NoiseKen

INSTRUCTION MANUAL

ELECTROSTATIC DISCHARGE SIMULATOR

MODEL ESS-S3011A

- Thank you very much for your purchasing this instrument.
- This instrument generates high voltage.
  Since failure to follow instructions for handling this instrument may cause an electric shock or other kinds of accidents, please be careful for safety in handling this instrument.
- Please read this booklet carefully, understand its content well to use this instrument safely and properly, and keep it by your side or other proper location so that it may be always readily available.

NOISE LABORATORY CO., LTD.

Edition 2.00
AEC00313-00E-1

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1. 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)**
  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**
  The medical device may malfunction since the instrument emits more electromagnetic wave than the regulated value.

- **Do not use the instrument for any purposes other than the EMC testing purposes described in this instruction manual**.
  The instrument is not supposed to be used in manufacturing process of a factory.

- **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.

- **The supplied AC power cable of the instrument is intended only for Japan and North America.**
  In case of using the instrument in other countries than the above, use an AC power cable that is certified for use under the safety rules of the country in which the instrument is being used.

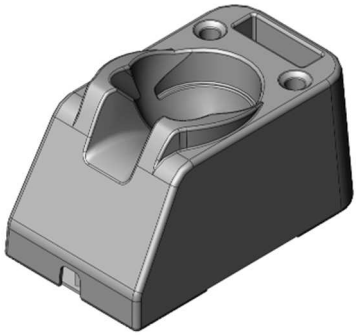
Before setting up the test site, connecting the equipment, or starting testing, please read the Chapter entitled "Basic Safety Precautions for the Safe Use of the Simulator" which contains additional safety advice.

2. CHECK PACKAGE CONTENTS

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

A

B



C

D

E

F

Item	Quantity
A: Main unit	1
B: Gun holder	1
C: Gun holder mounting plate	1
D: Gun holder mounting screws	6
E: AC power cable	1
F: Instruction Manual (this document)	1

3. APPLICATION FORM FOR INSTRUCTION MANUAL

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

We place an order for an instruction manual.

Model Name	ESS-S3011A
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.

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Cut Line

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5. PREFACE

We thank you very much for your purchase of the Computer-controlled Electrostatic Discharge Simulator Model: ESS-S3011A. 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 discharge simulator (Model ESS-S3011A).**
- **For ESD testing, the discharge gun (sold separately) is necessary. The complied standards depend on the connected discharge gun. ➔See <u>5-2. Function Restrictions and Compliance Standards by Combinations with Discharge Gun.</u>**
- **Keep this Instruction Manual by your side or other proper location so that it may be readily available when using the ESS-S3011A.**

5-1. Features

Compliant with IEC 61000-4-2 (Edition 2.0 2008)

- The electrostatic discharge immunity test defined in IEC 61000-4-2 (Edition 2.0 2008) can be performed by connecting the optionally available electrostatic discharge gun GT-30R/. GT-30RA NoiseKen's existing discharge gun TC-815R & TC-815S can also be connected.

Compliant with ISO 10605 (2nd Edition 2008)

- The electrostatic discharge immunity test defined in ISO 10605 (2nd Edition 2008) can be performed by attaching the accessary specified by NoiseKen to the optionally available electrostatic discharge gun GT-30R/ GT-30R.
- NoiseKen's existing discharge gun TC-815-330/2k & TC-815S-330/2k can also be connected.

Highly operable front panel

- The display panel is equipped with color LCD.
- Sloping front panel provides easy operation even when placed on the floor.
- The numeric keypad and rotary knob allow the user to set test conditions with ease.

A variety of functions to support testing

- "IEC STANDARD" mode allows the user to set the test levels specified in the standards easily.
- "MANUAL" mode allows the user to set test conditions freely.
- "SEQUENCE" mode allows the user to combine freely-created test condition units and test them in order.
- It provides the sweep function that enables test parameters to be changed in stages.
- Remote control from a PC through optical communications is possible. (The optical I/F unit is optional.)
- The upper limit of the voltage setting can be restricted by the user.
- A discharge detection function is provided to detect the actual discharge and notify the user (in air discharge mode only).
- A pre-check function is provided to enable operational inspection prior to the test.
- An automatic recognition function is provided to prevent an erroneous combination of the CR unit and discharge cup.
- An infrared remote controller is available (Optional).

5-2. Function Restrictions and Compliance Standards by Combinations with Discharge Gun

This instrument is a power supply/control unit used to perform electrostatic tests. The standard with which it complies differs depending on the discharge gun used in the combination with it.
Also, the requirements for the CR value and discharge current waveform vary, depending on the standard. To comply with each standard, an optionally available CR unit and discharge cup must be combined appropriately.
The following table shows the compliable standard for each discharge gun model.

○: Standard complied with in its normal configuration
△: Standard that can be complied with by using an optionally available CR unit and discharge cup
×: Standard that cannot be complied with even by combining optionally available components

Discharge gun model		IEC 61000-4-2		ISO 10605		Functional restriction on this instrument
		1.2	2.0	1st	2nd	
Current Model	**GT-30R / GT-30RA**	○	○	△	△	**No functional restrictions**
	GT-30R330	○	○	△	○	
	GT-30R2K / GT-30R2KA	△	△	○	○	
Previous Model	TC-815P	○	○	×	×	**The following functions are not available.** ・Discharge detection ・Pre-check ・Discharge gun LED light ・CR & cup combination recognition
	TC-815R	○	○	△	×	
	TC-815S	○	○	△	×	
	TC-815ISO	△	△	○	×	
	TC-815-330	×	○	△	○	
	TC-815S-330	×	○	△	○	
	TC-815-2k	×	△	○	○	
	TC-815S-2k	×	△	○	○	

※Complied standard in inspection on shipment
When this simulator is shipped out, it is inspected with the standard indicated as below depending on the discharge gun whch is shipped with the simulator.

Discharge gun model	Complied standard in inspection on shipment
GT-30R / GT-30R	IEC 61000-4-2 Ed.2
GT-30R330	ISO 10605 2nd
GT-30R2K / GT-30R2KA	ISO 10605 2nd

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 damage to property 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 levels of injury or damage that may result if the instrument is used incorrectly in a way that ignores the associated precautions with dividing them into three levels.

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

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

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

◆ The following symbols are indicated on 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.
 WARNING TO REDUCE THE RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.	Indicates a warning, a risk of electric shock, that caution is required, and that you should refer to the instruction manual. Warning text Do not remove the cover because of the risk of electric shock.
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.	Warning relating to the use of the instrument Noise Laboratory Co., Ltd. accepts no liability for damage resulting from misuse of the instrument.

6-2. DANGER Alerts

⚠ DANGER

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 since a high voltage power supply is built in the instrument.
  For inspection or repair of internal components, please contact your sales agent or the Noise Laboratory repair and calibration center. ➔ See **30. CONTACTING TECHNICAL SUPPORT**.

6-3. WARNING Alerts

⚠WARNING

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. ➔ See **30. CONTACTING TECHNICAL SUPPORT**.
  Repairing the instrument yourself is dangerous and should never be attempted.

Safety Rule

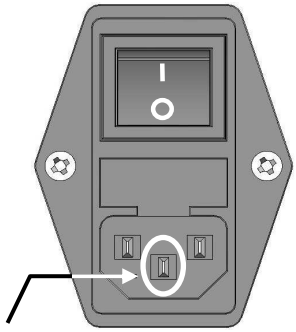
- **Turn the power switch to "Off" on the instrument before connecting or changing any of the cables**
  Failure to comply with this rule may result in electric shock or misoperation.

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 or instability of the simulator.
- **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.
  Plugging too many cables into the same power outlet may also 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.



Protective earth

Figure 6.1 AC inlet

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 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 use the 【PRE CHECK】 terminal for any purpose other than pre-check.**

- **Do not use the damaged 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 excessively
  - ❍ 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

⚠ CAUTION

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. Clean them periodically with following procedures.
  1) Unplug the AC plug from the mains socket and wait for five or more seconds.
  2) Unplug the high voltage input connector from the high voltage output connector.
  3) Blow dehumidified air into the high voltage output connector to clean out any dust or dirt.
  4) Clean off dust or dirt on the high voltage input connector using dry cloth.
  5) Before connecting again, confirm no alien substance on the connectors.

- **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. ➔ See **30. CONTACTING TECHNICAL SUPPORT**.

Prohibited

- **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. ➔ See **5-2. Function Restrictions and Compliance Standards by Combinations with Discharge Gun.**

- **Do not apply static electricity to the instrument itself intentionally**
  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 the followings are exclusions from the warranty policy.**

- ☐ **Deterioration of consumables**
- ☐ **Faults caused by misuse, neglect, accident, or so on on the user side**
- ☐ **Faults caused by damage of the EUT or other peripheral equipment**

And, besides, Noise Laboratory and its sales agents accept no liability for any compensation for losses or similar, or damage to the EUT (Equipment Under Test) or other peripheral equipment, which occurred as the result of ESD testing.

7. POINTS TO NOTE REGARDING CONSUMABLES ITEMS

- **High-Voltage Relay**
  - ❍ The high-voltage relays contained in the main unit and in the discharge gun are consumable items.
  - ❍ Their useful life varies depending on the use conditions and environment.
    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 as followings, the cause may be deterioration of a high-voltage relay.
    1) Unable to apply a static discharge after starting a test
    2) A static discharge occurs as soon as a high voltage is output
    In this case, please contact your sales agent or the Noise Laboratory repair and calibration center. ➔ See **30. CONTACTING TECHNICAL SUPPORT**.
    Do not attempt to repair the instrument yourself as this is very dangerous.

● Fuse

❍ The instrument contains fuses.

❍ A fuse holder is located in the AC inlet on the rear panel (See **9-2. Main Unit (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. ➔ See **30. CONTACTING TECHNICAL SUPPORT**.

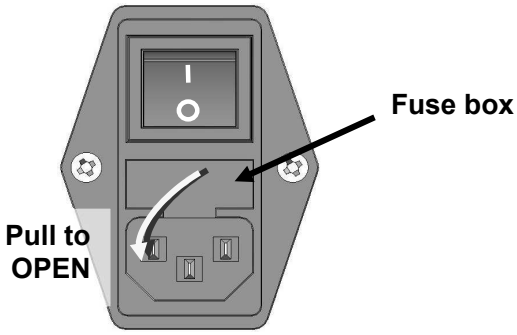


Figure 7-1 Fuse Box

● Battery of Infrared Remote Controller

❍ The infrared remote contoller instrument contains a battery which is exchangeable by users.

❍ The remote cotoller has a battery cover on the backside. For exchange the battery, slide this cover to take out the battery.

➔ See **9-5. Infrared Remote Controller**

Replace the battery with the following type.
Button-type lithium battery: CR2025

8. INTRODUCTION

8-1. How to Read This Document

The symbols used in this document and their explanations are shown below.

	Indicates a supplementary explanation.
	Indicates where to refer to.
	Indicates that there is a setting restriction.
	Indicates that it must be checked before use.
【 】	Indicates what is stated on the panel of the simulator.
[ ]	Indicates the content of the setting in the simulator.

8-2. Terms and Definitions

Term	Definition
EMC	Abbreviation of Electro Magnetic Compatibility. The concept which is generally required on electronic products and devices as a basic ability to radiate emission within the limit and to have enough immunity against external disturbances.
EMC technitian	A person who has enough skill and knowledge in EMC field. In this manual, this term means especialy a person who understands methods of ESD immunity testing well.
Protective earth terminal	An exclusively used terminal to ground a part of the electronic product, such as chassis, etc., where is likely to be touched by a human body, for preventing an elecric shock in case of internal electic leakage of the procut.
EUT	Equipment Under Test. Equipment to be tested by test equipment.
Electrostatic discharge (ESD) immunity test	A category of immunity test which simulates electrostatic discharge phenomnon that a charged human body or object discherges to an electronic product.
Contact discharge	A method of the ESD immunity testing in which the discharge tip of the discharge gun is kept in contact with the EUT or coupling plane and the discharge is actuated by the discharge switch of the simulator. It is an unrealistic phenomenon in nature, but enables the test more reproducible.
Air discharge	A method of the ESD immunity testing in which the discharge tip of the discharge gun is moved towards the EUT until the tip touches the EUT. It is closer to natural phenomenon but has an unstable elements since it is dependet on test enviroment due to discharge in the air.

Term	Definition
Discharge gun	A part of the simulator including charging and discharging circuit. One-hand handling is available.
CR unit	A part of the discharge gun equiped a charge capacitor (C) and a discharge resistor (R). The unit should be exchangeable to change the constant values of C and R on the circuit accroding to the standard requirement.
Discharge Cup	A head part of the discharge gun. There are mainly two types, for IEC standard and for ISO standard. It should be exchanged accordinf to the standard.
Discharge tip	Literally a “tip” part of the discharge gun. There are mainly two types, a conical type for contact discharge and a round type for air discharge.

8-3. Attaching Gun Holder

The supplied gun holder is attached to the base of the main unit, as shown below in Figure 8-1. Use the provided gun holder mounting screws.

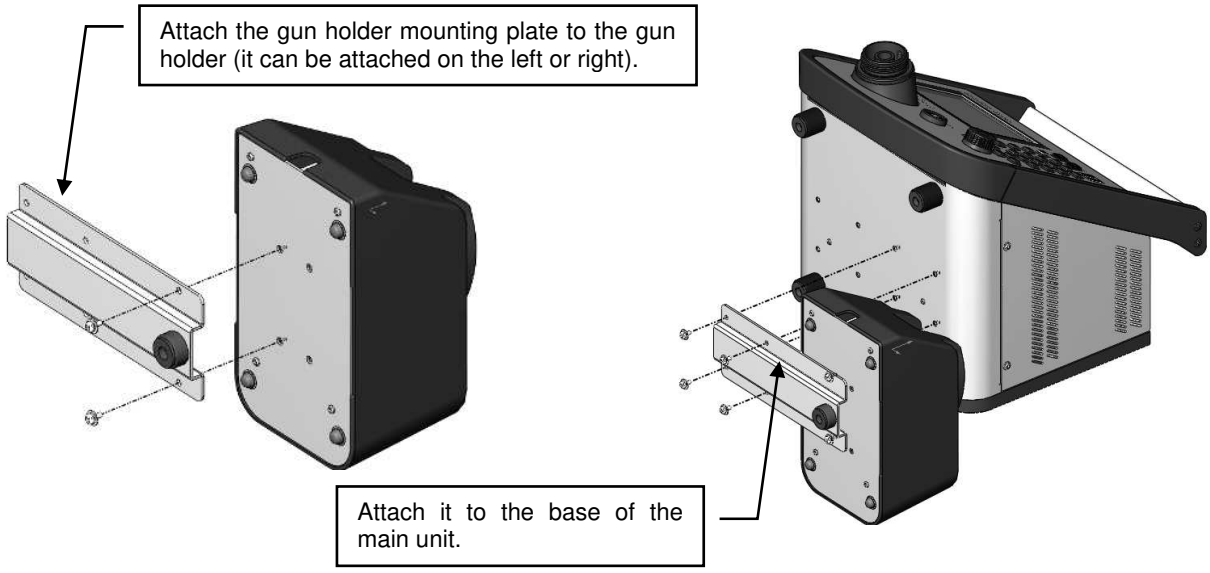
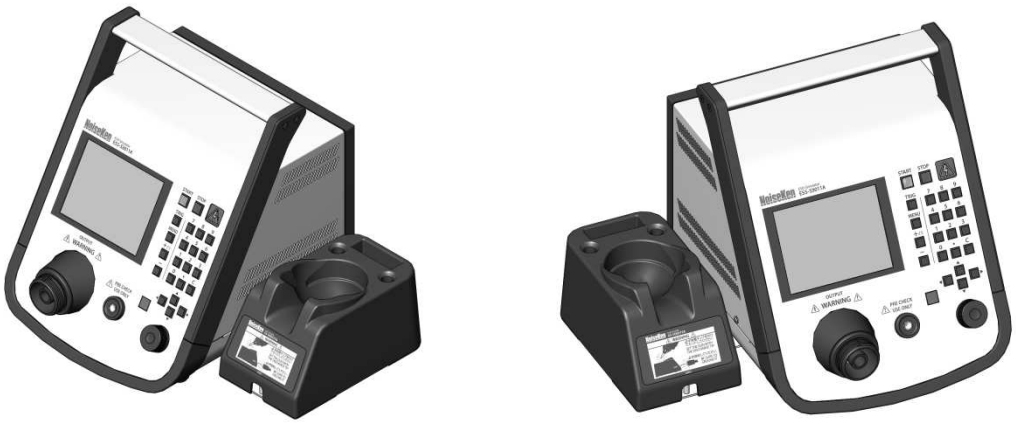


Figure 8-1 How to Attach Gun Holder

The gun holder can be attached to the left or right side of the main unit, as shown below in Figure 8-2. Attach it to the easier side to use.



Attached to the right side **Attached to the left side**

Figure 8-2 Completed Image of Attached Gun Holder

The gun holder can also be used without being attached to the main unit.

WARNING

When using the gun holder which is detached from the main unit, connect the GND clip of the discharge gun to the GND stud of the gun holder.

9. NAME AND FUNCTION OF EACH PART

9-1. Main Unit (Front Panel)

Figure 9-1 Main Unit (Front Panel)

(1) Model name

The product name and model name of the instrument and the company logo.

(2) LCD display

It displays various statuses.

(3) High-voltage output connector

Connector with a maximum output voltage of 30.5kV. The discharge gun connects to this connector.

(4) PRE CHECK terminal【PRE CHECK】

terminal used in PRE CHECK

(5) Carrying handle

Use this to carry or transport the instrument.

(6) Operation switch section

It provides various operation switches. See **9-3. Operation Switch Section** for details.

9-2. Main Unit (Rear Panel)

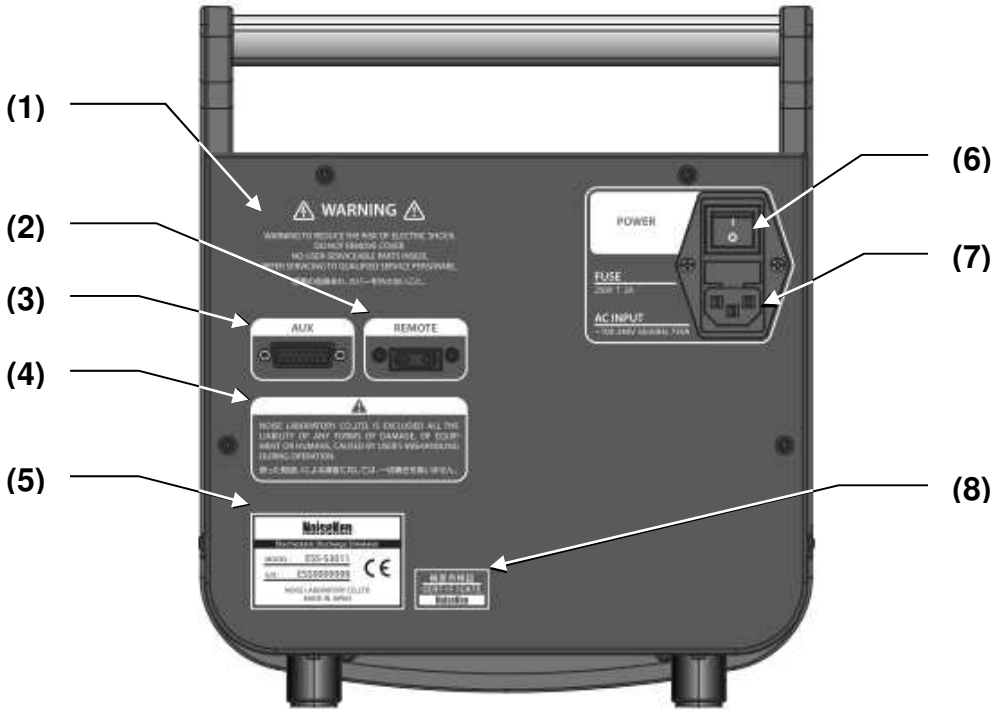


Figure 9-2 Main Unit (Rear Panel)

(1) 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.

(2) Optical communications connector 【REMOTE】

Connect the optical connector for remote control, which is sold separately as an option.

Use a dedicated optical cable as a communication cable and a conversion adapter to connect to the PC.

Place a cap when it is not used.

(3) AUX connector 【AUX】

A D-SUB 15-pin connector. Used to connect to external devices.

➔See **25-1. AUX Connector** for details.

(4) User warning

Noise Laboratory Co., Ltd. accepts no liability for damages resulting from incorrect operation.

(5) Serial number label

Contains the model name, serial number, and other information.

The serial number is to be confirmed for repair and calibration purpose.

(6) Power switch 【POWER】

Used to turn the power on and off.

(7) AC inlet (with internal fuse box)

Inlet used to plug in the supplied AC power cable. Includes an internal fuse.

If replacing the fuse, ➔See **7. POINTS TO NOTE REGARDING CONSUMABLES ITEMS**

(8) Inspection certification

Label certifying that the instrument passed the Noise Laboratory delivery inspection.

