NoiseKen

INSTRUCTION MANUAL

Electrostatic Discharge Simulator

ESS-PS1

Electrostatic Discharge Gun

GT-31S

Noise Laboratory Co., Ltd. (NoiseKen)

Edition 1.03
AEC00348-00E-0

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- Security Export Control System: Requirements for Exporting This NoiseKen Product
  Although the test equipment does not come under rows 1 to 15 of Appended Table 1 of the Export Trade Control Order, it comes under the restricted goods catch-all in row 16. For this reason, before exporting NoiseKen products or temporarily bringing it to a foreign country, a notice of export in advance must be submitted to us for an inspection for the final consumer or end use. We rely on our customers for the contents of the notice and check that the final destination country, the final consumer and end use described in the notice conform to the provisions of paragraph 16 in Appended Table 1 of the Export Trade Control Order. The export notice must always be submitted in order to comply with the law of export control.
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*Since the above details are based on the Order, they are subject to change according to amendments of the Order or similar reason. Please contact the Governmental organization (such as Security Export Control Administration Division, Trade Control Department, Trade and Economic Cooperation Bureau, Ministry of Economy, Trade and Industry) directly for the details, including the contents of the regulations of the Order or export procedure.

1. IMPORTANT SAFETY PRECAUTIONS

This section describes the precautions that must be strictly observed in order to prevent harm or damage to the user or others when using the Electrostatic Discharge Simulator ESS-PS1 and Electrostatic Discharge Gun GT-31S (hereafter collectively referred to as "the test equipment").

- **The test equipment must be used by trained EMC technicians (electricians)**
  There is a risk of death or serious injury, as well as a risk of electromagnetic noise exceeding regulatory limits being emitted. Please use the test equipment in a shielded room or in an environment with appropriate countermeasures against electromagnetic noise.

- **Do not use the test equipment for any purposes other than the EMC testing described in this manual.** There is a risk of death or serious injury.

- **Do not use the test equipment if you have an electronic medical device such as a pacemaker, and do not enter the test area while the test equipment is operating.**
  There is a risk of death or serious injury.

- **Do not use the test equipment in areas where an open flame is prohibited or in areas that are susceptible to explosion.** There is a risk of ignition due to discharge.

- **Make sure that the power cable (AC input cable for operation) complies with the safety standards of the country where the test equipment is used.**
  Using a non-compliant cable may cause fire or electric shock. The power cable supplied with the product at the time of shipment is intended for use in Japan and North America. If you use the test equipment in another country, use a cable certified to the safety standards of that country.

The section "BASIC PRECAUTIONS FOR SAFE USE OF THE TEST EQUIPMENT" (described later) contains important safety recommendations, and so be sure to fully read this section before making the testing environment settings, connections, and starting testing.

2. CHECK PACKAGE CONTENTS

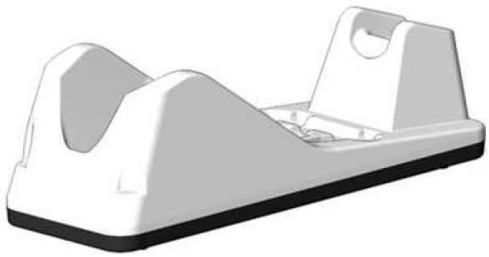
Before using this product, please check the following for the main unit and the included accessories.
This manual is common for both the Electrostatic Discharge Simulator ESS-PS1 and the Electrostatic Discharge Gun GT-31S, so please refer to the sections relevant to the product you purchased.

2−1. ESS-PS1

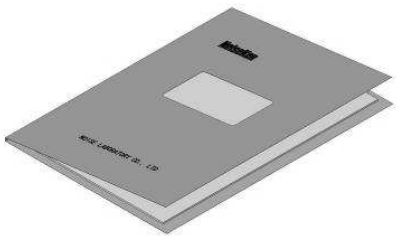
A

B

C



D



	Item	Model	Quantity	Remarks
A	Electrostatic Discharge Simulator	ESS-PS1	1	
B	AC adapter & AC cord	17-00007A	1 set	For ESS-PS1 only For Japan and North America 3P for AC100-115V
C	Gun stand	03-00127A	1	
D	Instruction manual (this manual)		1	In common with GT-31S

2−2. GT-31S

A

B

C

D

E

Item		Model	Quantity	Remarks
A	Electrostatic Discharge Gun	GT-31S	1	
B	Discharge module for 150 pF-330 Ω testing	06-00100A	1	Mounted on ESD Gun
C	Contact discharge tip (conical type)	12-00007A	1	
D	Air discharge tip (round type)	12-00008A	1	
E	Instruction manual (this manual)		1	In common with ESS-PS1

3. PREFACE

Thank you for purchasing the Electrostatic Discharge Simulator ESS-PS1 and the Electrostatic Discharge Gun GT-31S.
Before using the product, please read this manual thoroughly and make full use of the information provided.

- **This manual has been written to ensure that those who follow the operating procedures and precautions will be able to use the test equipment safely and take full advantage of its features.**
- **Keep this manual in a place where it can be easily accessed whenever you are handling the test equipment.**

3−1. Features

- This product is a test equipment designed to conduct ESD immunity tests as specified by the IEC 61000-4-2 (Edition 3.0) standard. You can perform ESD (ESD) immunity tests by connecting the ESD Simulator ESS-PS1 with the ESD Gun GT-31S.
- By attaching accessories specified by Noise Laboratory Co., Ltd. to the ESD Gun, ESD immunity tests as defined by the ISO 10605 (3rd Edition) standard can be conducted.
- The ESD Gun is equipped with an LCD touch panel for display and operation.
- The built-in battery expands the flexibility during large equipment tests.
  Additionally, tests can also be conducted with the AC adapter connected.
- Three test modes are available to support tests:
  -Standard Test Mode: Allows easy setting of test levels defined by standards.
  -Manual Test Mode: Allows for arbitrary test condition settings.
  -Sequence Test Mode: Enables combining custom test condition units and performing tests in sequence.
- The test apparatus is equipped with a sweep function that allows incremental adjustment of test parameters.
- A discharge detection function is included to notify when an actual discharge occurs. (This is only for the air discharge mode.)
- A pre-check function is equipped to allow operational checks before testing.
- The test equipment also features an automatic recognition function that displays the mounted discharge module.
- Remote control from a PC via optical communication is possible. (The optical I/F unit is optional.)

Please note that the screen images in this manual may differ in font or shape from the actual screen, and some parts may be omitted. Additionally, for the sake of readability in print, some screen displays may differ from the actual ones.

The operations performed on the LCD touch panel of the ESD Gun will be saved in the ESS-PS1.

For information on standard compliance and unit combinations, refer to ➔ 3−2. Compliance Standards Based on Combinations and ➔Table 11-1. Discharge Module and Corresponding Test Standards.

3－2. Compliance Standards Based on Combinations

Compliance standards for the ESD Gun GT-31S vary depending on the mounted discharge module.
In addition, the circuit constants and discharge current waveform specifications required by each standard are different, so it is necessary to use the appropriate discharge module to comply with each standard.
The table below lists the standards that can be complied with.

✓: Fully compliant with the standard.
△: Partly compliant with the standard.

Discharge module	IEC 61000-4-2		ISO 10605		
	2.0	3.0	1st	2nd	3rd
GT-31S -06-00100A (150 pF-330 Ω)	✓	✓	△	△	△
GT-31S & GT-ISOSET-A -06-00100A (150 pF-330 Ω) -06-00102A (330 pF-330 Ω) -06-00101A (150 pF-2 kΩ) -06-00103A (330 pF-2 kΩ)	✓	✓	✓*1	✓	✓

*To comply with the ISO 10605 standard, the optional ISO accessory set GT-ISOSET-A is required.

*Regarding the shipping inspection criteria

The shipping inspection criteria for the test equipment corresponds to the discharge module used in combination, as shown in the table below.

*1 Does not meet the requirement for a rise time of 5 ns or less for the air discharge waveform in ISO 10605 1st Edition.

Discharge module	Standards Complied with in Shipping Inspection
GT-31S -06-00100A (150 pF-330 Ω)	IEC 61000-4-2 Ed.3.0
GT-31S & GT-ISOSET-A -06-00100A (150 pF-330 Ω) -06-00102A (330 pF-330 Ω) -06-00101A (150 pF-2 kΩ) -06-00103A (330 pF-2 kΩ)	IEC 61000-4-2 Ed.3.0 ISO 10605 3rd

4. TABLE OF CONTENTS

5. BASIC PRECAUTIONS FOR SAFE USE OF THE TEST EQUIPMENT

- This section contains information that must be followed to prevent harm or damage to the person using the test equipment or to other people.

- The degree of potential harm or damage that can occur by failing to follow these safety precautions is described below. Be sure that you fully understand the meanings of the symbols and warning indicators before reading the main text.

5－1. Meaning of Safety Symbols

◆ The safety symbols below are used to indicate the degree of hazard or injury that can occur if the displayed information is not followed or if operation is not performed correctly.

⚠ DANGER

This indicates an imminent hazardous situation which, if not avoided, will result in death or serious injury if operation is not performed properly.

⚠WARNING

This indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury if operation is not performed properly.

⚠ CAUTION

This indicates a potentially hazardous situation which, if not avoided, could result in injury or property damage if operation is not performed properly.

5－2. Explanation of Symbols

◆ The symbols below describe information that must be followed.

	Indicates that you must pay careful attention.	 
	Indicates that the action is prohibited (must not be done).	 Prohibited  Disassembly Prohibited
	Indicates that the action is mandatory (must be done).	 Safety Rule  Always earth correctly  Turn the power switch OFF  Unplug the power plug from the outlet

◆ The following indications are displayed on the test equipment.

	**Notice warning of possible electric shock** Indicates high voltage and high current areas that are hazardous to humans.
	**General caution, warning, and hazard indication** To protect personnel and the test equipment, refer to this manual.
	Indicates a warning, risk of electric shock, or caution, and the user should refer to the manual.
	Indicates a warning, risk of electric shock, or caution, and the user should refer to the manual. Warning statement There is a risk of electric shock. Do not remove the cover.
	Indicates a warning, risk of electric shock, or caution, and the user should refer to the manual. Precautionary statement for handling Noise Laboratory Co., Ltd. assumes no responsibility for damage resulting from improper operation.

5－3. DANGER

 Disassemly Prohibited	**Do not disassemble or modify. Do not remove the cover.** Failure to follow this rule may result in death or serious injury, fire, or electric shock. For internal inspection or repair of the product, please contact the dealer where you purchased the product or the NoiseKen Customer Service Center. Refer to ➔**32. NOISE LABORATORY SUPPORT NETWORK**

 Prohibited	**Do not use the test equipment in areas where an open flame is prohibited or in areas that are susceptible to explosion.** There is a risk of ignition due to discharge.
	Do not use the test equipment if you have an electronic medical device such as a pacemaker, and do not enter the test area while the test equipment is operating. Electronic medical devices may malfunction and pose a risk to human safety.
	Do not touch the tip of the ESD Gun during testing. This may cause electric shock or injury.

5－4. WARNING

⚠WARNING

Safety Rule	**If any of the following abnormalities occur, stop using the test equipment immediately.** ❍ Smoke is emitted, or there is a burning smell ❍ Water or foreign object gets inside the test equipment ❍ The test equipment is dropped or damaged ❍ The AC adapter or AC cord is damaged (core wires are exposed or broken) Continuing to use the test equipment under these abnormal conditions may result in fire or electric shock. Immediately turn off the power, and unplug the AC cord from the outlet. After checking that smoke is no longer coming out, contact the dealer where you purchased the product or the NoiseKen Customer Service Center to request repair.➔ Refer to **NOISE LABORATORY SUPPORT NETWORK** Repairs by the customer are dangerous and must not be attempted.  Unplug the power plug from the outlet  Turn the power switch OFF
	Connect the *protective* ground of the AC cord when using. Failure to connect the protective ground could result in electric shock.  Always earth correctly
	Be sure that you understand the contents of this instruction manual before use. There is a risk of death or serious injury, and of emitting electromagnetic noise beyond regulatory limits. Noise Laboratory Co., Ltd. assumes no responsibility for any personal injury, damage to property, or any other damage caused by irresponsible or incorrect operation.
	The test equipment must be insulated and protected against the maximum output voltage of this product. Failure to provide proper insulation protection may result in electric shock, leakage, or fire hazard.
	Even if the EUT (Equipment Under Test) is incomplete or damaged, ensure that high-voltage static electricity does not contact any ungrounded metal objects. This may result in electric shock, injury, or damage to property.
	Use only the AC adapter included with the test equipment. Using any AC adapter other than the included one may cause malfunction, fire, electric shock, or operational failure.

 Safety Rule	**Use the AC adapter within the specified power voltage range and frequency (AC 100 V–240 V, 50 Hz/60Hz).** Using it outside the specified voltage range and frequency may cause fire, electric shock, or unstable operation.
	Fully insert the AC and DC plugs. Failure to do so may result in overheating or dust accumulation, which may cause fire or electric shock. Incomplete insertion and connecting too many devices to one outlet may cause the cable to heat up, resulting in fire or electric shock.
	Make sure the connectors and cables are connected properly. Make sure that the connections are performed properly, and do not use damaged connectors or cables. Doing so may result in electric shock or damage to the equipment.
	Turn off the power to the test equipment before making any cable connection changes. Failure to do so may cause electric shock, injury, or operational failure.
	Modifications to the discharge tip and discharge module, as well as attachment to the probe stand (optional), should only be done when the ESD Simulator is in [STOP] mode. Failure to do so may cause electric shock, injury, or operational failure.
	After testing, eliminate static electricity before touching the discharge tip or the EUT. Even after electrostatic application has ended, the discharge tip and EUT may still hold high voltage. Before touching the discharge tip or EUT, eliminate the static electricity (e.g., by contacting the metal part of the discharge tip or EUT with a grounding wire).
	Do not stop monitoring the test equipment, including the EUT, during testing. There is a risk of endangering third parties or related facilities.
	Place the test equipment in a stable location. Placing in an unstable location may cause the test equipment to fall or flip over, resulting in injury.

	Do not use the test equipment for purposes other than ESD tests. Failure to follow this rule may result in electric shock, personal injury, or damage to property.
 Prohibited	**Do not insert any objects into the test equipment or the connectors.** If metal or flammable objects are inserted from the ventilation holes or connectors, fire or electric shock may result.
	Do not place the test equipment where it blocks operation of the power switch. Failure to do so could hinder quick response in case of abnormal situations, leading to fire or electric shock.
	Do not perform tests on humans. It is extremely dangerous and can cause unexpected injury, so do not perform tests on humans under any circumstances.

