



INSTRUCTION MANUAL

ELECTROSTATIC DISCHARGE SIMULATOR

MODEL ESS-2002EX

NOISE LABORATORY CO., LTD.

Edition 1.04
AEC00228-00E-0E

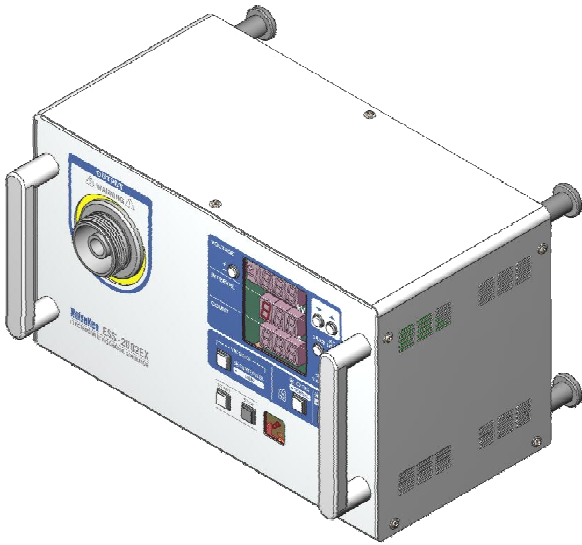
NOTICE

- The contents of this booklet are subject to change without prior notice.
- No part of this booklet may be reproduced or transferred, in any form, for any purpose, without the permission of Noise Laboratory Co., Ltd.
- The contents of this booklet have been thoroughly checked. However, if a doubtful point, an error in writing or a missing is found, please contact us.
- Noise Laboratory Co., Ltd. shall have no liability for any trouble resulting from the misuse or improper handling of this product regardless of the contents of this booklet or arising from the repair or remodeling of this product by a third party other than Noise Laboratory Co., Ltd. or its authorized person.
- Noise Laboratory Co., Ltd. shall have no liability for any trouble resulting from the remodeling or modification of this product.
- In no event shall Noise Laboratory Co., Ltd. be liable for any results arising from the use of this product.
- Trademarks, company names, and similar that appear in this document are trademarks or registered trademarks of their respective companies. This document does not use the TM and ® symbols.

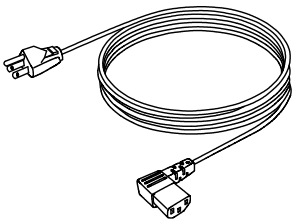
1. CHECK PACKAGE CONTENTS

Before using the instrument, please check that none of the associated items are missing.

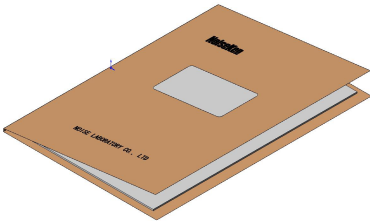
A



B



C



| <u>Item</u> | <u>Quantity</u> |
|---|-----------------|
| A: Main unit | 1 |
| B: AC power cable | 1 |
| C: Instruction Manual (this document) | 1 |

2. IMPORTANT SAFETY PRECAUTIONS

The "Important Safety Precautions" explain rules that must be followed to prevent any risk of harm or injury to the user of the instrument or to other people.

- **The instrument may only be used by trained EMC technicians (electrical technicians)**

There is a risk of death or serious injury, and of the emission of electromagnetic noise that exceeds the stipulated limits. Please use the instrument in conjunction with appropriate measures for dealing with electromagnetic noise such as a Faraday cage or shielded room.

- **Do not use the instrument for any purposes other than the EMC testing purposes described in this instruction manual**

Failure to follow this rule risks death or serious injury.

- **The instrument may not be used by people fitted with electronic medical devices such as pacemakers and such people may not enter the testing site while the instrument is operating**

Failure to follow this rule risks death or serious injury.

- **The instrument may not be used in a location where fire is prohibited or there is a risk of explosion**

Failure to follow this rule risks igniting a fire due to an electrical discharge.

- **Use an AC power cable that is certified for use under the safety rules of the country in which the instrument is being used.**

Failure to follow this rule risks fire or electric shock. The supplied AC power cable is intended for Japan and North America. If the instrument is used in a country other than these, use a cable that is certified for use under the safety rules of that country.

Before setting up the test site, connecting the equipment, or starting testing, please read the section entitled "Basic Safety Precautions for the Safe Use of the Simulator" which contains additional safety advice.

3. APPLICATION FORM FOR INSTRUCTION MANUAL

To: Noise Laboratory Co., Ltd. via sales agent

We place an order for an instruction manual.

Model Name

Serial No.

Applicant Address: _____

Company Name: _____
Department: _____
Contact Person: _____
Phone No. : _____
FAX No. : _____

Cut off this page "**PURCHASE ORDER FOR INSTRUCTION MANUAL**" from this volume and **keep it for future use with care.**

When an INSTRUCTION MANUAL is required, fill in the above Application Form and mail or fax it to your nearest sales agent of Noise Laboratory or Noise Laboratory.

The address, company name, individual's name, and other personal information (henceforth referred to as "personal information") entered in the application form will only be used for the purpose of sending the Instruction Manual and will not be shown or passed to any third party without a valid reason. Noise Laboratory Co., Ltd. will manage customer's personal information in an appropriate manner.

4. TABLE OF CONTENTS

| | |
|--|-----------|
| 1. CHECK PACKAGE CONTENTS | 1 |
| 2. IMPORTANT SAFETY PRECAUTIONS | 2 |
| 3. APPLICATION FORM FOR INSTRUCTION MANUAL | 3 |
| 4. TABLE OF CONTENTS | 5 |
| 5. PREFACE | 7 |
| 6. BASIC SAFETY PRECAUTIONS FOR THE SAFE USE OF THE SIMULATOR | 8 |
| 6-1. Meaning of Safety Symbols | 8 |
| 6-2. DANGER Alerts | 10 |
| 6-3. WARNING Alerts | 10 |
| 6-4. CAUTION Alerts | 12 |
| 7. POINTS TO NOTE REGARDING CONSUMABLE ITEMS | 14 |
| 8. NAME AND FUNCTION OF EACH PART | 16 |
| 8-1. Main Unit (Front Panel) | 16 |
| 8-2. Main Unit (Rear Panel) | 17 |
| 8-3. Discharge Gun | 18 |
| 8-4. Operation Panel | 19 |
| 9. RADIATION LEVEL MODE FUNCTION | 21 |
| 9-1. Points to Note When Using the Radiation Level Mode Function | 21 |
| 9-2. Differences Between Normal Mode (NORMAL) and Extra Mode (EXTRA) | 21 |
| 9-3. How to Use the Radiation Level Modes | 22 |
| 9-4. How to Select Extra Mode (EXTRA) | 23 |
| 10. CONNECTIONS | 24 |
| 10-1. Connecting the Discharge Gun | 24 |
| 10-2. Connecting the AC Power Cable | 25 |
| 11. OPERATION | 26 |
| 11-1. Turning the Power On or Off | 26 |
| 11-2. Test Condition Settings | 26 |
| 11-2-1. Output Polarity and VOLTAGE Setting | 26 |
| 11-2-2. INTERVAL Setting | 28 |
| 11-2-3. COUNT Setting | 29 |
| 11-2-4. IEC LEVEL Selection Switch | 30 |
| 11-2-5. V STEP Setting | 30 |
| 11-2-6. CONTACT/AIR Setting | 32 |
| 11-2-7. TRIGGER Setting | 32 |
| 11-3. Starting and Stopping a Test | 34 |
| 11-3-1. Starting a Test | 34 |
| 11-3-2. Stopping a Test | 34 |
| 12. BACKGROUND KNOWLEDGE ABOUT ELECTROSTATIC TESTING | 35 |

| | |
|---|-----------|
| 13. ERROR DISPLAY | 37 |
| 14. SPECIFICATIONS | 38 |
| 15. WARRANTY | 39 |
| 16. MAINTENANCE | 41 |
| 17. CONTACTING TECHNICAL SUPPORT | 42 |

5. PREFACE

We thank you very much for your purchase of the Computer-controlled Electrostatic Discharge Simulator Model: ESS-2002EX.

It is recommended that the contents of this manual be thoroughly understood and used as a ready reference for operation.

- This Instruction Manual was prepared so that any person who can observe the prescribed instruction method and operating precautions may safely handle and fully utilize this computer-controlled electrostatic simulator (Model ESS-2002EX).
- Keep this Instruction Manual by your side or other proper location so that it may be readily available when using the ESS-2002EX.

The ESS-2002EX is an electrostatic simulator for performing electrostatic discharge immunity test in accordance with the IEC 61000-4-2 and ISO 10605 standards.

Electrostatic testing is performed by connecting an electrostatic discharge gun (TC-815R or TC-815ISO) which is sold separately.

Notice




The fonts, layout, and similar in the screens shown in this manual may differ from the actual screens and parts of actual screens may be omitted. Also, some screens have been changed to make them clearer to understand in the printed manual.

6. BASIC SAFETY PRECAUTIONS FOR THE SAFE USE OF THE SIMULATOR











- The "Basic Safety Precautions" explain rules that must be followed to prevent any risk of damage or injury to the user of the instrument or to other people.
- The symbols below are used to indicate the level of injury or damage that may result if the instrument is used in a way that ignores these precautions. Please take careful note of the meanings of these symbols before proceeding to read this manual.

6-1. Meaning of Safety Symbols






- ◆ The following symbols indicate the level of injury or damage that may result if the instrument is used incorrectly in a way that ignores the associated precautions.

| | |
|--|---|
|  DANGER | <p>This symbol indicates that failure to comply with the associated precaution "is highly likely to result in the risk of death or serious injury".</p> |
|  WARNING | <p>This symbol indicates that failure to comply with the associated precaution "may result in death or serious injury".</p> |
|  CAUTION | <p>This symbol indicates that failure to comply with the associated precaution "may result in damage but that only physical damage is likely to occur".</p> |

- ◆ The following symbols indicate the nature of the associated precaution.

| | | | |
|---|--|--|---|
|  | <p>Indicates a warning (a situation where caution is required).</p> |  |  |
|  | <p>Indicates a prohibition (an action that is not allowed to occur).</p> |  <p>Prohibited</p> |  <p>Disassembly Prohibited</p> |
|  | <p>Indicates an instruction (an action that must always be taken).</p> |  <p>Safety Rule</p> |  <p>Always earth correctly</p> |
| | |  <p>Unplug from Mains Power</p> | |

The following symbols indicate the nature of the associated warnings or cautions that relate to the use of the instrument.

| | |
|---|---|
|  | Indicates a risk of electric shock. |
|  | Indicates that caution is required and that you should refer to the instruction manual. |
|  | Indicates a warning, a risk of electric shock, that caution is required, and that you should refer to the instruction manual. |
|  <p>WARNING TO REDUCE THE RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.</p> | <p>Indicates a warning, a risk of electric shock, that caution is required, and that you should refer to the instruction manual.</p> <p>Warning text Do not remove the cover because of the risk of electric shock.</p> |
| <p>NOISE LABORATORY CO.,LTD. IS EXCLUDED ALL THE LIABILITY OF ANY FORMS OF DAMAGE, OF EQUIPMENT OR HUMANS, CAUSED BY USER'S MISHANDLING DURING OPERATION.</p> | Warning relating to the use of the instrument Noise Laboratory Co., Ltd. accepts no liability for damage resulting from misuse of the instrument. |
|  | Indicates that you should read the instruction manual. |

6-2. DANGER Alerts



Disassembly
Prohibited

- **Do not disassemble or modify
Do not remove the cover**

Failure to comply with the precaution may result in death or serious injury and possible consequences include fire and electric shock.