9-3. Operation Switch Section

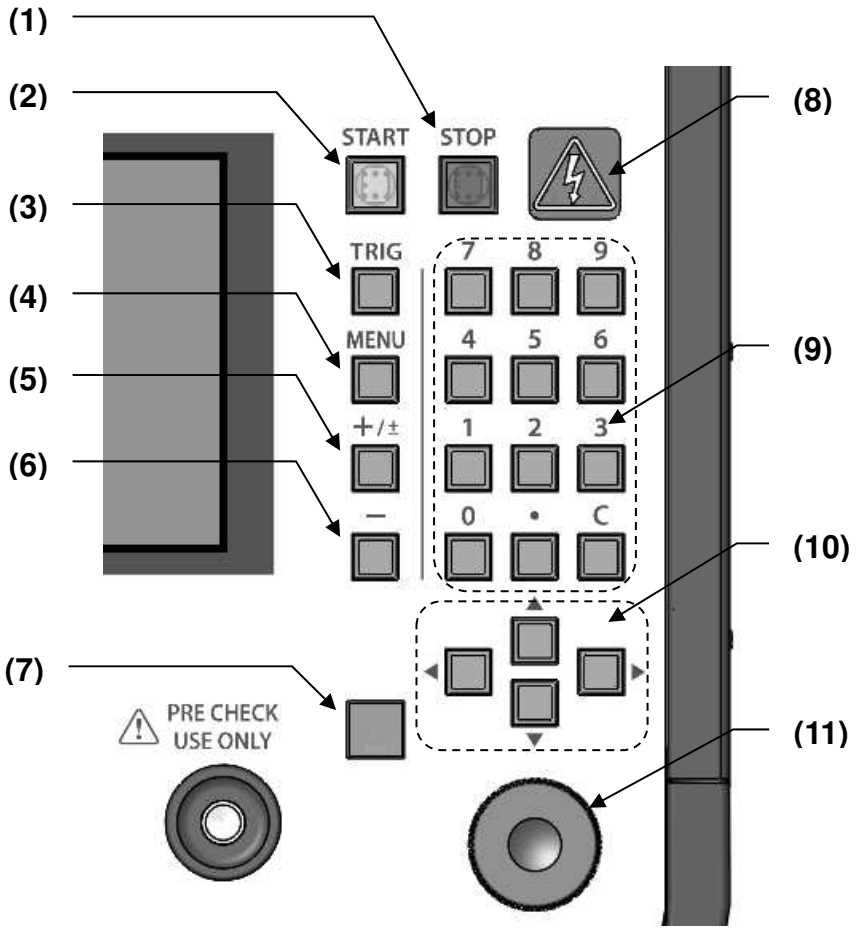


Figure 9-3 Operation Switch Section

(1) STOP switch 【STOP】

Switch used to stop the test. This shuts down the internal high-voltage power supply and turns off the high-voltage output.

(2) START switch 【START】

Switch used to start the test. Pressing this switch starts the set high-voltage output.

(3) TRIG switch 【TRIG】

Used to control the trigger of the discharge gun from the main unit. When using this switch, the trigger setting must be 【ESS】. For details, ➔see **15-1.TRIGGER Setting**.

(4) MENU switch【MENU】

Returns to MAIN MENU.

(5) +/± switch【+/±】

Sets the polarity of the applied voltage. Its operation varies depending on the polarity setting before the switch is pressed.

In SEQUENCE mode, it functions as “insertion” of the created test unit.

Setting before the switch is pressed		Setting after the switch is pressed
“+”	⇨	“±”
“–”	⇨	“+”
“±”	⇨	“+”

(6) – switch 【–】

Sets the polarity of the output voltage to “–”.

In SEQUENCE mode, it functions as “deletion” of the created test unit.

(7) Infrared photoreceptor window

Photoreceptor window for the infrared remote controller, which is sold separately as an option.

(8) Warning lamp

This WARNING lamp turns on/blinks during the test. It turns on when a voltage is output from the high-voltage output connector and blinks when electrostatic discharging starts.

(9) Numeric keypad

Changes the value of a selected item.

(10) Up/Down/Right/Left keys 【◄ ▲ ▼ ►】

Used to move the set item.

(11) Rotary knob

This rotary knob contains a push switch.

Rotating operation: Changes the value of a selected item.

Push operation: Moves the digit when the value to be changed is a numeric value.

9-4. Gun Holder

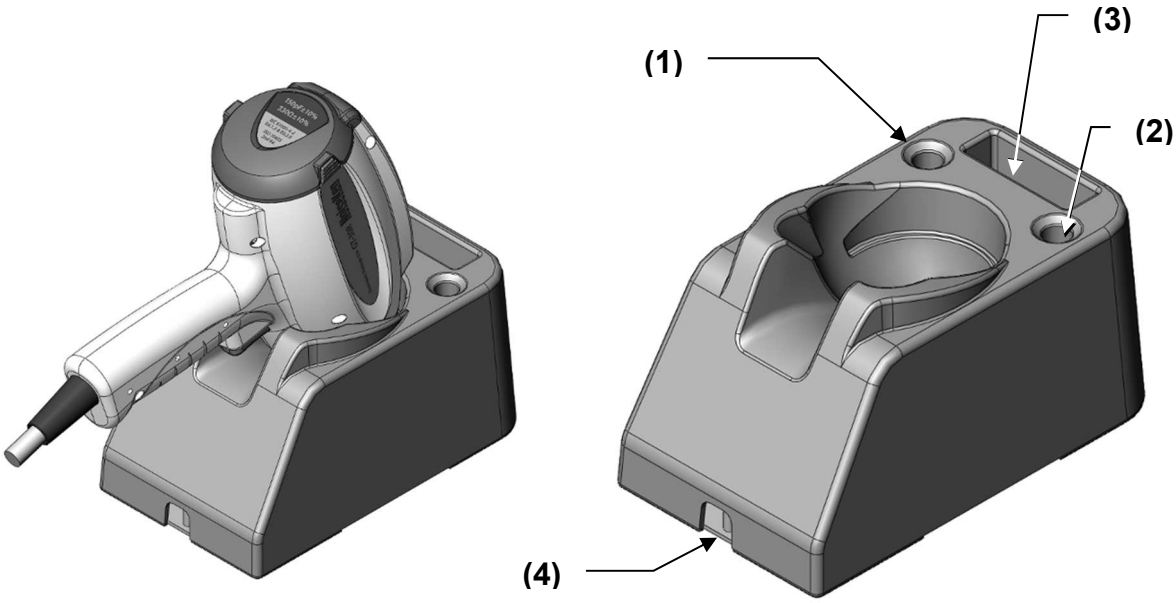


Figure 9-4 Gun Holder

(1) Discharge tip stand (left)
It holds a discharge tip for the discharge gun.

(2) Discharge tip stand (right)
It holds a discharge tip for the discharge gun.
It also suppots a ball-shaped discharge tip for air discharge tests based on ISO 10605 2nd Edition.

(3) Remote controller stand
It holds the infrared remote controller, which is sold separately as an option.

(4) GND stud
Used to connect the GND clip of the discharge gun (the clip at the end of the ground return cable)

The gun holder can also accommodate NoiseKen's previous discharge gun TC-815 series.

⚠WARNING

- Use the gun holder in the method specified for the main unit after fixing it correctly.
  ➔ See **8-3. Attaching Gun Holder**.
- When using it detached from the main unit, make sure to connect the GND clip of the discharge gun to the GND stud of the gun holder.

⚠ CAUTION

- Take precausions to prevent the discharge gun from falling off or down. Take extra care when no discharge tip is attached to the discharge gun, because it may fall down from the gun holder.

9-5. Infrared Remote Controller (Optional - MODEL:13-00004A)

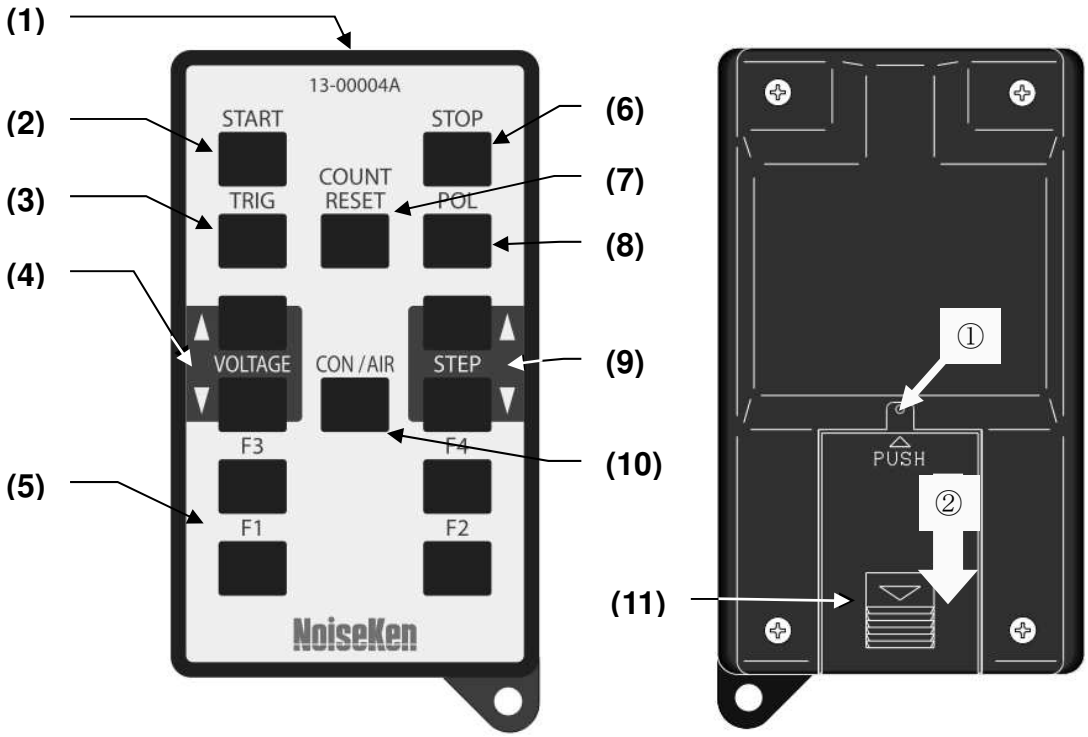


Figure 9-5 Remote Controller

(1) Infrared transmitter
Infrared transmission LED
Point it at the infrared photoreceptor during its operation.

(2) START switch 【START】
Used to start a test. Pressing the switch outputs a high voltage.
Performs the same operation as for the【START】switch in ESS-S3011A operation switch section.

(3) TRIG switch 【TRIG】
Used to control the trigger of the dischage gun from the main unit. Performs the same operation as for the 【TRIG】 switch in ESS-S3011A operation switch section. When using this switch, the trigger setting must be 【ESS】. For details, see **15-1.TRIGGER Setting**. This function works in the contact discharge mode【CONTACT】, not in the air discharge mode【AIR】.

(4) VOLTAGE switches 【VOLTAGE△】【VOLTAGE▽】
These switches are used to raise/lower the output voltage setting. A long press of the switches can increase/decrease the speed.

(5) Function switches 【F1】【F2】【F3】【F4】
Predefined functions are allocated to these function switches.
The funciton allocation is set by the main unit's UTILITY. For details, ➔see **23-4. Allocating Remote Controller Keys.**

(6) STOP switch 【STOP】

Used to stop a test. It stops the internal high-voltage power supply and also stops the high-voltage output from the main unit. Performs the same operation as for the 【STOP】 switch in ESS-S3011A operation switch section.

(7) Count reset switch 【COUNT RESET】

This switch is used to reset the discharge count displayed on ESS-S3011A.

(8) Polarity change switch 【POL】

This switch is used to change the polarity of the output voltage. Every time the switch is pressed, it is changed between “+” and “–”. The switch cannot be used to set “±”.

(9) STEP switches 【STEP△】【STEP▽】

For future optional function. Not function normally.

(10) CON/AIR switch 【CON/AIR】

This switch is used to set test mode. Every time the switch is pressed, it is changed between 〔CONTACT〕 and 〔AIR〕.

(11) Battery cover

The battery cover can be removed by sliding it toward the direction indicated by the arrow② while pressing the section indicated by the arrow① by something with a sharp point such as a tip of a ball-point pen.

Replace the battery with the following type.

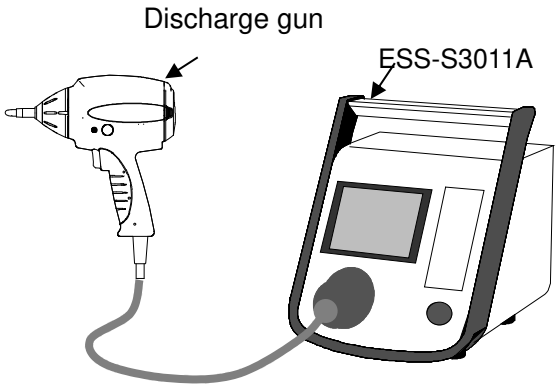
Button-type lithium battery: CR2025

10. BASIC TEST FLOW

This section describes the basic flow of the test using the simulator and the discharge gun GT-30R/ GT-30RA.

1) Connection

Conncet AC cable and the discharge gun GT-30R/ GT-30RA. For details,
➔see **11. DEVICE CONNECTIONS.**

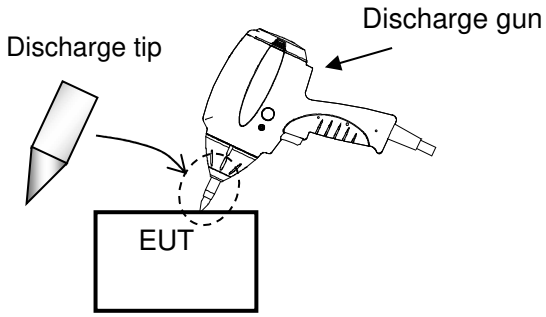


2) Selecting test mode

Select the test mode, “contact discharge mode” or “air discharge mode” based on your necessity.

Contact discharge test

Discharging with contacting the discharge tip of the gun to the EUT. Use the conical type discharge tip.

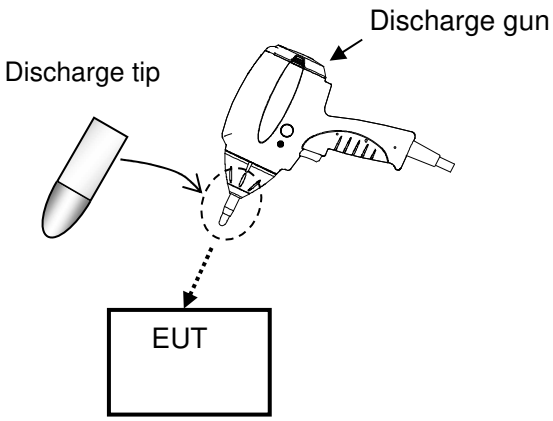


Contact discharge has two kinds of modes as follows.

Direct discharge: Discharging with contacting to EUT directly.
Indirect discharge: Discharging to the horizontal or vertical coupling plane. Discharge is applied to the EUT from the coupling plane indirectly.

Air discharge test

Discharging with making the discharge tip charged with test voltage close to the EUT. Use the round type discharge tip.



3) Basic settings

Basic operation procedures in “IEC STANDARD MODE” is shown as follows.

Turn on the unit and the main menu is indicated on the screen. Pressing 【1】 on the numeric keypad moves from the main menu to IEC STANDARD mode.

Set parametes for the test. For details, refer to “13. IEC STANDARD MODE”.

In this section, procedures of the gun-trigger method, holding the discharge gun by your hand, are described as an example.

① Setting polarity (+/-) ➔ **a**

② Select the item with pressing Up/Down keys. ➔ **b** : An orange coloured frame moves

③ Move the frame to【VOLTAGE】➔ **c** : Set output voltage with rotating the rotary knob.

④ Move the frame to【INTERVAL】➔ **c** : Set output interval with rotating the rotary knob.

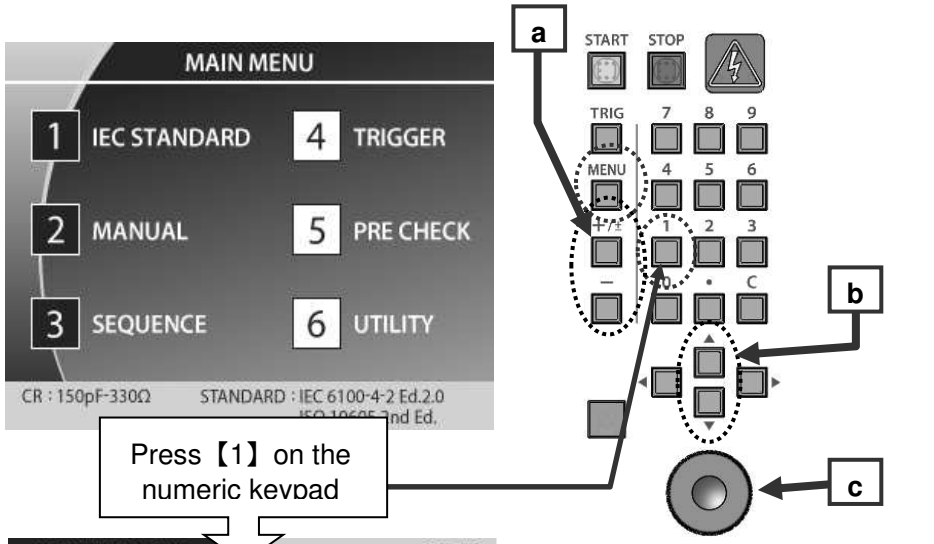
Setting output interval is avilable only in contact discharge mode. In air discharge mode, this column is indicated as ---

⑤ Move the frame to【COUNT】➔ **c** : Set discharge times with rotating the rotary knob.

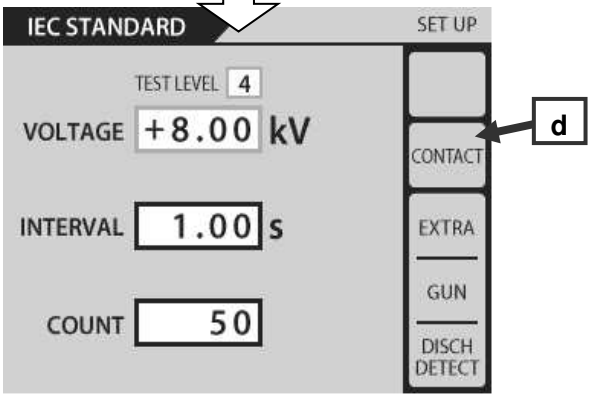
⑥ Select the test mode.

Move the frame to **d** ➔ **c** : Select the test mode with rotating the rotary knob.