	Do not use the AC cord for other purposes. The supplied AC cord is intended solely for use with the test equipment. Using it with other electrical appliances may cause fire or electric shock due to overheating. Likewise, using the AC cord from another electrical appliance with the test equipment may lead to insufficient performance or overheating, resulting in fire or electric shock due to insufficient current capacity.
 Prohibited	**Do not use any damaged AC cord.** Failure to follow this rule may cause fire or electric shock. Pay particular attention to the following: ❍ Do not modify the AC cord. ❍ Do not forcibly bend the AC cord. ❍ Do not forcibly twist the AC cord. ❍ Do not pull on the AC cord. ❍ Do not place the AC cord near heating devices. ❍ Do not place heavy objects on the AC cord.

5－5. CAUTION

⚠ CAUTION

	Take measures against electromagnetic radiation. During tests using the test equipment, large amounts of electromagnetic radiation may be emitted depending on the type of EUT, which may interfere with nearby electronic devices or wireless communication. If necessary, take measures such as using a shielded room or shielded cables.
	Be cautious with the tip of the contact discharge tip even when it is not charged with high voltage. The tip of the contact discharge tip is sharp and may cause injury if touched inadvertently, even when not charged with high voltage.
 Safety Rule	**Before applying static electricity, make sure the ground clip of this product is properly connected to a ground plane.** Failure to do so may result in electric shock, malfunction, or damage to property.
	If the test equipment is moved from a cold location to a warm location and condensation forms, allow it to dry naturally before use. Using the test equipment with condensation may cause electric shock, malfunction, or fire.
	Maintain a suitable operating environment. The operating environment for the test equipment is 15 to 35°C, humidity 20 to 60% RH (no condensation). Using the test equipment in other operating environments may result in malfunction.

Safety Rule	**Periodically clean the AC plug.** Accumulation of dust or moisture between the AC plug and the outlet may cause insulation failure and cause fire. Periodically unplug the AC plug and clean it with a dry cloth to remove dust or debris.
	Periodically clean the high-voltage input and output connectors. Accumulation of dust or moisture on these connectors may cause insulation failure and cause fire. Follow these steps for periodic cleaning: (1) Unplug the AC adapter, turn off the power, and wait for more than 5 seconds. (2) Disconnect the high-voltage input connector from the high-voltage output connector. (3) Blow dried air on the high-voltage output connector to remove dust and debris. (4) Wipe the high-voltage input connector with a dry cloth to remove dust and debris. (5) Make sure no foreign objects are present before reconnecting the connectors.
	Wipe the ESD Simulator ESS-PS1 with a dry cloth if it becomes dirty. Do not use solvents such as benzine or thinner as they may damage the outer surface or printing. If the outer surface or panel operation area becomes dirty, wipe it with a soft dry cloth. For heavy dirt, dampen a cloth with water or mild detergent, wipe, and then wipe with a dry cloth.
	Clean the ESD Gun using the specified method. Do not use solvents such as benzine or thinner as they may damage the outer surface or printing. Follow the specified cleaning method regularly to maintain the product's performance. ➔ Refer to **27. HOW TO CLEAN ESD GUN GT-31S**
	Make sure the warning labels are always visible. If the warning labels become dirty or peel off, replace them for safety. If the labels are lost, contact the dealer where you purchased the product or the NoiseKen Customer Service Center for replacements. ➔ Refer to **32. NOISE LABORATORY SUPPORT NETWORK .**
	Straighten twisted cables. Do not use or store cables in a twisted state, as this may cause internal conductor breakage.

Prohibited

Do not use the test equipment with anything other than ESS-PS1 and GT-31S.

The test equipment cannot be used with older ESD Simulators or ESD Guns. Forcing such connections may cause malfunctions.

➔ Refer to **3－2. Compliance Standards Based on** Combinations and➔ **Table 11-1. Discharge Module and Corresponding Test Standards**.

Do not intentionally apply static electricity to the test equipment.

This may cause malfunction or operational failure.

Do not place the test equipment in the following types of locations.

Placing it in these locations may result in fire or electric shock.

- ❍ Locations with high humidity or large amounts of dust
- ❍ Locations exposed to direct sunlight or exposed to high temperatures, such as near heating devices
- ❍ Locations where water droplets form, such as near windows

Do not block the ventilation holes, or use in locations with poor ventilation.

Blocking the ventilation holes may cause overheating and result in fire. Pay particular attention to the following:

- ❍ Do not place the test equipment on its back, side, or upside-down.
- ❍ Do not place the test equipment in confined, poorly ventilated spaces.
- ❍ Make sure the test equipment is placed at least 10 cm away from walls or other obstacles.

Do not plug in or operate the test equipment with wet hands.

This may cause electric shock or malfunction.

Do not pull the high-voltage input connector by the cord.

Failure to follow this rule may damage the cord and cause malfunction or fire.
Always pull the connector itself when disconnecting it.

Do not place containers with liquids on top of the test equipment.

Spills or liquid entering the test equipment may cause fire or electric shock.

Avoid dropping or applying strong impacts to the test equipment.

This may cause malfunction.

Do not hit or rub hard objects against the test equipment.

This may damage the paint or the LCD panel.

Do not sit on or place heavy objects on the test equipment.

This may cause deformation or breakage of the test equipment.

If the test equipment malfunctions during normal use, it will be repaired according to the Repair Service Warranty.
However, the following cases are excluded:

- ☐ **Deterioration of consumable parts.**
- ☐ **Failures caused by customer negligence.**
- ☐ **Failures caused by damage to the EUT (Equipment Under Test) or surrounding equipment.**

Please note that in the event the EUT or surrounding equipment is damaged as a result of ESD tests, neither Noise Laboratory Co., Ltd. nor the distributors assume any responsibility for compensation. For more information, refer to ➔ **30. WARRANTY**

6. POINTS TO NOTE REGARDING CONSUMABLES

6－1. About the Battery

- The battery built into the ESD Simulator ESS-PS1 is a consumable item.
- Its lifespan varies depending on usage conditions and the environment. As the battery is used repeatedly, its charge capacity will deteriorate, resulting in shorter usage times.
- The following symptoms may indicate battery deterioration:
  (1) The usage time is significantly shorter even after a full charge, or the battery does not fully charge.
  (2) The LED [BATTERY] on the main unit is blinking in error.
  In such cases, please contact the dealer where you purchased the product or the NoiseKen Customer Service Center to request repair.
  ➔ **32. NOISE LABORATORY SUPPORT NETWORK**
  Do not attempt to repair it yourself as it is dangerous.
- The rechargeable battery in this product can be recycled. Do not attempt to remove the rechargeable battery yourself; instead, contact the dealer where you purchased the product or the NoiseKen Customer Service Center.

6－2. About the High-Voltage Relay

- The high-voltage relay built into the ESD Simulator and the ESD Gun is a consumable item.
- Its lifespan varies depending on usage conditions and the environment. With repeated use, the relay contacts will degrade, resulting in poor contact, contact sticking, or insulation failure.
- The following symptoms may indicate high-voltage relay deterioration:
  (1) No static electricity is applied at the start of the test.
  (2) Static electricity is applied as soon as high voltage is output.
  In such cases, please contact the dealer where you purchased the product or the NoiseKen Customer Service Center to request repair.
  ➔ **32. NOISE LABORATORY SUPPORT NETWORK**
  Do not attempt to repair it yourself as it is dangerous.

6－3. About the Discharge Tip

- The discharge tip attached to the ESD Gun is a consumable item.
- Its lifespan varies depending on usage conditions and the environment. With repeated contact and discharge, the surface of the discharge tip will wear and deteriorate.
  In particular, the tip of the contact discharge tip will wear down with repeated contact and may lose its ability to penetrate the insulating coating of the EUT, potentially interfering with direct contact discharge tests.
  In such cases, replacement is necessary. Noise Laboratory Co., Ltd. sells various discharge tips individually.

6－4. About the Discharge Module

- The discharge module attached to the ESD Gun is a consumable item.
- With repeated discharges, its characteristics change, and even under normal usage conditions, the capacitance and discharge resistance values may no longer meet specifications.
  For this reason, we recommend regular calibration. For calibration and replacement, contact the dealer where you purchased the product or the NoiseKen Customer Service Center.➔ **32. NOISE LABORATORY SUPPORT NETWORK**
  Noise Laboratory Co., Ltd. sells various discharge modules individually.

If the test equipment malfunctions during normal use, it will be repaired according to the Repair Service Warranty.
However, neither Noise Laboratory Co., Ltd. nor the distributors assume any responsibility for compensation for malfunction of the test equipment, consumable deterioration, or damages caused by external factors, including damage to the EUT (Equipment Under Test) or surrounding equipment. We appreciate your understanding in advance.
For more information, refer to ➔ **30. WARRANTY**

7. INTRODUCTION

7−1. How to Use This Manual

The notations and explanations used in this manual are indicated below.

	Provides supplementary explanations.
	Indicates references to specific sections.
	Indicates restrictions on settings.
	Indicates points that must be confirmed before use.
【 】	Indicates content displayed on the panel of the test equipment.
『 』	Indicates content displayed on the LCD of the test equipment.

7−2. Terms and Definitions

The terms used in this manual are explained below.

Term	**Definition**
EMC	Abbreviation for 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 technician	A person who has enough skill and knowledge in EMC field. In this manual, this term means especially 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 housing, etc., where is likely to be touched by a human body, for preventing an electric shock in case of internal electric leakage of the product.
EUT	Abbreviation for Equipment Under Test, referring to the equipment being tested.
ESD (ESD) immunity test	A category of immunity test which simulates ESD phenomenon that a charged human body or object discharges to an electronic product.
Contact discharge	A method of the ESD immunity test in which the discharge tip of the ESD 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 test in which the discharge tip of the ESD Gun is moved towards the EUT until the tip touches the EUT. It is closer to natural phenomenon but has unstable elements since it depends on test environment due to discharge in the air.
ESD Gun	A test unit used in the ESD immunity test that contains the charge/discharge components. It can be handled with one hand.
Discharge module	One of the units that make up the ESD Gun. It contains a charging capacitor (C) and discharge resistor (R). The CR values need to be changed depending on the standards and test conditions, making this unit replaceable.
Discharge tip	One of the units that make up the ESD Gun. It typically includes a conical type tip for contact discharge and a round type tip for air discharge.

8. NAME AND FUNCTION OF EACH PART

8－1. ESD Simulator ESS-PS1

Front Panel of the ESS-PS1

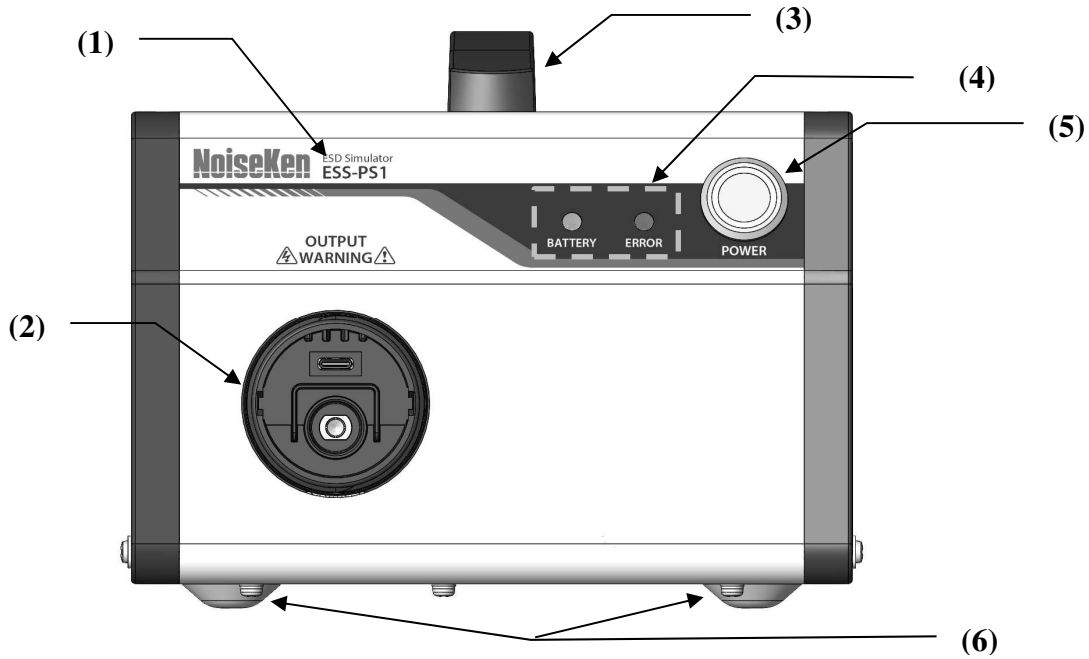


Figure 8-1. Front panel of the ESS-PS1

(1) Model name
Displays the product name, model name, and company logo.

(2) High-voltage output connector
A connector where a maximum voltage of 30.5 kV is output. The ESD Gun is connected here.

(3) Handle
Used for carrying and moving the test equipment.
The handle is a retractable arch-shaped handle.
When in use, pull the handle upward.
After use, return it to its original position.

(4) Status LEDs 【BATTERY】(orange), 【ERROR】(red)
These LEDs display the status of the test equipment.
【BATTERY】(orange) lights up or blinks when the internal battery is being charged or when an abnormality occurs.
【ERROR】(red) lights up when a malfunction occurs in the test equipment.
For more information, refer to ➔**21. FRONT PANEL LED DISPLAY OF ESS-PS1** .

(5) POWER switch 【POWER】
The power switch for operating the test equipment. When switched ON, power is supplied, the POWER switch lights up, and the LCD touch panel of the ESD Gun lights up. When switched OFF, the power of the main unit is turned off and the POWER switch goes out.

(6) Metal Feet
Electrically common to the FG of the main body. When placed on a reference ground plane, it connects the test equipment to the reference ground plane.

