



# Operation Manual

PRODUCT NAME

*Handheld Electrostatic Meter*

MODEL / Series / Product Number

IZH10

**SMC Corporation**

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# Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)<sup>\*)</sup>, and other safety regulations.

\*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components  
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components  
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements  
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots  
etc.



## **Danger**

**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



## **Warning**

**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



## **Caution**

**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

## **Warning**

### **1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

### **2. Only personnel with appropriate training should operate machinery and equipment.**

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

### **3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

### **4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.**

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.



# Safety Instructions

## Caution

**We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.**

**Use in non-manufacturing industries is not covered.**

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

## Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

### Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.\*2)  
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.  
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

**\*2) Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty

### Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

## Operator

- ◆ This operation manual is intended for those who have knowledge of machinery using pneumatic equipment, and have sufficient knowledge of assembly, operation and maintenance of such equipment. Only those persons are allowed to perform assembly, operation and maintenance.
- ◆ Read and understand this operation manual carefully before assembling, operating or providing maintenance to the product.

## Precautions

### **Warning**

- Do not disassemble, modify (including change of printed circuit board) or repair.  
An injury or failure can result.
- Do not operate outside of the specification.  
Fire, malfunction or damage can result.  
Please use it after confirming the specification.
- Do not operate in an atmosphere containing flammable or explosive gases.  
Fire or an explosion can result.  
The product is not designed to be explosion proof.

### **Caution**

- Avoid strong impact on the product  
Do not drop, hit or apply excessive shock to the product while handling.  
It can cause failure.
- Do not contact the sensor with the measured target.  
It can cause failure.
- Do not handle with wet hands.  
This can cause electric shock.
- Provide grounding to ensure safety and accurate measurement.  
Improper grounding of the ground wire can cause electrical charge to build up at the sensor and ground terminal of the product and discharge to the user.

## ■NOTE

- Follow the instructions given below when designing, selecting and handling the product.
  - The instructions on design and selection (installation, wiring, environment, adjustment, operation, maintenance, etc.) described below must also be followed.
- \*Environment
- Avoid using in a place where noise (electromagnetic wave and surge) is generated.  
This can result in malfunction (display of incorrect value), deterioration and damage of internal elements.
  - Do not leave the product in a place exposed to direct sunlight, inside a closed car and/or near a heating appliance.  
High temperature can cause deformation, discoloration and damage of the product.
  - Do not use in a place where the product could be splashed by oil or chemicals.  
This can cause failure.
- \*Handling
- Do not carry or swing the product by the sensor cable.  
Damage can result.  
If the cable gets caught on equipment, injury or damage to property can be caused.
  - Do not press the setting buttons with sharp pointed objects.  
The setting buttons can break.
  - Do not touch the detection port of the sensor with a finger or metal object directly.  
Directly touching the detection port of the sensor can cause a loss of specified function and performance, and failure.
  - When measuring objects with a high charged potential, consider a risk of electrostatic discharge to user.  
Use a high voltage measuring handle available as an option and wear protective rubber gloves.
  - Gradually bring the sensor closer to the measured target from a distance, and stop the measurement immediately if the displayed value indicates overflow (HHH) or underflow (LLL).  
The sensor is charged to high potential and can discharge to user.
  - Do not place objects and cables other than the measured target near the detection port of the sensor.  
Otherwise, their charged potential can cause the displayed value to deviate from the actually measured value.
  - The measurement distance is 50 mm.  
Refer to scales shown on the label attached to the product.
  - The product is designed to measure static electricity, and must not be used for other purposes.  
The product may show unexpected behavior and can fail to operate normally.
- \*Maintenance
- Use two off AA alkali dry cell batteries (LR6) in the product. Other batteries are not suitable.  
Use of incorrect batteries can result in damage.
  - Pay attention to the positive(+) and negative(-) polarities of the battery as stamped on the body of the product.  
If they are placed the wrong way around, the battery may leak or even burst.
  - Do not mix up a new battery and old battery or other kinds of battery.  
This can result in battery leakage, which causes failure.
  - Remove the batteries when the product will not be used for extended periods.  
Leaving batteries in the product can result in battery leakage, which causes failure.
  - If the body gets stained, clean it by wiping off with a soft cloth.  
If the stain is persistent, use a cloth immersed in a dilute solution of neutral detergent and wrung tightly and then clean up with a dry cloth.