Contact discharge test ➔【CONTACT】 | **Air discharge test** ➔【AIR】

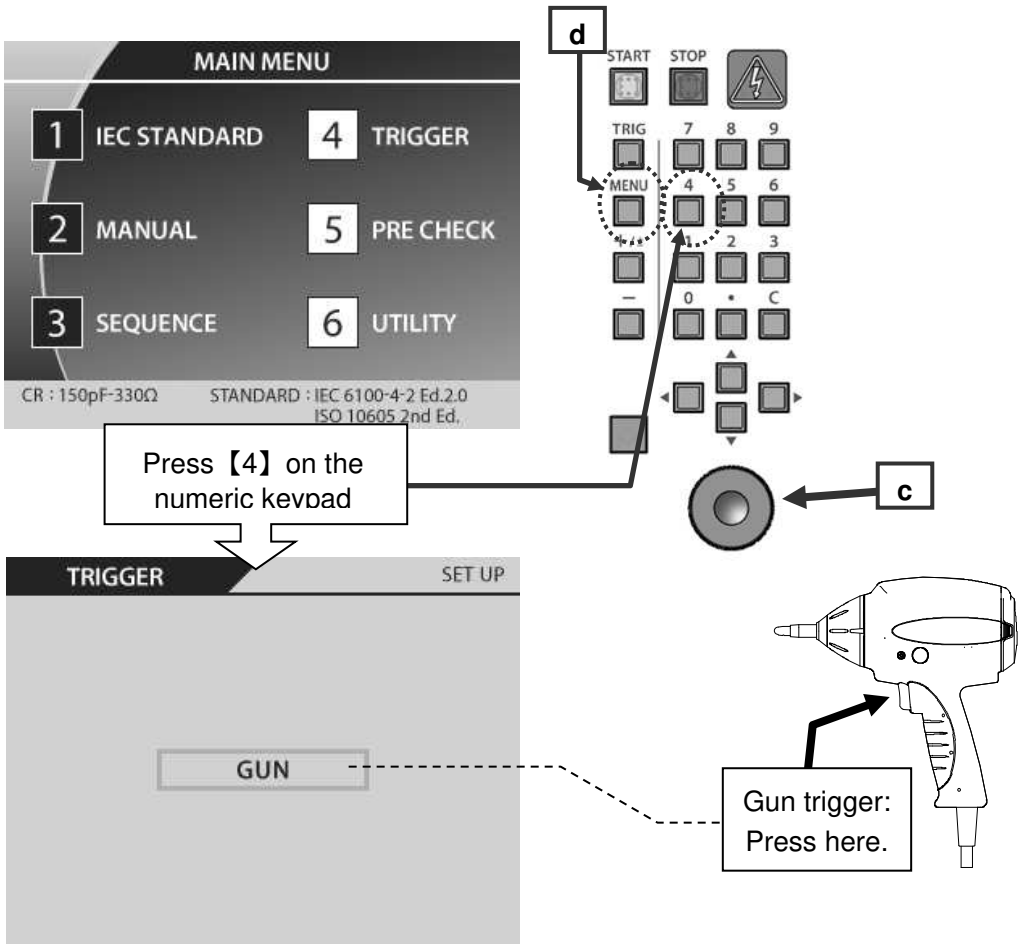


ESS-S3011A Operation keys



ESS-S3011A

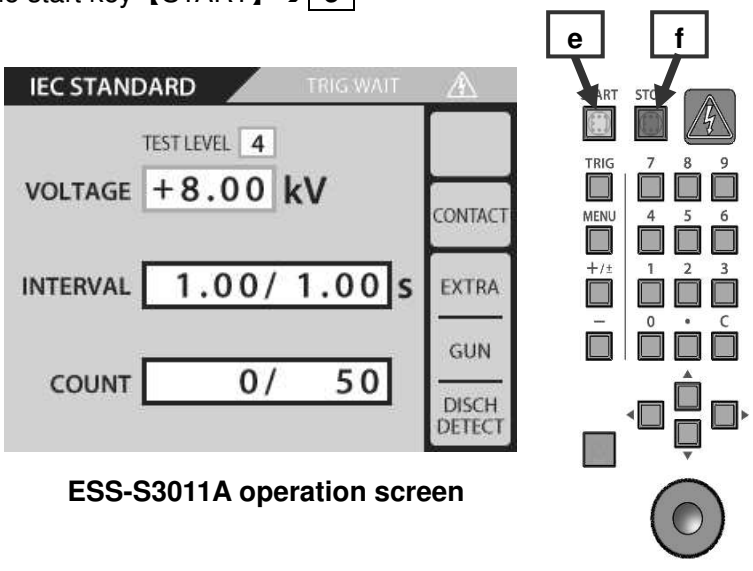
⑦ Pressing **d** moves to return to the main menu and pressing【4】on the numeric keypad moves from the main menu to the trigger setting screen. ➔**c** : Select the gun trigger【GUN】with rotating the rotary knob.



ESS-S3011A operation screen **Gun trigger**

4) Execution of test

① Press the start key【START】➔**e**



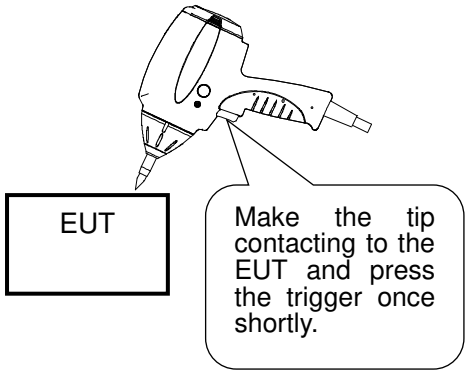
ESS-S3011A operation screen

② Press the gun trigger to discharge to the EUT.

The procedure is different according to the test mode.

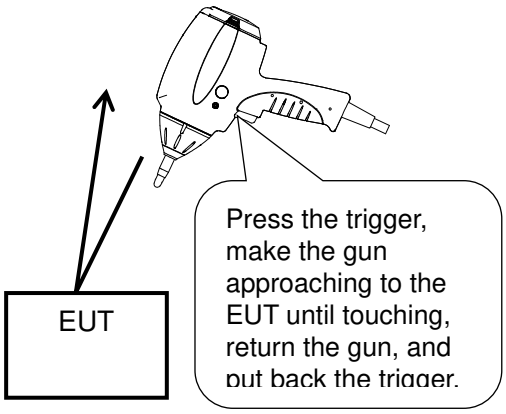
Contact discharge test

1) Make the discharge tip of the gun contacting to the EUT.
2) Press the trigger of the gun shortly and return it quickly.
3) The continuous discharge starts automatically with the previously-set interval. The set of discharges finishes when the discharge times reaches to the previously-set set number.
   Keep the discharge tip contacting to the same test point during the test.



Air discharge test

1) Press the trigger of the gun with keeping proper distance from the EUT. Hold the trigger pressed until the following procedure 3).
2) Make the discharge tip close to the test point of the EUT quickly and touch it to the point.
3) Make the gun further away from the EUT after contact. Put the trigger back when the gun is far enough from the EUT.
4) A count of discharge consists of the above procedure 1)～3). Repeat the above 1)～3) until the previously-set discharge times completes.



When the previously-set discharge times completes, one set of the test finishes.

The above status is waiting stage and the high voltage is still generating in the main unit.

- Inputting the triggger again restarts the test.
- Changing the output voltage is available in this status. ➔ Rotate the rotary knob.

③ When one set of the test completes, press the stop key【STOP】to turn off the high voltage power supply. ➔ f

④ Chanege conditions, such as polarity, output voltage, test mode and so on, and restart the test.

⑤ When a series of test completes, press the stop key【STOP】to turn off the high voltage power supply. ➔ f

11. DEVICE 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. ➔See **5-2. Function Restrictions and Compliance Standards by Combinations with Discharge Gun**
- **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. Clean them periodically with following procedures.
  1) Unplug the AC plug from the mains socket and wait for five or more seconds.
  2) Unplug the high voltage input connector from the high voltage output connector.
  3) Blow dehumidified air into the high voltage output connector to clean out any dust or dirt.
  4) Clean off dust or dirt on the high voltage input connector using dry cloth.
  5) Before connecting again, confirm no alien substance on the connectors.
- **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 plastic part of 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.

11-1. 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.

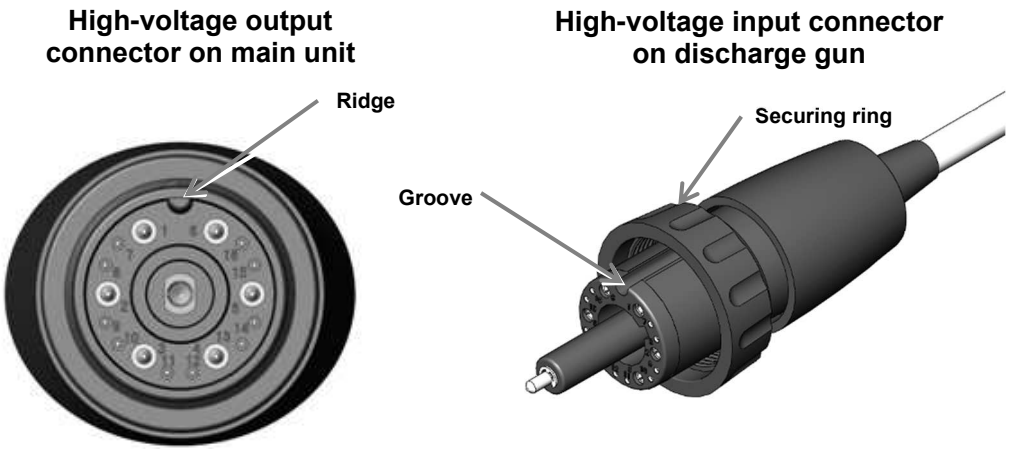


Figure 11.11-1 High-Voltage Input/Output Connector

11-2. 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.

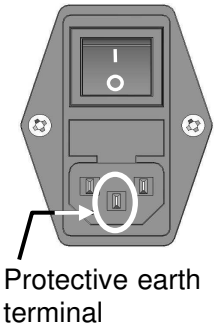


Figure 11.2 AC inlet

- **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.

Connect the supplied AC power cable to the AC inlet on the rear of the unit.

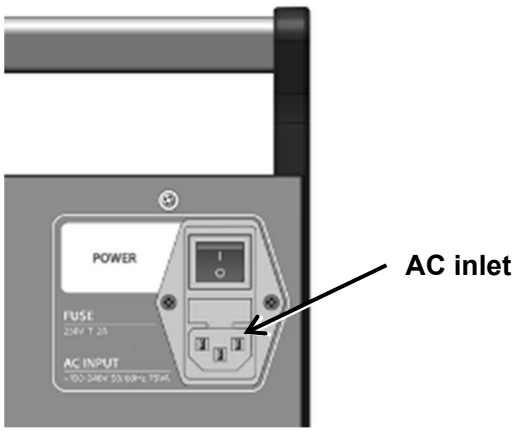


Figure 11. 3 AC Inlet on Rear of Unit

11-3. Connecting Warning Light (Optional)

When using the optional warning light, connect it to 【AUX】 at the rear top.

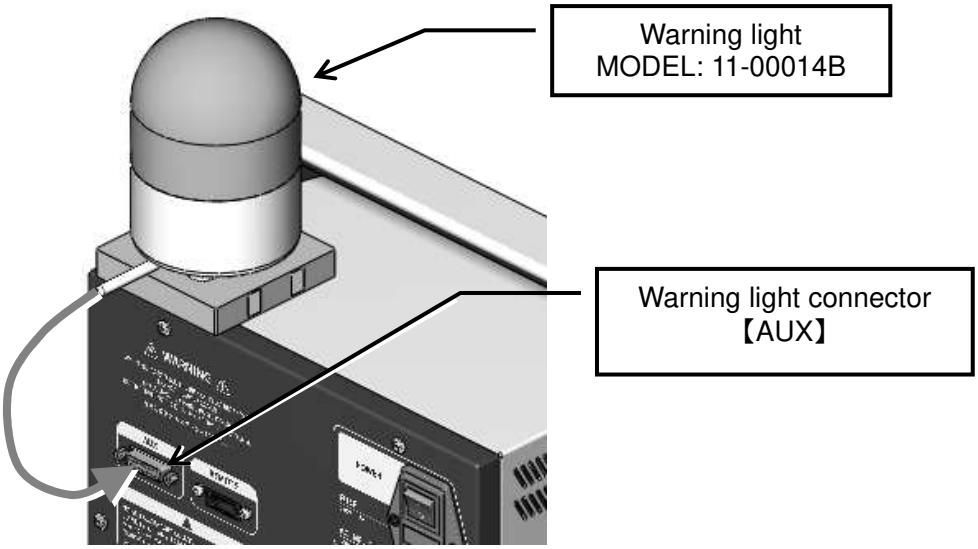


Figure11.4 Connecting Warning Light

The warning light spins and blinks, as the test is performed.

While the operation of the warning light is same as for the warning lamp on the control panel, it can warn a larger surrounding area.

11-4. Connecting Communication Cable (Optional)

When controlling this instrument remotely (optional), connect the communication cable to the optical communication connector 【REMOTE】, which is located in the output section. Use a dedicated optical cable as the communication cable and a conversion adaptor to connect to the PC. For how to use it, see the instruction manual for the remote software.

12. OPERATION

12-1. 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.

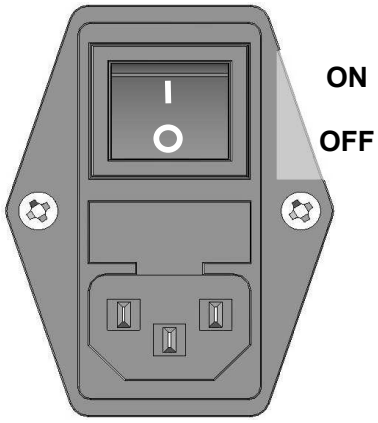


Figure 12-1 Power Switch

12-2. Explanation of Main Menu

When the power is turned on, the startup screen appears. Then, the display changes to the main menu after about two seconds.
The mode screens available from the main menu are selected by pressing a key on the numeric keypad.

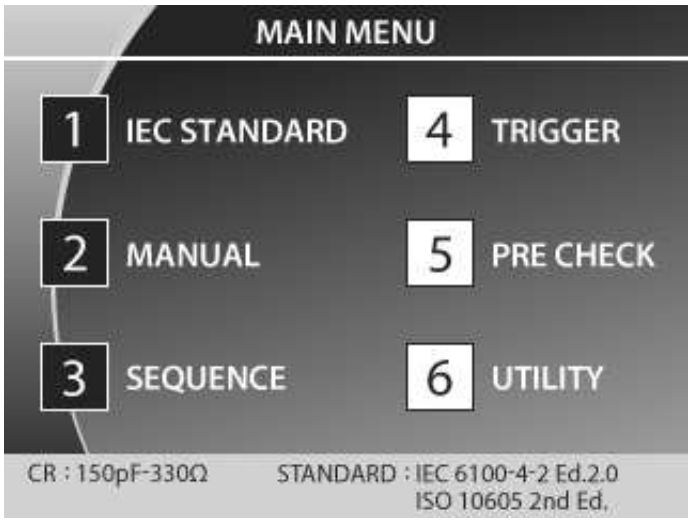


Figure 12-2 Main Menu Screen

1 IEC mode [IEC STANDARD]

This mode allows the user to perform the test easily, as the test levels specified in the IEC standard are preset. ➔ For details, see **13. IEC STANDARD MODE**.

2 Manual mode [MANUAL]

This mode allows the user to set each item manually to set sweep and other tests.

➔ For details, see **14. MANUAL MODE.**

3 Sequence mode [SEQUENCE]

Sequence mode works by performing a series of operations by combining manually created test units. ➔ For details, see **17. SEQUENCE MODE**

4 Trigger setting [TRIGGER]

This specifies how to control the trigger of the discharge gun.

➔ For details, see **15. TRIGGER SETTING**.

5 Pre-check [PRE CHECK]

Checks operation of the simulator and discharge gun.

➔ For details, see **22. PRE-START CHECK**

6 Utility [UTILITY]

Sets various kinds of auxiliary functions.

➔ For details, see **23. UTILITIES**.

12-3. Entering/Changing a Value (Explanation of Numeric Keypad/Rotary Knob)

The numeric keypad or rotary knob is used to enter or change the value of each setting item. The basic operation is described below.

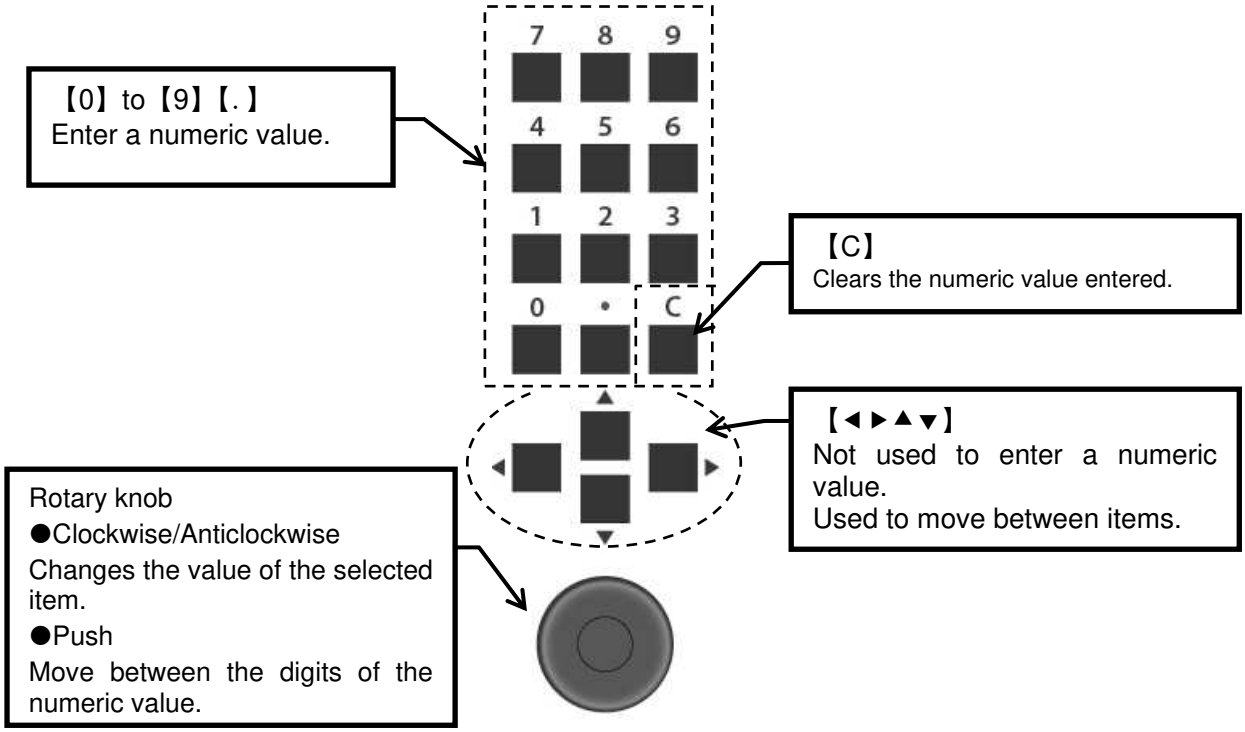


Figure 12-3 Numeric Keypad/Rotary Knob

13. IEC STANDARD MODE

13-1. Setup

Pressing 【1】 on the numeric keypad from the main menu moves to IEC STANDARD mode.
In this mode, the output voltage is automatically set for easier testing, by specifying the test level defined in the IEC standard.
Different test levels apply to the ISO and other standards. In such cases, a test must be performed in manual mode [MANUAL].

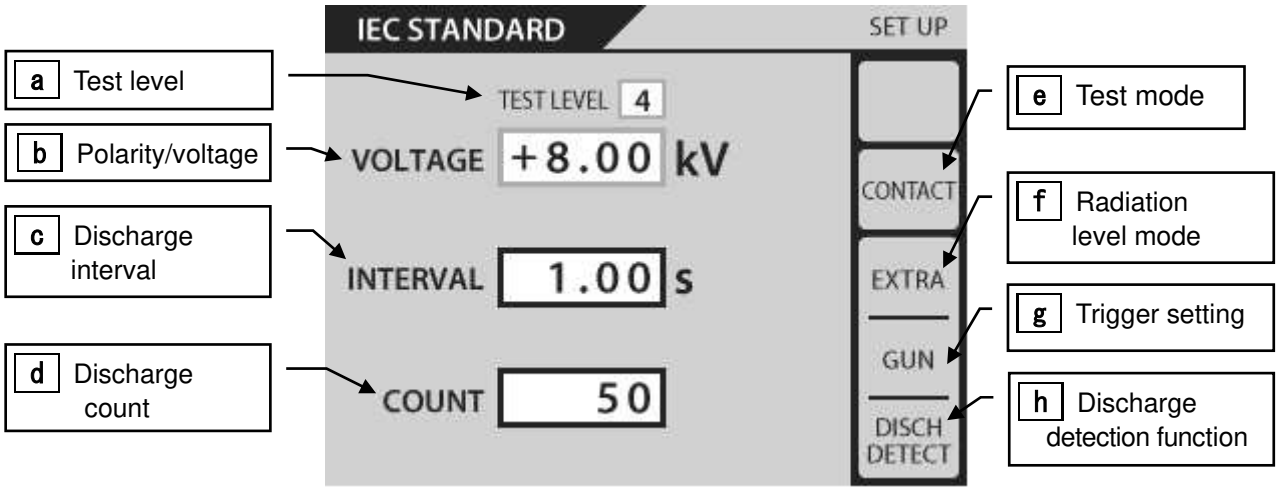


Figure 13-1 IEC STANDARD Mode Setting Screen

1) Moving between Setting Items
Pressing the Up/Down keys (▲ ▼) moves from one setting item frame to another in a cycle. The currently selected item frame is displayed in orange color. The numeric value or status can be changed using the numeric keypad or rotary knob.
The way of going aroud of the setting item frame: **a**/**b** ⇔ **c** ⇔ **d** ⇔ **e** ⇔ **a**/**b**.....

2) Output Polarity Setting
The output polarity setting can be changed directly by pressing the polarity switch.
Pressing the 【+/±】 switch once sets it to +.
In IEC STANDARD mode, ± cannot be set.
Pressing the 【−】 switch sets it to −.

3) Test Level Setting [TEST LEVEL] / [VOLTAGE] ➔ **a**/**b**
The test voltages that are defined in IEC 61000-4-2 can be set automatically according to Levels 1 to 4. When the test level is selected, its value can be changed using the numeric keypad or rotary knob.
Only 【1】 to【4】 are valid on the numeric keypad.
For the test levels and supported test voltages, see **Table 13.1 IEC Test Levels**.

Table 13.1 IEC Test Levels

Test Level	Test Voltage（kV）	
	Contact discharge (CONTACT)	Air discharge (AIR)
1	2	2
2	4	4
3	6	8
4	8	15

4) Discharge Interval Setting [INTERVAL] ➔ **c**
Sets the discharge interval time. It is invalid in air discharge mode. ➔Indicating **[- - -]**
When the discharge interval is selected, its value can be changed using the numeric keypad or rotary knob.
The range that can be set is 0.05 to 99.9.