For inspection or repair of internal components, please contact your sales agent or the Noise Laboratory repair and calibration center.

6-3. WARNING Alerts



Unplug from Mains Power

- **Stop using the instrument immediately if any of the following problems occur**
 - Unit emits smoke and an unusual smell
 - Water or other foreign material has got inside the unit
 - Unit is dropped or damaged
 - AC power cable is damaged (possibly exposing or disconnecting the wires, etc.)

Continuing to use the instrument in a faulty condition risks causing fire, electric shock, or similar.

Disconnect from the power supply immediately and unplug the AC plug from the socket.

After confirming that no more smoke is being emitted, send the instrument to your sales agent or the Noise Laboratory repair and calibration center for repair. Repairing the instrument yourself is dangerous and should never be attempted.



Safety Rule

- **Turn the power switch to "Off" on the instrument before connecting or changing any of the cables**

Failure to comply with this rule may result in electric shock, injury, or misoperation.



Safety Rule

- **Only use the instrument with a power supply voltage and frequency that is within the indicated range (AC 100V to 240V, 50Hz/60Hz)**
Using the instrument with a power supply voltage or frequency outside the indicated range may result in fire or electric shock.
- **Firmly insert the AC power cable plug into the socket**
Failure to comply with this rule may result in heating or the build-up of dust leading to fire, electric shock, or similar.
Failing to fully insert the plug or plugging too many cables into the same power outlet may cause cables to overheat leading to fire, electric shock, or similar.



Always earth correctly

- **Plug the AC power cable into a socket that has a protective earth terminal**
The AC power cable provided with the instrument has a three-pin plug that connects to the power supply and protective earth terminal.
The protective earth on the three-pin plug connects via the AC power cable to the metal parts on the instrument.
Because this provides protection from electric shock, ensure that you plug the power supply cable into a socket that has a properly earthed protective earth terminal.
Using the instrument without a protective earth connection may result in electric shock.



Prohibited

- **Do not insert objects into the instrument or its connectors**
Inserting metallic or flammable items into the ventilation slits, connectors, or other openings may result in fire, electric shock, or similar.
- **Do not touch the tip of the discharge gun while the instrument is operating**
Failure to comply with this rule may result in electric shock or injury.
- **Do not aim at a person during testing**
This is very dangerous and may result in unexpected injury so should never be attempted.
- **Do not install in a location that obstructs access to the power supply, STOP, and other switches**
Failure to comply with this rule may prevent you from reacting quickly when a problem occurs and may result in fire or electric shock.
- **Do not use the AC power cable for any purpose other than this instrument**
The supplied AC power cable is only intended for use with this instrument. Do not use it for any purpose other than this instrument. Use on any other electrical equipment risks overheating leading to fire, electric shock, or similar. Similarly, using an AC power cable from another electrical device may prevent the instrument from operating at its intended level of performance and may result in overheating if the current carrying capacity of the cable is insufficient, leading to fire, electric shock, or similar.

- **Do not damage the AC power cable**

Damage to the AC power cable may result in fire, electric shock, or similar. Take particular care in relation to the following precautions.

- Do not manipulate the AC power cable
- Do not bend the AC power cable excessively
- Do not twist the AC power cable
- Do not pull the AC power cable
- Do not locate the AC power cable close to a heater
- Do not place heavy objects on the AC power cable

6-4. CAUTION Alerts



Safety Rule

- **If condensation appears after the instrument is moved from a cold to a warm location, allow to dry naturally before using**

Using the instrument while condensation is present may result in electric shock, faults, or fire.
- **Clean the AC plug periodically**

Allowing dust or dirt to accumulate between the AC plug and socket and absorb moisture may reduce the electrical insulation and result in fire. Periodically unplug the AC plug from the mains socket and clean off any dirt or dust using a dry cloth.
- **Clean the high-voltage input and output connectors periodically**

Allowing dust or dirt to accumulate between the high-voltage input connector and high-voltage output connector and absorb moisture may reduce the electrical insulation and result in fire.

Periodically unplug the AC plug from the mains socket, wait for five or more seconds, then unplug the high-voltage input connector from the high-voltage output connector and blow dehumidified air into the high-voltage output connector to clean out any dust or dirt.

Also clean off any dirt or dust on the high-voltage input connector using a dry cloth.
- **If the instrument becomes dirty, clean with a dry cloth**

Never use benzene, thinner or other solvents as these may degrade the exterior surface or printed text.

If the exterior, operation panel, or other parts of the instrument become dirty, wipe with a dry soft cloth. If the dirt is difficult to remove, moisten the cloth with water or apply a small quantity of a neutral detergent to the cloth. Wipe dry after using these to clean the instrument.
- **Ensure that the safety warning labels are always visible**

If the safety warning labels become dirty or start to peel off, please reattach them for safety.

If the labels are lost, please contact your sales agent or the Noise Laboratory repair and calibration center for replacements.



Safety Rule

- **Do not use the instrument with other than a recommended discharge gun**
Using the instrument with other than a recommended discharge gun may result in poor operation and abnormal test results.
- **Do not apply static electricity to the instrument itself**
Failure to comply with this rule may cause the instrument to become faulty.
- **Do not install the instrument in any of the following locations**
Installing the instrument in any of the following locations may result in fire, electric shock, and similar.
 - Humid or dusty environments
 - Locations where the instrument is likely to become hot such as close to a heater or exposed to direct sunlight
 - Locations where the instrument is likely to get wet such as next to a window
- **Do not block the ventilation slits or use in a location with poor ventilation**
Do not block the ventilation slits on the instrument. Blocking the ventilation slits causes heat to build up inside the unit which may lead to fire. Take particular note of the following precautions.
 - Do not lie the unit face up, on its side, or upside down.
 - Do not position in cramped locations with poor ventilation.
 - Allow a gap of at least 10cm from walls and similar when installing.
- **Do not unplug the high-voltage input connector by pulling on the cable**
Failure to comply with this rule may damage the cable, resulting in faults or fire. Hold by the high-voltage connector when unplugging.
- **Do not operate the instrument or insert or remove the AC plug or high-voltage input connector if you have wet hands**
Failure to comply with this rule may result in electric shock or faults.
- **Do not place water-filled containers on the instrument**
If the water is spilt and gets inside the instrument it may result in fire or electric shock.
- **Do not drop or subject to strong physical shocks**
Failure to comply with this rule may result in faults.
- **Do not knock or scratch with hard objects**
Such actions may damage the exterior coating or LCD panel.

* If this instrument becomes faulty during normal use, it will be repaired in accordance with the terms of the warranty. However, please note that Noise Laboratory Co., Ltd. and its sales agents accept no liability for compensation for any losses or similar, or damage to the EUT (Equipment Under Test) or other peripheral equipment, caused by faults in the instrument, deterioration of consumables, or other external causes.

7. POINTS TO NOTE REGARDING CONSUMABLE ITEMS

● Secondary Battery for Memory Backup

- The instrument contains a secondary battery used to maintain memory data while the power is turned off.
- The secondary battery is a consumable item. The secondary battery deteriorates with repeated charging and discharging and the charging capacity steadily falls with normal use.
- If the memory backup fails to function even when the battery is charged, the cause may be deterioration of the secondary battery. In this case, please contact your sales agent or the Noise Laboratory repair and calibration center to arrange replacement. Do not attempt to repair the instrument yourself as this is very dangerous.
- The secondary battery may go flat resulting in loss of memory data if the instrument remains unused for two months or more. If the memory backup fails to function, the stored settings and display settings when the power is turned on revert to their defaults.
- If you want to maintain a memory backup over a long period, please leave the power to the instrument turned on for approximately 24 hours once every two months. (The actual recharging time may vary depending on the operation conditions and environment.)
 - * Please note that Noise Laboratory Co. Ltd. accepts no liability for loss of backup data due to battery wear, fault, misoperation, or other reason.
Please make a note of important settings information beforehand.

● High-Voltage Relay

- The main unit and discharge gun contain high-voltage relays.
- The high-voltage relays are consumable items. The electrical contacts in the high-voltage relays deteriorate with use and this can result in poor electrical connections, contact welding, or insulation failure occurring during normal use.
- If you experience problems such as being unable to apply a static discharge after starting a test or a static discharge occurs as soon as a high voltage is output, the cause may be deterioration of a high-voltage relay. In this case, please contact your sales agent or the Noise Laboratory repair and calibration center. Do not attempt to repair the instrument yourself as this is very dangerous.

- **Fuse**

- This instrument contains fuses.
- A fuse holder is located in the AC inlet on the rear panel and the fuse can be replaced by the user. Please replace with a fuse of the following type.
Rated voltage 250V/Rated current 2A Slow-blow fuse
Recommended fuse: Littelfuse 218.002P
Quantity: 2
- If unable to obtain the correct fuse, please contact your sales agent or the Noise Laboratory repair and calibration center.