## Model Indication How to Order

○Applicable body

**IZH10** - □

Option

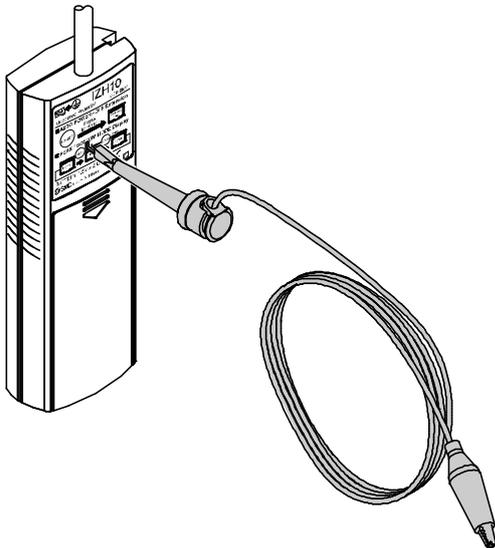
Model No.	Content
Nil	No option
H	High voltage measuring handle

○Accessories

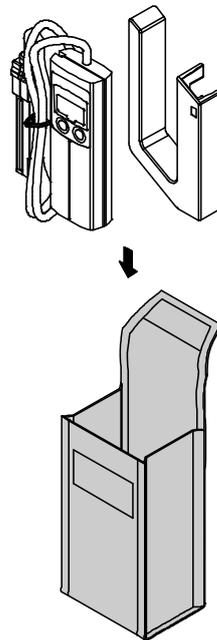
The ground wire and soft case are included with all products.

●Ground wire (1.5 m)