5) Number of Discharges to Perform [COUNT] ➔ **d**
Sets the number of discharges to be repeated.
When the number of discharges is selected, its value can be changed using numeric keypad or rotary knob. The range that can be set is 1 to 60,000 or continuously.
<How to set continuous discharge: Indication [CONTINUE] >
-Rotary knob: Rotate anticlockwise fully.
-Numeric keypad: Enter “0” to this item frame and move from this frame to another with the Up/Down key.

6) Test Mode Setting [CONTACT/AIR] ➔ **e**
Sets the test mode (contact discharge/air discharge).
When the test mode is selected, its value can be changed using the rotary knob. The values that can be set are contact discharge mode [CONTACT] and air discharge mode [AIR].
Turning it clockwise sets it to AIR, while turning it anticlockwise sets it to CONTACT.

- Contact discharge mode [CONTACT]
  Pressing the trigger switch causes the discharge relay in the discharge gun to continue to operate according to the INTERVAL and COUNT setting values.
- Air discharge mode [AIR]
  As long as the trigger switch is pressed down, the dischage relay in the discharge gun remains turned on, keeping the discharge tip charged. Once the trigger switch is released, the discharge relay is also turned off.

7) Displaying the Radiation Level Mode Setting [EXTRA / NORMAL] ➔ **f**
This item cannot be selected. It shows the status of the radiation level mode.
The setting is changed by the utility [UTILITY]. See ➔ **23-3. SETTING 2 - Special Function Settings**

8) Displaying the Trigger Setting [GUN / ESS / EXT] ➔ **g**

This item cannot be selected. It shows the status of the trigger setting.

The setting is changed on the trigger setting screen.

Pressing 【4】 on the numeric keypad from the main menu moves to the trigger setting screen.

See ➔**15. TRIGGER SETTING.**

9) Displaying the Discharge Detection Funciton Setting [DISCHARGE DETECT] ➔ **h**

This setting cannot be selected. It shows whether the discharge detection function is ON (DISCH DETECT displayed) or OFF (no display).

The setting is changed by the utility [UTILITY]. See ➔ **23-3. SETTING 2 - Special Function Settings.**

14. MANUAL MODE

14-1. Setup

Manual test mode is used to perform tests in which all of the settings are specified by the user.
Manually specified test conditions are stored in real time in the displayed units numbered **[1]** to **[99]**.
The conditions stored for the test unit can be set again by calling its unit number.
The test unit can also be used as the test unit for the sequence test mode.

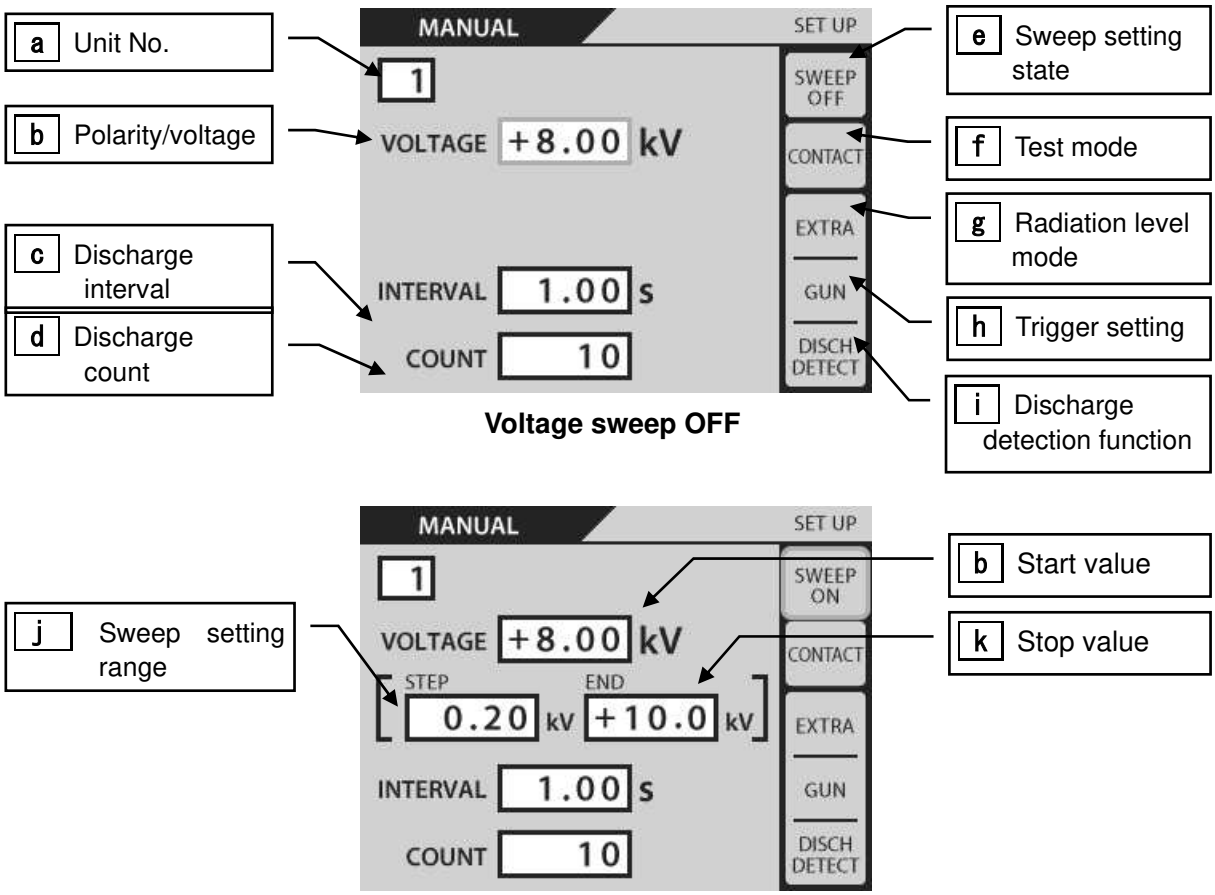


Figure 14-1 Manual Mode Setting Screen

1) Moving between Setting Items

Pressing the Up/Down keys (▲ ▼) moves from one setting item frame to another in a cycle. The currently selected item frame is displayed in orange color. The numeric value or status can be changed using the numeric keypad or rotary knob.

The way of going aroud of the setting item frame: **( )** shows the way in case of

a ⇔ **b** ⇔(**j** ⇔ **k**⇔) **c** ⇔ **d** ⇔ **e** ⇔ **f** ⇔ **a**.....

2) Unit Number Setting ➔ **a**

The set test conditions are automatically stored to the test units **[1]** to **[99]** (Hereinafter, the stored test is called a “test unit”). In other words, a test unit can be stored with its unit number. When the setting item frame is moved to the unit number setting **a**, its value can be changed using the numeric keypad or rotary knob.

<Example of Use>

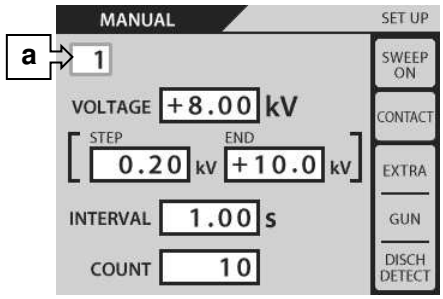
-Select the unit number frame. ➔ **a**

-Set the test unit [1] as an example. Enter [1] into the unit number column with using the rotary knob or the numeric keypad.

-Set all test conditions of the test unit [1]. The latest setting conditions are overwritten and stored as the test unit [1].

-Select the unit number frame to set another test unit. Enter [2] into the unit number column to set the test unit [2]. When the test conditions are input, the latest conditions are overwritten and stored as the test unit [2].

-Select the unit number frame again and enter [1]. The latest status stored previously is recalled as the test unit [1].



Unit No. **[1]**

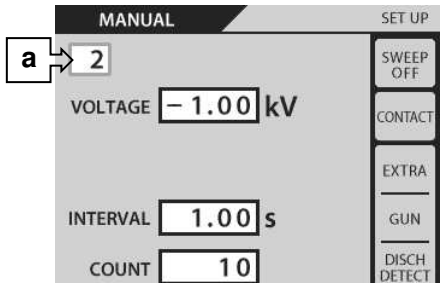


Figure 14-2 Example of test unit

The setting conditions of the test unit always reflect the latest status. Therefore, if the test conditions need to be stored surely, writing down the settings as a backup is recommendable.

3) Output Polarity Setting

The output polarity setting can be changed directly by pressing the polarity switch.
Pressing the【+/±】switch once sets it to +.
Pressing the【-】switch sets it to -.
<In case that the sweep function is effective [SWEEP ON] ➔ **e** >
Pressing the【+/±】switch twice sets it to ±.
When the polarity is set to [±], it is first output at positive polarity for the set number of times, and then continues to be output at negative polarity.

4) Test Voltage Setting [VOLTAGE] ➔ **b**
When the test voltage is selected, its value can be changed using the numeric keypad or rotary knob. The range that can be set is 0.20 to 30.5.

5) Discharge Interval Setting [INTERVAL] ➔ **c**
Sets the discharge interval time. It is invalid in air discharge mode.
When the discharge interval is selected, its value can be changed using the numeric keypad or rotary knob. The range that can be set is 0.05 to 600 or manually.

6) Number of Discharges to Perform [COUNT] ➔ **d**
Sets the number of discharges to be continued.
When the number of discharges is selected, its value can be changed using numeric keypad or rotary knob. The range that can be set is 1 to 60,000 or continuously.
<How to set continuous discharge: Indication [CONTINUE] >
-Rotary knob: Rotate anticlockwise fully.
-Numeric keypad: Enter “0” to this item frame and move from this frame to another with the Up/Down key.

7) Test Mode Setting [CONTACT/AIR] ➔ **f**
Sets the test mode (contact discharge/air discharge).
When the test mode is selected, its value can be changed using the rotary knob.
Clockwise: Contact discharge mode [CONTACT]
Anticlockwise: Air discharge mode [AIR]

- Contact discharge mode [CONTACT]
  Pressing the trigger switch causes the discharge relay in the discharge gun to continue to operate according to the INTERVAL and COUNT setting values.
- Air discharge mode [AIR]
  As long as the trigger switch is pressed down, the dischage relay in the discharge gun remains turned on, keeping the discharge tip charged. Once the trigger switch is released, the discharge relay is also turned off.

8) Voltage Sweep Setting [SWEEP OFF / ON] ➔ e

When the voltage sweep is selected, its value can be changed using the rotary knob. The values that can be set are ON and OFF.

Turning it clockwise sets it to ON, while turning it anticlockwise sets it to OFF.

When it is set to ON, the step voltage [STEP] ➔ j and end voltage [END] ➔ k are displayed.

When the voltage sweep is set, the voltage specified in [STEP] is automatically added to [VOLTAGE] after the specified number of discharges are performed. And it continues until the [END] voltage is reached.

shows the operation chart for when the voltage sweep is set.

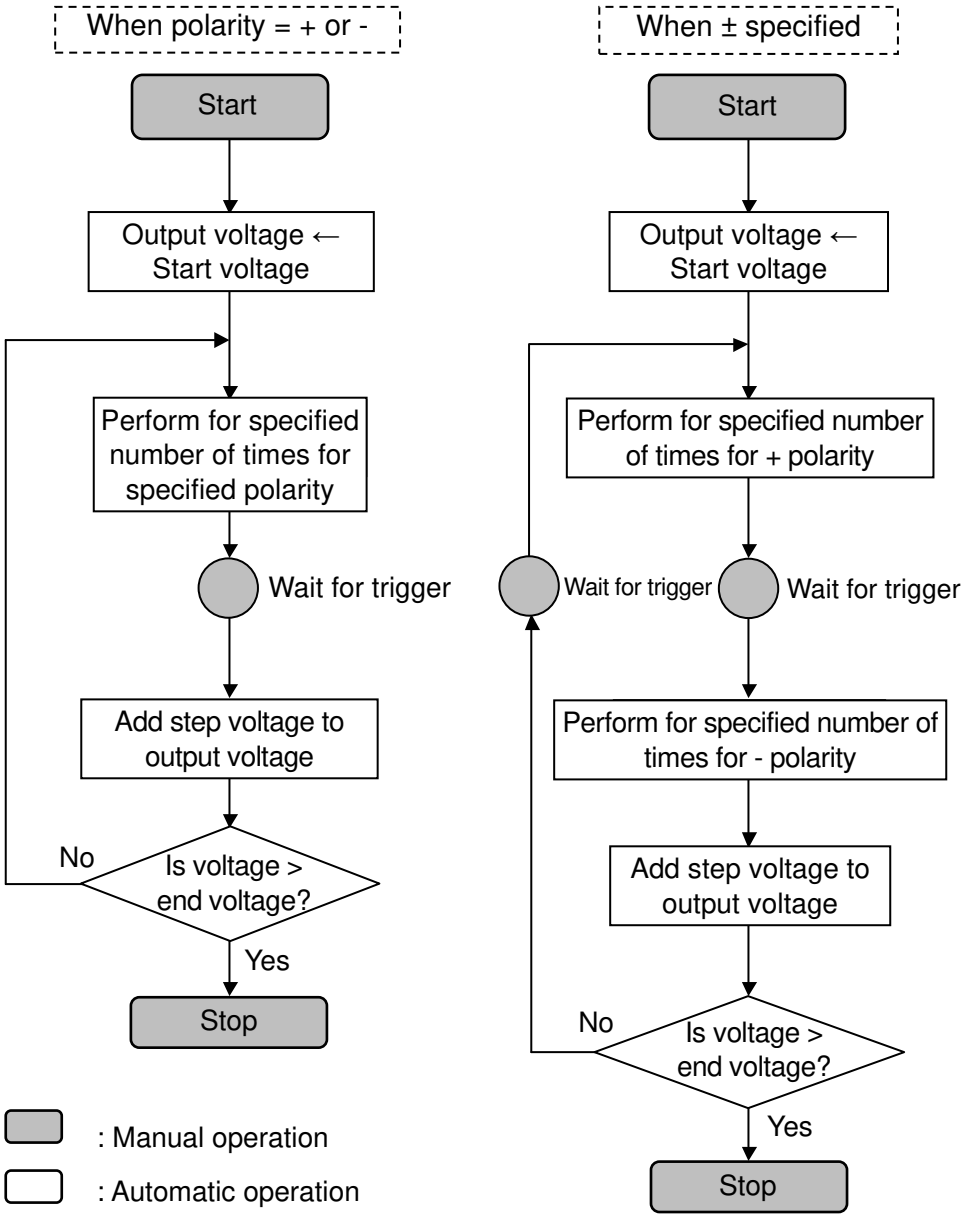


Figure 14-3 Flowchart of Voltage Sweep Mode

9) Displaying the Radiation Level Mode Setting [EXTRA / NORMAL] ➔ **g**
This item cannot be selected. It shows the status of the radiation level mode.
The setting is changed by the utility [UTILITY].
➔ See **23-3. SETTING 2 - Special Function Settings.**

10) Displaying the Trigger Setting [GUN / ESS / EXT] ➔ **h**
This item cannot be selected. It shows the status of the trigger setting.
The setting is changed on the trigger setting screen.
Pressing 【4】 on the numeric keypad from the main menu moves to the trigger setting screen.
➔ See **15. TRIGGER SETTING.**

11) Displaying the Discharge Detection Funciton Setting [DISCHARGE DETECT] ➔ **i**
This setting cannot be selected.
It shows whether the discharge detection function is ON (DISCH DETECT displayed) or OFF (no display). The setting is changed by the utility [UTILITY].
➔ See **23-3. SETTING 2 - Special Function Settings.**

15. TRIGGER SETTING

15-1. TRIGGER Setting

The discharge trigger is set from Item 【4】 on the main menu.

The following setting is performed by turning the rotary knob.

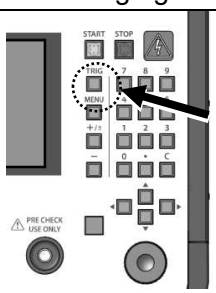
Figure 15-1 TRIGGER Setting Screen

1) Gun trigger [GUN]
   This setting allows the trigger switch on the discharge gun to be used as the discharge trigger.

2) Controller trigger [TRIG]
   This setting allows the 【TRIG】 switch on the simulator or the infrared remote controller to be used as the discharge trigger.

3) External trigger [EXTERNAL]
   The discharge is started and temporarily stopped by inputting an electric signal from the 【AUX】 connector at the rear.
   For details of the 【AUX】connector, see ➔ **25-1. AUX Connector**.

Table 15.1 List of Trigger Settings

Trigger Selection	Trigger Switch	Test Mode	
		Contact ［CONTACT］	Air ［AIR］
[GUN]	 Trigger switch on the discharge gun	Pulling the gun trigger switch starts continuous discharge. Pulling the trigger switch again stops it temporarily.	Pull the gun trigger switch at each discharge and have the gun contact EUT.
[ESS]	 【TRIG】 switch on the main unit	Pressing the 【TRIG】 switch starts continuous discharge. Pressing the 【TRIG】 switch again stops it temporarily.	Press the 【TRIG】 switch at each discharge and have the gun contact EUT.
[EXTERNAL]	 Input from 【AUX】 at the rear of the main unit	Input the trigger signal from the 【AUX】 connector. Inputting the trigger signal starts continuous discharge. Inputting the signal again stops it temporarily.	Input the trigger signal from the 【AUX】 connector at each discharge and have the gun contact EUT.

When NoiseKen's previous discharge gun TC-815 series is attached to the probe stand, the trigger switch on the discharge gun remains pressed down.
To start or temporarily stop discharges, therefore, use the controller trigger or external trigger setting.

The discharge gun GT-30R/GT-30RA type allows the gun trigger to be used while being attached to the probe stand.

16. EXECUTING TEST

In this chapter, procedure of executing ESD test in the IEC STANDARD mode and the manual mode is described.

16-1. Proceduere of Executing Test

⚠WARNING 警告

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

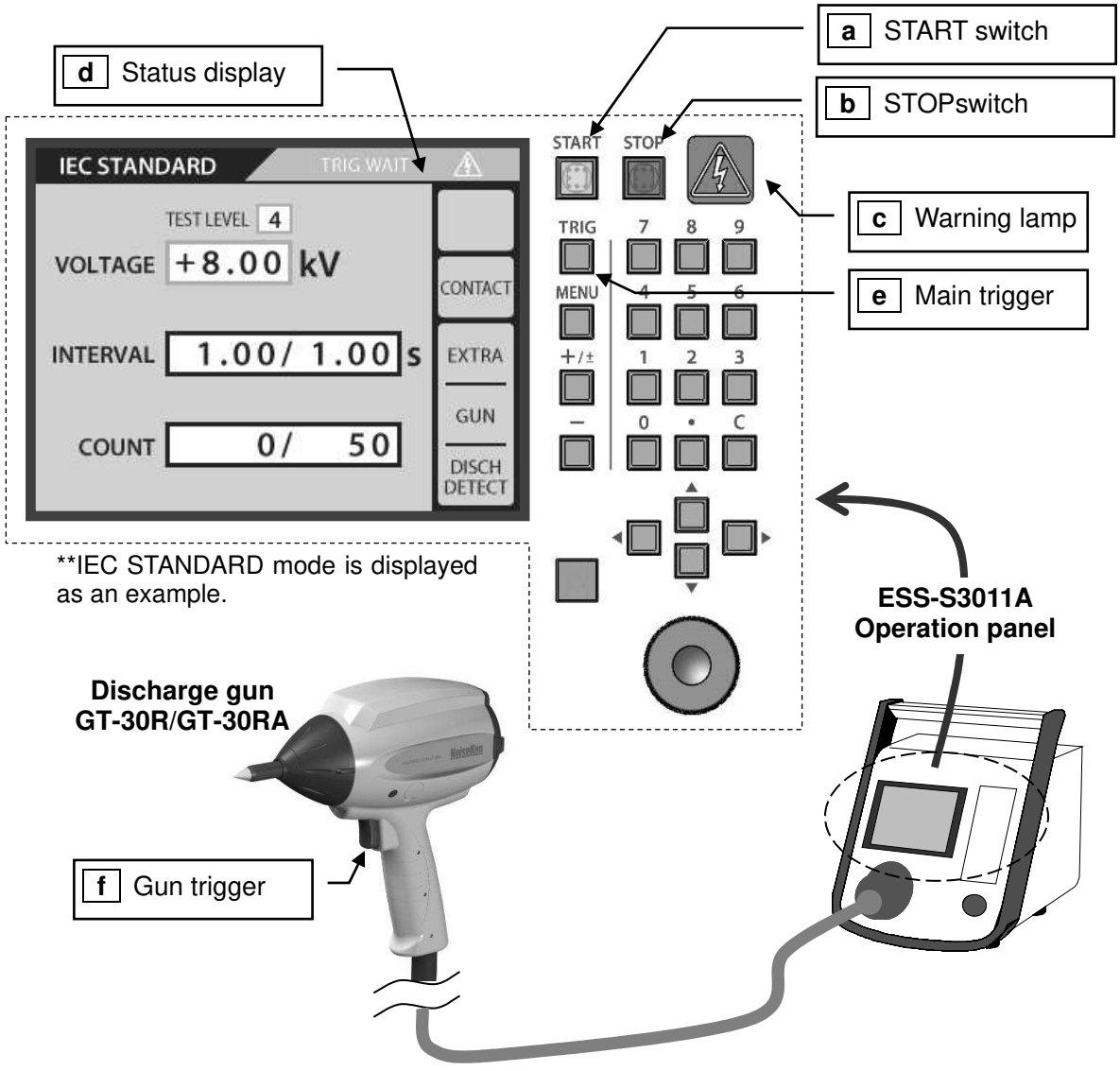


Figure 16-1. Executing the ESD test

1) Pressing the【START】switch **a** outputs a high voltage from the simulator.
➔The START switch and warning lamp **c** illuminate.
➔The status display **d** changes from READY to TRIG WAIT (Trigger input waiting status).

