.

# Operation

## Measurement of surface (point to point) resistance

- 1 Connect the electrode.  
Please use the attached electrode, alligator clip according to the measurement application.  
  
Connect the electrode and the code jack of this unit (for banana plug) with the connection cord (white) and the electrode cord jack (for monaural plug) with the connection cord (gray).
- 2 Using the attached scales, place the electrodes at the specified distance and perform the measurement.



Go to the right page

(Reference)

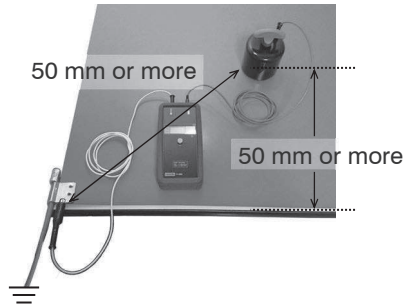
### **Standard RCJS-5-1**

Electrode distance 250 mm

Place the electrode at 50 mm or more away from the sample end

## Measure the resistance (ground-to-ground resistance between EPA) between the groundable connection points

- 1 Connect the electrode.  
Please use the attached electrode, alligator clip according to the measurement application.  
  
Connect the electrode and the code jack of this unit (for banana plug) with the connection cord (white) and the electrode cord jack (for monaural plug) with the connection cord (gray).
- 2 Connect the alligator clip to the ground point. Using a cloth scale, place the electrode at a specified distance from the grounding point and perform measurement.



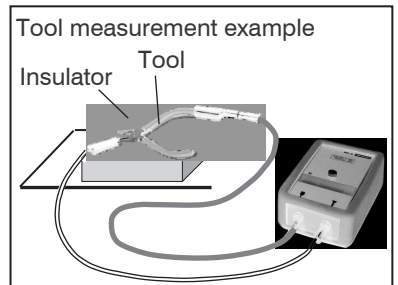
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(Reference)

### **Standard RCJS-5-1**

Distance between ground point and electrode 50 mm or more

Place the electrode at a distance of 50 mm or more from the sample end or grounding point



By using optional item F-102 / F-103, measurement of clothes and shoes is also possible.

# Operation

- 3** When you press and hold the measurement switch (0.5 sec or more), the resistance value is displayed on the display and measurement starts.

When the object is less than  $1 \times 10^6 \Omega$ , the applied voltage is 10 V, and when the object is  $1 \times 10^6 \Omega$  or more, the applied voltage becomes 100 V, one of the marks will light up.

It turns off automatically after 35 seconds have elapsed.

The standard stipulates to read the measured value after 15 seconds. It is also possible to hold the measured value after 15 seconds according to the standard (see page 7).

When the resistance value is outside the measurement range, it is displayed as shown below.

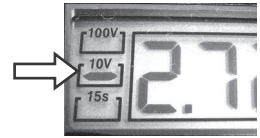
When  $9.00 \times 10^2 \Omega$  or less, " $9.00 \times 10^2 \Omega$ " indication flashes.

When it is  $2.00 \times 10^{12} \Omega$  or more, " $2.00 \times 10^{12} \Omega$ " indication flashes.

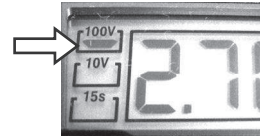
Since high resistance measurement ( $10^9$  to  $10^{10} \Omega$  or more) measures a weak current, it is susceptible to ambient noise influences, and external factors such as noise elements may be included in the measurement result.

If highly accurate measurements such as calibration are required, measure after measures on the next page.

When 10 V is applied




When 100 V is applied



## Warning

Do not touch the electrodes during measurement. There is a danger of electric shock. Especially when you touch the electrode after pushing the measurement button, 100 V may be applied, which is extremely dangerous.

## Caution

-  (Bat) and measurement value blink alternately, battery life is reached.



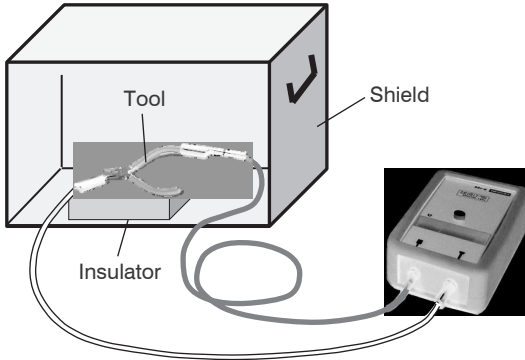
If the display blinks or the measured value is not displayed, replace the battery with a new one and perform measurement again. An accurate measurement result can not be obtained unless the battery is exhausted and it is below the rated voltage of this unit.

- Do not touch the cord / electrode / alligator clip during measurement. The equipment may be affected and accurate measurement may not be performed.
- If lateral force is applied to the plug by tensioning the cord strongly, contact failure will occur. Leave the cord lightly and measure it.