●Soft case



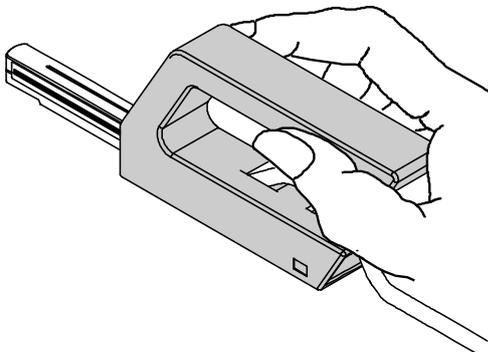
IZH-A-01



IZH-B-01

○Option

●High voltage measuring handle

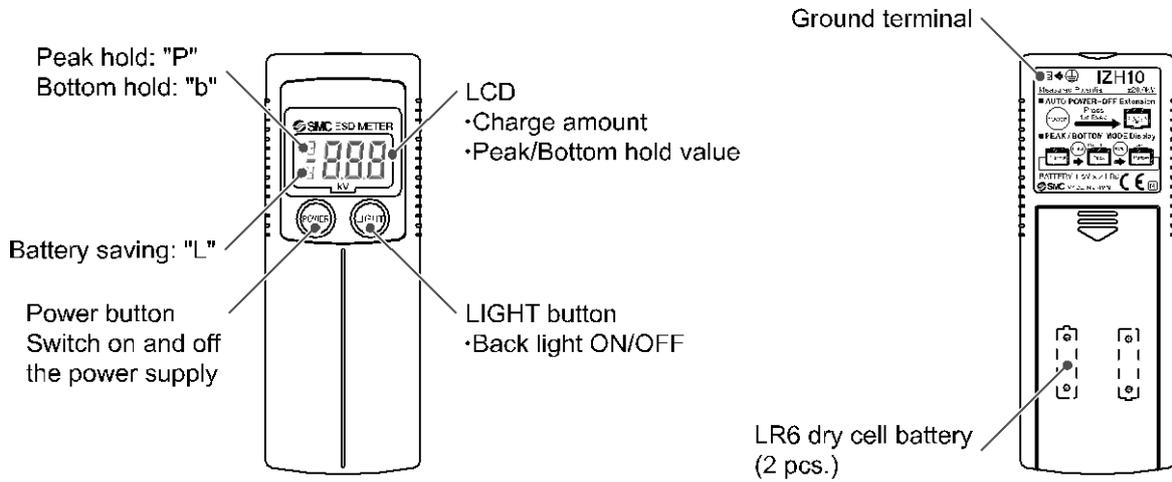


IZH-C-01

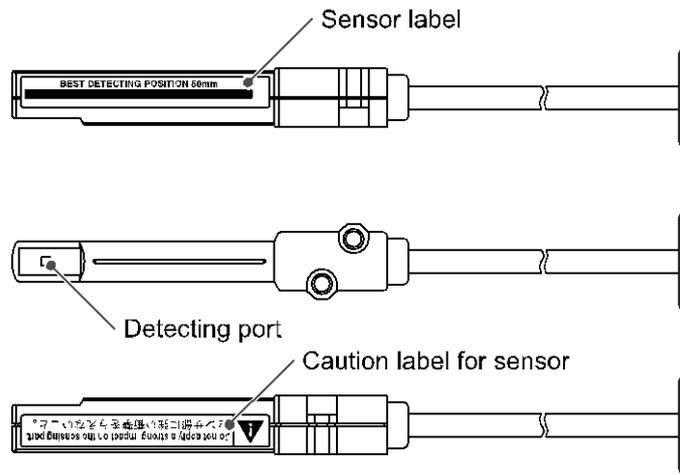
# Summary of Product parts

○ Names of individual parts

● Display



● Sensor



## ■ Definition and terminology

	Terms	Meaning
A	Auto power-OFF (function)	A function that turns off the power supply automatically when no buttons are pressed for 5 minutes after the power supply is turned on.
	Auto power-OFF extension (function)	A function that extends the time of auto power-off to 15 minutes.
B	Back light	A light that makes the display visible in a dark environment.
	Battery low display (function)	A function that warns that the battery is running out by showing “L”. The display has two stages depending on the amount of battery left. Refer to “Battery low display function” on page 13.
	Bottom display (mode)	The minimum charged potential obtained since entering bottom display mode.
D	Display accuracy	A value which shows the deviation between the displayed charged potential and the actual charged potential.
	Display unit change (function)	A function that automatically changes the minimum display unit in relation to charged potential.
F	F.S. (Full Span or Full Scale)	Abbreviation of full span or full scale, which means the maximum fluctuation range. In this product, it is calculated to $+20 - (-20) = 40$ kV because the rated charge is -20 kV to +20kV. (Ref.: $1\%F.S.=40 \times 0.01=0.4$ kV)
M	Measuring distance	The distance from the measured target to the head of the sensor. Refer to “Procedure” on page 10. The rated measuring distance is 50 mm. The display shows the charge amount range for a 50 mm measuring distance. Take the indication on the label on the sensor as a reference.
	Minimum display unit	The minimum unit that can be displayed on the LCD. 0.1 kV for $\pm 1$ to $\pm 20$ kV 0.01 kV for 0 to $\pm 0.99$ kV
O	Operating humidity range	The ambient humidity range in which the product can be used.
	Operating temperature range	The ambient temperature range in which the product can be used.
P	Peak display (mode)	The maximum charged potential obtained since entering peak display mode.
R	Rated charge amount range	The charge amount range in which the product can measure satisfying its specifications. (-20 kV to +20 kV)
S	Storage humidity range	The humidity range in which the product can be stored without damage with the power supply off.
	Storage temperature range	The temperature range in which the product can be stored without damage with the power supply off.
Z	Zero clear (function)	A function to calibrate the display to zero. The calibration range is $\pm 5\%F.S.$ of default setting.

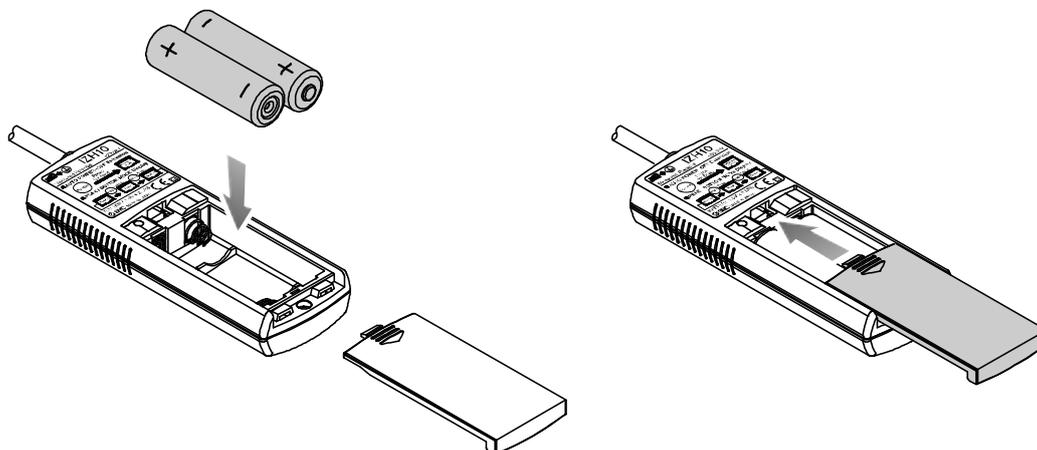
## Assembly

### ○ Insertion of batteries

Slide the lid of the case to open and insert the batteries into it.

The type of battery that can be used is 2 A alkali dry cell battery (LR6).

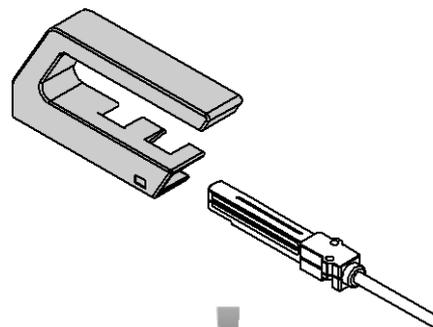
When inserting the batteries, pay attention to the polarities and insert them in the correct direction.  
After insertion, ensure the lid is closed for use.



### ○ Mounting of the high voltage measuring handle

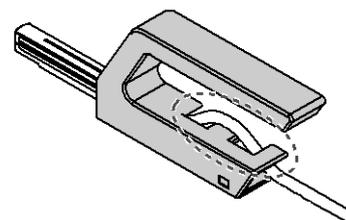
#### 1. Insert the sensor.

Insert the sensor to the handle in the direction shown in the right figure.



#### 2. Fix the cable.

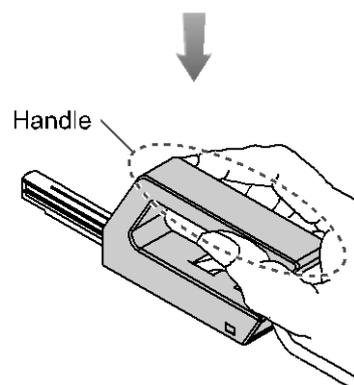
Fix the cable as shown in the right figure.