Rear Panel of the ESS-PS1

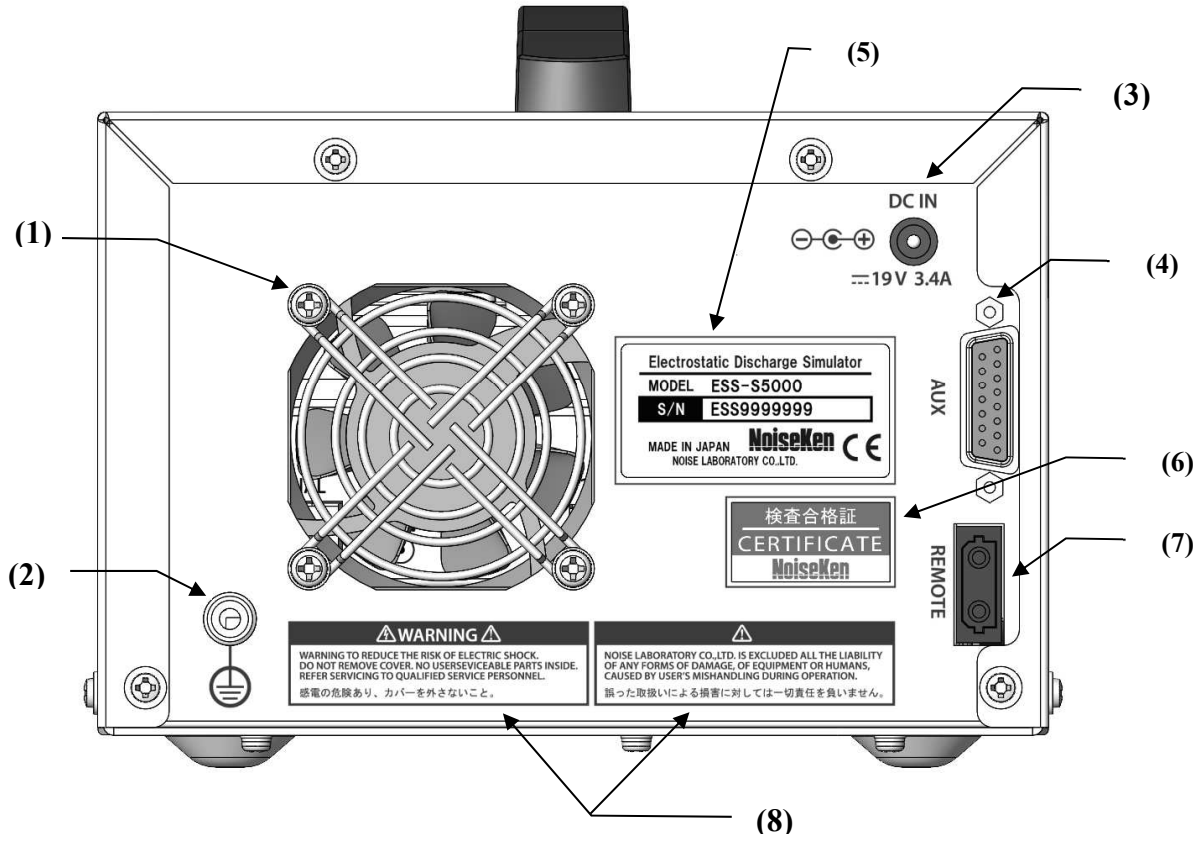


Figure 8-2. Rear panel of the ESS-PS1

(1) Fan

The internal heat dissipation fan. Make sure the exhaust is not blocked.

(2) FG terminal

The ground connection terminal for the test equipment.

Electrically common to the metal feet at the bottom of the main unit. If placing the test equipment on the reference ground plane is difficult, connect this terminal to the reference ground plane with using appropriate wiring.

(3) DC jack 【DC IN】

Power terminal for connecting the AC adapter. Connect the AC adapter when operating with the adapter or when charging the battery.

(4) AUX connector 【AUX】

A D-SUB 15 pin connector used for connecting external devices.

For more information, refer to➔ **22－1. AUX Connector**.

(5) Nameplate label

Displays the model name and product number.

You may need to check this when requesting repairs.

(6) Inspection certificate label

A label indicating that the product passed NoiseKen outgoing inspection.

(7) Optical communication connector 【REMOTE】
Connects the optional optical connector for remote control.
Connect to a PC using a special optical cable and adapter.
When not in use, keep the cap on.

(8) Handling precautions
【Noise Laboratory Co., Ltd. assumes no responsibility for damage resulting from improper operation.】
【There is a risk of electric shock. Do not remove the cover.】

Gun Stand

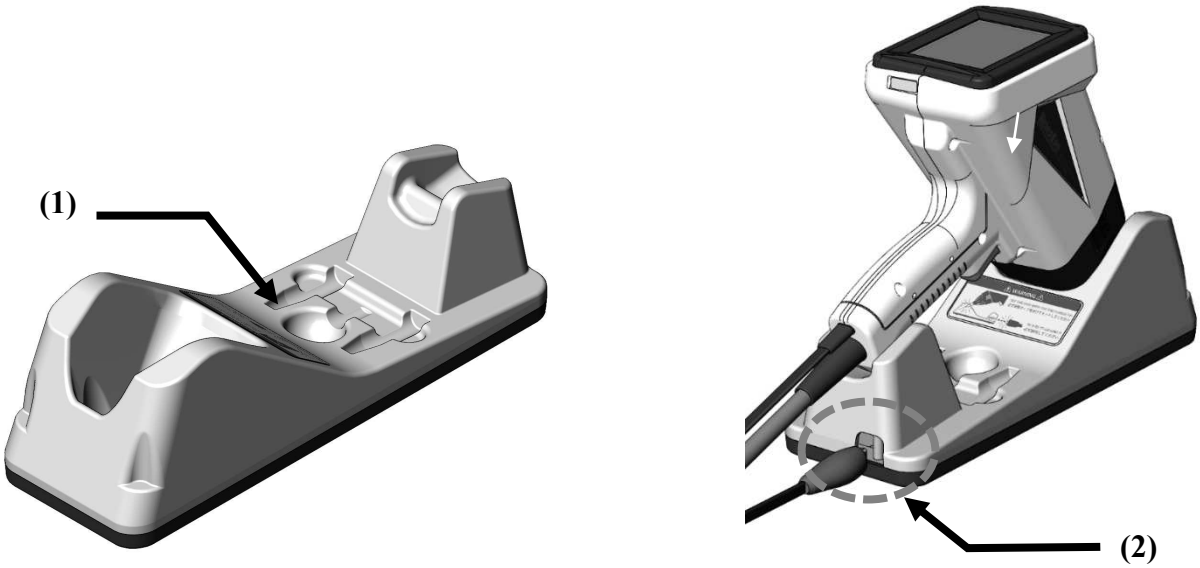


Figure 8-3. Gun stand appearance

(1) Discharge tip stand
A discharge tip of the ESD Gun can be placed on this stand. A spherical-type discharge tip can also be placed.

(2) GND stud
A stud for connecting the GND clip (ground return cable clip) of the ESD Gun. Connect the GND clip when using the pre-check function.

The gun stand is compatible with the ESD Gun GT-31S.
It is not compatible with the older GT-30R or TC-815 series ESD Guns.

⚠ CAUTION

- Be careful not to let the gun come loose or drop. Make sure the gun is properly placed on the gun stand to prevent it from coming off.

8－2. ESD Gun GT-31S

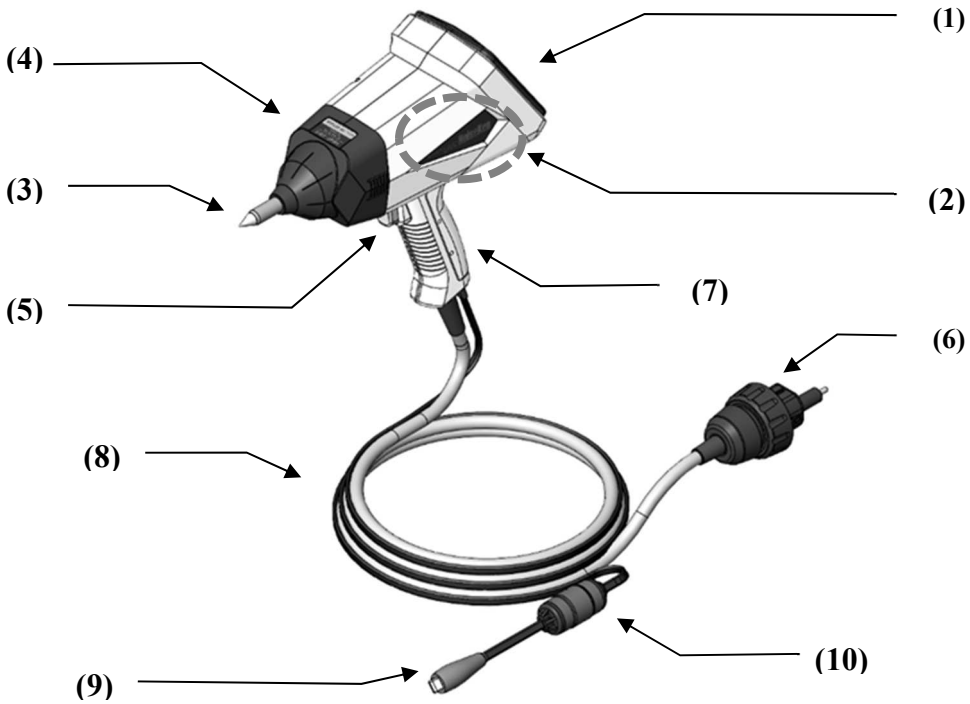


Figure 8-4. ESD Gun appearance-1

(1) Touch panel LCD
Used to monitor test progress and set test and function settings.

(2) Nameplate label
Displays the product name, model name, and company logo.

(3) Discharge tip
An electrode tip for performing ESD.
Three types of discharge tips are available for different tests.

The discharge tip has a screw structure and can be replaced.
For details on the replacement method, refer to➔ **11－2. Discharge Tip**.

- Conical-type discharge tip — Compliant with IEC and ISO standards.
  For contact discharge.
- Round-type discharge tip — Compliant with IEC and ISO standards.
  For air discharge.
- Spherical-type discharge tip: φ30 mm — Compliant with ISO standards.
  For air discharge exceeding 15 kV.

*The spherical-type discharge tip is included in the ISO accessory set.

(4) Discharge module

A module that shapes the output current waveform.

For ISO standard tests, the discharge module needs to be replaced.

The discharge module has a plug-in structure for easy replacement.

For more information, refer to➔ **11－1. Discharge Module**.

(5) Trigger switch

A switch to initiate ESD.

The operation varies depending on the settings of the ESD test.

(6) High-voltage input connector

Connects to the high-voltage output connector of the ESS-PS1.

(7) Probe stand mounting hole

A hole for attaching the probe stand.

(8) High-voltage cable

A cable for connecting to the ESS-PS1. About 2 meters long.

Do not use or store the cable in a twisted state, as this may cause internal conductor breakage.

(9) GND cable

A ground return cable for ESD.

The alligator clip at the end can be removed and screwed onto a ground plane.

For more information, refer to➔ **11－3. GND Clip**.

Always connect the GND cable to the ground plane to prevent electric shock or injury.

(10) Ferrite core

A ferrite core for shaping current waveforms.

Be careful of drops or impacts.
If the ferrite core inside the case is damaged, the output characteristics may change.

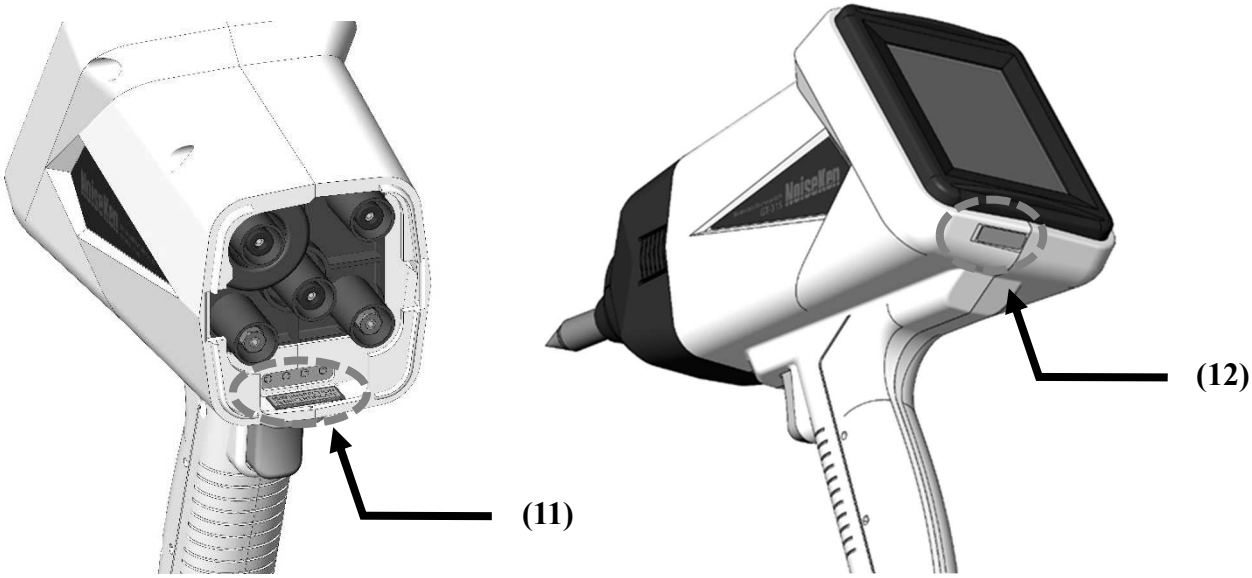


Figure 8-5. ESD Gun appearance-2

(11) Inspection certificate label

A label indicating that the product passed NoiseKen outgoing inspection.

The label is located on the discharge module mounting section and can be seen when the discharge module is removed.

Product number label

Displays the product number of this product. The label is located below the touch panel LCD.

9. BASIC TEST FLOW

This section explains the basic test flow when using the test equipment.

9－1. Connection and Setup

Connection

Connect the ESS-PS1 to the ESD Gun.

If operating with the AC adapter, connect the AC adapter to the ESS-PS1.

For more information, refer to ➔**10－2. Connecting the AC Adapter**.

Setup

Place the ESS-PS1 on the reference ground plane.

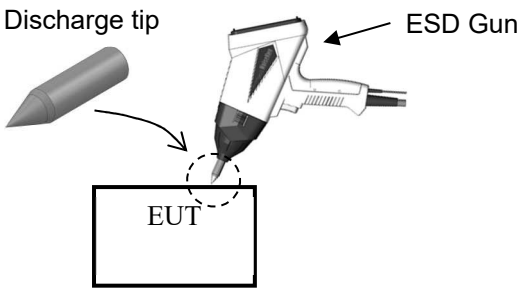
If placing the ESS-PS1 on the reference ground plane is difficult, connect the FG terminal on the ESS-PS1 rear panel to the reference ground plane using appropriate wiring.

9－2. Selecting the Test Mode

The settings depend on whether you are conducting a contact discharge test or an air discharge test.

Contact discharge test

In this mode, the discharge tip of the ESD Gun is brought into contact with the EUT (Equipment Under Test) to discharge. Use the conical-type (pointed-type) discharge tip for this test.

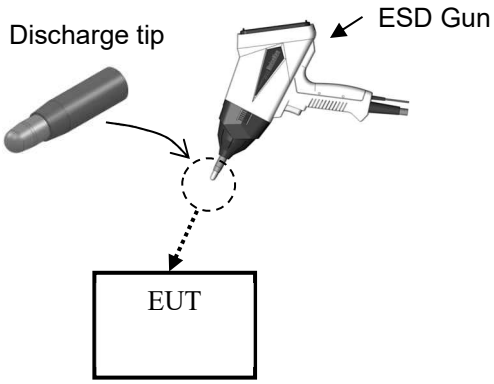


※ Contact discharge tests can be further divided into direct discharge and indirect discharge.