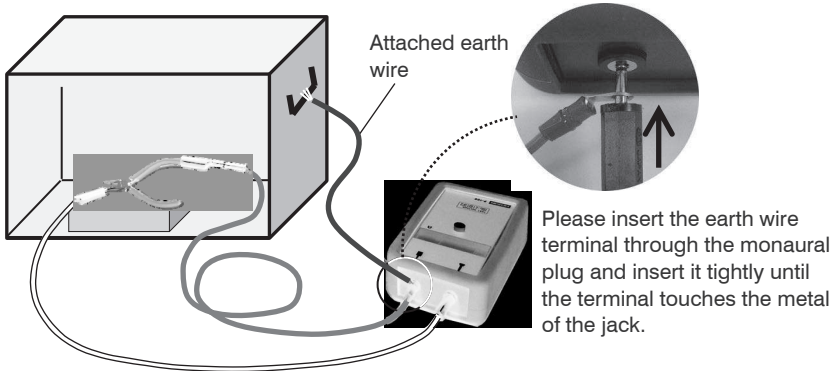
# Operation

## 【Countermeasure】

In order to remove noise elements, measures should be taken after countermeasures against shielding, such as surrounding the object to be measured with a metal casing.



If the numerical value still does not stabilize, connect the attached ground wire to the shield part of the object to be measured, and set the shield part of the target and the measuring object to the same potential. (3 terminal measurement)



## 【About daily management】

If it is difficult to measure in an environment where the noise environment has been removed, such as on-site daily management, it is necessary to measure (preliminary evaluation) in a noise-free environment before using the ESD protection product, Please perform measurement before starting use.

(The measured value will change depending on the influence of humidity, temperature, etc. Please adjust the measurement conditions as much as possible.) If the humidity exceeds 60%, measurement results within the accuracy range will not be obtained.

If the measurement results of both are different, it can be inferred that the difference is an external factor such as a noise factor.

In daily inspection, we recommend that you manage this considering the difference.

# About measurement mode

Measurement mode can be switched by mode switch.  
The following constant measurement mode is set at shipment.

## <Always measuring mode>

The measured value is displayed at all times.  
It automatically turns off in 35 seconds from the start of measurement.

## <Measurement value hold mode>

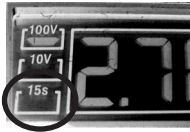
Fixed the measurement value after 15 seconds from the start of measurement, turn OFF after displaying for 5 seconds.

The current mode can be confirmed with the 15 S mark.

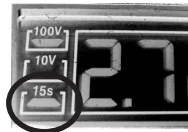
Always measuring mode ... Not displayed.

Measurement value hold mode ... Displays for 15 seconds from power on.

Display panel - Always measuring mode



Display panel - Measured value hold mode



When the object to be measured is high resistance ( $\times 10^{10}$  to  $10^{11} \Omega$  or more), it takes time to stabilize the measured value.

Because measured values may not be stabilized within 15 seconds, we recommend you to use in constant measurement mode when measuring high resistance.

Measurement value When using hold mode, please measure twice or more and adopt later measurement result.

When the object to be measured is in the vicinity of the switching point of applied voltage (around  $1.00 \times 10^6 \Omega$ ), the applied voltage may go back and forth between 100 V / 10 V and the measurement result may not be stabilized.

In this case, please adopt measurement result narrowed down to either applied voltage.

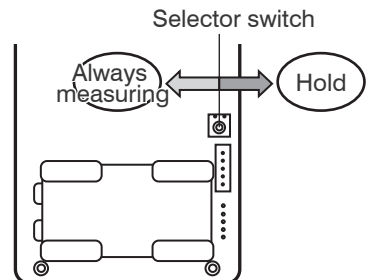
Measurement value In the hold mode, it is sometimes fixed as a result of an unintended applied voltage, so we recommend using it in the continuous measurement mode.

## How to switch measurement mode

Remove the protective case and remove the 4 screws on the back side, the main case opens.

When the switch at the upper right of the battery box is tilted to the left, it is always in measurement mode, and when it is tilted to the right, it enters measurement value hold mode.

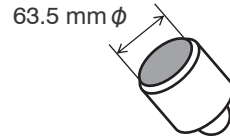
After switching, install the main unit case and the protective case in reverse order.



# On compatibility of electrode device to standard

## About external dimensions

Although the external dimensions are  $79 \text{ mm } \phi \times 110 \text{ mm}$ , the conductive pad in contact with the object to be measured is  $63.5 \text{ mm } \phi$  and conforms to the standard.



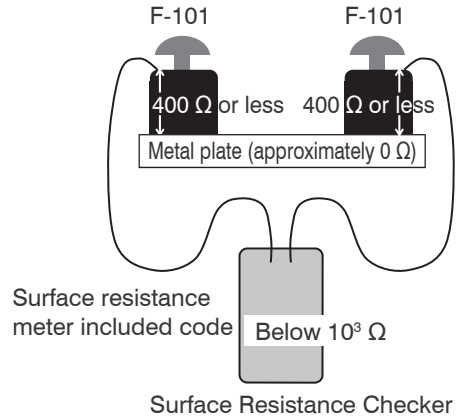
## On the resistance of the electrode device

RCJS-5-1 stipulates that "the inter-point resistance between two probes must have sufficient conductivity so that it is lower than  $10^3 \Omega$ ".

For our products, the resistance per electrode (between the cord jack and the conductive pad) is  $400 \Omega$  or less, and the resistance of the circuit as shown in the figure is  $800 \Omega$  or less.

## About weight

Weight  $2.3 \text{ kg}$  (1 piece) conforms to the standard  $2.5 \text{ kg} \pm 0.25 \text{ kg}$ .



# Maintenance and calibration

- When the electrode becomes dirty please wipe gently with alcohol etc. Do not use thinners, benzine, etc.
- We also have calibration certificate attached (F-109-TA, F-109-1-TA). Please re-calibrate after use for a certain period through our purchase store.

**HOZAN TOOL INDUSTRIAL CO.,LTD.**

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