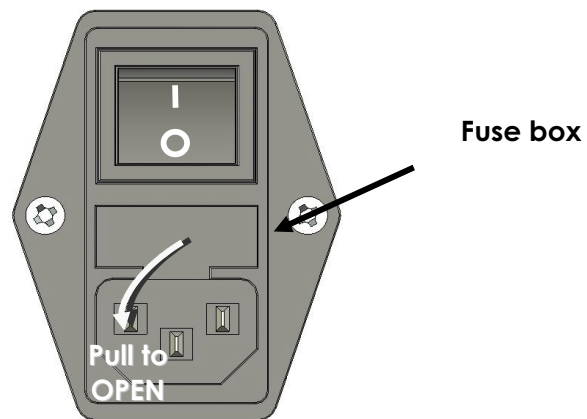


Figure 7-1 Fuse Box

8. NAME AND FUNCTION OF EACH PART

8-1. Main Unit (Front Panel)

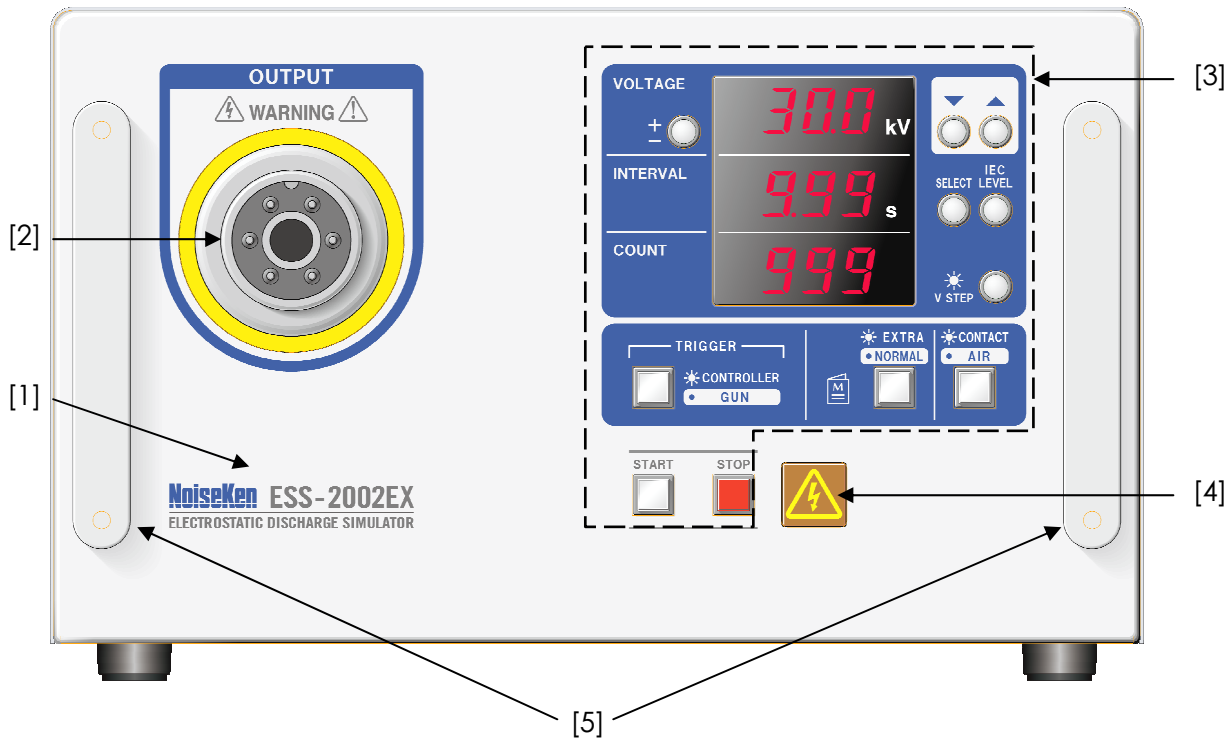


Figure 8-1 Main Unit (Front Panel)

- [1] Model name
The product name and model name of the instrument and the company logo.
- [2] High-voltage output connector
Connector with a maximum output voltage of 30.5kV. The discharge gun connects to this connector.
- [3] Operation panel
Operating switches and displays.
- [4] Warning lamp
Illuminates when a high voltage is output and flashes when electrostatic discharging starts.
- [5] Carrying handle
Use this to carry or transport the instrument.

8-2. Main Unit (Rear Panel)

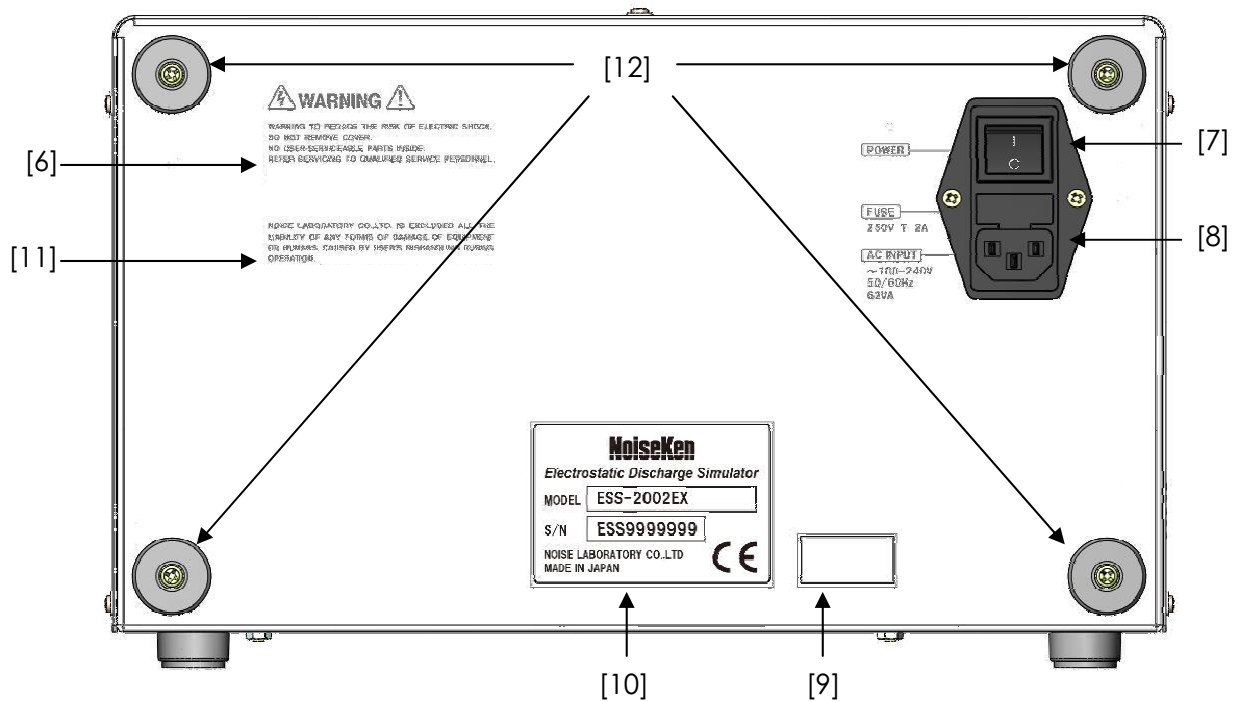


Figure 8-2 Main Unit (Rear Panel)

- [6] Warning text
Indicates a warning, a risk of electric shock, that caution is required, and that you should refer to the instruction manual. Also includes a warning not to open the cover due to the risk of electric shock.
- [7] Power switch
Used to turn the power on and off.
- [8] AC inlet (with internal fuse box)
Inlet used to plug in the supplied AC power cable. Includes an internal fuse.
If replacing the fuse, please replace with a fuse of the following type.
Rated voltage 250V/Rated current 2A Slow-blow fuse
Recommended fuse: Littelfuse 218.002P
- [9] Inspection certification
Label certifying that the instrument passed the Noise Laboratory delivery inspection.
- [10] Serial number label
Contains the model name, serial number, and other information.
- [11] User warning
Noise Laboratory Co., Ltd. accepts no liability for damages resulting from incorrect operation.
- [12] Rear panel feet
Stand the instrument on these feet when transporting, moving, or storing. They can also be used to store the AC power cable.

Note: Do not perform electrostatic discharge testing with the instrument standing on the rear panel feet. This may change the nature of the electrostatic discharge waveform.

8-3. Discharge Gun

Please refer to the instruction manual for the discharge gun for more details.