Direct discharge: Discharge directly to the EUT.
Indirect discharge: Discharge to the horizontal or vertical coupling planes. The EUT will experience indirect discharge from the coupling planes.

Air discharge test

In this mode, the charged discharge tip charged to the test voltage is brought close to the EUT to discharge. Use the round-type discharge tip for this test.



9－3. Basic Settings

The following explanation shows the basic operation in the Standard mode.
When the power is turned on, the main menu is displayed on the control panel.
Touch 『STANDARD』 to enter the Standard mode.
Set parameters for the test. For detailed instructions, refer to➔**13. STANDARD TEST MODE**.
The following describes the general method using the trigger switch of the ESD Gun.

Touch the screen to set each item.

① Set the corresponding standard.➔ **a** Each tap switches between 『IEC』 and 『ISO』.
② Set the test level.➔ **b** When tapped, the test levels corresponding to the selected standard are displayed. Touch the desired test level.
③ Select the output polarity.➔ **c** Each tap switches between 『+』 and 『-』.
④ Set the discharge interval.➔ **d** Tap to display a numeric keypad, then input the desired value. Discharge interval settings apply **only to contact discharge tests**. For air discharge tests, 『---』 is displayed.
⑤ Set the number of discharges.➔ **e** Tap to display a numeric keypad, then input the desired value.
⑥ Set the test mode (contact discharge/air discharge). **f** Each tap switches between 『Contact』 (contact discharge mode) and 『Air』 (air discharge mode).

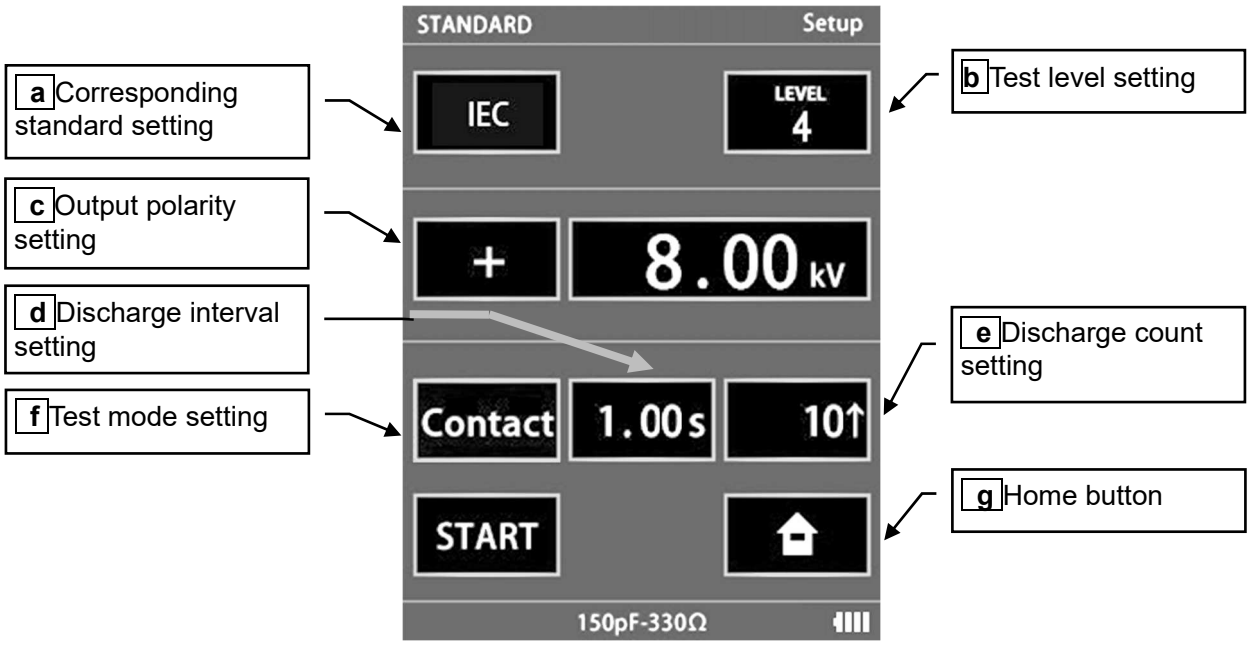
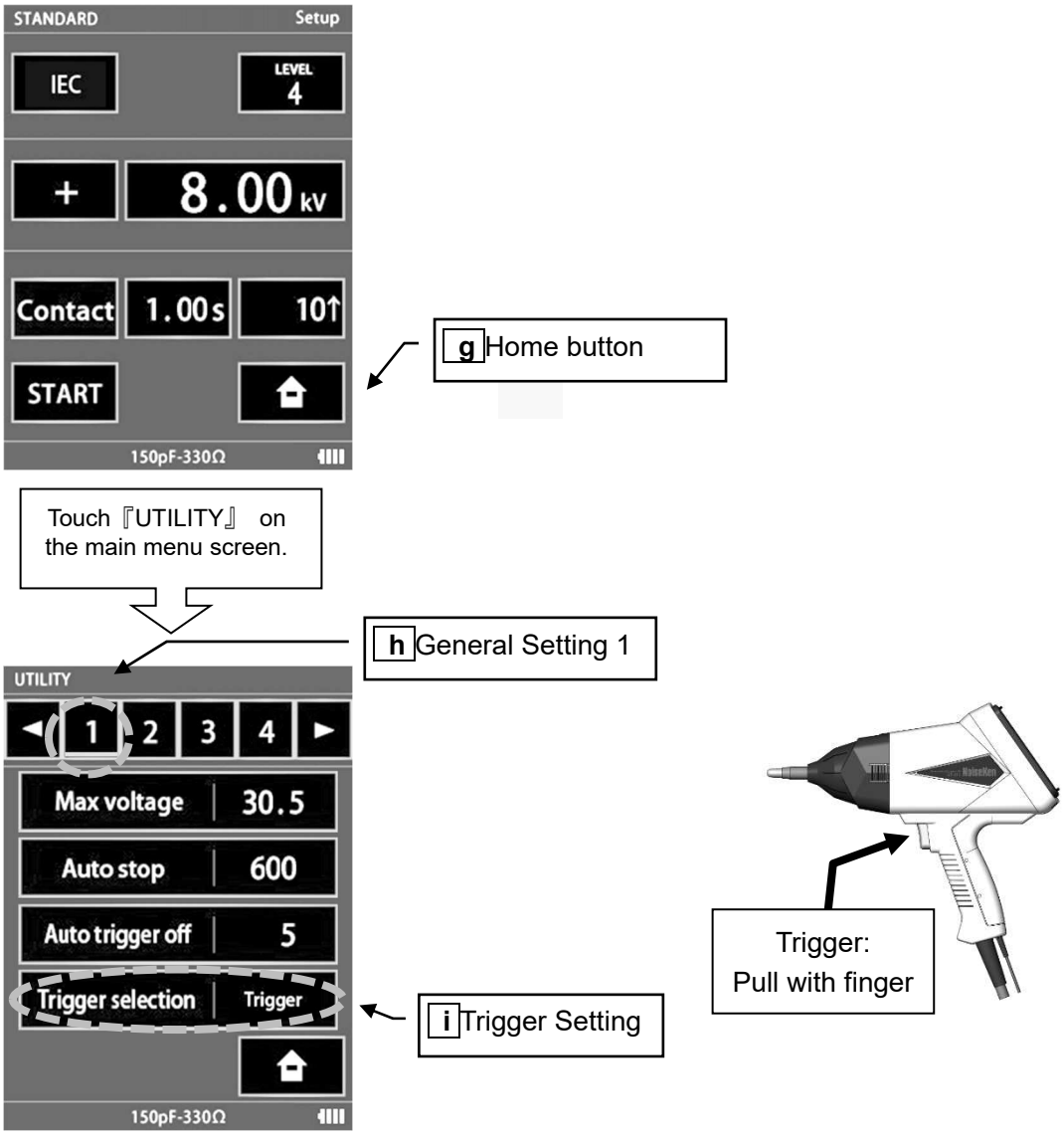


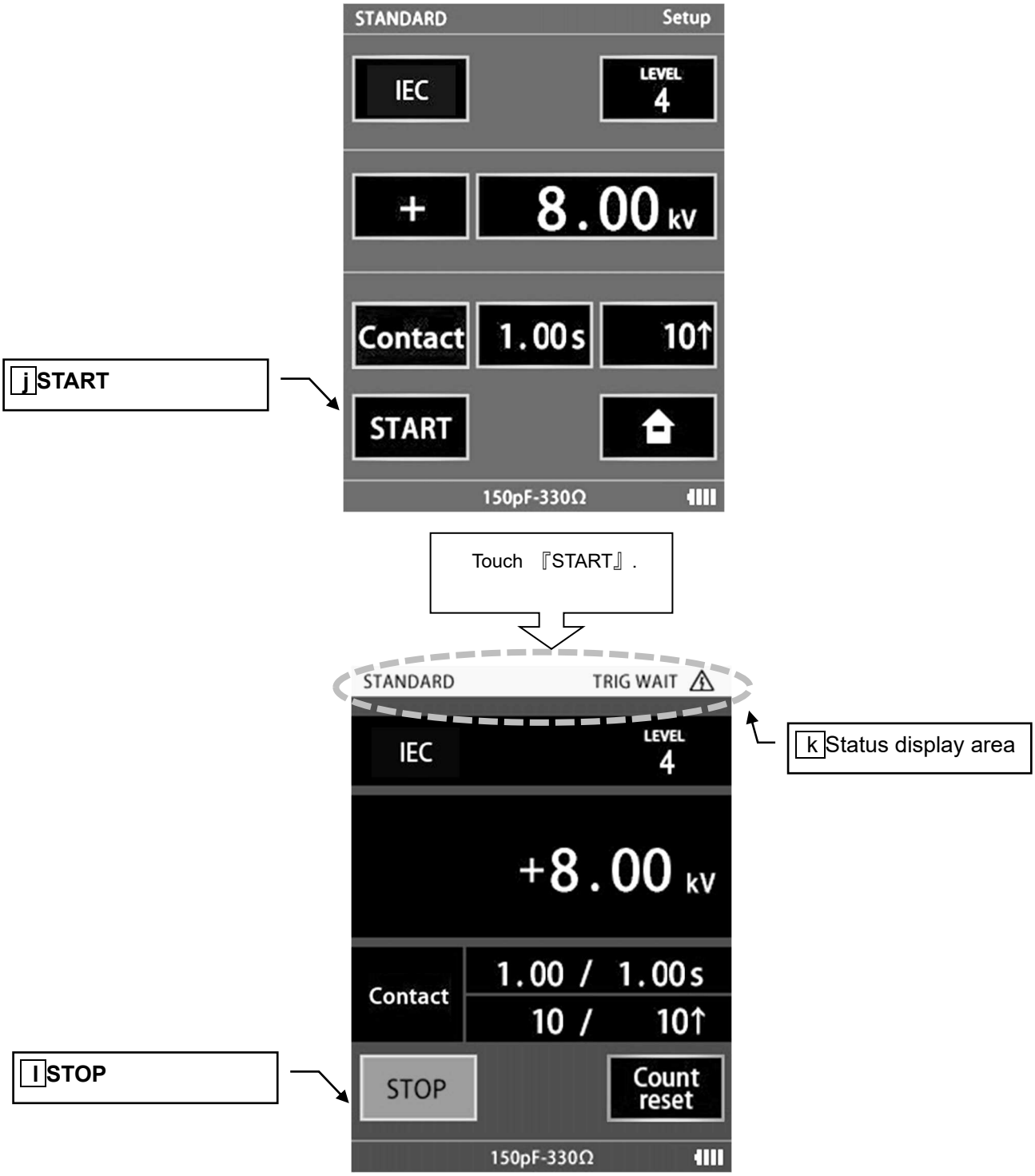
Figure 9-1. IEC standard mode setting screen

⑦ For trigger setting, g touch the home button to return to the main menu, then touch 『UTILITY』.
i Touch trigger setting and select 『Trigger』.



9－4. Test execution

Move to STANDARD mode and start the test by touching j 【START】.
Once 【START】 changes to l 【STOP】, k the status display area turns yellow and a high-voltage warning mark is displayed.



① Pull the gun trigger to discharge to the EUT.

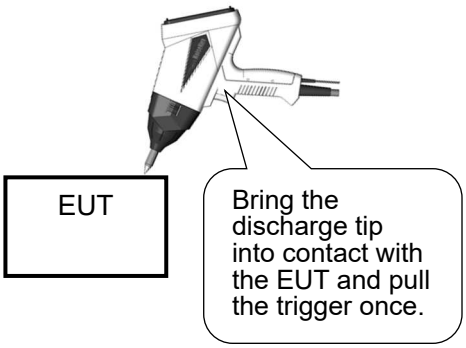
The trigger input method varies between contact discharge and air discharge tests.

Contact discharge test

1) Bring the discharge tip of the gun into contact with the EUT.

2) Pull the trigger switch once briefly. Immediately return the trigger switch to its original position, and automatic repeated discharges will begin at the set interval.

3)
The test will continue for the set number of discharges. Keep the discharge tip contacting to the same test point during the test.



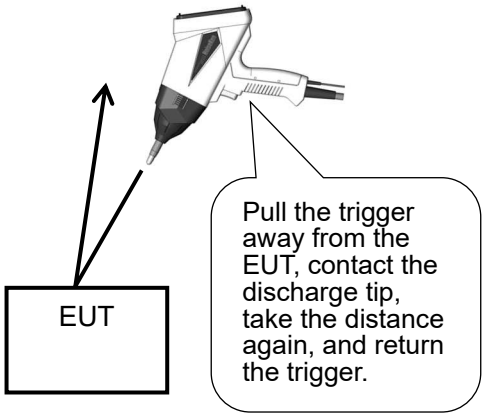
Air discharge test

1) Pull the trigger of the gun with keeping proper distance from the EUT. Keep the trigger pulled through steps 1) to 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 steps 1) to 3). Repeat the above 1) to 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 standby state and the high voltage is still generating in the main unit.

- Inputting the trigger again restarts the test.

② When one set of the test completes, touch **I** **【STOP】** to turn off the high voltage.

③ Change conditions, such as polarity, output voltage, test mode and so on, and restart the test.

④ After completing all test sequences, the test is finished.

I Touch **【STOP】** to turn off the high voltage.

10. CONNECTING METHODS

⚠WARNING

- **Be sure to turn off the power supply of the main unit when connecting the ESD Gun to the main unit or changing setup of the test equipment.** Failure to comply with this rule may cause electric shock, injury, or malfunction.
- **Do not insert foreign objects into the test equipment or connectors.** If metal or flammable objects are inserted from the ventilation holes or connectors, fire or electric shock could result.