2) Inputting the specified trigger starts discharge testing.
The warning lamp **c** blinks.
The status display **d** changes to [RUNNING!!].
How to use the discharge trigger is shown as the below table 16.1

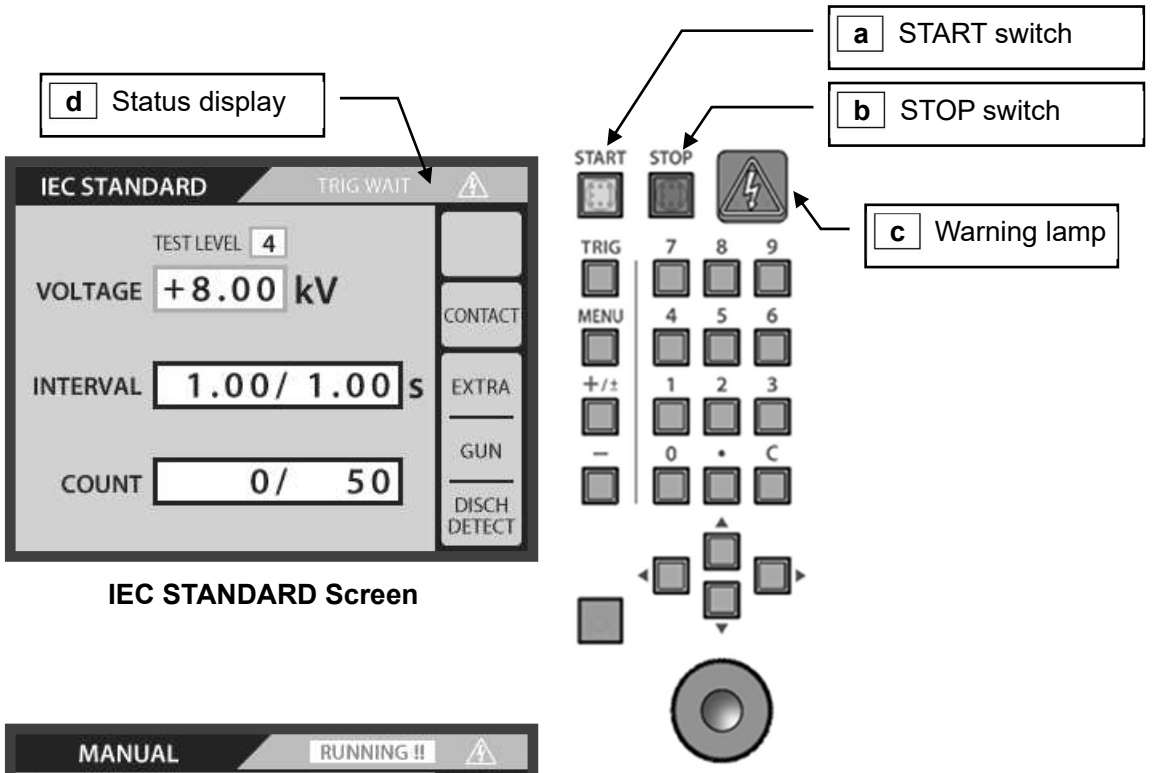
Table 16.1 Trigger switch operation in each discharge mode

Order	**Contact discharge mode【CONTACT】**	**Air discharge mode【AIR】**
i	Turn ON START swich **a**	
ii	Input the main/gun trigger **e** / **f** once ➔ Continuous discharge test starts	Put the discharge gun away from the EUT. Press the main/gun trigger **e** / **f** Keep the trigger pressing and make the gun close to the EUT quickly.
iii	The gun continues to discharge automatically with the set interval until the set count is complete.	Keep the trigger pressing and touch the discharge tip to the discharge point of the EUT. Make the gun further away from the EUT after contact. Put the trigger back when the gun is far enough from the EUT. The above procedures (i ～ iii) are regarded as one count of discharging.
iv	During the continuous discharge test, if the main/gun trigger **e** / **f** is input once ※, the continuous charge is interrupted. ➔The status display **d** indicates [PAUSE]. Inputting the trigger again makes the test restart. ※When using at extra mode【EXTRA】, press the main/gun trigger switch longer one or more seconds.	Repeat the above i ～ iii until the previously-set discharge times completes.
v	When the simulator counts up to the set discharge times, it gets into the standby state.	
⚠	If the trigger is put back before discharge in the air discharge mode, discharge to the EUT is incomplete.	

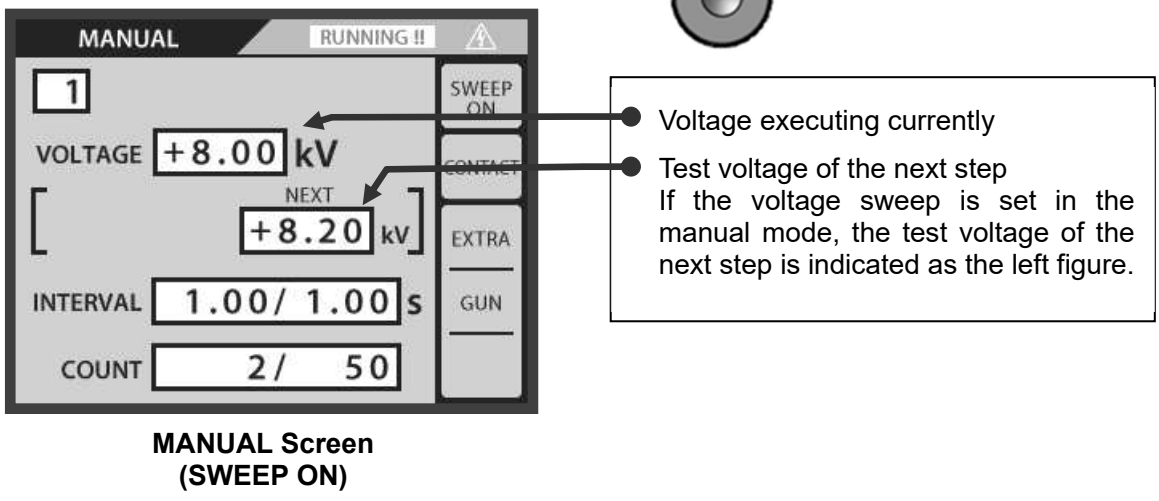
3） During the test, the discharge interval [INTERVAL] is displayed by counting down from the set time, second by second. The number of discharges [COUNT] is displayed by counting up from 0 to the set number, one by one.

4） During discharging, the test voltage can be changed using the numeric keypad or rotary knob.

When the voltage sweep is set, the voltage cannot be changed during the test.



IEC STANDARD Screen



MANUAL Screen (SWEEP ON)

Concerning the continuous mode [CONTINUE]
If the test is conducted with turning on the voltage sweep mode, a manual input of the trigger is necessary for each step change, but this operation can be omitted by the continuous mode.

How to set the continuous mode
Press the trigger switch longer for inppting the trigger after starting the test.
➔The status display **d** indicates [CONTINUE!!]

5) The simulator goes to the standby state after the specified number of discharges have completed.
➔The warning lamp **a** iluminates.
➔The status display **d** indicates [TRIG WAIT]

16-2. 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 after the end of the test.

Pressing the【STOP】switch **b** stops the test, turns off the internal high-voltage power supply, and turns off the warning lamp **c**.

17. SEQUENCE MODE

17-1. Outline of the Sequence Mode

Sequence mode works by performing a series of operations which consist of a combination of test units stored in manual mode.

Each sequence can consist of a combination of units up to 22 steps. The programmed sequence program is stored with the sequemce program number. Maximum 20 programs are available on this mode.

Pressing [3] on the numerical keypad moves to the sequence mode. Sequence programs is created on the sequence setting screen and the seeing of the test unit of the manual mode is available on the same single screen.

17-2. Creating a Test Unit

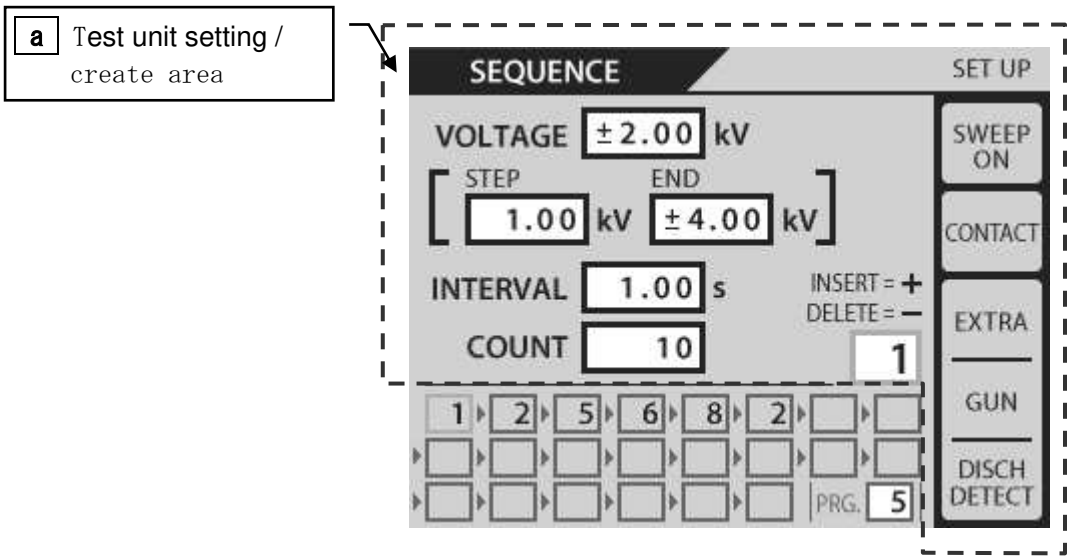


Figure 17-1 Sequence Mode Setting Screen

A test unit is created before a sequence program is created.
The test unit created in MANUAL mode is used (➔See **14. MANUAL MODE**) or a new one is created on the SEQUENCE mode setting screen. ➔ **a**

a The procedure of setting the test unit is same as that of the manual mode. ➔**14-1. Setup**

The test unit is shared in both MANUAL mode and SEQUENCE mode.

Both modes allow the content of the test unit to be changed and always reflect the final content status. ➔ **Figure17-2 Schematic Diagram of Test Unit and Sequence Program**

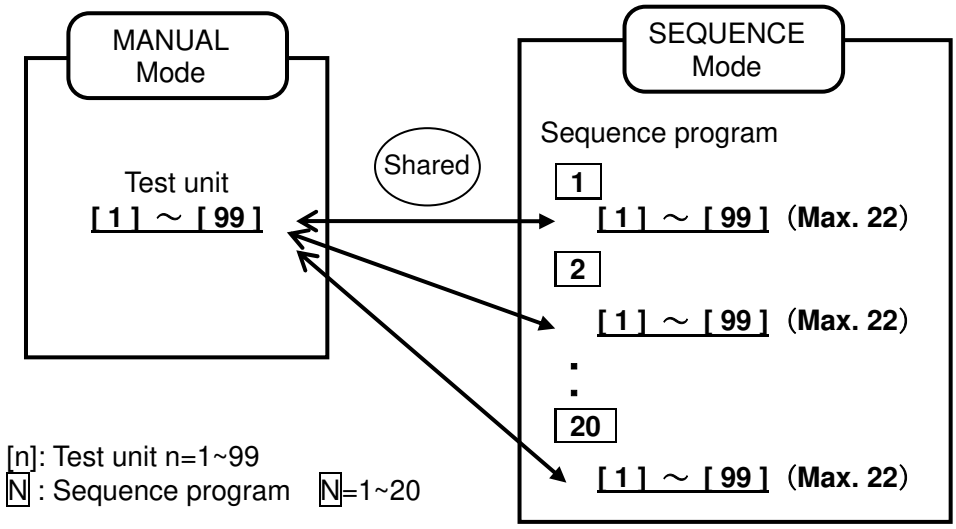


Figure17-2 Schematic Diagram of Test Unit and Sequence Program

17-3. Creating a Sequence Program

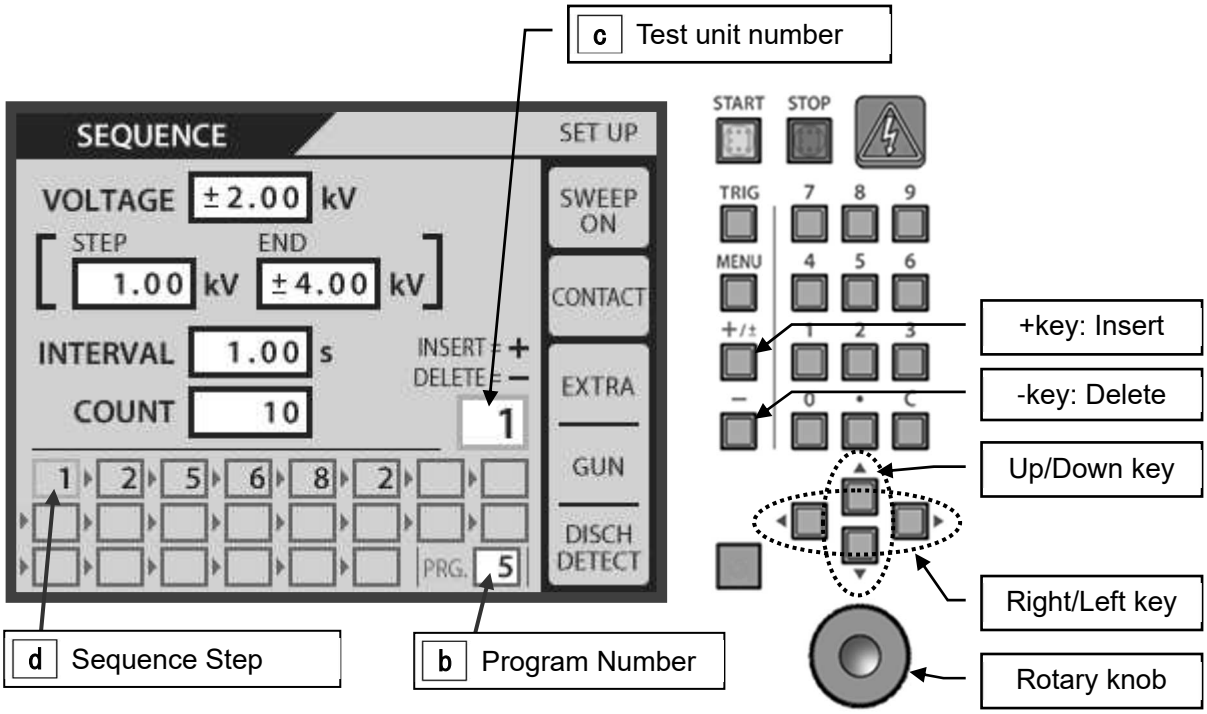


Figure 17-3 Creating sequence program

A sequence program is created by combining up to 22 units from the test units created in MANUAL mode: **[1] to [99]**.
Sequence programs can be stored into **1** **to** **20**.

1) Moving the setting item
   Pressing the Up/Down key makes the setting frame go around. The frame of the selected item is indicated by orange colour and the selected item is changeable by the numerical keypad or the rotary knob.

2) Specifying the program number [PRG.] ➔ **b**
   Use the Up/Down keys (▲ ▼) to select the program number. Use the numeric keypad or the rotary knob to specify the number.

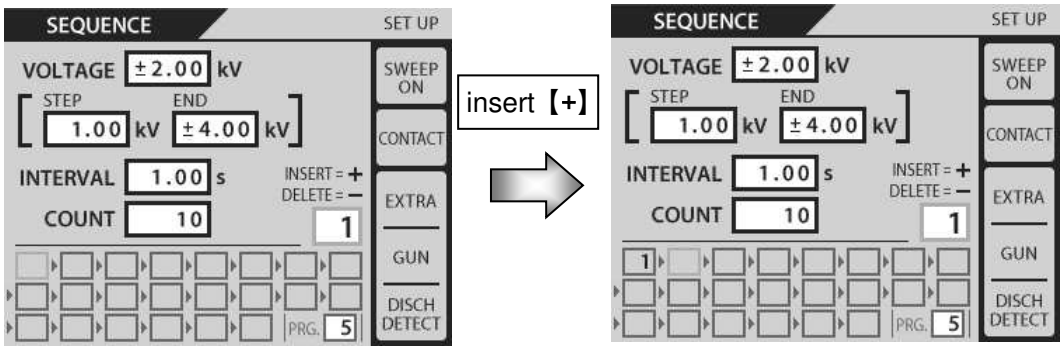
3) Specifying the sequence step and producing the sequence step
   Select the test unit number ➔ **c** by Up/Down keys (▲ ▼) and specify the test unit number by the numeric keypad or the rotary knob. When the the test unit number is selected, the sequence step ➔ **d** is also selected at the same time. Use the Right/Left keys (◄ ►) to select the sequence step to be changed.

4) Creating the sequence program
   Cretae the sequence program with referring the the next page **Figure 17-4. Example of creating sequence program.**

Example 1. Creating a new sequence step

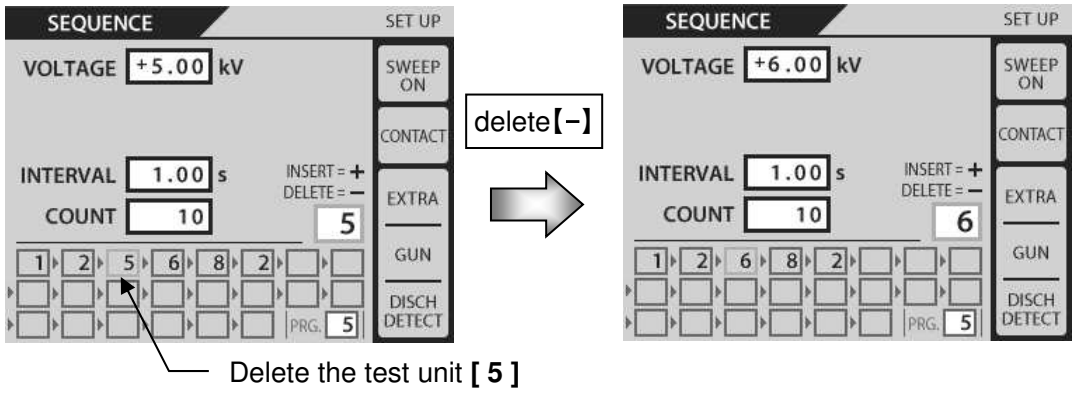
Specify the program **5** and create a new sequence. Nothing is input in the first step. Set the test unit [1] at the first step.

Press [+] key when the sequence step frame and the test unit number are selected so that the [1] is inserted in the sequence step frame and the sequence step frames move to right one by one.



Example 2. Deleting a sequence step

In case of deleting a test unit from a sequence step, select the sequence to be deleted by the Right/Left keys and press [-]. The test units after the deleted one move forward one by one.



Example 3. Inserting sequence step

Select the sequence step frame with the Right/Left key and select the test unit to be inserted by the rotary knob. Press [+] so that the selected test unit is inserted into the selected position.