#### 3. Complete

Now, the handle becomes available.

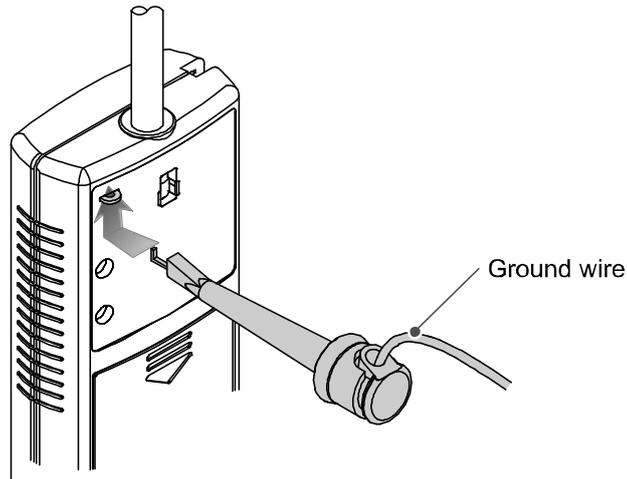
Hold the handle for use.



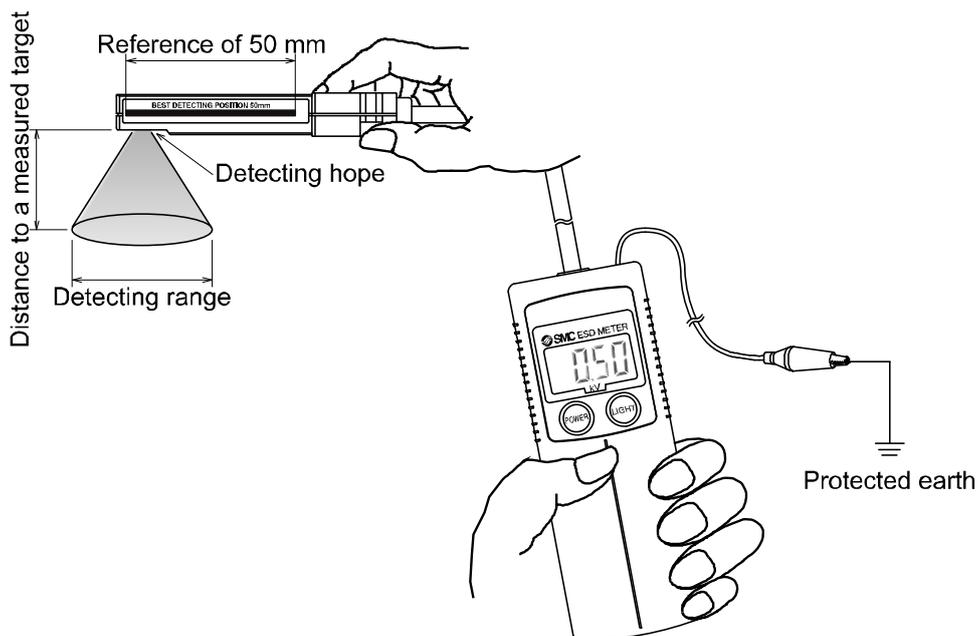
## Setting / Adjustment

### ■ Procedure

1. Insert the batteries in place.
2. Connect the ground wire.  
Connect the ground wire to a place where is connected to an external protective earthing system.  
The place where the ground wire is to be connected is as shown below.



3. Press the .
4. Get the sensor close to the position 50 mm away from the measured target.  
Gradually bring the sensor closer to the measured target from a distance, and stop measurement immediately if the displayed value indicates overflow (HHH) or underflow (LLL).  
(The target has a high charged potential that is highly dangerous. The measured value does not change even if the distance is shortened.)
5. Check the display.

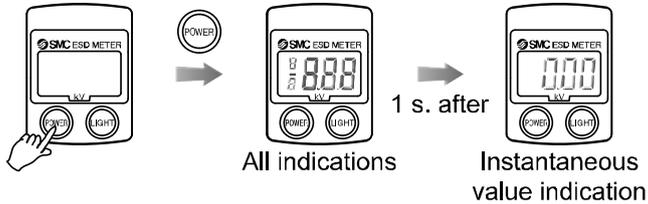


\*: The detecting range of the sensor is 180 mm (at the best measurement distance of 50 mm).

## ■Function settings

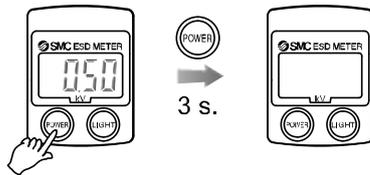
### ○Power ON

When the  is pressed with the power supply off, the power supply will be turned on.  
All indications are displayed for 1 s. after the power supply is turned on.



### ○Power OFF

When the  is pressed for 3 s. or more with the power supply on, the power supply will be turned off.  
Also, no button operation for a certain period will turn off the power supply.  
(For details, refer to Auto power-OFF function.)



Turn off the power supply after using the product to keep the life of batteries as long as possible.