⚠ CAUTION

- **Do not use the test equipment with other than a recommended ESD Gun.** The test equipment cannot be used with combinations other than those specified by Noise Laboratory Co., Ltd. Forcing connections may cause damage or malfunction.
- **Periodically clean the high-voltage input and output connectors**.
  Dust or moisture accumulation between the high-voltage input and output connectors may cause insulation failure and cause fire.
  (1) Turn off the power switch of the ESD Simulator and wait for more than 5 seconds.
  (2) Unplug the high-voltage input connector from the high-voltage output connector.
  (3) Blow dried air on the high-voltage output connector to remove dust or debris.
  (4) Wipe the high-voltage input connector with a dry cloth to remove dust or debris.
- **Do not unplug the high-voltage input connector by pulling on the cable.** Failure to do so may damage the cord and cause malfunction or fire.
  Hold by the plastic part of the high-voltage input connector when unplugging.
- **Do not handle the high-voltage input connector or operate the test equipment with wet hands.**
  Failure to comply with this rule may result in electric shock or malfunction.
- **Straighten twisted cables.**

  Do not use or store the cable in a twisted state, as this may cause internal conductor breakage.

10－1.Connecting the ESD Simulator and the ESD Gun

Align the recessed portion of the high-voltage output connector on the ESD Simulator with the protruding portion of the high-voltage input connector on the ESD Gun and join them. Turn the securing ring on the high-voltage input connector of the ESD Gun clockwise to secure in place.

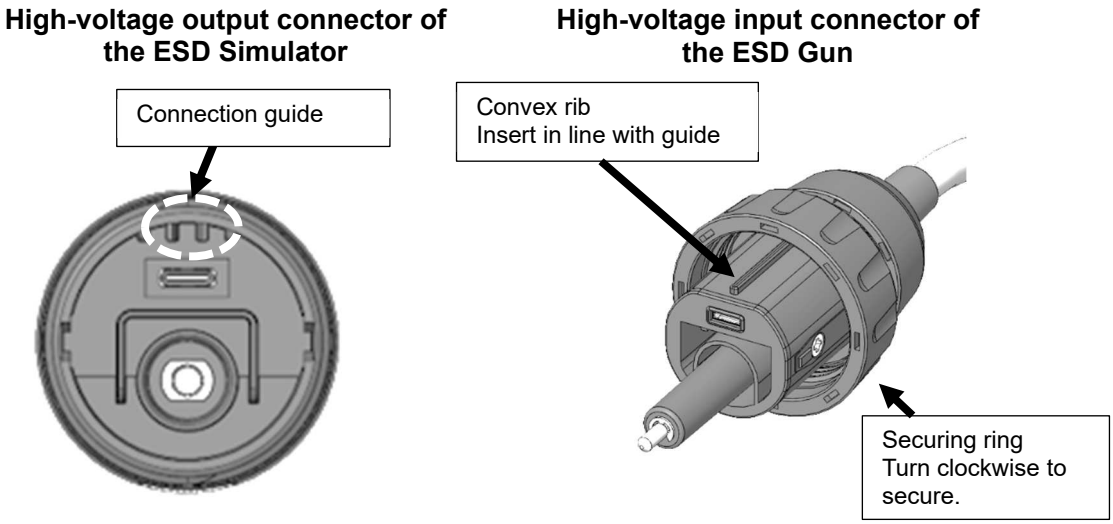


Figure 10-1. High-voltage input and output connectors

Figure 10-2. Connected state

10－2.Connecting the AC Adapter

When operating the test equipment with the AC adapter or charging the battery, connect the AC adapter to the DC jack on the rear panel of the ESS-PS1.

⚠WARNING

- **The AC adapter's AC cord should be plugged into an outlet with a protective earth terminal.** The AC adapter for the test equipment comes with a three-pin plug for connecting to the power supply and protective earth. To protect against electric shock, make sure the plug is connected to an outlet with a properly grounded protective earth terminal.
  Failure to connect the protective earth may result in electric shock.
- **Fully insert the AC and DC plugs.**
  Failure to do so may result in overheating or dust accumulation, which may cause fire or electric shock. Improperly inserting the plug or connecting too many devices to one outlet may cause the cord to overheat, resulting in fire or electric shock.
- **Do not use the AC cord for any other purpose.** The supplied AC cord is intended solely for use with the test equipment. Using it with other electrical appliances may cause fire or electric shock due to overheating. Likewise, using the AC cord from another electrical appliance with the test equipment may lead to insufficient performance or overheating, resulting in fire or electric shock due to insufficient current capacity.
- **Even when using the AC adapter, place the test equipment on the reference ground plane.** The test equipment is not grounded when using the AC adapter alone.

⚠ CAUTION

- **Clean the AC plug periodically.** Accumulation of dust or moisture between the AC plug and the outlet may cause insulation failure and cause fire. Periodically unplug the AC plug and clean it with a dry cloth to remove dust or debris.
- **Do not handle the AC plug or operate the test equipment with wet hands.**
  Failure to comply with this rule may cause electric shock or malfunction.

Connect the AC adapter to the DC jack on the rear panel of the ESS-PS1.

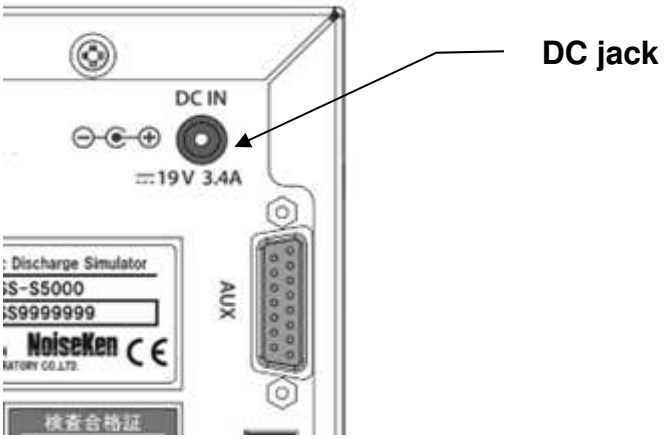


Figure 10-3. DC jack on rear panel

10－3.Connecting the Warning Light (Optional)

To use the optional warning light, connect it to 【AUX】 on the rear panel of the ESS-PS1.

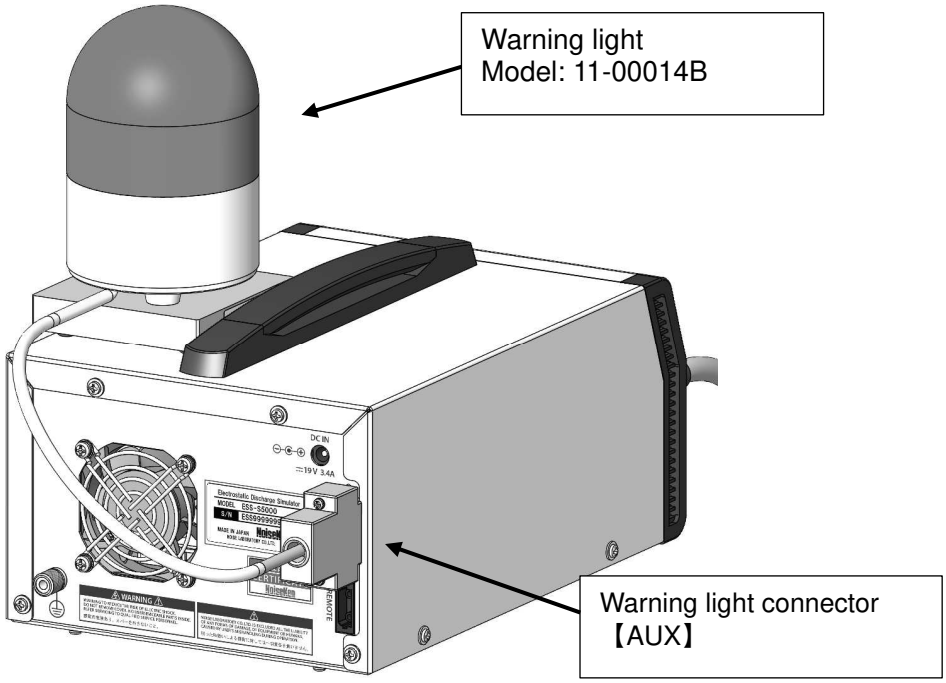


Figure 10-4. Connecting the warning light

The warning light operates in the same manner as the high voltage warning indicator on the ESD Gun screen, but provides a broader visual warning to the surrounding area.

10－4.Connecting the Communication Cable (Optional)

To remotely control the test equipment (optional), connect the communication cable to 【REMOTE】 on the rear panel of the ESS-PS1. Use a dedicated optical cable and adapter to connect to a PC.

11. HOW TO REPLACE ESD GUN COMPONENTS

11－1. Discharge Module

⚠WARNING

- **When removing or attaching the discharge module, make sure the ESD Simulator is in the "STOP" state or turned off.**
  Failure to do so may result in electric shock or injury.

Discharge Module and Corresponding Standards

By replacing the discharge module, the test equipment can output the required current waveform for two test standards (IEC 61000-4-2 and ISO 10605) using a single ESD Gun.

The test standards that each discharge module complies with are as follows.

Table 11-1. Discharge Module and Corresponding Test Standards

Discharge module	Compliance standards
06-00100A (150 pF-330 Ω)	IEC 61000-4-2 Ed.2.0 IEC 61000-4-2 Ed.3.0 ISO 10605 2nd Ed. ISO 10605 3rd Ed.
06-00102A (330 pF-330 Ω)	ISO 10605 2nd Ed. ISO 10605 3rd Ed.
06-00101A (150 pF-2 kΩ)	ISO 10605 1st Ed. ISO 10605 2nd Ed. ISO 10605 3rd Ed.
06-00103A (330 pF-2 kΩ)	ISO 10605 1st Ed. ISO 10605 2nd Ed. ISO 10605 3rd Ed.

Discharge modules other than those supplied with the product are available as optional (sold separately).

How to Replace the Discharge Module

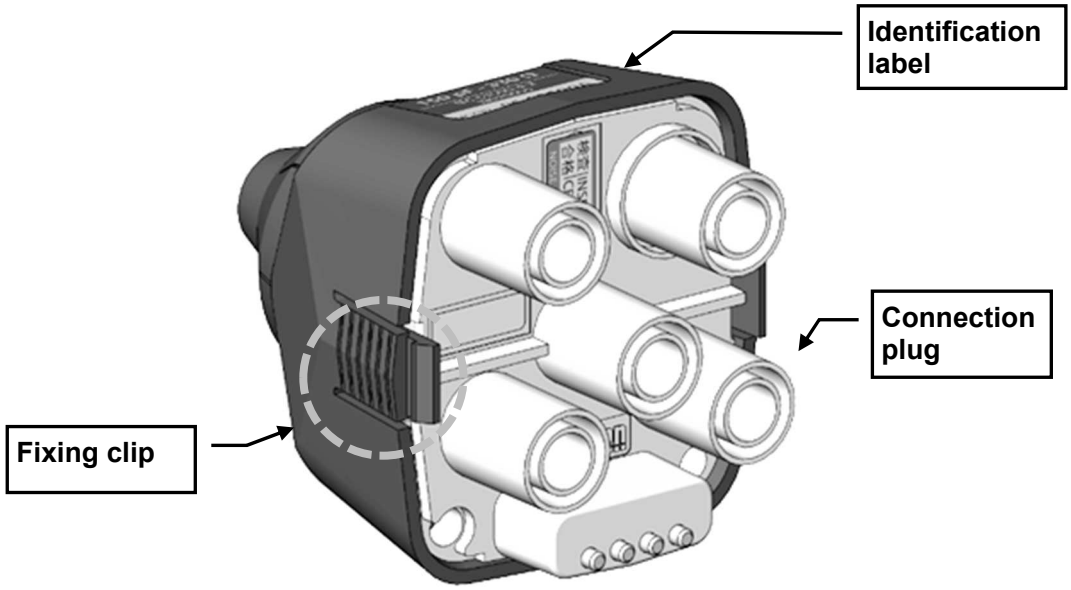


Figure 11-1. Discharge module appearance

- To remove the discharge module, firmly hold the ESD Gun and gently pull out the module while pressing the clips on both sides of the module.
- When attaching the module, align the identification label facing up and match the connection pins of the ESD Gun and discharge module. Gently push the module in.

The discharge module cannot be disassembled.

Do not loosen screws or forcibly twist the cover, as this may cause damage.

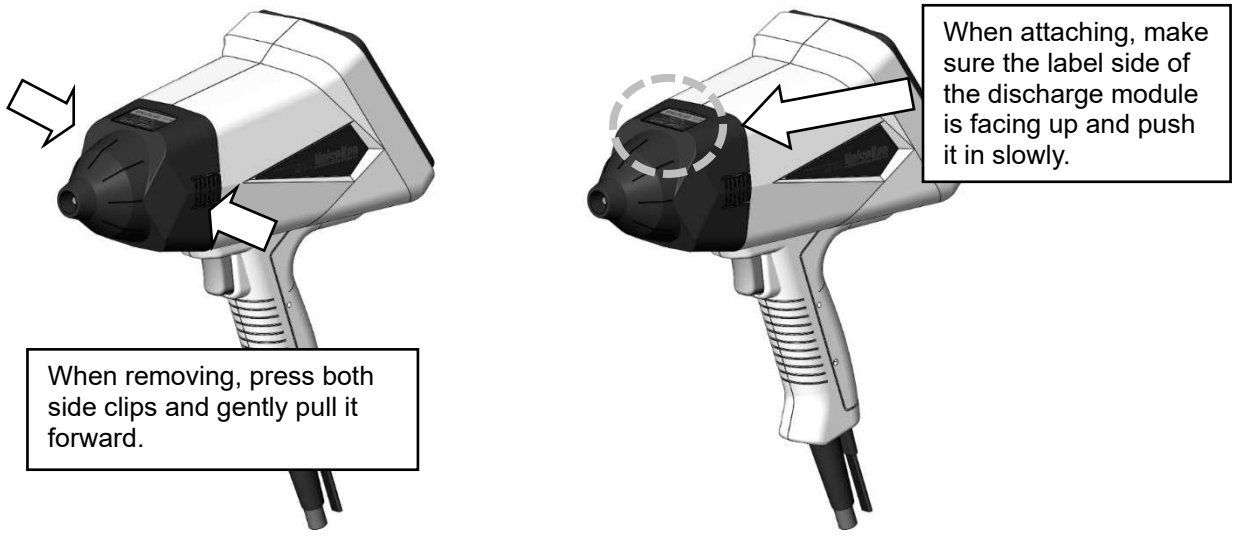


Figure 11-2. How to attach and remove the discharge module

- There is a correct orientation for the discharge module. If the module does not fit, do not force it. Make sure the module is in the correct orientation.
- Do not disassemble the discharge module.
  Individual parts such as energy storage capacitors and discharge resistors cannot be replaced.