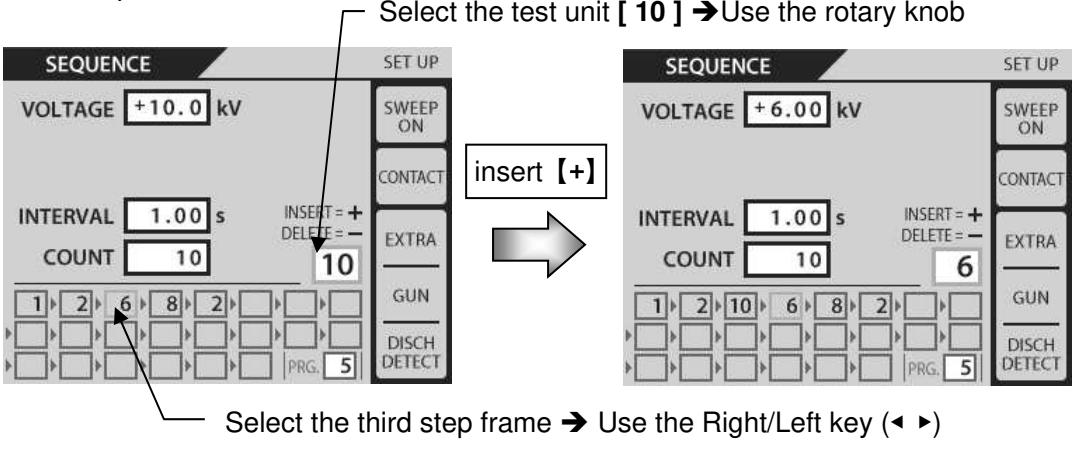


Figure 17-4 Examples of creating sequence program

17-4. Starting a Test

The basic test flow is similar to the IEC STANDARD mode and the MANUAL mode.
➔ **16. EXECUTING TEST**

⚠WARNING

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

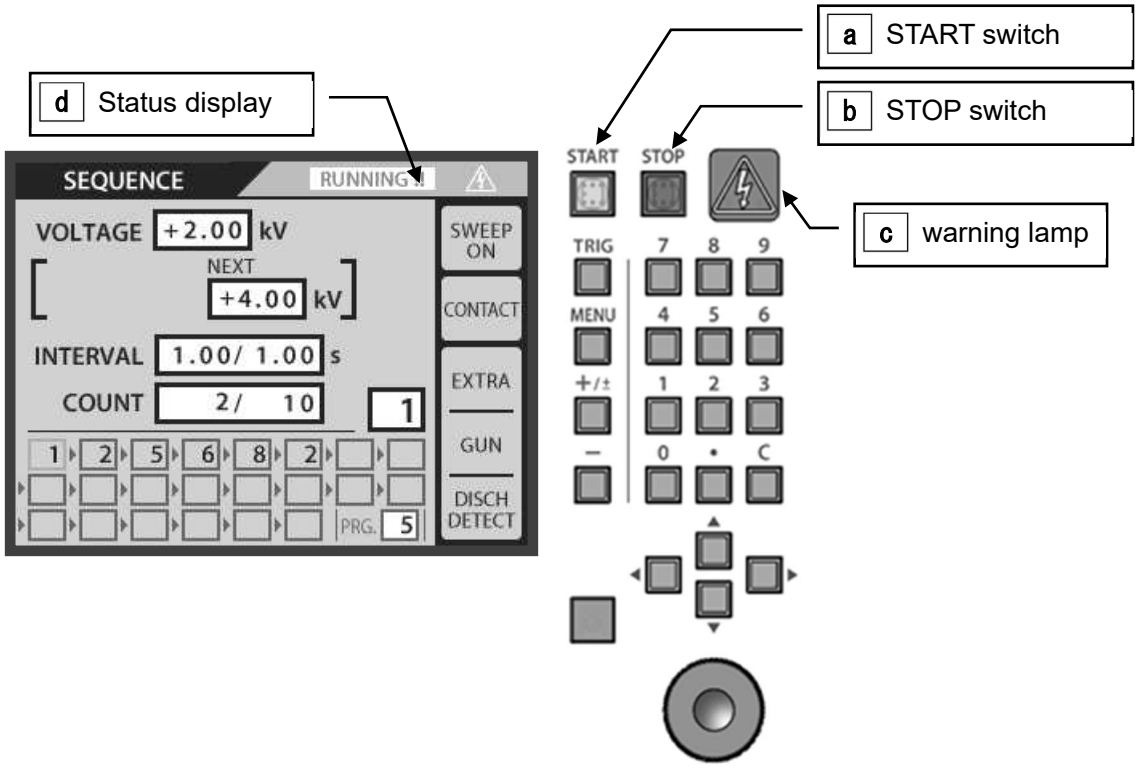


Figure 17-5 Screen During Sequence Test Mode

1) Pressing the【START】switch [a] outputs a high voltage from the simulator.
   ➔ The START switch [a] and warning lamp [c] illuminate.
   ➔ The display [d] changes from [**READY**] to [**TRIG WAIT**].

2) Inputting the specified trigger starts discharge testing.
   ➔ The warning lamp blinks [c]
   ➔ The display [d] changes to [**RUNNING!!**].

3) The simulator goes to the standby state after one test step completes. For executing the next test step, input the trigger again.

➔ Status display area:

[TRIG WAIT] ⇒ (Manual trigger input) ⇒ [READY] ⇒ [TRIG WAIT] ⇒ (Manual trigger input) ⇒ Executing the next step

Continuous mode [CONTINUE]

If this mode is selected, the manual input for moving to the next step can be omitted.

How to set the continuous mode

Press the trigger switch longer when staring test and inputting trigger (This operation is available on both of the main unit and on the discharge gun). The status display area indicates [CONTINUE!!].

However, continuous mode is suspended, if the next step is in air discharge mode.

4) The simulator goes to the standby state after the specified number of discharges have completed for the current unit.

➔ The warning lamp [a] iluminates

➔ The display area [d] changes to [TRIG WAIT].

Inputting the discharge trigger again continues the test from the next step.

17-5. 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 after the end of the test.

Pressing the 【STOP】 switch [b] stops the test, turns off the internal high-voltage power supply, and turns off the warning lamp [c] .

18. RADIATION LEVEL MODE

This simulator can reduce the radiation noise generated by the discharge gun.

18-1. Radiation Noise

When the internal high-voltage relay in the discharge gun is operated by inputting the trigger switch, a spark discharge unique to the high voltage occurs at the contact point with the internal high-voltage relay.

As this spark discharge occurs within the sealed high-voltage relay, it causes no direct danger to human bodies. It, however, may incur radiation noise, which impacts EUT.

This simulator has been improved so that the radiation level can be lower than our previous models. If differences of structure, radiation level and so on between this model and other models are taken into consideration, the test result may be thought different from what it could be otherwise.

Based on the above presumption, this simulator is equipped with a special function for lower radiation called extra mode【EXTRA】as a default setting and it can be switched to normal mode【NORMAL】easily to make the radiation level same as our previous models.

18-2. Differences between Radiation Level Modes

There are differences between extra mode (EXTRA) and normal mode (NORMAL), as shown below.

① Different level of radiated noise

The radiated noise in extra mode (EXTRA) is lower.

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

② Difference in the voltage waveform

There is a difference in the open voltage waveform of the discharge gun output. It can be expressed with test conditions, as shown below.

- Electrostatic discharge mode: Contact discharge mode
- Impedance between the discharge tip and discharge gun GND: 2MΩ or more

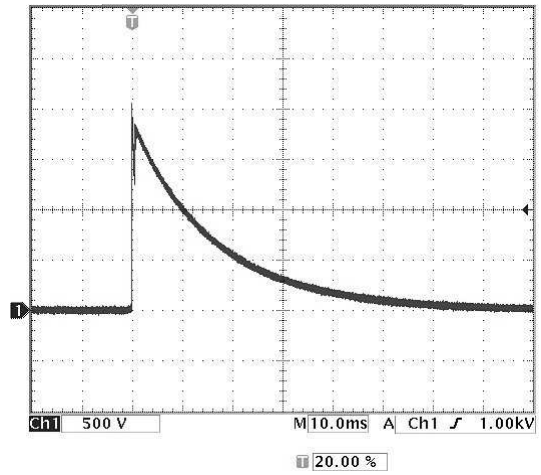
IEC 61000-4-2 and ISO 10605 standards do not stipulate any open voltage waveform.

For the current waveform using the specified target, there is no difference between extra and normal modes.

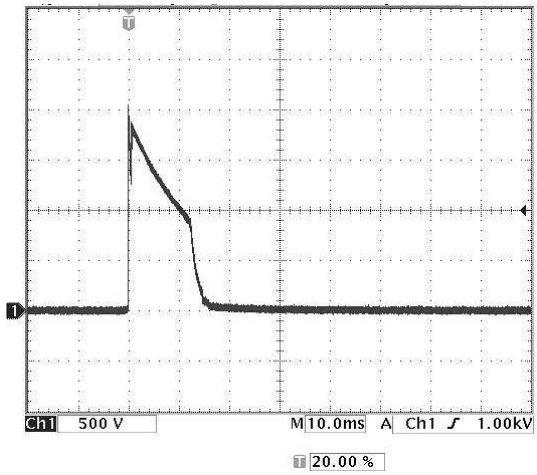
Testing in normal mode does not necessarily guarantee that test results will be identical to those obtained from previous simulators.

Electrostatic tests are affected by the individual variability of the simulator main unit and discharge gun.
They may also be affected by the test environment and arrangement method.

Voltage waveform measurement conditions
Impedance between the discharge tip and GND: approx. 100MΩ (1000:1 high-voltage probe used)
Simulator setting conditions: ＋2kV, contact discharge



Extra Mode (EXTRA) Voltage Waveform



Normal Mode (NORMAL) Voltage Waveform

Figure 18-1 Open Voltage Waveforms

18-3. How to Change the Radiation Level Modes

To chnage normal mode【NORMAL】from the setting【EXTRA】mode, set by the UTILITY.
➔see **23-3. SETTING 2 - Special Function Settings.**

If the discharge interval [INTERVAL] is 0.99 second or less when using at extra mode 【EXTRA】, radiation level is equivalent to the normal mode 【NORMAL】

Displaying is still extra mode【EXTRA】.

19. DISCHARGE DETECTION FUNCTION

The discharge detection function detects the actual discharge in air discharge mode and notifies the user.

To enable this function, it must be set by the utility. ➔see **23-3. SETTING 2 - Special Function Settings.**

19-1. Operation of Discharge Detection Function

The discharge detection function only operates in air discharge mode.

The detection operation starts, when the trigger switch is turned on and the discharge relay inside the discharge gun is turned on.

After that, the detection operation stops, when a discharge is detected or the trigger switch is turned off.

When a discharge is detected, it operates as shown in Table 19.1 below, according to the utility setting.

Table 19.1 Operation of Discharge Detection Function

Item	When Discharge is Detected	When No Discharge is Detected	Function Setting by Utility
Status display lamp on discharge gun	Red → Green	Remains red	None
Buzzer sound	Short sound ”pip”	No sound	ON/OFF selection
Discharge count	Count up	No discharge count even when the trigger is input	ON/OFF selection (When the function is OFF, it counts up every time the trigger is input)

- The discharge detection function is used to detect spark discharges caused by electrostatic discharges. In some cases, therefore, no discharge may be detected, depending on the impedance of the discharge channel and the charged status of the discharged object.
  Moreover, no discharge may be detected, depending on the type of the CR unit (CR value) attached to the discharge gun.
- If the discharge detection function does not work under the above conditions, the sensitivity of the discharge detection function can be changed.
  For details of the setting method and other information, ➔see **23-3. SETTING 2 - Special Function Settings.**

When the discharge gun TC-815 series is used, the discharge detection function is not available.

20. AUTOMATIC CR UNIT & DISCHARGE CUP RECOGNITION FUNCTION

The automatic CR unit & discharge cup recognition function is used to determine the type of the CR unit and the type of the discharge cup attached to the discharge gun as well as checking their combination. It checks whether the combination result complies with IEC 61000-4-2 and ISO 10605, and displays the outcome on the screen.

20-1. Operation of Automatic Recognition Function

When the CR unit or discharge cup for the discharge gun is replaced and the power of this instrument is turned on, automatic recognition is enabled to determine their types.
The CR unit and the discharge cup are determined separately. If their combination complies with a standard, the compliance standard is displayed at the bottom of the main menu.

It automatically determines whether or not the following standards are complied with:

- IEC 61000-4-2 Edition 1.2
- IEC 61000-4-2 Edition 2.0
- ISO 10605 1st Edition
- ISO 10605 2nd Edition

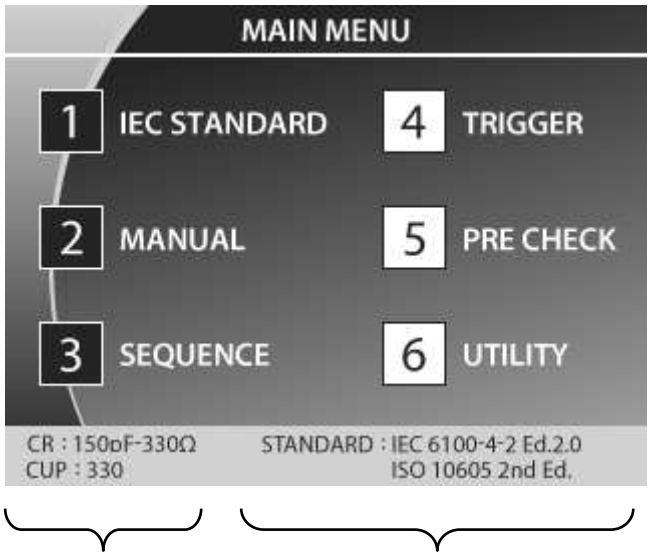


Figure 20-1 Main Menu Screen

Table 20.1 Displaying Compliance

CR unit [CR]	Discharge cup [CUP]	Compliance standard displayed
150pF-330Ω	330	IEC 61000-4-2 ISO 10605 2nd Ed.
330pF-330Ω	330	ISO 10605 2nd Ed.
150pF-2kΩ	2k	ISO 10605 1st Ed. & 2nd Ed.
330pF-2kΩ	2k	ISO 10605 1st Ed. & 2nd Ed.

When the discharge gun TC-815 series is used, neither the CR unit nor the discharge cup can be determined. Moreover, neither the CR value nor the compliance standard is displayed.

20-2. Determining CR Unit

Table 20.2 below shows various types of CR units and their recognition displays.
When the discharge gun GT-30R/GT-30RA is used, a test cannot be started unless a CR unit is set.

Table 20.2 Automatically Recognizable CR Units

CR Unit	Display	Operational Restriction
Not attached	None	START disabled
150pF-330Ω	150pF-330Ω	None
330pF-330Ω	330pF-330Ω	None
150pF-2kΩ	150pF-2kΩ	None
330pF-2kΩ	330pF-2kΩ	None
C value disregarded-0Ω	0Ω	None
Other (30kV-enabled unit)	ETC	None
Other (20kV MAX unit)	ETC (20kV MAX)	Maximum voltage: 20.0kV

When the discharge gun TC-815 series is used, the CR unit cannot be determined and the CR value is not displayed. There is also no operational restriction.

20-3. Determining Discharge Cup

Table 20.3 below shows the types of automatically recognized discharge cups.
When the discharge gun GT-30R/GT-30RA is used, a test cannot be started unless a discharge cup is set.

Table 20.3 Automatically Recognizable Discharge Cup

Discharge Cup	Operational Restriction
Not attached	START disabled
330Ω discharge cup	None
2kΩ discharge cup	None
Other	None

When the discharge gun TC-815 series is used, the discharge cup cannot be determined. There is also no operational restriction.

21. DISCHARGE GUN LED LIGHT

This function is used to turn on the LED light provided to the discharge gun to illuminate EUT.

To use the function, set it by the utility. ➔see **23-3. SETTING 2 - Special Function Settings.**

21-1. Operation of Discharge Gun LED Light Function

This function works during a test (after START).

Pressing the 【START】 switch turns on the LED light provided to the discharge gun.

Pressing the 【STOP】 switch turns off the LED light.

The LED light can be turned on and off during a test by allocating the function to a function key on the remote controller. For how to allocate it to a function key, ➔see **23-4. Allocating Remote Controller Keys.**

When the discharge gun TC-815 series is used, the LED light does not function.

22. PRE-START CHECK

The simulator can check the operations of the main unit and the discharge gun. It is recommended to perform the operation check as pre-check before the test. Thie operation does not mean calibration of this model.

The pre-check is performed by operating the discharge gun, according to what is shown on the LCD display.
Use the gun holder and the 【PRE CHECK】 terminal on the front panel, which are supplied with the simulator by default. For the discharge tip, use a cone-shaped discharge tip for contact discharge tests.
The pre-check consists of three steps and is performed in the order: [CHECK 1] ⇨ [CHECK 2] ⇨ [CHECK 3].

In [CHECK 1] and [CHECK 2] of the pre-check, up to ±30kV is normally checked. If any output voltage restriction is set, however, the check is restricted to up to the set voltage value.

When the discharge gun TC-815 series is used, the pre-check function is not available.

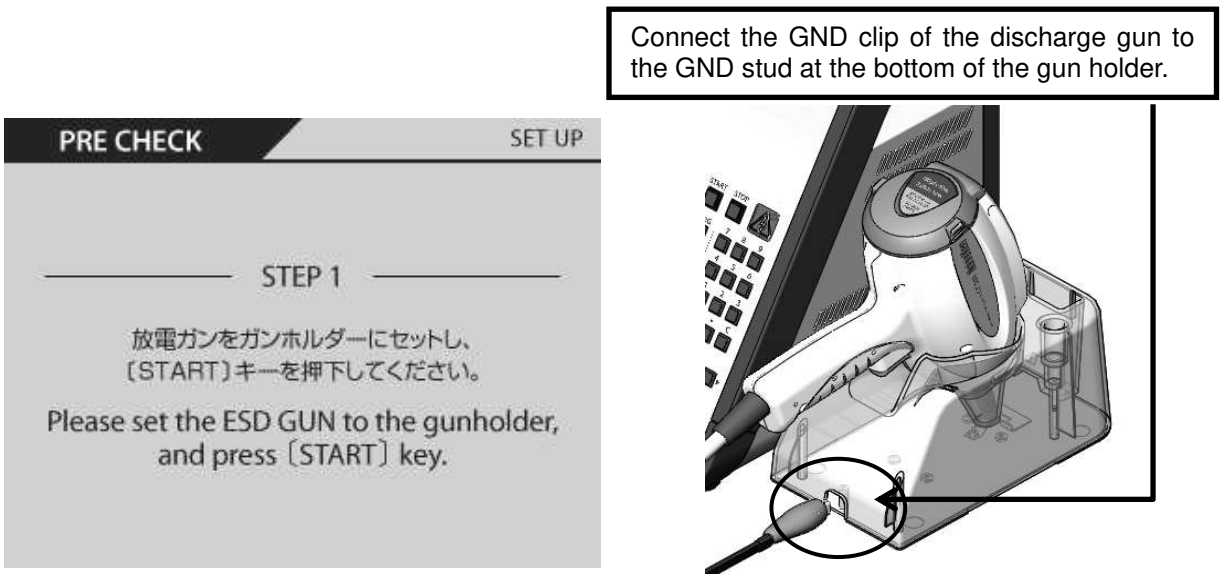
22-1. Starting the Pre-check

Pressing 【5】 on the numeric keypad from the main menu moves to the pre-check screen.
The pre-check is divided into [STEP 1] and [STEP 2]. A message is shown on the screen to explain each operation.

22-2. STEP 1 - Checking High-voltage Power Output and Insufficient Insulation

[STEP 1] performs two checks. [CHECK 1] and [CHECK 2] are performed simultaneously. If there is any abnormality, the pre-check is suspended and a message is displayed.

1) [STEP 1]
Set the discharge gun to the gun holder while the discharge gun is connected to the main unit.
Connect the GND clip of the discharge gun to the GND stud of the gun holder.
After it is set, press the 【START】 key.



Pre-check STEP-1 screen **Set to gun holder**

Figure 22-1 Performing Pre-check - [STEP 1]

Make sure to set the discharge gun to the gun holder and connect the GND clip to the GND stud properly. Or proper checks may not be performed.

Performing CHECK 1

Pressing the 【START】 key performs [CHECK 1].

[CHECK 1] checks the output voltage of the high-voltage power supply in the simulator.

Performing CHECK 2

Once [CHECK 1] is completed, [CHECK 2] is performed immediately.

[CHECK 2] checks the isolation voltage in the discharge gun that is connected to the simulator.