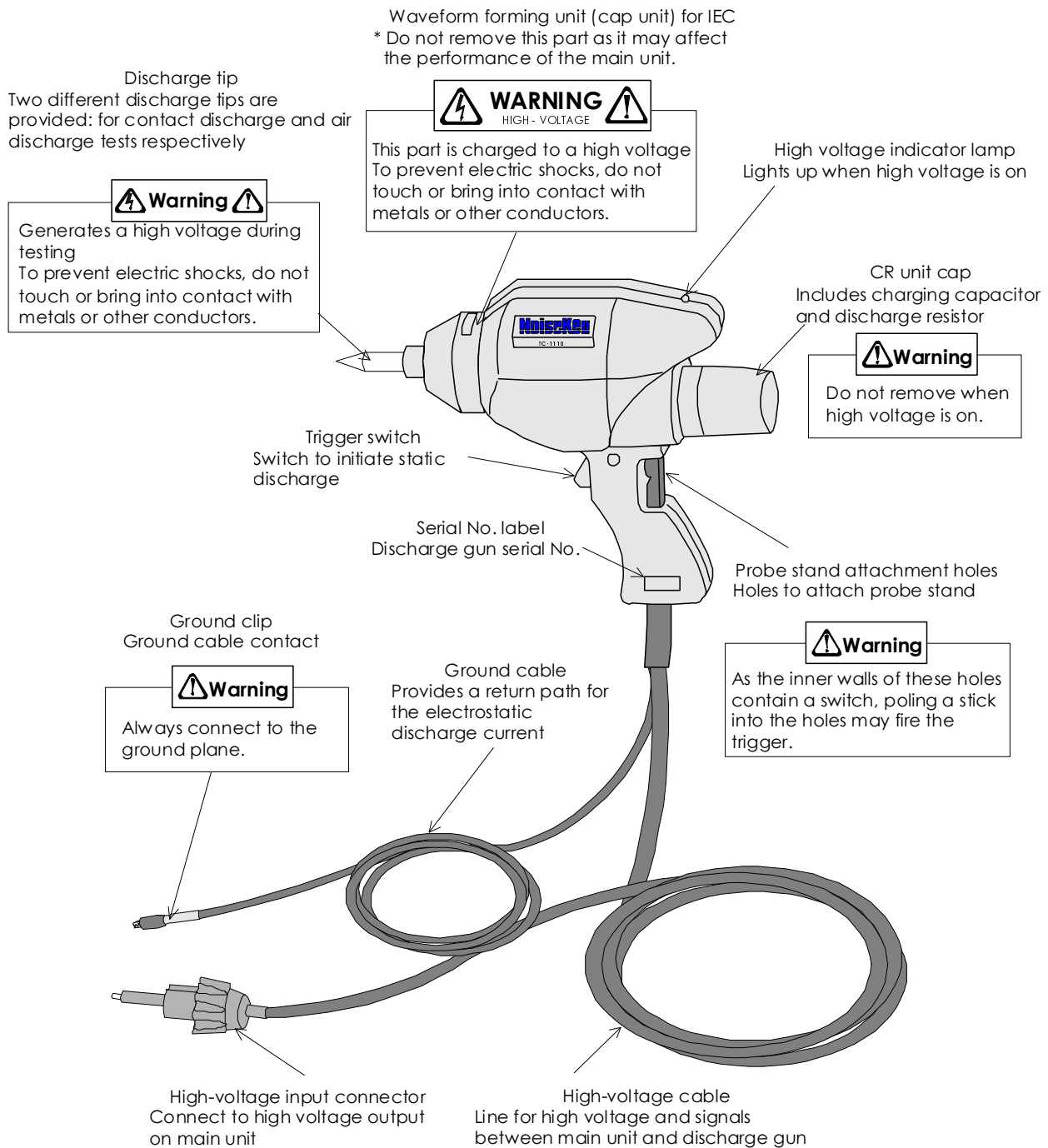


Figure 8-3 Discharge Gun

8-4. Operation Panel

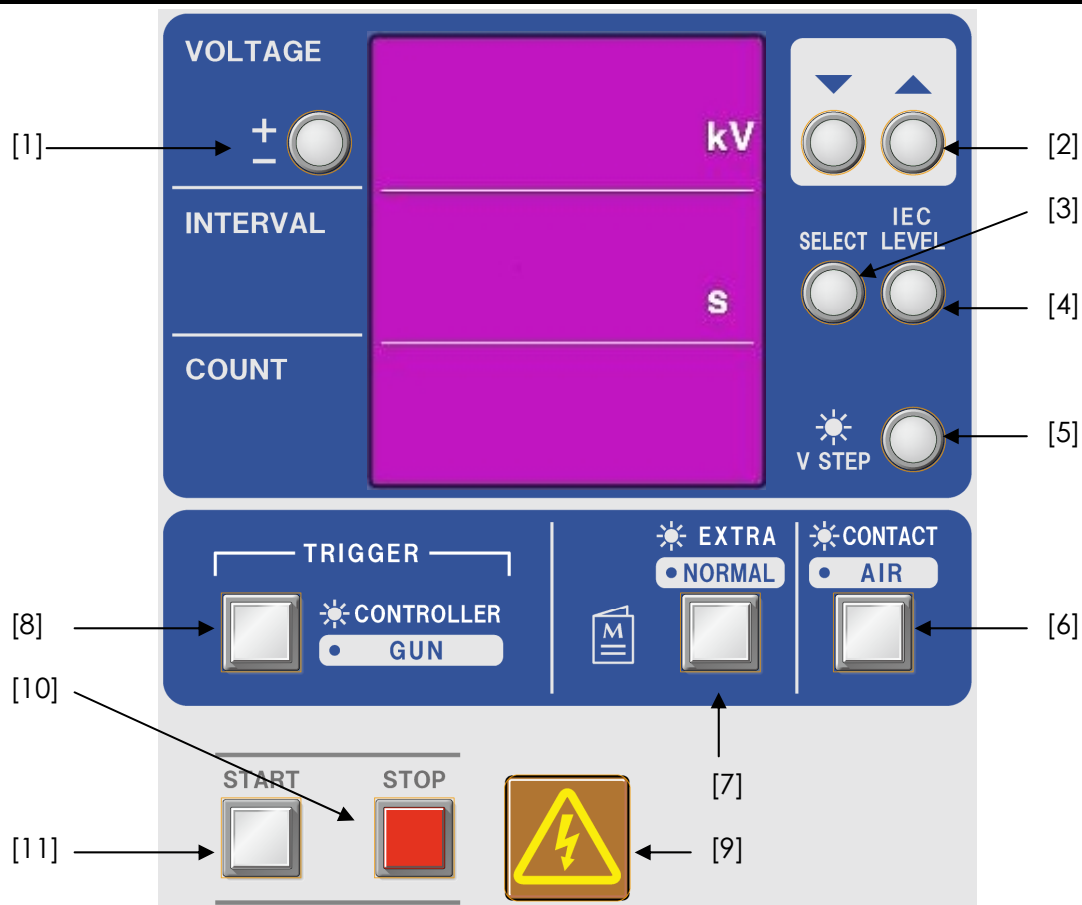


Figure 8-4 Operation Panel

- [1] Output polarity selection switch
Selects the polarity of the applied voltage.
- [2] ▼ ▲ up/down switches
Adjusts the selected value up or down. If you hold down a switch, the value changes faster.
- [3] SELECT setting selection switch
The VOLTAGE, INTERVAL, or COUNT setting blinks each time you press the SELECT switch. You can change the value of the currently blinking setting.
- [4] IEC LEVEL selection switch
Selects a voltage for the IEC61000-4-2 standard. The setting cycles through the following options:
When contact discharge mode (CONTACT) is selected: 2.0kV, 4.0kV, 6.0kV, or 8.0kV
When air discharge mode (AIR) is selected: 2.0kV, 4.0kV, 8.0kV, or 15.0kV
- [5] V STEP selection switch
Used to change the up and down step size for the VOLTAGE setting.

- [6] Static discharge mode selection switch
Selects either contact discharge mode (CONTACT) [Switch LED turns on] or air discharge mode (AIR) [Switch LED turns off].
- [7] Radiation level mode selection switch
A special operation for selecting either normal mode (NORMAL) [Switch LED turns on] or extra mode (EXTRA) [Switch LED turns off] for the radiation from the discharge gun.
Normal mode (NORMAL) is selected in the default settings.
Selecting extra mode (EXTRA) reduces the radiation from the discharge gun.
A special operation is required to select the mode. See "RADIATION LEVEL MODE FUNCTION" for details.
- [8] TRIGGER selection switch
Selects CONTROLLER (main unit trigger mode) [Switch LED turns on] or GUN (discharge gun trigger mode) [Switch LED turns off].
- [9] Warning lamp
Turns on when a voltage is output from the high-voltage output connector and blinks when electrostatic discharging starts.
- [10] STOP switch
Stops the test.
- [11] START switch
Outputs high voltage.

9. RADIATION LEVEL MODE FUNCTION

To improve the reliability of its electrostatic discharge simulators, Noise Laboratory released the new TC-815R discharge gun in 2004. The new discharge gun was an upgrade of the TC-815P model and featured reduced ringing in the output current waveform and lower radiated noise from the discharge gun.

Whereas there is a trend towards lower operating voltages and faster CPU clock speeds in modern electronic components and equipment, and also a switch to plastic cases that are increasingly being adopted as devices become smaller, this has also been accompanied by a deterioration in immunity to noise, including poorer shielding performance and greater sensitivity to radiated noise. A consequence of this is that there have been reports of EUTs malfunctioning due to radiated noise from the discharge gun.

There is a limit to how much radiated noise can be reduced by improvements to the discharge gun and accordingly a new function called the "Radiation Level Mode Selection Function" has been developed and incorporated into the electrostatic discharge simulator to reduce radiated noise.

The new Radiation Level Mode Selection Function effectively combines two types of electrostatic discharge simulator in the same unit, being able to select between its default setting of normal mode (NORMAL), which provides the same conditions as electrostatic discharge simulators that comply with the IEC 61000-4-2 and ISO 10605 standards (referred to below as "previous simulators"), and extra mode (EXTRA), which produces a lower level of radiation.

9-1. Points to Note When Using the Radiation Level Mode Function

Regardless of the radiation level mode, the simulator performs electrostatic discharge immunity tests that comply with the IEC 61000-4-2 and ISO 10605 standards. However, because the level of radiated noise from the discharge gun in extra mode (EXTRA) is lower than in the normal mode (NORMAL) used by previous simulators, results may differ from past tests. When using extra mode (EXTRA), please verify consistency with past test results.

Also, if performing tests using both radiation level modes, please record whether you used normal mode (NORMAL) or extra mode (EXTRA) in the test report or similar to ensure that you have sufficient information to reproduce the test.

9-2. Differences Between Normal Mode (NORMAL) and Extra Mode (EXTRA)

Although the simulator performs electrostatic discharge immunity tests that comply with the IEC 61000-4-2 and ISO 10605 standards regardless of the radiation level mode, there are differences between normal mode (NORMAL) and extra mode (EXTRA).

[1] Different level of radiated noise

The radiated noise in normal mode (NORMAL) is at a similar level to previous simulators.
The radiated noise in extra mode (EXTRA) is lower.

[2] Different voltage waveform

With IEC 61000-4-2 and ISO 10605 standards, there is the difference in the voltage waveform which does not have stipulation.

Conditions under which differences in waveform appear.

- Electrostatic discharge mode: Contact discharge
- The electrostatic discharge is applied to a point at which the impedance between the discharge tip and discharge gun GND is 2MΩ or more.

The figures below show the voltage waveforms when a 1000:1 high-voltage probe is connected to an oscilloscope, and where the impedance between the discharge tip and discharge gun GND is approximately 100MΩ.

ESS setting: +2kV, contact discharge, TC-815R discharge gun

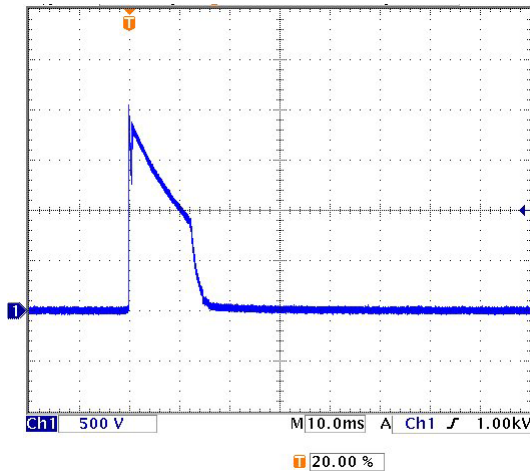


Figure 9-1 Normal Mode Voltage Waveform

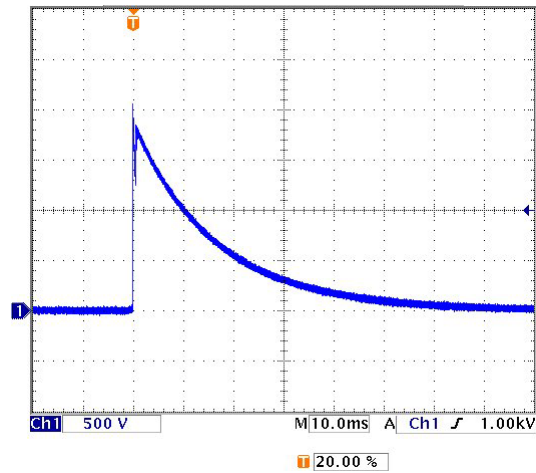


Figure 9-2 Extra Mode Voltage Waveform

9-3. How to Use the Radiation Level Modes

The radiation level modes are normal mode (NORMAL) [Switch LED turns on] and extra mode (EXTRA) [Switch LED turns off].

The simulator always starts up with the radiation level mode set to normal mode (NORMAL) when the POWER switch is turned on.

Also, the radiation level mode selection cannot be changed while the simulator is running.

The LED in the radiation level mode selection switch turns off to indicate that the simulator is in normal mode (NORMAL).

Normal mode (NORMAL) can be used to perform testing in the same way as previous simulators.

Note: The above does not guarantee that test results will be identical to those obtained from previous simulators.

Individual variability of the simulator and discharge gun will cause differences in the results.

9-4. How to Select Extra Mode (EXTRA)

If the radiation level mode selection switch is held down when the POWER switch is turned on, the simulator starts up in extra mode (EXTRA). (When the POWER switch is turned on normally, the simulator starts in normal mode (NORMAL).)