11－2. Discharge Tip

⚠WARNING

- **When replacing the discharge tip, make sure the ESD Simulator is in the 【STOP】 state or turned off.**
  Failure to do so may result in electric shock or injury.
- **Before touching the discharge tip, remove static electricity.**
  Even after completing the ESD immunity test, the discharge tip may still be charged with high voltage. When replacing the discharge tip, remove any static charge (by making the discharge tip contact the GND clip, etc.) before touching the discharge tip.
- **Be cautious of the sharp tip of the conical-type discharge tip.**
  The tip of the conical-type discharge tip is sharp, so handle it carefully to avoid injury.

Types of Discharge Tip and Their Applications

There are three types of discharge tips, which are available as default, as shown in the following table. They must be used differently, according to the applicable test standard and test method.

Table 11-2. Types of discharge tip

Type/Application	Shape	Compliance standards
Conical-type discharge tip For contact discharge		● IEC 61000-4-2 Ed.2.0 & Ed.3.0 ● ISO 10605 1st & 2nd & 3rd Ed.
Round-type discharge tip For air discharge		● IEC 61000-4-2 Ed.2.0 & Ed.3.0 ● ISO 10605 1st & 2nd & 3rd Ed.
(*1) **Spherical-type discharge tip: φ30 mm** For air discharge exceeding 15 kV		● ISO 10605 2nd & 3rd Ed.

(*1) Spherical-type discharge tip is sold separately and is intended for ISO 10605 2nd and 3rd Edition tests.

A spherical-type discharge tip is for testing to ISO 10605 2nd Edition and 3rd Edition standards. It is not specified in the IEC 61000-4-2 standard.
A round-type discharge tip tends to be unable to maintain a high voltage in an air discharge test exceeding 15 kV, due to natural discharge to the air.
To improve this, use a spherical-type discharge tip instead.

How to Replace the Discharge Tip

1) After eliminating static charge from the discharge tip, remove the discharge tip by turning it anticlockwise.

2) Turn the desired discharge tip clockwise to attach it to the ESD Gun firmly.

Figure 11-3. How to attach and remove the discharge tip

11－3.GND Clip

The alligator clip at the end of the GND cable can be removed.

When grounding the GND cable with a screw, remove the clip as shown below.

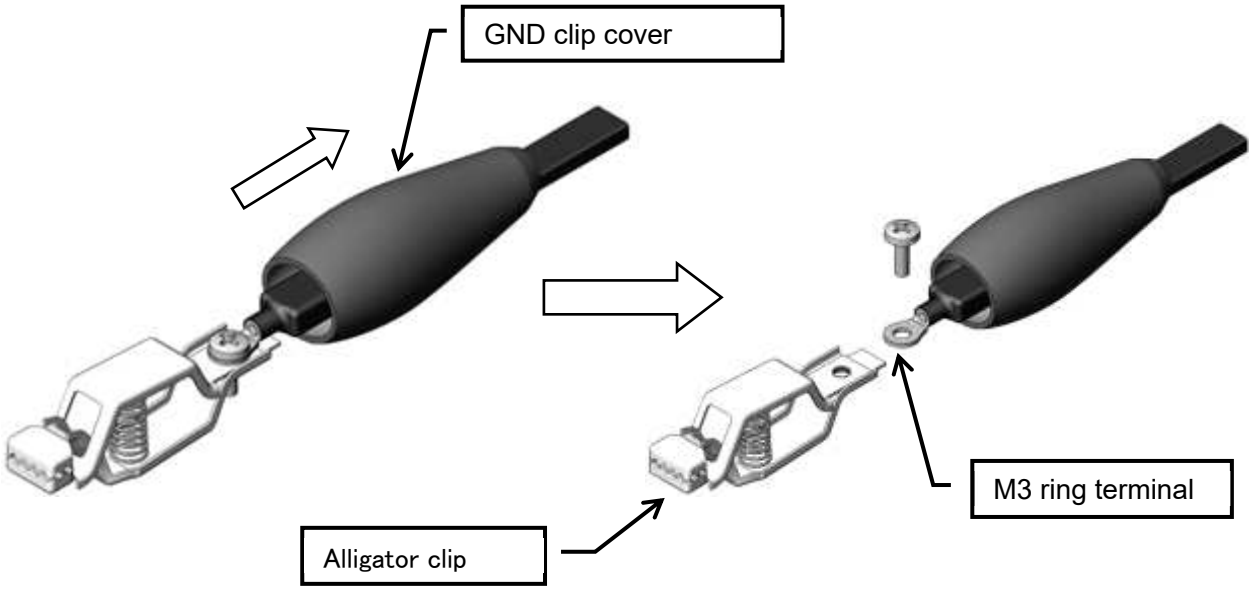


Figure 11-4. How to remove the GND clip

12. OPERATION PROCEDURE

12－1. Power ON/OFF

Pressing the POWER switch on the front panel of the ESS-PS1 will turn the power ON, and the POWER switch and the ESD Gun's touch panel LCD will light up. Pressing the POWER switch again will turn the power OFF, and the POWER switch and the ESD Gun's touch panel LCD will go out.

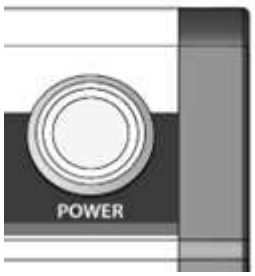


Figure 12-1. POWER switch

12－2. Main Menu Explanation

When the power is turned ON, the main menu is displayed.
You can navigate to different mode screens by tapping the appropriate items on the main menu.

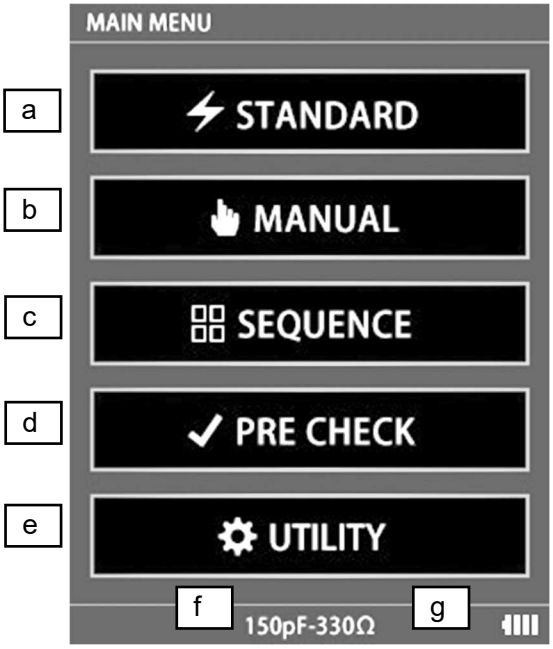


Figure 12-2. Main menu screen

a Standard test mode: 『**STANDARD**』

Tapping this moves you to the standard test mode. Test levels as per IEC and ISO standards are preset, allowing for easy testing. For more information, refer to➔**13. STANDARD TEST MODE**.

b Manual test mode: 『**MANUAL**』

Tapping this moves you to the manual test mode. Each item can be set manually, and sweep and other tests can also be set. For more information, refer to ➔**14. MANUAL TEST MODE**.

c Sequence test mode: 『**SEQUENCE**』

Tapping this moves you to the sequence test mode. You can combine custom-made test units and conduct a series of tests. For more information, refer to ➔**16. SEQUENCE TEST MODE**.

d Pre-check: 『**PRE CHECK**』

Tapping this moves you to the pre-check function. This checks the operation of the test equipment. For more information, refer to ➔**19. PRE-CHECK**.

e Utility: 『**UTILITY**』

Tapping this moves you to the utility settings. This allows you to set auxiliary functions. For more information, refer to ➔**20. UTILITY**.

f Display of mounted discharge module

This shows the information about the discharge module mounted on the ESD Gun. For more information, refer to ➔**17－2. Discharge module identification**.

g Battery level display

Displays the remaining battery level. The display indicates the battery level in four stages.

12－3. Entering/Changing Values (Explanation of the Numeric Keypad)

When entering or changing values for each setting item, a numeric keypad is available for some items.
The numeric keypad is displayed by tapping the number section of the relevant setting item.
Basic operations of the numeric keypad are described below.

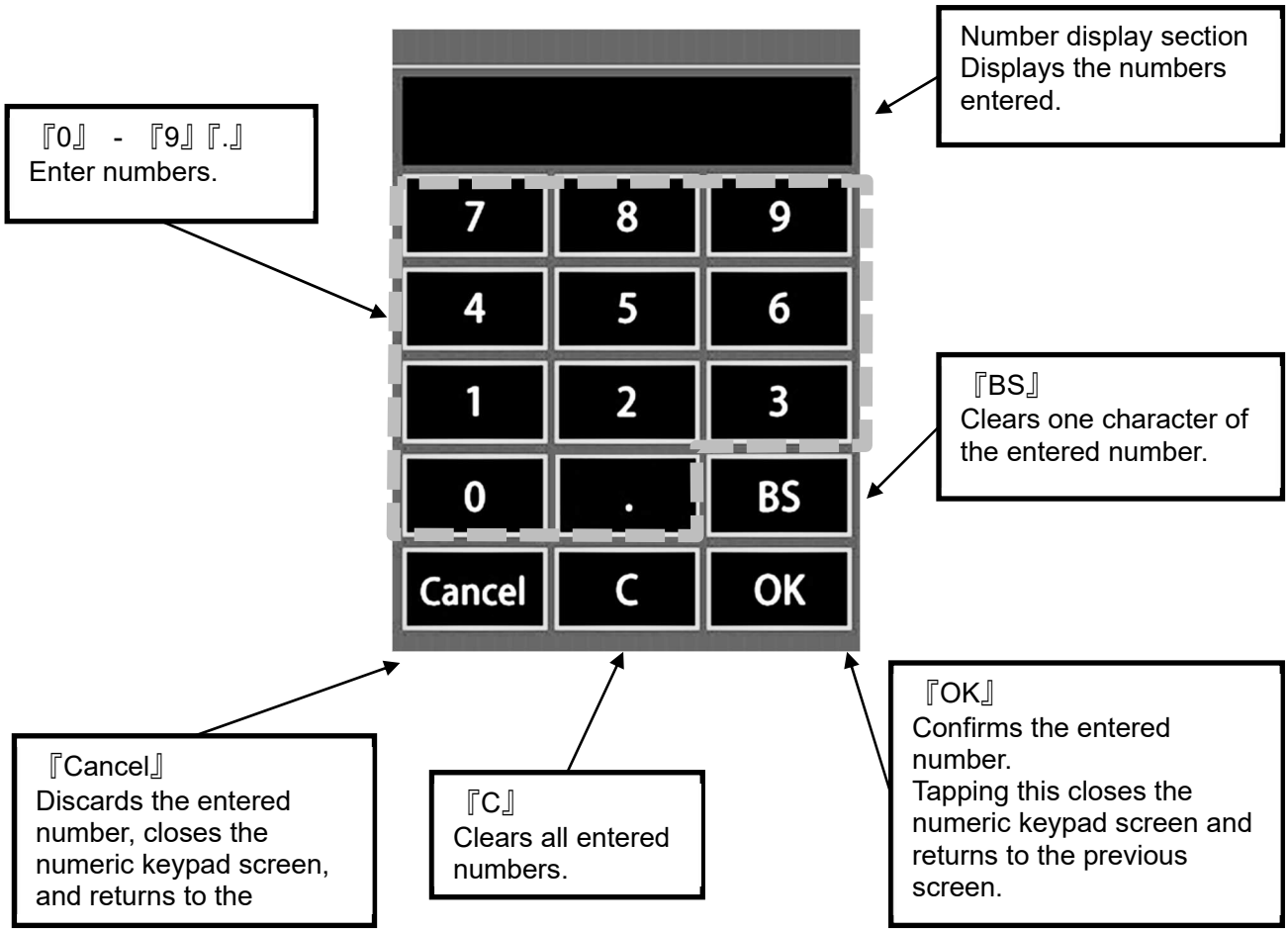


Figure 12-3. Numeric keypad

13. STANDARD TEST MODE

13－1.Standard Test Mode Setting Screen

Touch 『STANDARD』 on the main menu to enter the standard test mode.
In this mode, the output voltage is automatically set by specifying the test levels defined in the IEC and ISO standards, allowing for easy testing.
If you want to conduct tests with custom test voltages, please use the manual test mode.

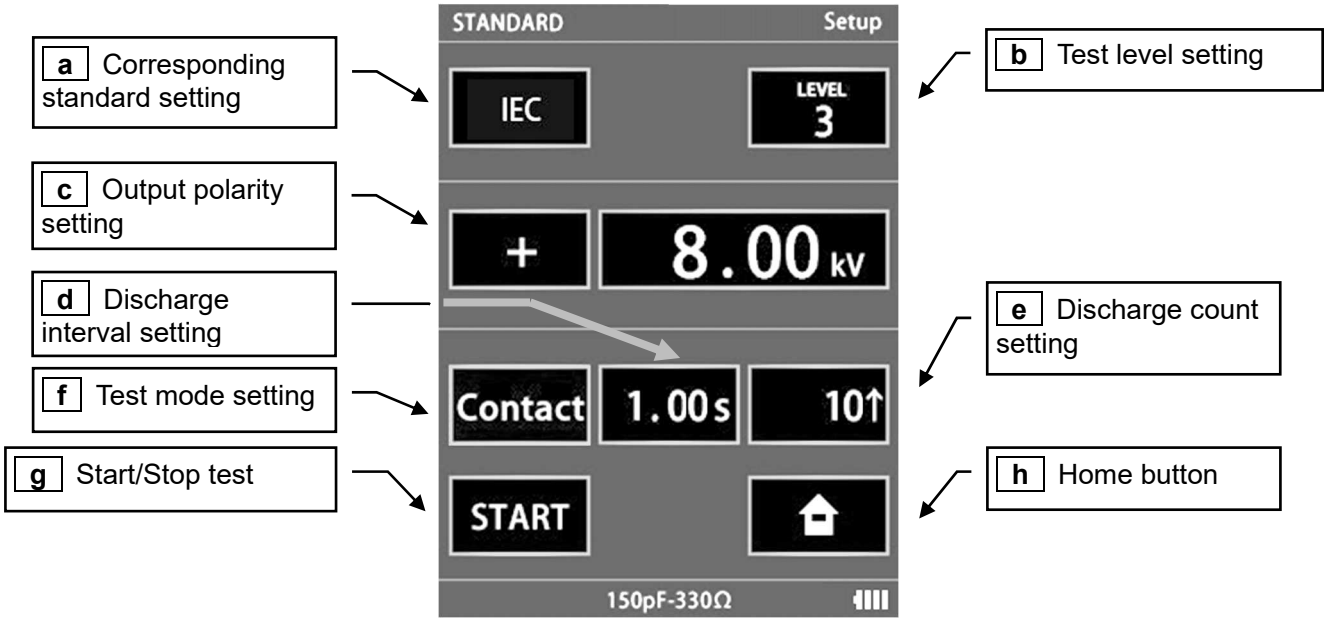


Figure 13-1. Standard test mode setting screen

Touch the item you want to set to set each item.

a Corresponding standard setting: 『IEC/ISO』

Set the test standard.
Each tap switches between 『IEC』 and 『ISO』.

b Test level setting

Set the test level as defined by the IEC and ISO standards. Tap this button to display the selection screen for the test levels defined in the respective standard.
For 『IEC』, you can select the test voltages corresponding to levels 1 to 4 as defined in IEC 61000-4-2 Ed.2.0.
For 『ISO』, you can select from 7 test voltages listed under "C.4.2 Suggested test severity levels" in ISO 10605 3rd Edition.
For correspondence between test level and test voltage, refer to Table 13-1. IEC test levels and Table 13-2. ISO 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

Table 13-2. ISO test levels

Test voltage (kV)
2
4
6
8
15
20
25

c Output polarity setting: 『+/-』

Set the output voltage polarity.