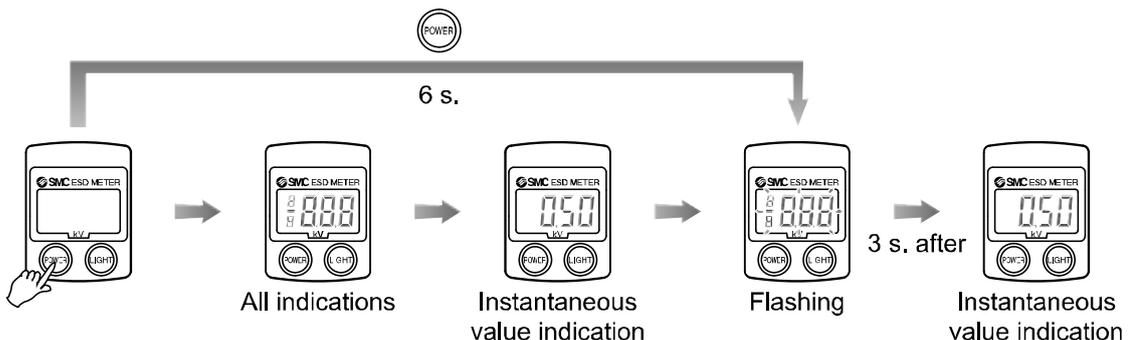
### ○Auto power-OFF

If no button is pressed for 5 min. or more with the power supply on, the power supply will turn off automatically.



### ○Auto power-OFF extension

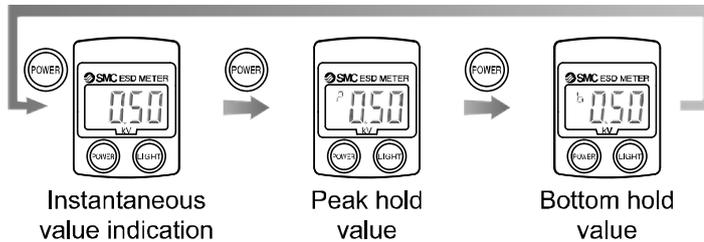
When the  is pressed for 6 s. or more with the power supply off, the continuous operating time with no button operation will extend to 15 min.  
(When this auto power-off extension is activated, indications on the display will keep flashing for 3 s.)



○Peak/Bottom hold value

When the  is pressed with the power supply on, the indication will be changed to instantaneous value, peak hold value, bottom hold value and instantaneous value, in that order.

\*: Release the  after "P" or "b" is displayed so as not to turn off the power supply.



●Peak hold value

The maximum charged potential and "P" are displayed.

The maximum charged potential is continuously detected and updated from when the peak hold is started. If the value over the held maximum charged potential is detected, the display will change.

●Bottom hold value

The minimum charged potential and "b" are displayed.

The minimum charged potential is continuously detected and updated from when the bottom hold is started. If the value under the held minimum charged potential is detected, the display will change.

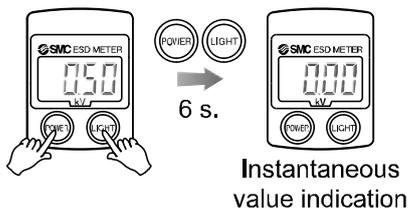
○Zero clear

A displayed value can be adjusted to zero at measured charged potential in a range of  $\pm 5\%$ F.S. of default potential.

(There will be a slight displacement, depending on the deviation of the sensor itself and ambient environment of the sensor when the zero clear is performed.)

When the  and  are pressed for 6 s. or more with the power supply on, the displayed value is reset to zero, and then the measuring mode is recovered automatically.

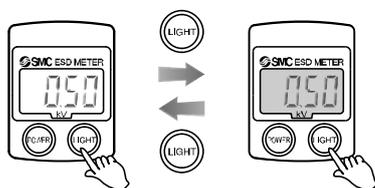
Once the power supply is turned off, the offset value for zero clear is cleared.



○Light-up of back light

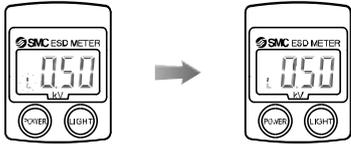
When the  is pressed while the charged potential is displayed, the back light will turn on.

Re-pressing the  will turn off the back light.



○Battery low

When the battery voltage lowers, "L" will be displayed. The display will be done in a different way depending on how much battery is left.



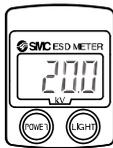
Display	Content
L (Flashing)	The battery is low. Prepare for replacement with a new one.
L (Solid on)	The battery is very low. Replace with new battery immediately.

○Indicated digit change function

The minimum indicate digit is changed depending on charged potential.