The radiation level mode selection cannot be changed while the simulator is running.

The LED in the radiation level mode selection switch turns on to indicate that the simulator is in extra mode (EXTRA).

Selecting extra mode (EXTRA) reduces the radiation from the discharge gun.

The minimum repeat cycle in extra mode (EXTRA) is restricted to 1.0s.

| Radiation Level Mode | LED in Radiation Level Mode Selection Switch | Minimum Repeat Cycle |
|----------------------|--|----------------------|
| Normal mode (NORMAL) | Off | 0.05s min |
| Extra mode (EXTRA) | On | 1.00s min |



Figure 9-3 Lower Section of Operation Panel (Front Panel)

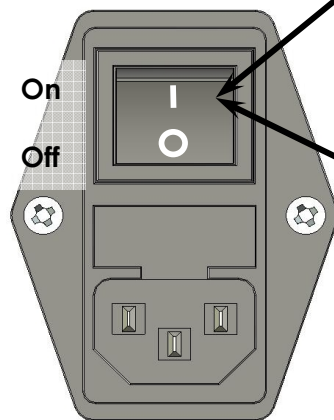


Figure 9-4 Power Switch (Rear Panel)

➤ **How to select extra mode (EXTRA)**
Holding down the EXTRA/NORMAL switch on the simulator when turning on the POWER switch starts the simulator in extra mode (EXTRA).

➤ **How to select normal mode (NORMAL)**
Turning on the POWER switch normally starts the simulator in normal mode (NORMAL).

10. CONNECTIONS

⚠ WARNING

- Turn the power switch to "Off" on the instrument before connecting or changing any of the cables
Failure to comply with this rule may result in electric shock, injury, or misoperation.
- Do not insert objects into the instrument and its connectors
Inserting metallic or flammable items into the ventilation slits, connectors, or other openings may result in fire, electric shock, or similar.

⚠ CAUTION

- Do not use the instrument with other than a recommended discharge gun
Using the instrument with other than a recommended discharge gun may result in poor operation and abnormal test results.
- Clean the high-voltage input and output connectors periodically
Allowing dust or dirt to accumulate between the high-voltage input connector and high-voltage output connector and absorb moisture may reduce the electrical insulation and result in fire.
Periodically unplug the AC plug from the mains socket, wait for five or more seconds, then unplug the high-voltage input connector from the high-voltage output connector and blow dehumidified air into the high-voltage output connector to clean out any dust or dirt.
Also clean off any dirt or dust on the high-voltage input connector using a dry cloth.
- Do not unplug the high-voltage input connector by pulling on the cable
Failure to comply with this rule may damage the cable, resulting in faults or fire.
Hold by the high-voltage connector when unplugging.
- Do not operate the instrument or insert or remove the AC plug or high-voltage input connector if you have wet hands.
Failure to comply with this rule may result in electric shock or faults.

10-1. Connecting the Discharge Gun

Align the groove on the high-voltage input connector from the discharge gun with the ridge on the high-voltage output connector on the main unit and insert. Rotate the securing ring on the high-voltage input connector from the discharge gun clockwise to secure in place.

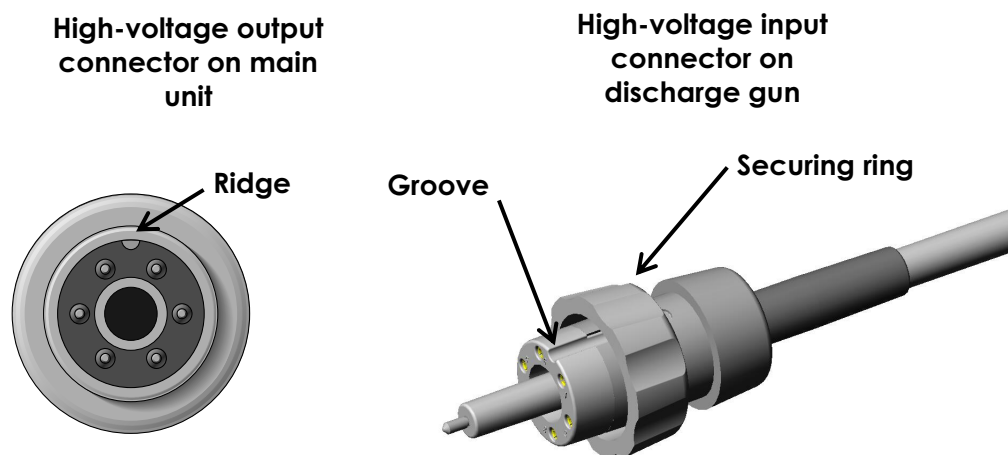


Figure 10-1 High-Voltage Output Connector

10-2. Connecting the AC Power Cable

⚠ WARNING

- **Plug the AC power cable into a socket that has a protective earth terminal**
The AC power cable provided with the instrument has a three-pin plug that connects to the power supply and protective earth terminal.
The protective earth on the three-pin plug connects via the AC power cable to the metal parts on the instrument.
Because this provides protection from electric shock, ensure that you plug the power supply cable into a socket that has a properly earthed protective earth terminal.
Using the instrument without a protective earth connection may result in electric shock.
- **Firmly insert the AC power cable plug into the socket**
Failing to fully insert the plug may result in heating or the build-up of dust leading to fire, electric shock, or similar.
Failing to fully insert the plug or plugging too many cables into the same power outlet may cause cables to overheat leading to fire, electric shock, or similar.
- **Do not use the AC power cable for any other purpose**
The supplied AC power cable is only intended for use with this instrument. Do not use it for any purpose other than this instrument. Use on any other electrical equipment risks overheating leading to fire, electric shock, or similar. Similarly, using an AC power cable from another electrical device may prevent the instrument from operating at its intended level of performance and may result in overheating if the current carrying capacity of the cable is insufficient, leading to fire, electric shock, or similar.

⚠ CAUTION

- **Clean the AC plug periodically**
Allowing dust or dirt to accumulate between the AC plug and socket and absorb moisture may reduce the electrical insulation and result in fire. Periodically unplug the AC plug from the mains socket and clean off any dirt or dust using a dry cloth.
- **Do not operate the instrument or insert or remove the AC plug if you have wet hands**
Failure to comply with this rule may result in electric shock or faults.

An AC power cable with a three-pin plug is provided with the simulator to connect to the mains power supply and protective earth.

The protective earth on the three-pin plug connects via the AC power cable to the metal parts on the simulator.

Because this provides protection from electric shock, ensure that you plug the power supply cable into a socket that has a properly earthed protective earth terminal.

Using the instrument without a protective earth connection may result in electric shock.

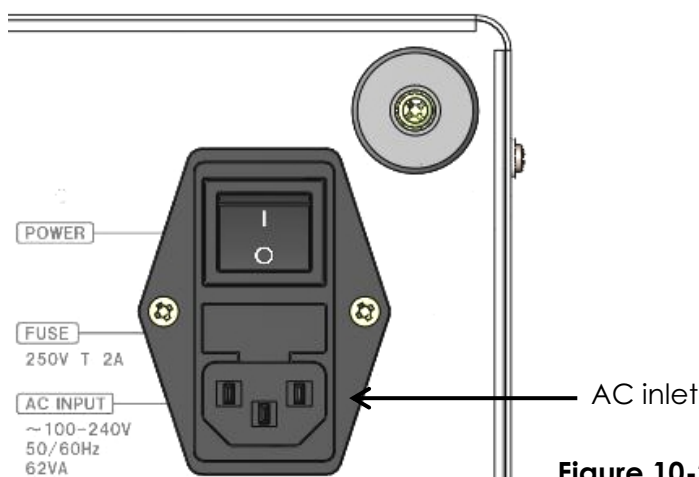


Figure 10-2 AC Inlet on Rear of Unit

11. OPERATION

11-1. Turning the Power On or Off

Press the "I" side of the power switch on the rear of the simulator to turn on the power. This lights up the operation panel display. Press the "O" side of the power switch to turn off the power and the operation panel display.

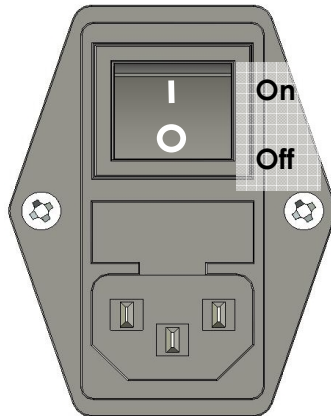


Figure 11-1 Power Switch

11-2. Test Condition Settings

11-2-1. Output Polarity and VOLTAGE Setting

The output polarity setting specifies the polarity for electrostatic discharging and the VOLTAGE setting specifies the voltage for electrostatic discharging. This voltage is displayed in the VOLTAGE display.

The setting range is 0.20kV to 30.5kV and the voltage can be set in 0.05kV steps up to 1.0kV and in 0.1kV steps above 1.0kV.

[1] Output polarity selection

Press the output polarity selection switch to select the polarity.

The selected polarity is indicated as either "+" or "-".

The polarity cannot be changed when the START button is pressed.

* **Figure 11-2 Top Part of Operation Panel shows both "+" and "-" but in practice only the selected polarity is displayed.**

[2] VOLTAGE setting

Press the SELECT switch until the VOLTAGE display starts blinking to indicate that the setting value can be changed.

Use the ▼ and ▲ switches to increase or decrease the VOLTAGE setting.

Pressing the ▼ down switch decreases the setting and pressing the ▲ up switch increases the setting.

Holding down either switch for a longer time (1s or more) increases the speed at which the setting value changes.

The VOLTAGE setting can also be changed when the START button is pressed.