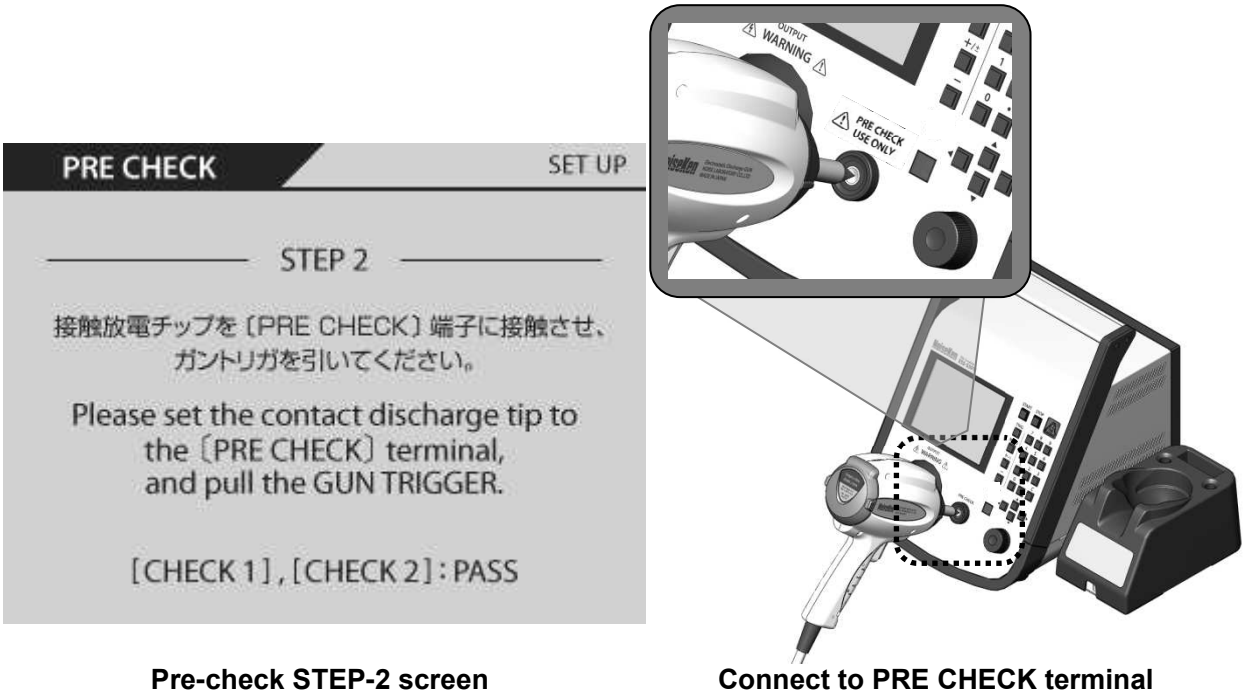
Figure 22-2 Screens for PRE CHECK - CHECK 1 & CHECK 2

22-3. STEP 2 - Checking Discharge Relay of Discharge Gun

[STEP 2] performs one check. If there is any abnormality, the pre-check is suspended and a message is displayed.

1) [CHECK 3]

Checks the operation of the discharge relay contained in the discharge gun. In [CHECK3], 20 times of discharges are applied to the pre-check terminal【PRE CHECK】to ensure proper discharge. Perform this check by having the discharge tip of the discharge gun contact the pre-check terminal【PRE CHECK】, which is located on the operation panel of the simulator.



Pre-check STEP-2 screen **Connect to PRE CHECK terminal**

Figure 22-3 Performing Pre-check - STEP 2

Performing CHECK 3

Perform CHECK 3 by pulling the gun trigger while having the discharge tip of the discharge gun contact the pre-check terminal 【PRE CHECK】. The check time is approximately one second.

Figure 22-4 CHECK 3 Screen

- Make sure to connect the GND clip of the discharge gun to the GND stud properly. Or proper checks may not be performed.
- An error occurs, if the discharge tip comes off the pre-check terminal. In that case, do it again from STEP 1.
- Do not use the 【PRE CHECK】 terminal for any purpose other than pre-check.

22-4. Displaying the Result

Once the pre-check is completed, the result is displayed on the screen.

1) When the pre-check is completed properly

When [CHECK 1] to [CHECK 3] are completed properly, the screen as shown in **Figure 22-5 Displaying PRE CHECK Result ①** appears.

Pressing any switch returns to the main menu.

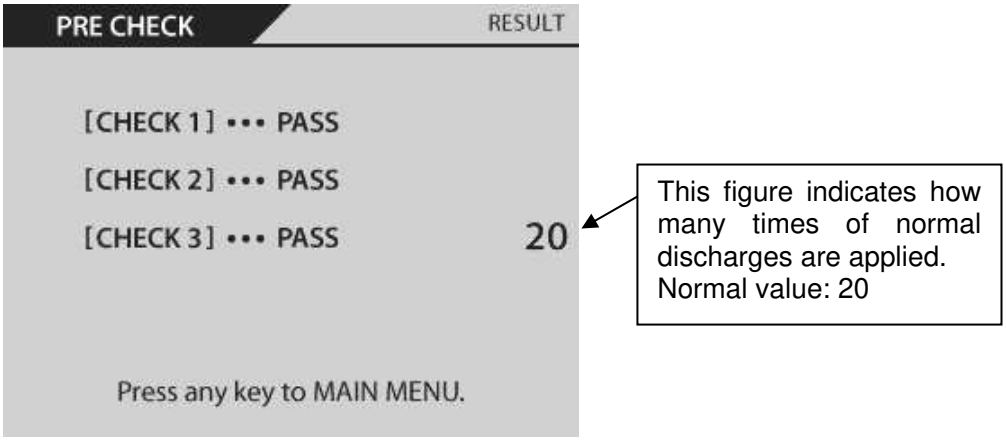


Figure 22-5 Displaying PRE CHECK Result ①

2) When the pre-check is suspended

If there is any abnormality during the pre-check, the pre-check is suspended and the result is displayed.

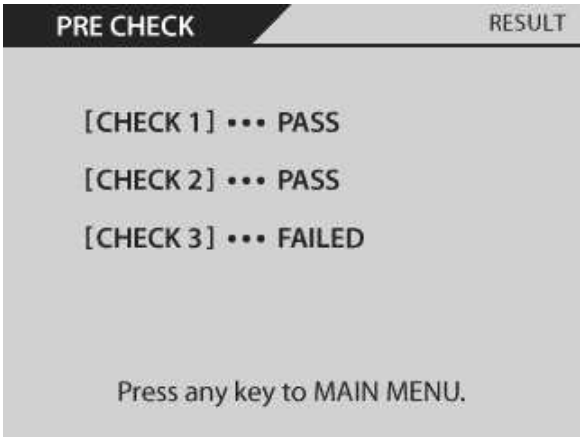


Figure 22-6 Displaying PRE CHECK Result ②

22-5. ERROR Causes and Solutions

When an error occurs during the pre-check, the simulator or the discharge gun may be faulty. The cause of the fault varies, depending on which check resulted in an error.
The following table shows the list of causes of faults for each check and their solutions.

Table 22.1 List of Messages

When Error Occurs in CHECK 1	
Situation	The high-voltage output of the simulator may be faulty. **FAILED（at OO kV）** is displayed.
Cause	・The high-voltage power supply of the simulator is faulty. ・The charger of the discharge gun is faulty due to insufficient isolation, etc.
Solution	・Repair the simulator or discharge gun. (See **30. CONTACTING TECHNICAL SUPPORT**.)
When Error Occurs in CHECK 2	
Situation	The discharge gun may be faulty due to insufficient isolation, etc. **FAILED（at OO kV）** is displayed.
Cause	・Insufficient isolation in the discharge gun ・The discharge relay in the discharge gun has deteriorated.
Solution	・Use an output voltage restriction by the utility. E.g. For FAILED at 20kV, it may still be usable, if the output voltage restriction is set to 15kV. In that case, perform the pre-check again. ・Repair the simulator or discharge gun. (See **30. CONTACTING TECHNICAL SUPPORT**.)
When Error Occurs in CHECK 3	
Situation	The output in the discharge gun may be unstable.
Cause	・There is a contact failure in the discharge channel of the discharge gun. ・The discharge tip came off the check terminal during the check. ・The discharge relay in the discharge gun has deteriorated.
Solution	・Clean the discharge tip and the 【PRE CHECK】 terminal. ・Make sure to keep the discharge tip contacting the pre-check terminal and perform it again. ・Repair the simulator or discharge gun. (See **30. CONTACTING TECHNICAL SUPPORT**.)

23. UTILITIES

The utilities enable a variety of settings, including general settings and special function settings of the simulator.

Selecting [UTILITY] by pressing 【6】 on the main menu displays the top screen for the utilities.

23-1. UTILITY TOP MENU

On the utility top screen, pressing a key on the numeric keypad allows the user to move to each of the utility screens.

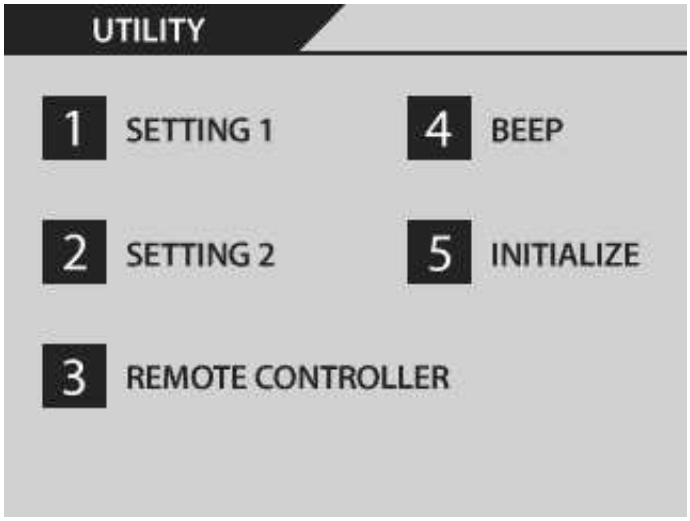


Figure 23-1 UTILITY TOP

1 SETTING 1 (general settings) [SETTING 1]

Sets mainly limitation of function of the simulator and operation mode of accessories.

2 SETTING 2 (special function settings) [SETTING 2]

Sets mainly the radiation level mode and the settings of the discharge detective function.

3 Remote controller key allocation [REMOTE CONTROLLER]

Sets the user's definition key of the remote contoller [F1]~[F4].

4 Beep sound setting [Beep]

Sets beep sounds in various kinds of operation.

5 Initializing settings [INITIALIZE]

Initializes all settins to default value (Settings on shipment).

23-2. SETTING 1 - General Settings

The general settings are mainly used to set operational restrictions to the simulator as well as the operations of accessories.

Pressing the Up/Down keys (▲ ▼) moves from one setting item frame to another in a cycle. The currently selected item frame is displayed in orange color. The numeric value or status can be changed using the numeric keypad or rotary knob. Pressing Right/Left keys (◄ ►) changes the screen of UTILITY (common in the series of utility screen).

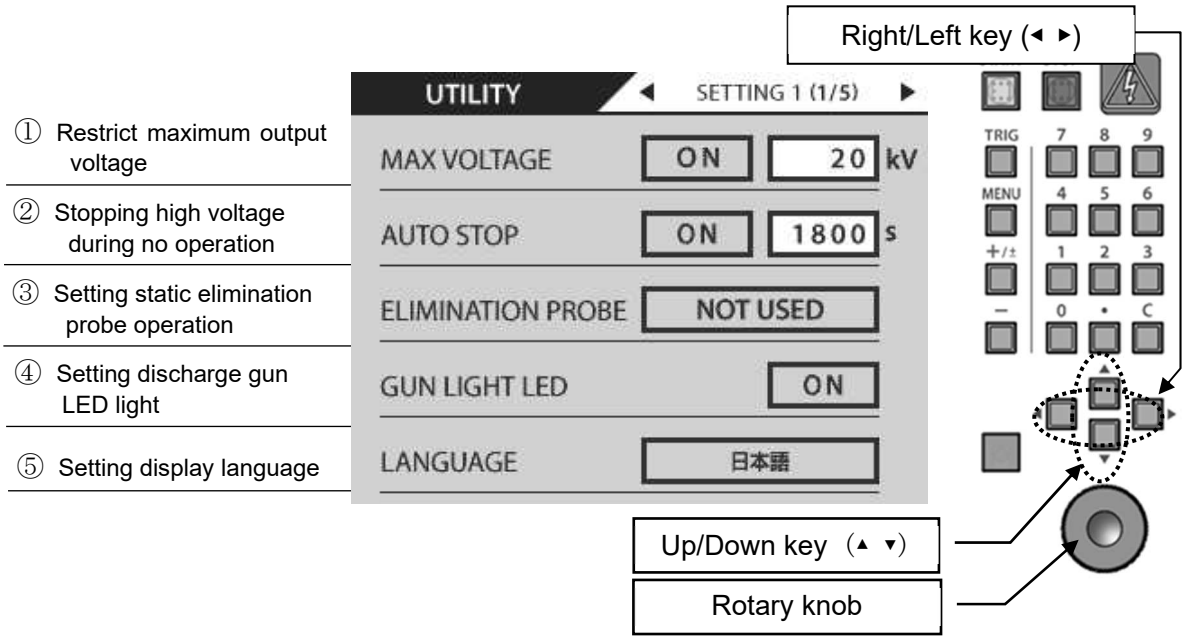


Figure 23-2 SETTING 1 - General Settings

① Restricting the maximum output voltage [MAX VOLTAGE]

The maximum output voltage for the simulator is 30.5kV, However, a upper limit can be set.

[ON / OFF] is changed using the rotary knob.

The output voltage restriction range that can be set is 1 to 30 kV.

② Stopping the high voltage during no operation [AUTO STOP]

Specifies the time for automatically turning off the high voltage when there has been no operation for a while after the high voltage is turned on by pressing the 【START】 switch. The operation for turning off the high voltage is the same operation as for the 【STOP】 switch.

[ON / OFF] is changed using the rotary knob.

The auto-stop function range that can be set is 1 to 3600 seconds.

③ Setting the operation of static elimination probe [ELIMINATION PROBE]

It can specify the operation for when the automatic static elimination probe 01-00013A/B (optional) is connected to the external connection terminal 【AUX】 at the rear.

[NOT USED / EVERY DISCHARGE / COUNT UP] is changed using the rotary knob.

[NOT USED]	The static elimination probe is not used. When the static elimination probe is connected, it is left open.
[EVERY DISCHARGE]	Static elimination is performed in each discharge operation. If, however, the discharge interval is less than one second, the Count Up operation (shown below) is performed.
[COUNT UP]	No. of discharges: Static elimination is performed only when the number of discharge operations specified in COUNT are completed.

④ Discharge gun LED light [GUN LIGHT LED]

It can be set to turn on and off the LED light provided to the discharge gun GT-30R/GT-30RA. This light is turned on only during the test. [ON / OFF] is changed using the rotary knob.

[ON]	Pressing the 【START】 switch turns on the LED light. Pressing the 【STOP】 turns it off.
[OFF]	The LED light is not turned on.

⑤ Setting the display language [LANGUAGE]

Specifies the display language for the screens.

[ENGLISH / 日本語] is changed using the rotary knob.

The Japanese setting may still show some parts in English.

23-3. SETTING 2 - Special Function Settings

Utility Screen 2 is used to set the radiation level mode and the discharge detection function.
Pressing the Up/Down keys (▲ ▼) moves from one setting item frame to another in a cycle. The currently selected item frame is displayed in orange color. The numeric value or status can be changed using the numeric keypad or rotary knob. Pressing Right/Left keys (◄ ►) changes the screen of UTILITY (common in the series of utility screen).

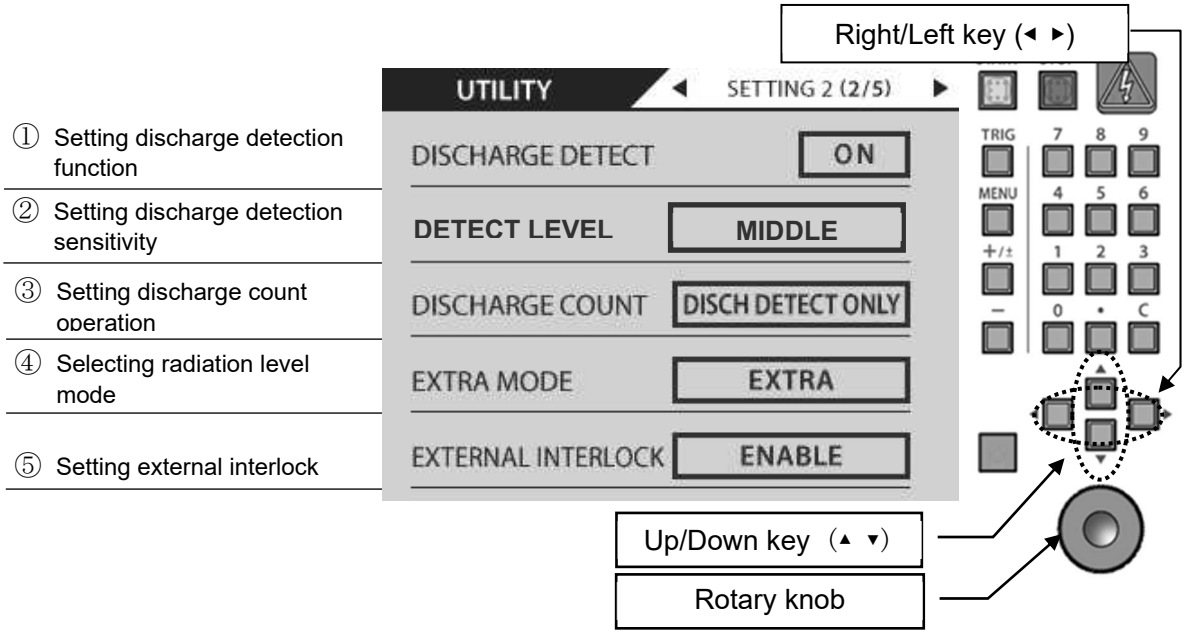


Figure 23-3 SETTING 2 - Special Function Settings

① Setting discharge detection function [DISCHARGE DETECT]
Sets the discharge detection function. The factory default setting is [OFF].
[ON / OFF] is changed using the rotary knob.

② Setting the discharge detection sensitivity [DETECT LEVEL]
The sensitivity setting for the discharge detection function can be changed. The normal sensitivity and factory default setting are [MIDDLE].
[LOW / MIDDLE / HIGH] is changed using the rotary knob.

[LOW]	Sets the discharge detection function to low sensitivity
[MIDDLE]	Sets the discharge detection function to normal sensitivity
[HIGH]	Sets the discharge detection function to high sensitivity

③ Setting the discharge count operation [DISCHARGE COUNT]

Sets discharge count conditions.

[ALL / DISCHARGE DETECT ONLY] is changed using the rotary knob.

[ALL]	All trigger signals are counted, regardless of the discharge detection function.
[DISCH DETECT ONLY]	They are counted only when discharges are detected by the discharge detection function. This setting is enabled when the following conditions are met. ・The discharge detection function is set to [ON]. ・The test mode is set to air discharge mode.

④ Setting the radiation level mode [EXTRA MODE]

Sets the radiation level mode. The factory default setting is [EXTRA].

[EXTRA / NORMAL] is changed using the rotary knob.

[EXTRA]	Set to extra mode
[NORMAL]	Set to normal mode

⑤ External interlock [EXTERNAL INTERLOCK]

It can be set to enable/disable the external interlock of the external connection terminal 【AUX】 at the rear.

[ENABLE / DISABLE] is changed using the rotary knob.

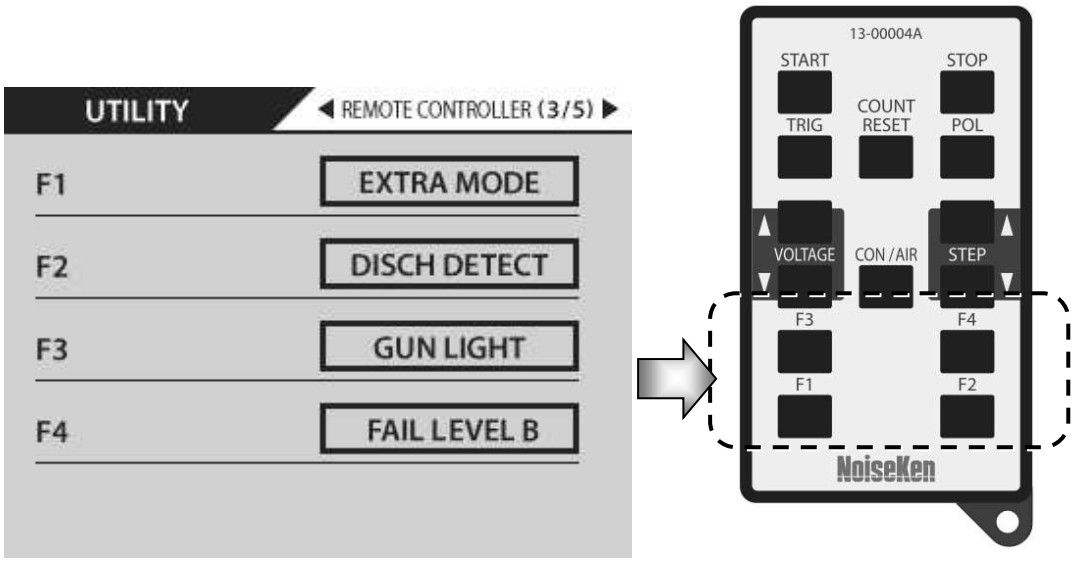
[ENABLE]	Enables the external interlock.
[DISABLE]	Disables the external interlock.

23-4. Allocating Remote Controller Keys

Utility Screen 3 is used to allocate the user-defined keys for the infrared remote controller: 【F1】 to 【F4】.

Pressing the Up/Down keys (▲ ▼) moves from one setting item frame to another in a cycle. The currently selected item frame is displayed in orange color.

The item to be allocated is changed using the rotary knob. Pressing Right/Left keys (◄ ►) changes the screen of UTILITY (common in the series of utility screen).