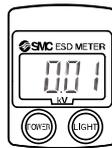
<Display example>

$\pm 1$  to  $\pm 20$  kV



Min. indicate unit: 0.1 kV

0 to  $\pm 0.99$  kV



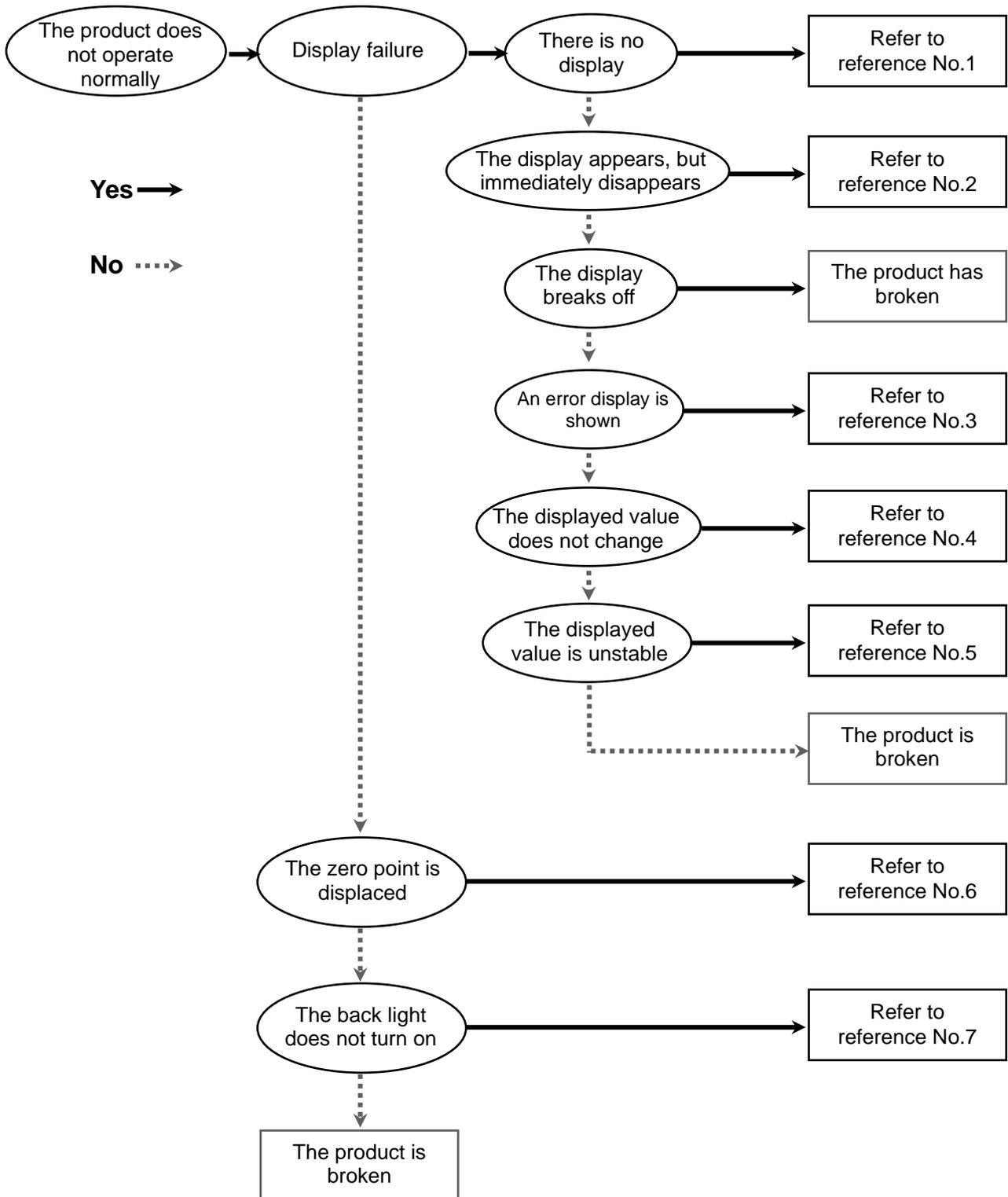
Min. indicate unit: 0.01 kV

# Troubleshooting

## ○ Troubleshooting

When the product is found to have operation failure, use the following flowchart to identify the cause of failure.

If there is no cause applicable to the failure, consider the product itself has broken. The product can break for reasons in the operating environment. In such a case, consult with SMC about measures to be taken.