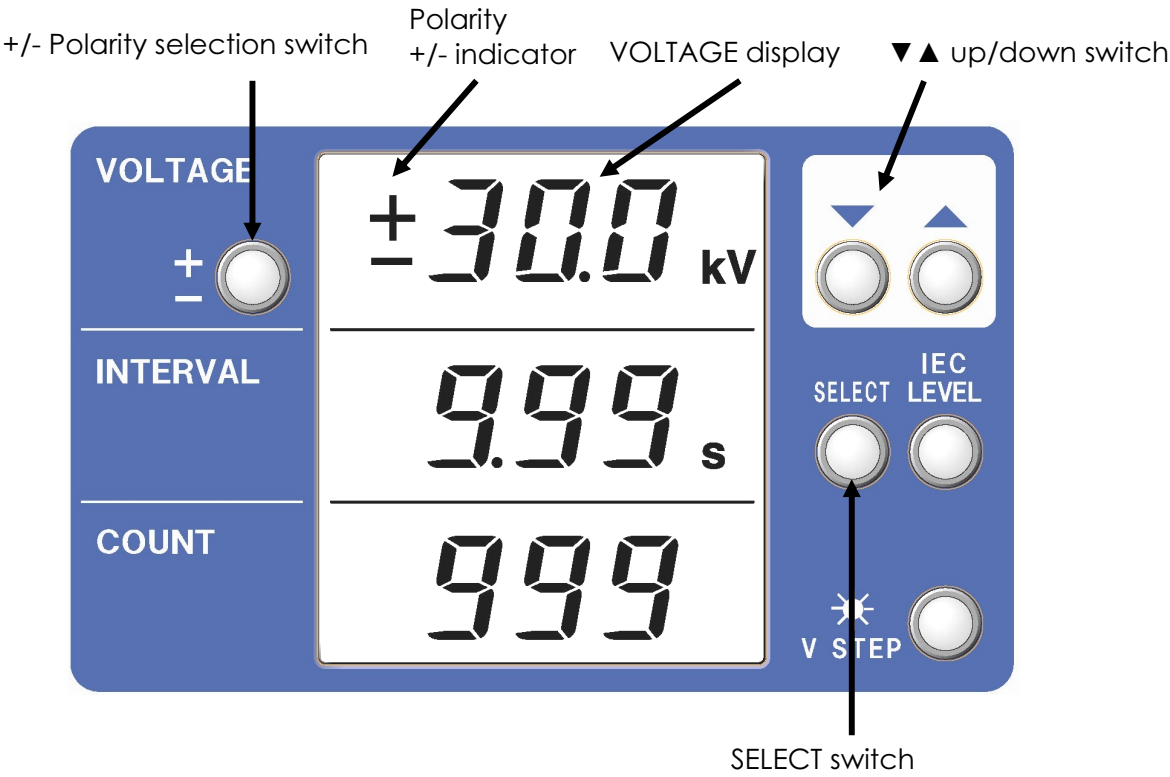


Figure 11-2 Top Part of Operation Panel

11-2-2. INTERVAL Setting

The INTERVAL setting specifies the repeat interval for the electrostatic discharge. The setting is displayed in the INTERVAL display.

The setting range when the electrostatic discharge mode selection switch is set to contact discharge mode (CONTACT) [switch LED on] is 0.05s to 9.99s in 0.01s steps.

However, the INTERVAL setting range is different depending on the radiation level mode selection switch setting, as shown in the table below.

| Electrostatic discharge mode selection switch | EXTRA/NORMAL Radiation level mode selection switch | INTERVAL setting |
|---|---|-----------------------|
| Contact discharge mode (CONTACT) | NORMAL | 0.05s to 9.99s |
| | EXTRA | 1s to 9.99s |
| Air discharge mode (AIR) | EXTRA/NORMAL | Setting not available |

As air discharge mode (AIR) performs a discharge each time the trigger is pulled, the INTERVAL setting is not applicable in this mode.

In this case, "--" appears in the INTERVAL display.

Press the SELECT switch until the INTERVAL display starts blinking to indicate that the setting value can be changed.

Use the ▼ and ▲ switches to increase or decrease the INTERVAL setting.

Pressing the ▼ down switch decreases the setting and pressing the ▲ up switch increases the setting.

Holding down either switch for a longer time (1s or more) increases the speed at which the setting value changes.

The INTERVAL setting cannot be changed when the START button is pressed.

When you press START => TRIGGER, the INTERVAL setting starts to count down after the first discharge.

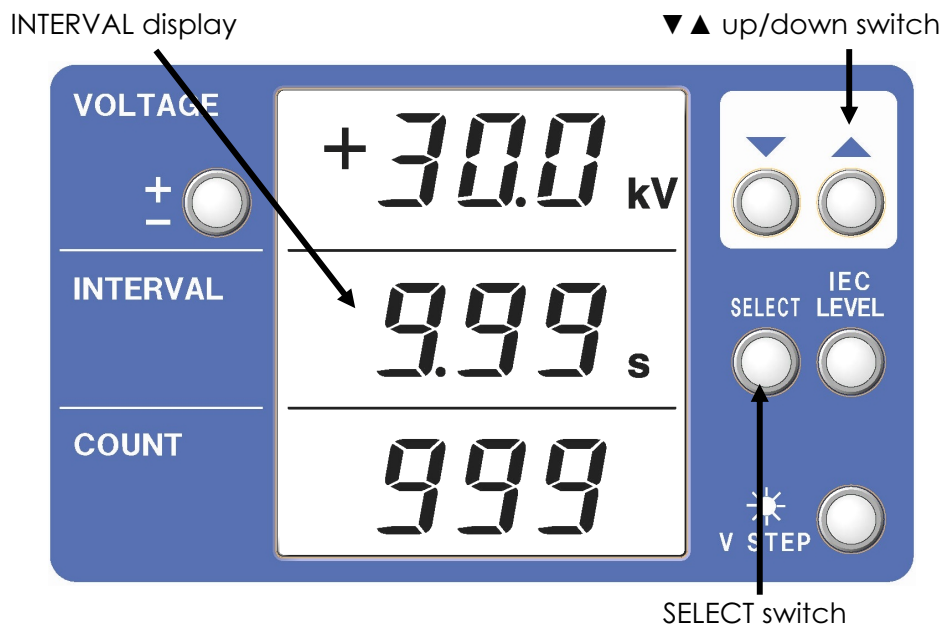


Figure 11-3 Top Part of Operation Panel

11-2-3. COUNT Setting

The COUNT setting specifies the number of electrostatic discharges. The setting is displayed on the COUNT display.

The setting range is 1 to 999 in steps of 1. Continuous discharge can also be selected.

Press the SELECT switch until the COUNT display starts blinking to indicate that the setting value can be changed.

Use the ▼ and ▲ switches to increase or decrease the COUNT setting.

Pressing the ▼ down switch decreases the setting and pressing the ▲ up switch increases the setting.

Holding down either switch for a longer time (1s or more) increases the speed at which the setting value changes.

To select continuous discharge, keep pressing the ▼ down switch until you pass the minimum setting. "Cnt" (abbreviation for CONTINUE) appears on the COUNT display when continuous discharge is selected.

The COUNT setting cannot be changed when the START button is pressed.

When you press START => TRIGGER, the COUNT display starts to count up from 1.

A buzzer sounds twice when the number of discharges specified in the COUNT setting has been reached to indicate that the test is finished and the simulator goes to standby until the next TRIGGER.

To temporarily pause electrostatic discharge, press the TRIGGER switch.

To halt electrostatic discharge, press the STOP switch.

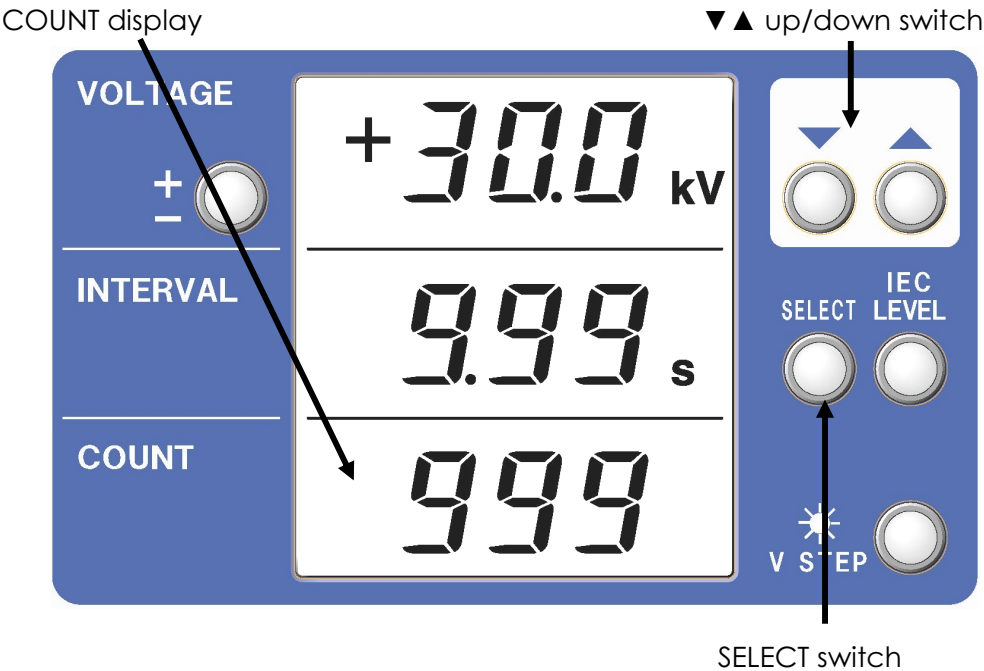


Figure 11-4 Top Part of Operation Panel

11-2-4. IEC LEVEL Selection Switch

The IEC LEVEL selection switch changes the VOLTAGE setting values to the voltages specified by the IEC61000-4-2 standard. The voltage setting is displayed on the VOLTAGE display.

| Electrostatic discharge mode selection switch | Voltages specified in IEC61000-4-2 standard |
|---|---|
| Contact discharge mode (CONTACT) | 2.0kV, 4.0kV, 6.0kV, 8.0kV |
| Air discharge mode (AIR) | 2.0kV, 4.0kV, 8.0kV, 15.0kV |

Pressing the IEC LEVEL selection switch changes the voltage steps to the IEC61000-4-2 standard voltages listed above. The IEC LEVEL selection can also be specified when the START button is pressed.

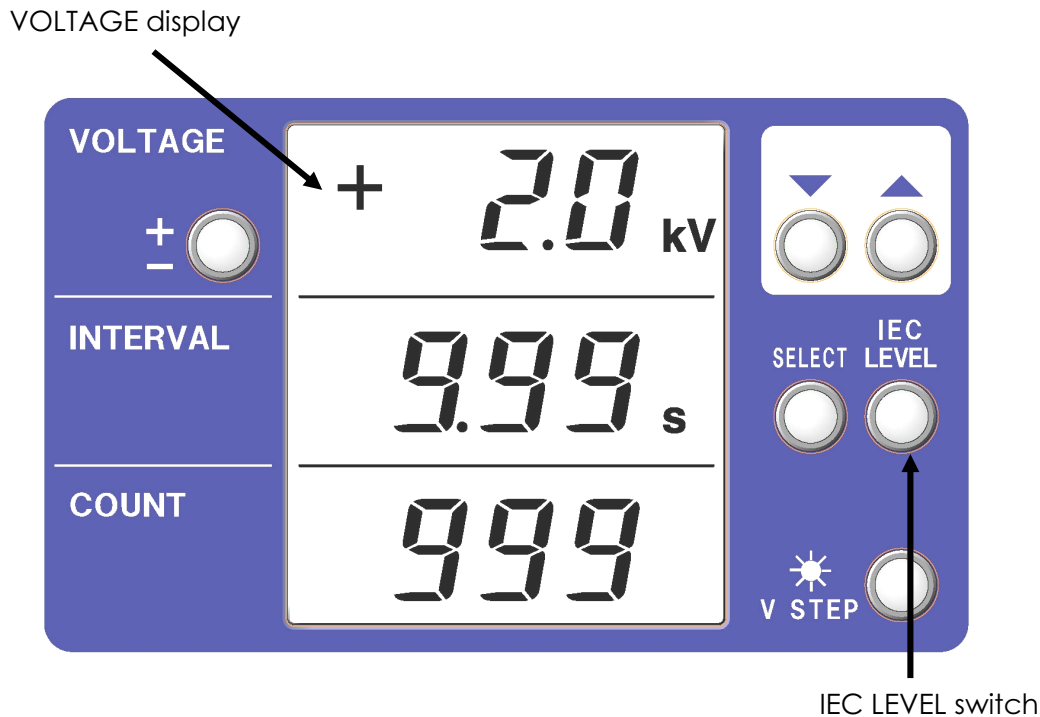


Figure 11-5 Top Part of Operation Panel

11-2-5. V STEP Setting

The V STEP setting can be used to specify the up/down steps for the VOLTAGE setting. The setting range is 0.00 to 10.0kV in 0.05kV steps up to 1.0kV and in 0.1kV steps above 1.0kV.