Example of Function Allocation **Infrared Remote Controller**

Figure 23-4 UTILITY - Allocating Remote Controller Keys

The following table shows the list of allocable functions and their descriptions.
The following functions can be allocated to any of the user-defined keys: 【F1】 to 【F4】.

[IEC LEVEL]	Steps to the test voltage according to the test level in the IEC standard. It is available in IEC STANDARD mode, MANUAL mode and sequence mode. The test level can also be changed after the test is started. **・CONTACT:** 2kV → 4kV → 6kV → 8kV → (2kV → continuous) **・AIR:** 2kV → 4kV → 8kV → 15kV → (2kV → continuous)
[GUN LIGHT]	Changes the ON/OFF status of the irradiation LED light.
[DISCHARGE DETECT]	Changes the ON/OFF status of the discharge detection function.
[EXTRA MODE]	Changes the radiation level mode.
[NOT USED]	Allocates no function.
[FAIL LEVEL B]	Stores the fail level B to a log.
[FAIL LEVEL C]	Stores the fail level C to a log.
[FAIL LEVEL D]	Stores the fail level D to a log.
[UNIT UP]	Increases the unit number of manual mode.
[UNIT DOWN]	Decreases the unit number of manual mode.
[LOCK・UNLOCK]	Change enable / disable test settings except the IEC mode.

The factory default setting for all of the function allocations is [NOT USED].

Storing fail levels (B, C and D):
If EUT malfunctions or becomes faulty during the test, the test operator can press the [FAIL LEVEL B,C,D] button to store the event to a log in the PC remote software.
This function is not enabled, unless the PC remote software is running.
For details, see the instruction manual for the PC remote software.

23-5. Beep Sound Setting

Utility Screen 4 is used to set various operation sounds.

Pressing the Up/Down keys (▲ ▼) moves from one setting item frame to another in a cycle. The currently selected item frame is displayed in orange color. Its status can be changed using the rotary knob.

Pressing Right/Left keys (◄ ►) changes the screen of UTILITY (common in the series of utility screen).

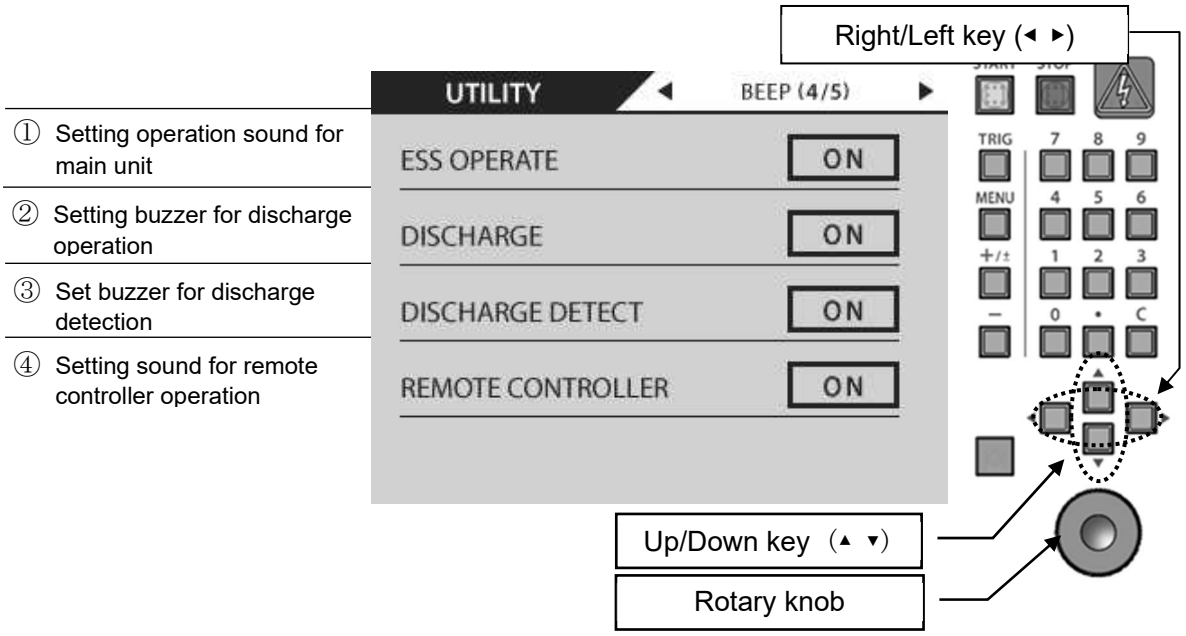


Figure 23-5 UTILITY - Beep Sound Setting

① Setting the buzzer for the main unit operation [ESS OPERATE]

The operation sound (“pip” sound) for the simulator can be turned on and off.

[ON / OFF] is changed using the rotary knob.

[ON]	Pressing an operation switch on the simulator sounds the operation sound.
[OFF]	The operation sound is not sounded except for the 【START】 and 【STOP】 switches.

② Setting the buzzer for discharge operation [DISCHARGE]

The warning buzzer (“pip” sound) for discharge operation can be turned on and off.

[ON / OFF] is changed using the rotary knob.

[ON]	The buzzer is sounded during discharge operation. In contact discharge mode, the buzzer is sounded during discharge operation. In air discharge mode, the buzzer is sounded when the trigger switch is pressed. If, however, the discharge interval is 1 second or less, the buzzer is sounded once every second.
[OFF]	The buzzer is not sounded during discharge operation.

③ Setting the buzzer for discharge detection [DISCHARGE DETECT]

The buzzer (“pip-pip” sound) for discharge detection can be turned on and off.

[ON / OFF] is changed using the rotary knob.

[ON]	The buzzer is sounded during discharge detection. It can be set even when the discharge detection function is set to [OFF]. In that case, however, the buzzer is not sounded.
[OFF]	The buzzer is not sounded during discharge detection.

④ Setting the buzzer for remote controller operation [REMOTE CONTROLLER]

The operation sound (“pip” sound) for the remote controller can be turned on and off. [ON / OFF] is changed using the rotary knob.

[ON]	The buzzer is sounded during using the remote contoller.
[OFF]	The buzzer is not sounded during using the remote contoller.

23-6. Clearing Settings

Utility Screen 5 allows settings to be cleared (i.e. back to the factory default settings).

Turning the rotary knob changes the display of the mode to be cleared. Pressing the 【C】 key on the numeric keypad clears the settings.

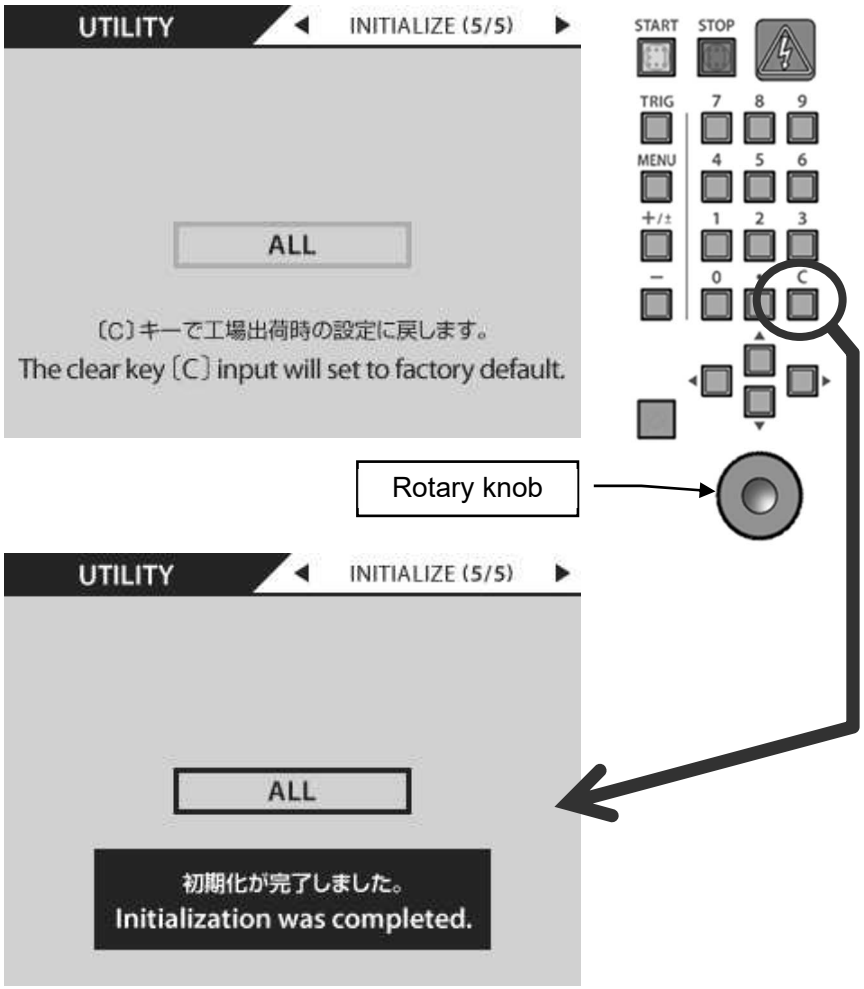


Figure 23-6 UTILITY - Clearing Settings

[ALL]	All of the settings in utility, sequence mode and manual mode are cleared simultaneously. Once cleared, they become factory default settings.
[UTILITY]	All of the utility settings are cleared. Once cleared, they become factory default settings.
[SEQUENCE]	All of the settings in sequence mode are cleared. Once cleared, they become factory default settings.
[MANUAL]	All of the settings in manual mode are cleared. Once cleared, they become factory default settings.

It must be noted that once the settings are cleared, all of the stored manual test units and sequence programs are deleted.

24. BACKGROUND KNOWLEDGE ABOUT ELECTROSTATIC DISCHARGE TESTING

1) Principle of electrostatic tester

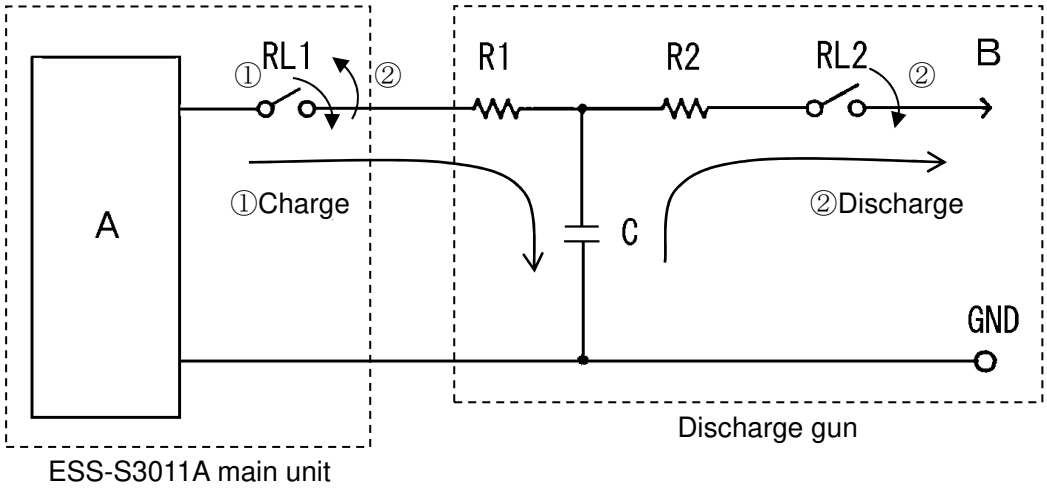
The basic circuit of an electrostatic is shown below.

① The high voltage generated in the high voltage power supply is charged in the charging capacitor through the charging relay and charging resistance.

➔ Pressing [START] status on this simulator

② 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.

➔ Inputtin the trigger signal status on this simulator



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 24-1 Basic Circuit for an Electrostatic Discharge Simulator

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-S3011A 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 tip 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. 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. Repeat this the specified number of times.

  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.

As for the output waveform prescription, see the instrauction manual of the discharge gun MODEL: GT-30R/GT-30RA

25. AUXILIARY INTERFACE

25-1. AUX Connector

This is a DSUB15 female connector used for the warning light (Model: 11-00014B), automatic elimination probe (Model: 01-00013A/B), and control signal input and output.
If using both the warning light and automatic elimination probe (both of which are available as options), please use the AUX connector junction box (Model: 05-00052A).

Table 25.1 AUX Connector Pin Layout

Pin No.	Signal Name	Pin No.	Signal Name
1	Warning light output +	9	External interlock power supply (+24V)
2	Warning light output -	10	External interlock input
3	Auto. elimination probe output +	11	+24V
4	Auto. elimination probe output -	12	No connection
5	+24V	13	+24V
6	Reserved	14	No connection
7	External trigger input power supply (+24V)	15	GND
8	External trigger input		

- Warning light (Model: 11-00014B) connection
  You can connect an optional warning light (Model: 11-00014B).
  If connected, the warning light illuminates to indicate when the start switch has been pressed and the high-voltage power supply is operating.

- Automatic elimination probe (Model: 01-00013A/B) connection
  You can connect an optional automatic elimination (neutralization) probe (Model: 01-00013A/B).
  You can use utility mode to setup how to perform neutralization. ➔ See **23-2. SETTING 1 - General Settings**.

Table 25.2 Electrical Specifications of AUX Connector Input Pins

Electrical Specifications of External Input Pins (Same for all input pins)	
H level input voltage	5V to 24V
L level input voltage	0V to 0.5V
Input impedance	7kΩ min. 10kΩ typ.
Minimum pulse time	100ms

Note: Do not apply voltages greater than 24V to the external input pins as this may cause a fault.

- External trigger input

  The external trigger can be used to input the trigger from an external source.

  To use this function, select [EXTERNAL] in the trigger selection setting in the initial menu screen. ➔ See **15-1.TRIGGER Setting**.

  To input an external trigger, input a high level (5V to 24V) with a pulse time of 100ms or longer. Table 25.2 lists the specifications for the input terminal.

  The following types of signal can be used as the external trigger input.

  ▪ Relay output

  ▪ PNP open collector output

  ▪ Voltage output

  If using a relay output or PNP open collector output, use [Pin No.7 External Trigger Input Power Supply].

- External interlock input

  You can install an interlock mechanism by connecting an external emergency stop switch or similar to the external interlock input.

  Use utility mode to enable or disable the external interlock. ➔ See **23-3.SETTING 2 - Special Function Settings**.

  If the external interlock is enabled via utility mode, [Err External Interlock Error] appears and the test is unable to proceed unless either [Pin No.9 External Interlock Power Supply] or a high level (5V to 24V) is input to [Pin No.10 External Interlock Input]. Table 25.2 lists the specifications for the input terminal.

  The following types of signal can be used as the external interlock input.

  ▪ Relay output

  ▪ PNP open collector output

  ▪ Voltage output

  If using a relay output or PNP open collector output, use [Pin No.9 External Interlock Power Supply].

25-2. Optical Communication Connector

The instrument can communicate with a PC via the optical communication connector (interface).

For the protocol and other details, please contact your sales agent or the Noise Laboratory service office.

26. ERROR DISPLAY

Table 26.1 Error List

ERROR 1	
Description of error	Discharge gun interlock error An interlock is present at the high-voltage output connector.
How to clear error	Push the STOP switch.
How to prevent error	Attach the high-voltage connector of the discharge gun correctly.
ERROR 2	
Description of error	External interlock error An external interlock is present.
How to clear error	Push the STOP switch.
How to prevent error	Attach the AUX connector or external interlock correctly. Disable the external interlock.
ERROR 3	
Description of error	Trigger error The trigger switch is stuck in the input position.
How to clear error	Push the STOP switch.
How to prevent error	Stop the trigger switch from remaining in the input position. Change the trigger selection.
ERROR 4	
Description of error	PC control error Unable to communicate with PC.
How to clear error	Push the STOP switch.
How to prevent error	Check the communications connector, optical fiber cable, and PC software.
ERROR 5	
Description of error	Automatic stop No operation was performed within the specified time period with automatic stop in place.
How to clear error	Push the STOP switch.
How to prevent error	Lengthen the time period or disable the automatic stop function. Operate the simulator within the required time.

ERROR 6	
Description of error	High-voltage power output error The output of the high-voltage power supply is unable to be confirmed.
How to clear error	Push the STOP switch.
How to prevent error	When this error occurs, the simulator and discharge gun may be faulty. For repairing the simulator and discharge gun, see **30.CONTACTING TECHNICAL SUPPORT**.

ERROR 7	
Description of error	MAX VOLTAGE error An attempt was made to output a voltage that exceeds the set MAX VOLTAGE.
How to clear error	Push the STOP switch.
How to prevent error	・Lower the setting voltage below the MAX VOLTAGE setting. ・Turn off MAX VOLTAGE. (See **23-2. SETTING 1 - General Settings**.)

ERROR 8	
Description of error	CR unit or discharge cup recognition error Neither of them are attached or GT-30R/GT-30RA is faulty.
How to clear error	Push the STOP switch.
How to prevent error	Attach the CR unit and discharge cup correctly. If the error continues even after they are attached correctly, they may be faulty. For repairing the simulator and discharge gun, see **30.CONTACTING TECHNICAL SUPPORT**.

27. SPECIFICATIONS

Main Unit（ESS-S3011A）

Parameters	Function/Performance
Output polarity	Positive or negative
Output voltage	0.20kV to 30.0kV（30.5kVmax） 0.20kV to 10.00kV: 0.01kV step setting 10.0kV to 30.0kV: 0.1kV step setting
Tolerance	0.20kV to 2.0kV±10% 2.0kV to 30.0kV±5%
Repeat cycle 〔INTERVAL〕	0.05s to 600.0s±10% or manually 0.05s to 9.99s: 0.01s step setting 10.0s to 600.0s: 0.1s step setting
No. of discharges 〔COUNT〕	1 to 60,000 times set in increments of 1, or continuous discharge
Electrostatic discharge mode	Contact discharge or air discharge
Radiation level mode	Extra mode (EXTRA) or normal mode (NORMAL)
Trigger setting	Gun trigger 〔GUN〕, controller trigger 〔ESS〕, or external trigger 〔EXTERNAL〕
IEC test mode	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
Manual test mode	Contact or air discharge mode: User specified from 0.20kV to 30.5kV A sweep function is available and a 50 unit memory
Sequence test mode	49 program-used units can be stored 20 programs can be stored with up to 22 steps per program
Warning lamp	Turns on when a voltage is output from the high-voltage output connector Blinks when electrostatic discharging starts
Recommended discharge guns	GT-30R/GT-30RA
Charging resistor in simulator	10MΩ
AUX connectors	Used to connect a warning light (MODEL: 11-00014B) or automatic neutralization probe (MODEL: 01-00013A/B), and as the interlock input or external trigger input terminal
Optical communications connector	Optical connector for communications with a PC (serial interface) Please contact your sales agent or the Noise Laboratory service office for details

Mains power supply	AC100V to AC240V ±10%, 50Hz/60Hz
Power consumption	75VA
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	(W)270 ㎜ × (H)312 ㎜× (D)296 ㎜
Weight	7.0kg (approx.)

Infrared Remote Controller (Optional - MODEL:13-00004A)

Parameters	Function/Performance
Mains power supply	Lithium battery CR2025×1
Operating temperature range	15 to 35°C
Operating humidity range	25 to 75%RH (no condensation)
External dimensions	(W)54mm × (H)92mm × (D)12mm
Weight	40g (approx.)

Gun Holder

Parameters	Function/Performance
Supported discharge gun	GT-30R/GT-30RA TC-815R TC815S TC-815-330/2K TC-815S-330/2k
External dimensions	(W)120mm × (H)119mm × (D)208mm
Weight	0.5kg (approx.)

28. 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.
   If the user or unauthorized service person should open the cover or case of the product which cannot be allowed to open, this warranty prescription becomes ineffective.

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

29. 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.

30. 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.

□ Custmer Service Center

TEL +81-42-712-2051
FAX +81-42-712-2050
E-mail:sales@noiseken.com

31. Information for CE Marking, EU and European territories

Manufacture: **Noise Laboratory Co., Ltd**
1-4-4, Chiyoda, Chuo-ku, Sagamihara City,
Kanagawa Pref., 252-0237, Japan

Importers: Territory: Germany, Austria, Benelux and Eastern Europe
DHS Elmea Tools GmbH Main Office
Carl-Zeiss-Strasse 43
63322 Roedermark, Germany

DHS Elmea Tools GmbH Office Tulln/Austria
Bruedergass 1-3, Top B14
3430 Tulln, **Austria**

DHS Elmea Tools GmbH Office BeNeLux
Het Voorburg 7
4101 KK Culemborg, Niederlande

Territory: Italy
TESEO SpA
Corso Alexander Fleming, 27
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Territory: France, Spain and Portugal
AR France
Bat D1, 7 rue du fossé Blanc
92230 Gennevilliers, France

Territory: U.K., Ireland, Norway, Sweden and Denmark
AR Europe
Unit 8, Madingley Court, Chippenham Drive,
Kingston, Milton Keynes, Buckinghamshire MK10 0BZ, United Kingdom

Instruction for class A equipment:
Caution: This equipment is not intended for use residential environments and may not provide adequate protection to radio reception in such environments.

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