Each tap switches between 『+』 and 『-』.

d Discharge interval setting

Set the discharge interval for contact discharge mode.

This setting is disabled in air discharge mode and displays 『---』.

Tap to change the value using the numeric keypad.

The range that can be set is 0.05 to 600.

If you input a value greater than 600, the interval will be set to 600 seconds.

If you input a value less than 0.05, the interval will be set to 0.05 seconds.

e Discharge count setting

Set the number of discharge repetitions.

Tap to change the number of discharges and the counting method using the numeric keypad.

By tapping the 『↑ ↓』 key on the keypad, you can switch between count-up and count-down modes.

The range that can be set is 1 to 60,000 or continuous.

If you input a value greater than 60,000, the number of discharges will be set to 60,000.

If you input 『0』, the mode will switch to continuous, and the number of discharges will display 『Continuous』.

f Test mode setting

Set the test mode (contact discharge or air discharge).

Each tap switches between 『Contact』 and 『Air』.

- Contact discharge mode: 『Contact』
  When the trigger switch is pressed, the discharge relay inside the ESD Gun operates repeatedly according to the set 『DISCHARGE INTERVAL』 and 『DISCHARGE COUNT』.
- Air discharge mode: 『Air』
  As long as the trigger switch is held down, the discharge relay inside the ESD Gun remains ON, charging the discharge tip. Once the trigger switch is released, the discharge relay is also turned off.

g Start/Stop the test: 『START/STOP』

Tapping 『START』 begins the test with the set conditions.

Once the test starts, the display changes from 『START』 to 『STOP』, and high voltage is output.

Tapping 『STOP』 stops the test and turns off the high voltage.

⚠WARNING

- **Be cautious during testing, as the voltage set on the ESD Simulator will be generated.**
  The discharge module will become charged with high voltage, so avoid touching it to prevent electric shock or injury.
- **Be sure that no one is near the test environment and that all preparations are complete.**
  Failure to comply with this rule may result in electric shock or injury.

⚠ CAUTION

- **Straighten twisted cables.**
  Do not use or store the cable in a twisted state, as this may cause internal conductor breakage.

h Home button

Tap to exit the standard test mode and return to the main menu.

14. MANUAL TEST MODE

14－1.Manual Test Mode Setting Screen

Touch 『MANUAL』 on the main menu to enter the manual test mode.

Manual test mode is used to perform tests in which all the settings are specified by the user.

The specified test conditions are automatically saved to the displayed test unit number 『1』 to 『99』.

The saved test conditions can be recalled by selecting the corresponding unit number.

The test unit can also be used as the test unit for the sequence test mode.

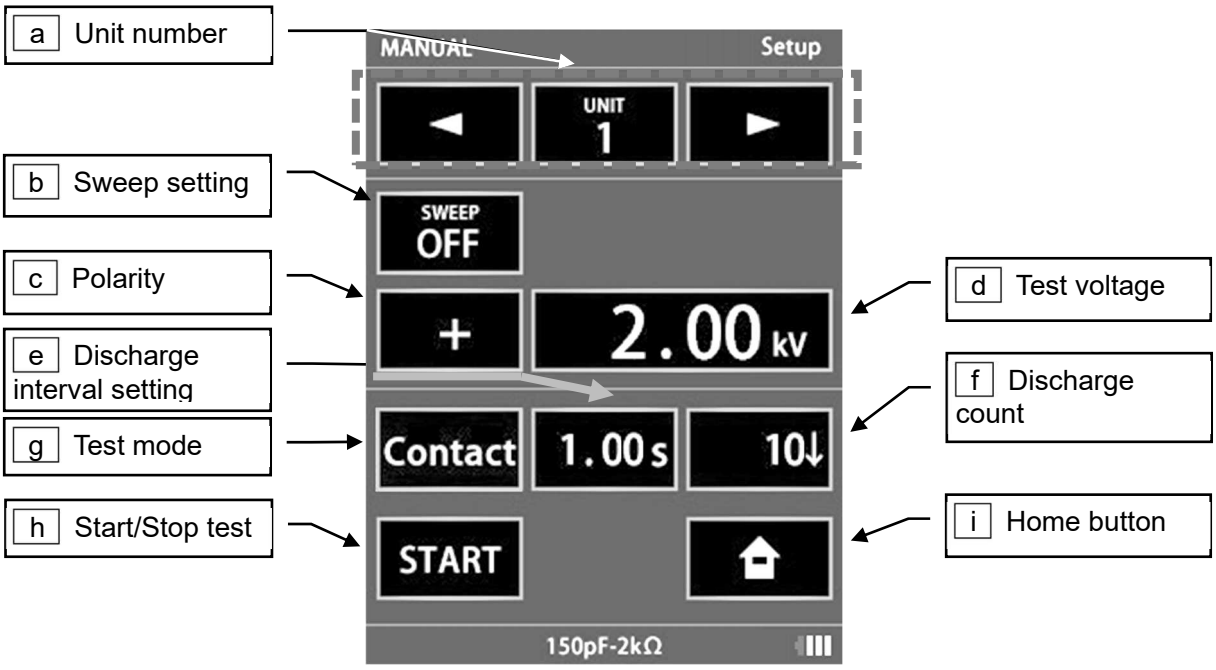


Figure 14-1. Manual test mode setting screen

Touch the item you want to set to set each item.

a Unit number

You can automatically save the set test conditions to unit numbers 『1』 to 『99』.

The saved test condition is referred to as a **test unit**.

You can assign a unit number to a test unit and save it.

By touching the unit number, you can select a number using the numeric keypad.

By tapping 『◁/▷』,

you can switch between unit numbers one by one.

*The input range for the numeric keypad is 1 to 99.

Usage

① Select the unit number field.➔a

② For example, select unit number 『1』 using the numeric keypad.

③ Set the test conditions other than the unit number.
The latest settings will be saved (overwritten) to unit number『1』.

④ Select the unit number field and change it to a different number.
For example, select unit number 『10』.➔a
Set the test conditions other than the unit number.
The latest settings will be saved to unit number 『10』as well.

⑤ When you return to unit number 『1』,
the latest settings for unit number 『1』 will be recalled
as the test settings.

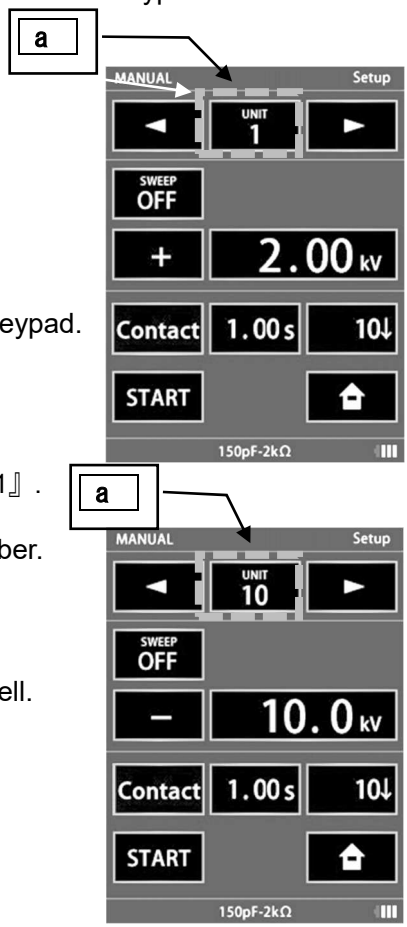


Figure 14-2. Example of test unit

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

b Sweep function setting: 『ON/OFF』

Set whether the voltage sweep function is enabled.
Each tap switches between 『ON』 and 『OFF』.
For more information, refer to ➔ **14－2. Voltage Sweep Setting**.

c Output polarity setting: 『+/-』

Set the output voltage polarity.
Each tap switches between 『+』 and 『-』.
When the voltage sweep is set, each tap switches between『+』,『-』, and『±』.
When the polarity is set to『±』, it outputs the set number of times with the "+" polarity first, and then outputs the "-" polarity continuously.

[d] Test voltage setting

Set the test voltage.

Tap to change the value using the numeric keypad. The range that can be set is 0.20 to 30.5 kV.

If you input a value greater than 30.5, the test voltage will be set to 30.5 kV.

If you input a value less than 0.20, the test voltage will be set to 0.20 kV.

[e] Discharge interval setting

Set the discharge interval for contact discharge mode.

This setting is disabled in air discharge mode and displays 『---』.

Tap to change the value using the numeric keypad.

The range that can be set is 0.05 to 600.

If you input a value greater than 600, the interval will be set to 600 seconds.

If you input a value less than 0.05, the interval will be set to 0.05 seconds.

[f] Discharge count setting

Set the number of discharge repetitions.

Tap to change the number of discharges and the counting method using the numeric keypad.

By tapping 『↑ ↓』 on the keypad, you can switch between count-up and count-down modes.

The range that can be set is 1 to 60,000 or continuous.

If you input a value greater than 60,000, the number of discharges will be set to 60,000.

If you input 『0』, the mode will switch to continuous, and the number of discharges will display 『Continuous』.

[g] Test mode setting: 『Contact/Air』

Each tap switches between 『Contact』 and 『Air』.

- Contact discharge mode: 『Concatct』
  When the trigger switch is pressed, the discharge relay inside the ESD Gun operates repeatedly according to the set 『DISCAHRGE INTERVAL』 and 『DISCHARGE COUNT』.
- Air discharge mode: 『Air』
  As long as the trigger switch is held down, the discharge relay inside the ESD Gun remains ON, charging the discharge tip. Once the trigger switch is released, the discharge relay is also turned off.

[h] Start/Stop the test: 『START/STOP』

Tapping 『START』 begins the test with the set conditions.

Once the test starts, the display changes from 『START』 to 『STOP』, and high voltage is generated.

Tapping 『STOP』 stops the test and turns off the high voltage.

[i] Home button

Tap to exit the manual test mode and return to the main menu.

14－2. Voltage Sweep Setting

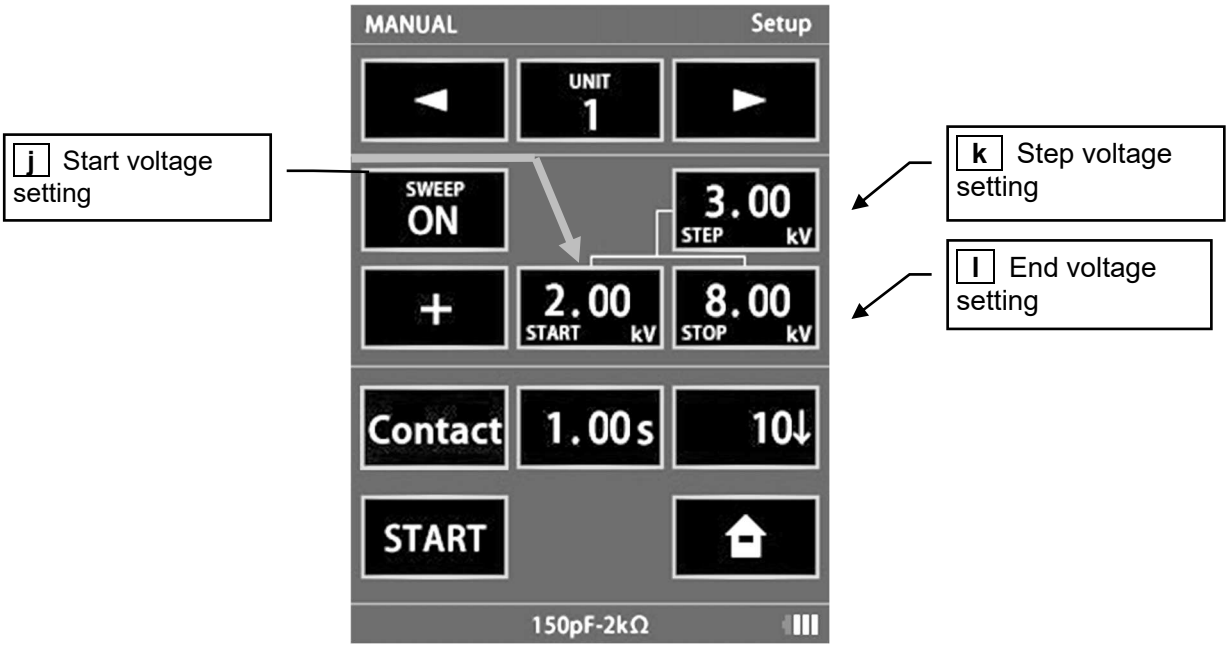


Figure 14-3. Sweep setting screen when ON

When the sweep function is set to 『ON』, the start voltage (『START』)➔ j step voltage (『STEP』)➔ **k and end voltage (『STOP』)➔** l 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. It continues until the 『END』 voltage is reached.

Figure 14-4. Flowchart of voltage sweep mode shows the operation chart for when the voltage sweep is set.