The V STEP switch LED illuminates to indicate when a user-specified V STEP setting is specified for the VOLTAGE setting increment and turns off when the default voltage steps are specified.

Setting V STEP to 0.00kV disables the V STEP function. In this case, the LED remains off (function disabled) even when the V STEP switch is pressed.

Note

As the value displayed in the VOLTAGE display increments and decrements with the step size specified by the V STEP setting, set or enable the V STEP function after first setting the VOLTAGE.

The up/down steps cannot exceed the VOLTAGE setting range (0.20 to 30.5kV).

The full VOLTAGE setting range may not be available, depending on the V STEP setting.

If a V STEP setting of 0.1kV or less is specified, the VOLTAGE setting value will increment or decrement in 0.1kV steps for settings above 1.0kV.

Holding down the V STEP switch (for 1s or more) changes the VOLTAGE display to show the V STEP setting and allows you to change the setting.

Use the ▼ and ▲ switches to increase or decrease the V STEP setting.

Pressing the ▼ down switch decreases the setting and pressing the ▲ up switch increases the setting.

Holding down either switch for a longer time (1s or more) increases the speed at which the setting value changes.

Pressing the V STEP switch again sets the displayed V STEP setting and illuminates the V STEP switch LED.

Once a V STEP setting has been specified, pressing the V STEP switch toggles the V STEP function on and off and turns the V STEP switch LED on or off to indicate whether the function is enabled.

The V STEP setting cannot be modified when the START button is pressed.

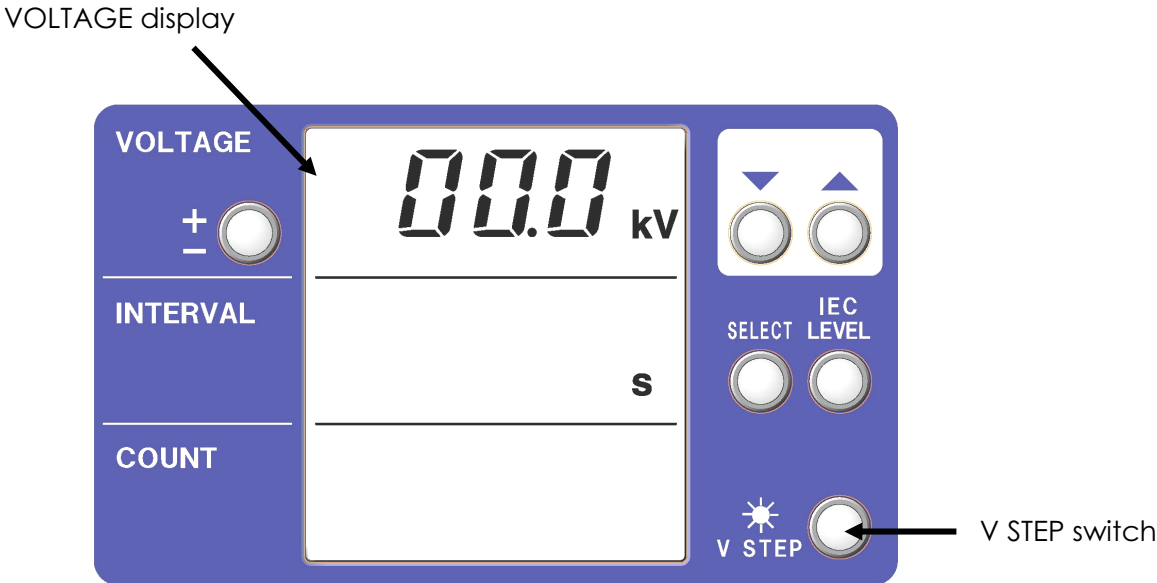


Figure 11-6 Top Part of Operation Panel

11-2-6. CONTACT/AIR Setting

The CONTACT/AIR setting selects the electrostatic discharge mode. The available modes are contact discharge mode (CONTACT) and air discharge mode (AIR). Pressing the CONTACT/AIR switch toggles the setting between contact discharge mode (CONTACT) [switch LED on] and air discharge mode (AIR) [switch LED off].

| CONTACT/AIR switch LED | CONTACT/AIR setting |
|------------------------|---------------------------------------|
| Switch LED on | Contact discharge mode (CONTACT) test |
| Switch LED off | Air discharge mode (AIR) test |

In air discharge mode (AIR), the relay in the discharge gun stays on while the trigger switch is pressed which charges the discharge tip. Releasing the trigger switch turns the relay off.



Figure 11-7 Bottom Part of Operation Panel

CONTACT/AIR switch

11-2-7. TRIGGER Setting

The TRIGGER setting specifies the trigger mode setting for electrostatic discharging. The available modes are CONTROLLER (main unit trigger mode) and GUN (discharge gun trigger mode).

Pressing the TRIGGER switch toggles the setting between CONTROLLER (main unit trigger mode) [switch LED on] and GUN (discharge gun trigger mode) [switch LED off]. The TRIGGER switch LED blinks if a test is started with CONTROLLER (main unit trigger mode) set. In this case, the TRIGGER switch acts to start or pause electrostatic discharging. The TRIGGER setting cannot be changed when the START button is pressed.

| TRIGGER switch LED | CONTROLLER/GUN setting |
|--------------------|-------------------------------------|
| Switch LED on | CONTROLLER (main unit trigger mode) |
| Switch LED off | GUN (discharge gun trigger mode) |

(1) Operation in CONTROLLER mode (main unit trigger mode)

Pressing the START switch to start a test causes the TRIGGER switch on the simulator to start blinking indicating that it can be used to start and pause electrostatic discharging.

In contact discharge mode (CONTACT), pressing the TRIGGER switch once starts electrostatic discharging in accordance with the specified settings.

Pressing the TRIGGER switch again alternately pauses and restarts operation.

In air discharge mode (AIR), electrostatic discharging operates continuously while the TRIGGER switch is pressed.

The trigger switch on the discharge gun has no effect when CONTROLLER mode (main unit trigger mode) is set.

(2) Operation in GUN mode (discharge gun trigger mode)

Pressing the START switch to start a test enables the trigger switch on the discharge gun to be used to start and pause electrostatic discharging.

In contact discharge mode (CONTACT), pressing the trigger switch once starts electrostatic discharging in accordance with the specified settings.

Pressing the trigger switch again alternately pauses and restarts operation.

In air discharge mode (AIR), electrostatic discharging operates continuously while the trigger switch is pressed.

The trigger switch on the main unit has no effect when GUN mode (discharge gun trigger mode) is set.

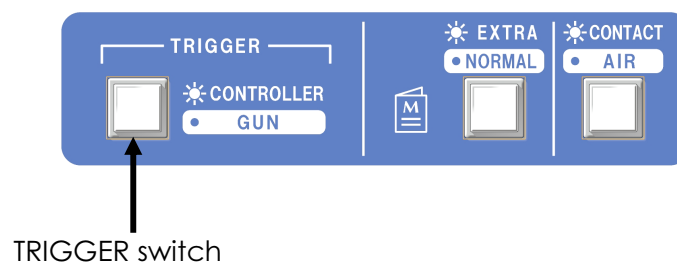


Figure 11-8 Bottom Part of Operation Panel

11-3. Starting and Stopping a Test

11-3-1. Starting a Test



Warning

- Before you start, check that the discharge gun is connected.
- Starting a test will generate the indicated voltage. Take adequate precautions.
- Take care to ensure there are no other people close to the discharge gun or simulator, and that all necessary preparation for the discharge test has been carried out.

After specifying the settings, press the START switch to start the test.

The warning lamp illuminates to indicate that a voltage is being output from the high-voltage output connector to charge the charging capacitor in the discharge gun.

The warning lamp starts to blink when you press the trigger switch to perform an electrostatic discharge.

11-3-2. Stopping a Test



Warning

- As the simulator waits for the next trigger input after the specified number of discharges have been performed, the high-voltage power supply in the simulator does not turn off. Always press the STOP switch to end the test.

Press the STOP switch (red).

This stops the test, turns off the voltage output, and extinguishes the warning lamp.



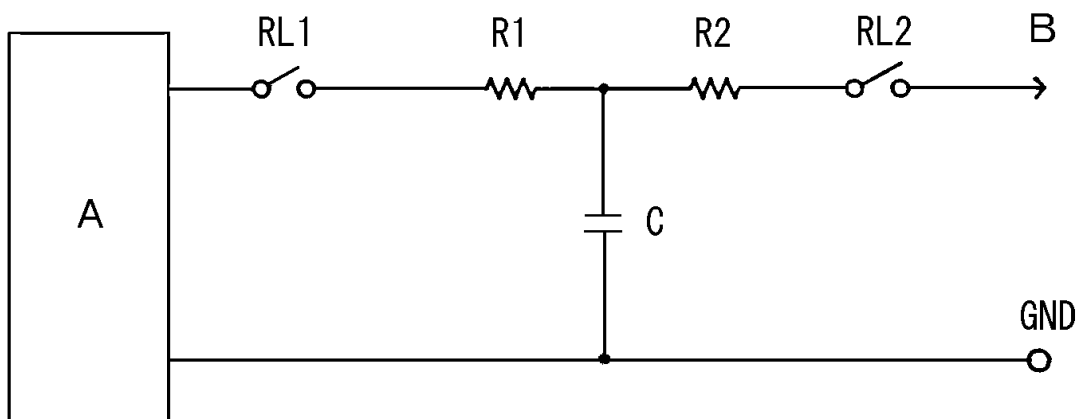
Figure 11-9 Operation Panel START and STOP Controls

12. BACKGROUND KNOWLEDGE ABOUT ELECTROSTATIC TESTING

1) Principle of electrostatic tester

The basic circuit of an electrostatic is shown below.

The high voltage generated in the high voltage power supply is charged in the charging capacitor through the charging relay and charging resistance. When the charging relay is turned off and the discharging relay is turned on, the high voltage (electric charge) accumulated in the charging capacitor is applied to EUT through the discharging resistance.