○Cross reference for troubleshooting

Reference No.	Problem	Possible cause	Investigation method	Countermeasure
1	There is no display.	The battery is inserted incorrectly.	Check the orientation of battery.	Check the orientation of battery as shown in the case and if it is incorrect, reinsert the battery.
		The battery is running out.	Check how much battery is left.	Replace with a new battery.
2	The display appears, but immediately disappears.	The battery is running out.	Check for battery low display.	Replace with a new battery.
		The auto power-off mode is working.	Check the operating time has passed 5 minutes.	Press the POWER button with the power supply off for 6 s. at least, and extend the continuous operation time to 15 minutes.
3	An error display is shown.	A charge over $\pm 5\%$ F.S. of the default zero point is given to the sensor during zero clear operation. (Er1)	The display during zero clear operation is $\pm 5\%$ F.S. at max.	Return to a condition with no charge, and retry zero clear operation.
		The sensor is broken. (Er2)		Stop using immediately and contact SMC.
		Error in internal data. (Er3)		Turn off the power supply once, and turn it on again. Ask SMC to investigate if the error persists.
		The upper/lower limit of the measurable voltage range is exceeded. (HHH/LLL)	Check the measured value is displayed when the charged object is kept far away from the sensor.	If the measured value is displayed normally for the object far away from the sensor, it means the charge amount of the measured target is beyond the specifications of the product. Stop using immediately.
		The measuring distance is not appropriate. (HHH/LLL)	Check the measuring distance referring to the label on the sensor (50 mm).	Adjust the distance between the measured target and sensor to the rated value (50 mm).
4	The displayed value does not change.	The peak hold mode or bottom hold mode is set.	Check whether the LCD is displaying "P" for peak hold mode or "b" for bottom hold mode.	Hold the POWER button pressed until "P" or "b" disappears, and then move to the instantaneous display mode.
5	The displayed value is unstable.	The ground wire is not grounded.	Check the ground wire is connected properly.	Ground the ground wire.
6	The zero point is displaced.	The ground wire is not grounded.	Check the ground wire is connected properly.	Ground the ground wire.
		Ambient environment is charged.	Measure in an open place like outside of a room, and check the zero point returns.	Execute zero clear operation.
7	The back light does not turn on.	Operating environment is too bright to see.	Check the back light is on in a dark place.	If the light is confirmed to be off, ask SMC to investigate.

○Error indication function

Error Name	Error display	Error Type	Troubleshooting Method
Zero clear error	Er 1	A charge over $\pm 5\%$ F.S. of the default zero point is given to the sensor during zero clear operation. (Er1) *: After approx. 1 s. error display, the sensor returns to measurement mode. This time will depend on the deviation of the product itself and ambient environment during zero clear operation.	Return to a condition without charge, and retry zero clear operation.
Sensor failure	Er 2	The sensor is broken.	Stop using immediately and contact SMC.
System error	Er 3	Error in internal data.	Turn off the power supply once, and turn it on again. Ask SMC to investigate if the error persists.
Measurement error	HHH	The value is outside of the displayed range because a charge over the upper limit of the measurable voltage range is given to the sensor or the measuring distance is not appropriate.	Eliminate charge until the value comes to the measurable voltage range. Also, check the measuring distance is proper.
	LLL	The value is outside of the displayed range because a charge over the lower limit of the measurable voltage range is given to the sensor or the measuring distance is not appropriate.	
Cable broken		The cable is broken and the product cannot measure correctly. The charge amount is detected, but not reflected in the displayed value.	Stop using immediately and contact SMC.

# Specification

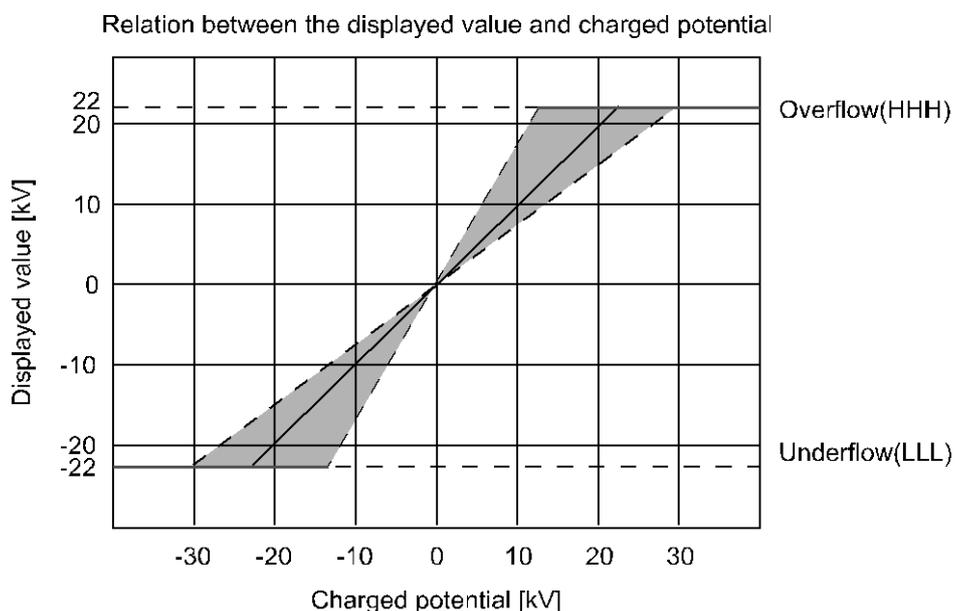
## ■ Specifications

Item		IZH10
Rated charge amount range		±20.0 kV
Minimum display unit		0.1 kV (±1 kV to 20 kV), 0.01 kV (0 to ±0.99 kV)
Measuring distance		50 mm (between the detection port and measured target)
Power supply *1		1.5 VDC 2 A alkali dry cell battery (2 pcs.) (continuously used for 15 hours *2)
Display accuracy		±5%F.S. ±1 digit
Environment	Enclosure	IP40
	Operating temp. range	Operation: 0 to 40 °C, Storage: -10 to 60 °C (no freezing and condensation)
	Operating humidity range	Operation/Storage: 35 to 85%R.H. (no condensation)
Material		Display: PC/ABS, Sensor: ABS
Weight		85 g (excluding batteries)
Standard		CE marking
Accessories		Ground wire (IZH-A-01), Soft case (IZH-B-01)

\*1: 2 A alkali dry cell batteries (2 pcs.) are not included, and must be prepared separately.