RL1 : Charging relay

RL2 : Discharging relay

R1 : Charging resistor

R2 : Discharging resistor

C : Charge/discharge capacitor

A : High-voltage power supply

B : Discharge tip

**Figure 12-1 Basic Circuit for an Electrostatic Discharge Simulator
(From IEC 61000-4-2 Standard)**

2) Electrostatic test by IEC standards

The international Electrotechnical Commission (IEC) issued the Standards for Electrostatic Discharge Requirements Pub. 61000-4-2, which defined tester circuits and constants, discharge current waveforms, test voltage levels, test environments, etc. A combination of the ESS-2000 and discharge gun can be used for electrostatic discharge tests conforming to IEC pub. 61000-4-2.

3) Contact Discharge and Air Discharge

The electrostatic discharge can be applied either by direct contact (CONTACT) or via the air (AIR). The test procedure and electrostatic simulator operation are different in each case, as described below. The effect on the EUT is also different.

- Contact discharge (CONTACT)

The electrostatic discharge is applied by placing the discharge tip in direct contact with the case of the EUT (if the case is painted, the paint is peeled off to allow contact).

Coupling between the internal circuits and the discharge current that flows through the case of the EUT causes the EUT to malfunction. Because the discharge contacts the EUT directly, this method of testing has a comparatively good level of repeatability.

The test uses a cone-shaped discharge tip that extends out from the end of the discharge gun.

After bringing the discharge gun into contact with the measurement point on the EUT, the trigger is input to apply the specified number of discharges to the EUT at the specified time intervals. The charging relay and discharge relay turn on and off in tandem to alternately charge the charge/discharge capacitor and then discharge it into the EUT. Discharging can be paused by inputting another trigger while discharge is in progress.

- Air discharge (AIR)

In the IEC standard, this method is used in situations when contact discharge is not practical (when it is stipulated that an insulating coating is applied or the EUT case is made of an insulator).

In this method, the discharge gun uses a discharge tip with circular shape.

Turn on the trigger with the discharge gun held away from the EUT and then as rapidly as possible bring the discharge tip closer until it comes into contact with the EUT. After the discharge occurs, pull the discharge tip (discharge gun) back away from the EUT and turn off the trigger. To perform another discharge, turn the trigger on again and repeat the above procedure.

The simulator allows air discharge or contact discharge to be selected for each test item. As described above, the difference between the two modes is in the different operation of the charging and discharging relays and the use of the trigger switch. Also, the discharge interval setting is not applicable when using air discharge mode.

4) Test Procedure for Electrostatic Testing

Electrostatic testing must be performed under specific conditions including factors such as the ground plane and coupling plane. Refer to the "IEC61000-4-2" standard published by the IEC for details.

13. ERROR DISPLAY

| Err 1 | |
|----------------------|---|
| Description of error | The discharge gun is not connected. Interlock error |
| How to clear error | Press the STOP switch. |
| How to prevent error | Insert the high-voltage input connector of the discharge gun into the high-voltage output connector on the main unit of the simulator. Rotate the securing ring on the high-voltage input connector of the discharge gun clockwise to secure in place. (See "10. CONNECTIONS") |
| Err 2 | |
| Description of error | The secondary battery used for memory backup is flat. |
| How to clear error | Press the STOP switch. |
| How to prevent error | Turn on the power to the simulator for approximate 24 hours to allow the battery to recharge. If Err 2 continues to appear even after recharging, the cause may be deterioration of the secondary battery. In this case, please contact your sales agent or the Noise Laboratory repair and calibration center to arrange replacement. (See "7. POINTS TO NOTE REGARDING CONSUMABLE ITEMS") |
| Err 3 | |
| Description of error | With mounting the discharge gun on the probe stand, START switch was pressed when the gun trigger was selected as trigger mode. The trigger was input before the high voltage power supply was not ready. |
| How to clear error | Press the STOP switch. |
| How to prevent error | In case the discharge gun is mounted on the probe stand, select the main unit trigger as the trigger mode (Refer to 11-2-7. TRIGGER setting). In case not using the probe stand, press the trigger switch after confirming illuminating of the warning lamp. |

14. SPECIFICATIONS

Simulator (ESS-2002EX)

| Parameter | | Function/Performance |
|--------------------------------|---------------------------|---|
| Output polarity | | Positive or negative |
| Output voltage | | 0.20kV to 30.0kV (30.5kVmax) 0.2kV to 1.0kV: 0.05kV step setting 1.0kV to 30.0kV: 0.1kV step setting |
| Tolerance | | 0.20kV to 1.9kV $\pm 10\%$ 2.0kV to 30.0kV $\pm 5\%$ |
| Repeat cycle [INTERVAL] | | Normal mode (NORMAL): 0.05s to 9.99s $\pm 10\%$ Extra mode (EXTRA): 1.00s to 9.99s $\pm 10\%$ 0.01s step setting |
| No. of discharges [COUNT] | | 1 to 999 times set in increments of 1, or continuous discharge |
| Electrostatic discharge mode | | Contact discharge mode (CONTACT) or air discharge mode (AIR) |
| Radiation level mode | | Normal mode (NORMAL) or extra mode (EXTRA) |
| Trigger mode | | Gun trigger or controller trigger |
| Voltage selection function | IEC LEVEL selection | Contact discharge mode: 2.0kV, 4.0kV, 6.0kV, and 8.0kV step settings Air discharge mode: 2.0kV, 4.0kV, 8.0kV, and 15.0kV step settings |
| | V STEP selection (Manual) | User specified from 0.00kV to 10kV 0.2kV to 1.0kV: Set in 0.05kV steps 1.0kV to 30.0kV: Set in 0.1kV steps |
| Warning lamp | | Turns on when a voltage is output from the high-voltage output connector Blinks when electrostatic discharging starts |
| Recommended discharge guns | | TC-815R, TC-815ISO |
| Charging resistor in simulator | | 10M Ω (Combined with the 43M Ω resistor in the discharge gun, this gives a total of 53M Ω) |

| | |
|-----------------------------|---|
| Mains power supply | AC100V to AC240V $\pm 10\%$, 50Hz/60Hz |
| Power consumption | 62VA |
| Operating temperature range | +15°C to +35°C |
| Operating humidity range | 25%RH to 75%RH (no condensation) |
| Storage temperature range | -10°C to +50°C |
| Storage humidity range | 0%RH to 85%RH (no condensation) |
| External dimensions (mm) | (W)345mm x (H)225mm x (D)243mm |
| Weight | 4.6kg (approx.) |

* No remote control function is available.

15. WARRANTY

Servicing terms

The following terms are applicable to servicing by Noise Laboratory Co., Ltd., (hereafter referred to as the Company) provided to maintain the intended performance of its products.

1. Scope

The following terms shall apply only to products made by the Company.

2. Technical servicing fee

In the event of a failure of a product within the warranty period (see warranty section), the Company will repair a product without charge. After the warranty expires, repairs will be billed at a nominal cost.

3. Ownership of replacement parts

Any faulty parts replaced in the course of repair services shall belong to the Company. In the case when repairs are billed to the customer, replaced faulty parts will be retained by the Company unless other arrangements are made.

4. Limited liability

In the event that damages resulting from servicing by the Company are intentional or caused by negligence, the Company will pay the cost but at the purchase value of the relevant product maximum. But, notwithstanding the foregoing, the Company shall not be responsible for any incidental or consequential damages of any nature, including without limitation thereof loss of would-be profit or compensation demanded from a third party.

5. Incorrect parts, missing parts, and damage

In the event that the Company's product purchased by the customer has incorrect parts, missing parts, or is damaged, such that the product is not able to be used, the Company accepts no liability for any losses incurred by the customer that relate to lost earnings, commercial losses, other secondary losses, special losses, or indirect or punitive losses. Nor is any liability accepted for any losses resulting from a responsibility of the customer to compensate any third party.

6. Refusal to provide repair services

The company may not accept a repair order in the following cases:

- More than 5 years have passed since the product discontinued
- More than 8 years have passed after delivery
- Required component for servicing already discontinued and no alternative is available.
- Product changed, repaired or remodeled without obtaining a prior permission from the Company.
- Product severely damaged to the extent it has lost its original form

Limited Warranty

Noise Laboratory Co., Ltd. (hereafter referred to as the Company) warrants its products to be free from defects in materials and workmanship under normal use and service for a period of one year from date of delivery. In the event of failure of a product covered by this warranty, the Company will repair the product or may, at its option, replace it in lieu of repair without charge.

Notwithstanding the foregoing, the Company shall not be responsible for any incidental or consequential damages of any nature, including without limitation thereof loss of would-be profit or compensation demanded from a third party. This warranty is valid only in Japan.

1. Scope

This warranty shall only apply to products made by the Company.

2. Period

One year from date of delivery. The warranty may be valid in 6 months after servicing if the same failure on the same component has repeated.

3. Exclusions

The followings are exclusions from this warranty:

- ✧ Consumable parts (including mercury relay, HV relay, coaxial cable, coaxial connector, automatic switch, and contactor).
- ✧ Failure caused by misuse, neglect, accident or abnormal conditions of operation.
- ✧ Failure caused by remodeling on the user side without prior permission from the Company.
- ✧ Failure caused by servicing by unauthorized personnel by the Company
- ✧ Failure due to fore majeure including but not limited to, acts of God, fire, war, riot, rebellion and others.
- ✧ Failure due to shock or drop in or after transit.
- ✧ Failure due to operation in environment being out of ambient specifications.
- ✧ A unit shipped to overseas.

16. MAINTENANCE

1. When repair, maintenance or internal adjustment of the unit is required, a qualified service engineer takes charge of such work.
2. Maintenance on the user side is restricted to the outside cleaning and functional check of the unit.
3. When checking or replacing the fuse, turn off the switch of the unit and disconnect the plug socket beforehand.
4. When cleaning the unit, turn off the switch of this unit and the connected equipment and disconnect the plug socket beforehand.
5. Avoid using chemicals for cleaning. Otherwise, the coating of the unit may peel off or the sight glass may be broken.
6. Do not open the cover of this unit.

17. CONTACTING TECHNICAL SUPPORT

- If you experience a malfunction, please have available both the model and serial number of your unit and contact the nearest distributor/agent or Noise Laboratory Technical Support.
- When it is necessary to send your unit back to Noise Laboratory, fill in the repair order form completely, pack the unit in the original package or equivalent one suitable for transit, and send the package.

Repair and Calibration Center

TEL (0088)25-3939 (toll free) / (042)712-2021
FAX (042)712-2020

Produced by: Noise Laboratory Co., Ltd.
1-4-4, Chiyoda, Chuo-ku, Sagamihara City, Kanagawa Pref., 252-0237, Japan
TEL 042-712-2031 FAX 042-712-2030

Documents with missing or incorrectly bound pages will be replaced
PRINTED IN JAPAN