\*2: When using new batteries at ordinary temperature.

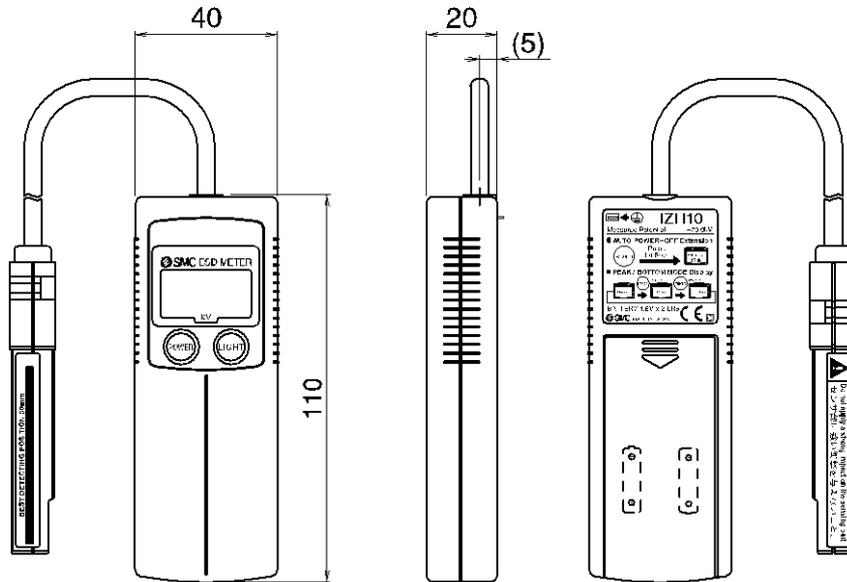
## ■ Characteristics graph (for reference)



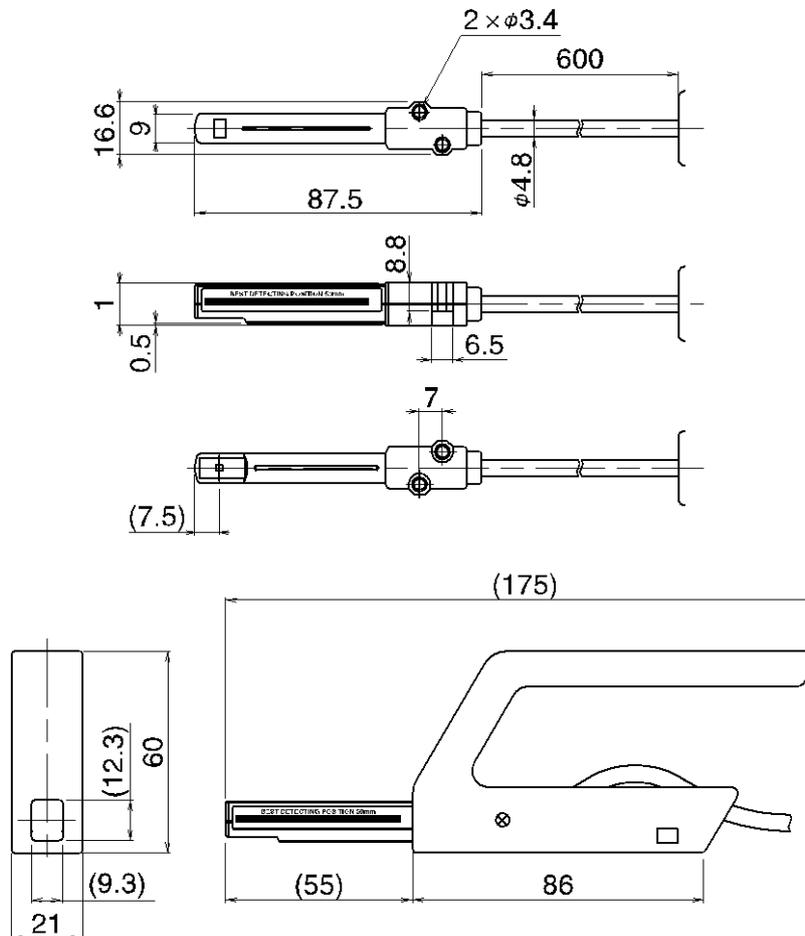
There will be difference between the actual value and displayed value of charged potential depending on the measuring distance between the measured target and the sensor. The shaded part shows the deviation in a measuring distance range of 25 to 75 mm.

■ Dimensions

• Display



• Sensor



#### Revision history

- A: Change format
- B: Limited warranty and Disclaimer and measurement laws are added.
- C: The Safety Instructions. (p2, p3)  
The back cover.

## SMC Corporation

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URL <https://www.smcworld.com>

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.  
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