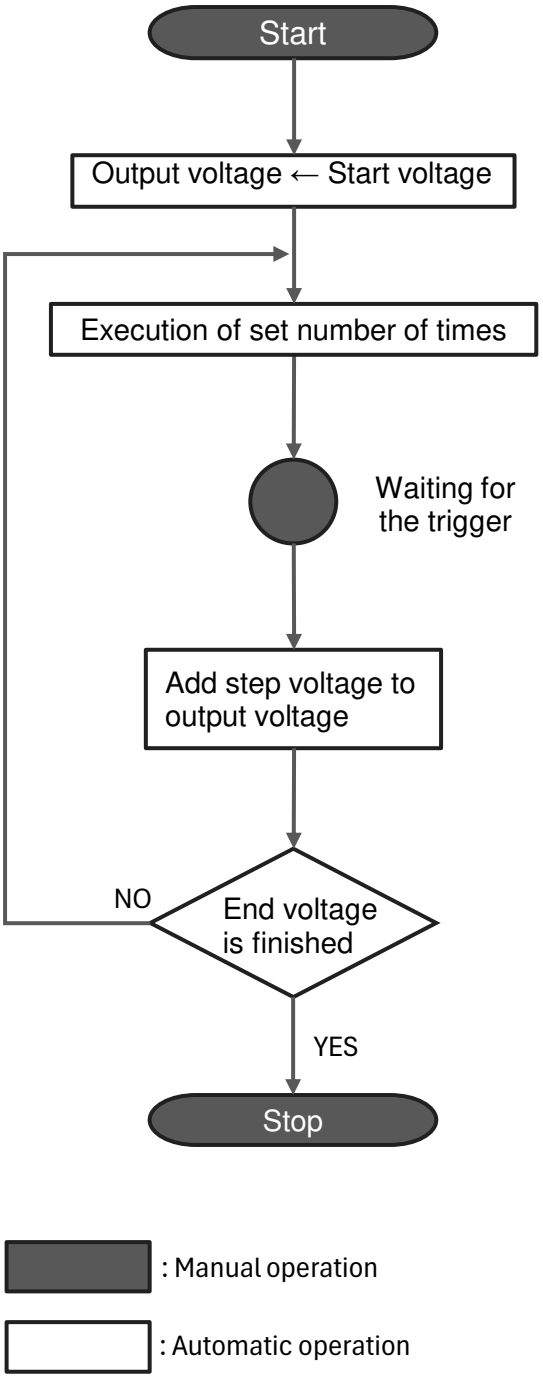


Figure 14-4. Flowchart of voltage sweep mode

15. TEST EXECUTION

This section explains the procedure for executing ESD tests in both standard mode and manual mode.

15－1.Starting the Test

⚠WARNING

- **Be cautious during testing, as the voltage set on the ESD Simulator will be generated.**
  The discharge module will become charged with high voltage, so avoid touching it to prevent electric shock or injury.
- **Be sure that no one is near the test environment and that all preparations are complete.**
  Failure to comply with this rule may result in electric shock or injury.

⚠ CAUTION

- **Straighten twisted cables.**
  Do not use or store the cable in a twisted state, as this may cause internal conductor breakage.

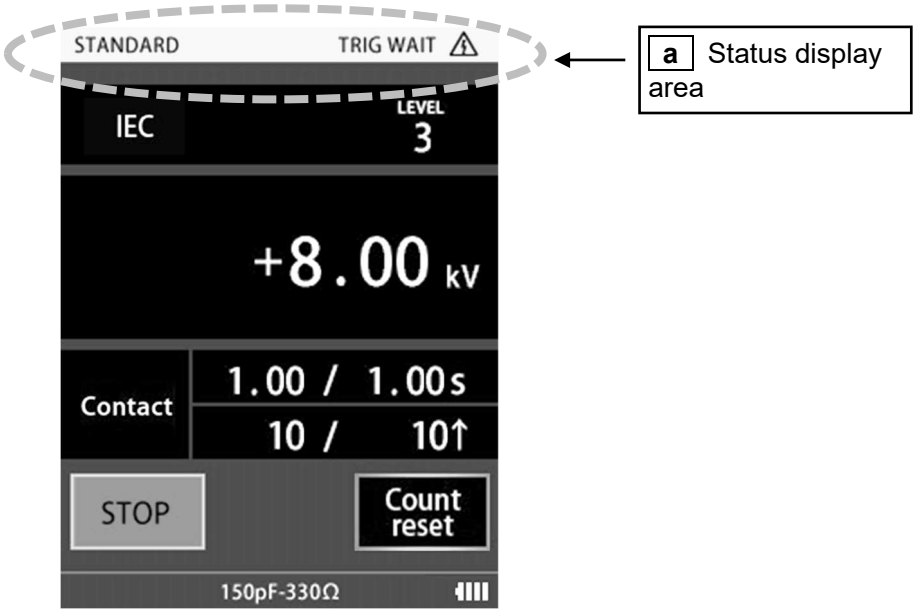


Figure 15-1. Status display area

When 『START』 is tapped, high voltage is output from the ESS-PS1 to the ESD Gun.
The display changes from 『START』 to 『STOP』, and **a** the status display area turns yellow and a high-voltage warning symbol is displayed.
a Status display area will display 『READY』⇒『TRIG WAIT』. (Trigger input waiting state).
Once the set discharge trigger is input, the discharge will begin, and **a** the status display area will display 『RUNNING』.

Continuous mode

When the voltage sweep is set, the manual input for moving to the next step can be omitted.

How to set the continuous mode

Press the trigger switch longer for inputting the trigger after starting the test.
➔ **a** Status display area will display 『CONTINUE』.

This works for both the trigger switch and external trigger.

If the 『START』 display does not change to 『STOP』, or the high-voltage warning symbol does not appear, check the following:

Make sure that the high-voltage output connector of the simulator is connected to the high-voltage input connector of the ESD Gun correctly.

If the issue persists, it could indicate a malfunction.

Please contact the dealer where you purchased the product or the NoiseKen Customer Service Center. Refer to ➔**32. NOISE LABORATORY SUPPORT NETWORK**.

The discharge trigger can be selected between a trigger switch on the ESD Gun and an external trigger that inputs an external signal.

For more information, refer to ➔**20—2 General Setting 1 『1』 (Trigger Setting)**.

The discharge trigger operation for each test mode is shown below.

Table 15-1. Discharge trigger operation for each test mode

Order	Contact discharge mode 『Contact』	Air discharge mode 『Air』
1	Tap 『START』.	
2	Input the discharge trigger once. → Discharge starts.	Move the ESD Gun away from the EUT, then input the discharge trigger. With the input still on, quickly move the ESD Gun closer to the EUT.
3	The gun continues to discharge automatically with the set interval until the set count is complete.	With the input still on, touch the discharge tip to the discharge point on 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 are regarded as one count of discharging.
4	During test execution, input the discharge trigger once to pause continuous discharge. ➔ 『Pause』 is displayed in **a** the status display area. Inputting the trigger again makes the discharge restart.	Repeat the above until the set number of times.
5	After discharging up to the set number of times, it gets into the standby state.	
	If the trigger is released before discharging in the air discharge mode, no discharge will occur to the EUT. Restart the process from the beginning.	

15－2. Reset the Number of Discharges

⚠WARNING

- **Pause by discharge trigger does not put it in 「STOP」 state.**
  This is dangerous because the unintentional triggering can restart the ESD. If the test is not to be resumed immediately, tap 『STOP』 to turn off the high voltage to prevent electric shock and injury.
- **Before touching the discharge tip, remove static electricity.**
  Even after completing the ESD immunity test, the discharge tip may still be charged with high voltage.
  When replacing the discharge tip, remove any static charge (by making the discharge tip contact the GND clip, etc.) before touching the discharge tip.

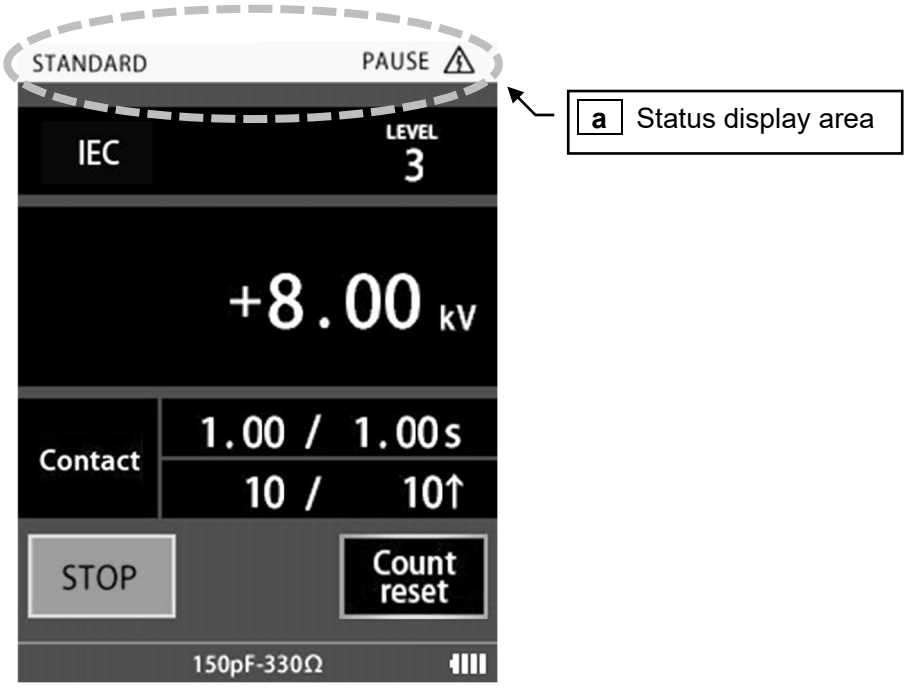


Figure 15-2. Test execution screen

1) In the contact discharge mode (『Contact』), pressing the trigger switch again during discharging can stop discharge temporarily.
   In the air discharge mode (『Air』), since static electricity cannot be discharged without inputting the discharge trigger, the pause function by pressing the trigger switch is not available.
2) When paused, **a** the status display area will show 『PAUSE』.
3) Tapping 『Count reset』 resets the number of discharges, and the test can be performed again with the set number of discharges.

15－3. Ending the Test

⚠WARNING

- **Pause by discharge trigger does not put it in 「STOP」 state.**
  This is dangerous because the unintentional triggering can restart the ESD. If the test is not to be resumed immediately, tap 『STOP』 to turn off the high voltage to prevent electric shock and injury.
- **Before touching the discharge tip, remove static electricity.**
  Even after completing the ESD immunity test, the discharge tip may still be charged with high voltage.
  When replacing the discharge tip, remove any static charge (by making the discharge tip contact the GND clip, etc.) before touching the discharge tip.

To stop the test, tap 『STOP』.

The test can be completed even if the set number of discharges has not been completed.

If the trigger switch is operated after the set number of discharges has been completed, the test can be repeated with the set number of discharges.

16. SEQUENCE TEST MODE

16－1.Overview of Sequence Test Mode

The sequence test mode allows you to combine test units saved in the manual test mode to run a series of tests continuously.

You can combine **up to 6 test units** into a single sequence.

In addition, **up to 20 sequence programs** can be created and saved by sequence program number.

Tap 『SEQUENCE』 on the main menu to enter the sequence test mode.

In the sequence test mode settings screen, you can create sequence programs.

In this same screen, you can also edit the test units from the manual test mode.

16－2.Creating a Test Unit

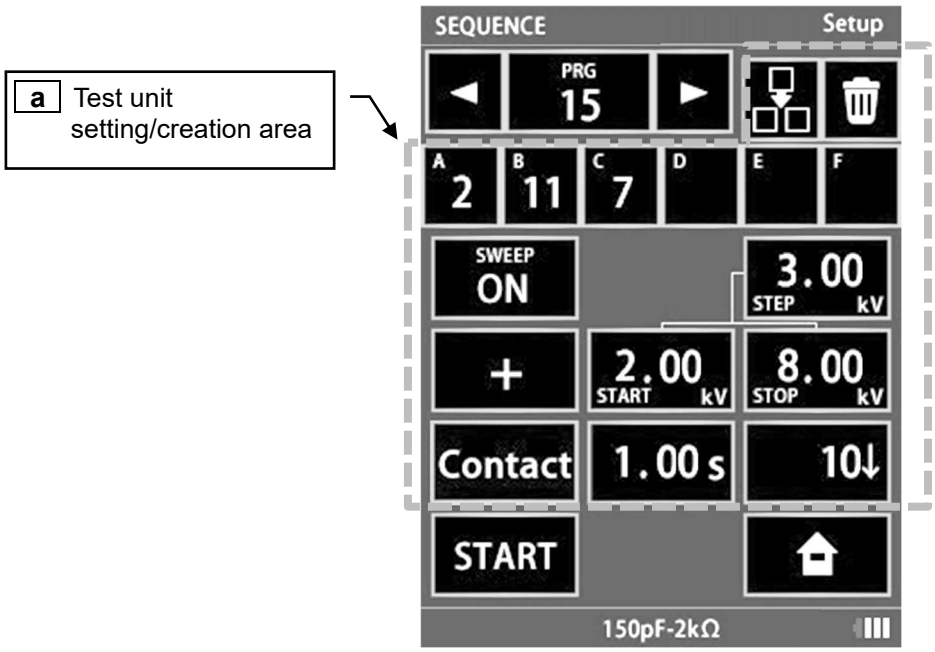


Figure 16-1. Sequence test mode setting screen

Before creating a sequence program, you need to create test units.

You can either use the test units created in the manual test mode (refer to ➔**14. MANUAL TEST MODE** or create new ones in the sequence test mode settings screen.➔ a

The procedure for setting test units is the same as in the manual test mode.➔ Refer to **14. MANUAL TEST MODE**.

Test units are shared between the manual test mode and sequence test mode.

You can modify the content of test units in either mode, and the content will always reflect the latest state.➔ Refer to Figure 16-2. Schematic diagram of test unit and sequence program.

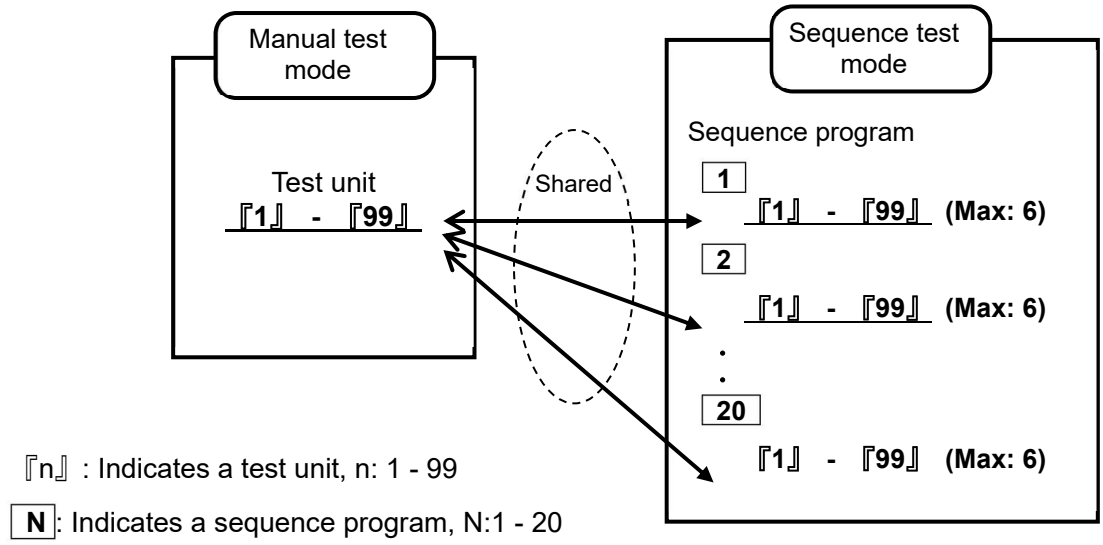


Figure 16-2. Schematic diagram of test unit and sequence program

16－3.Creating a Sequence Program

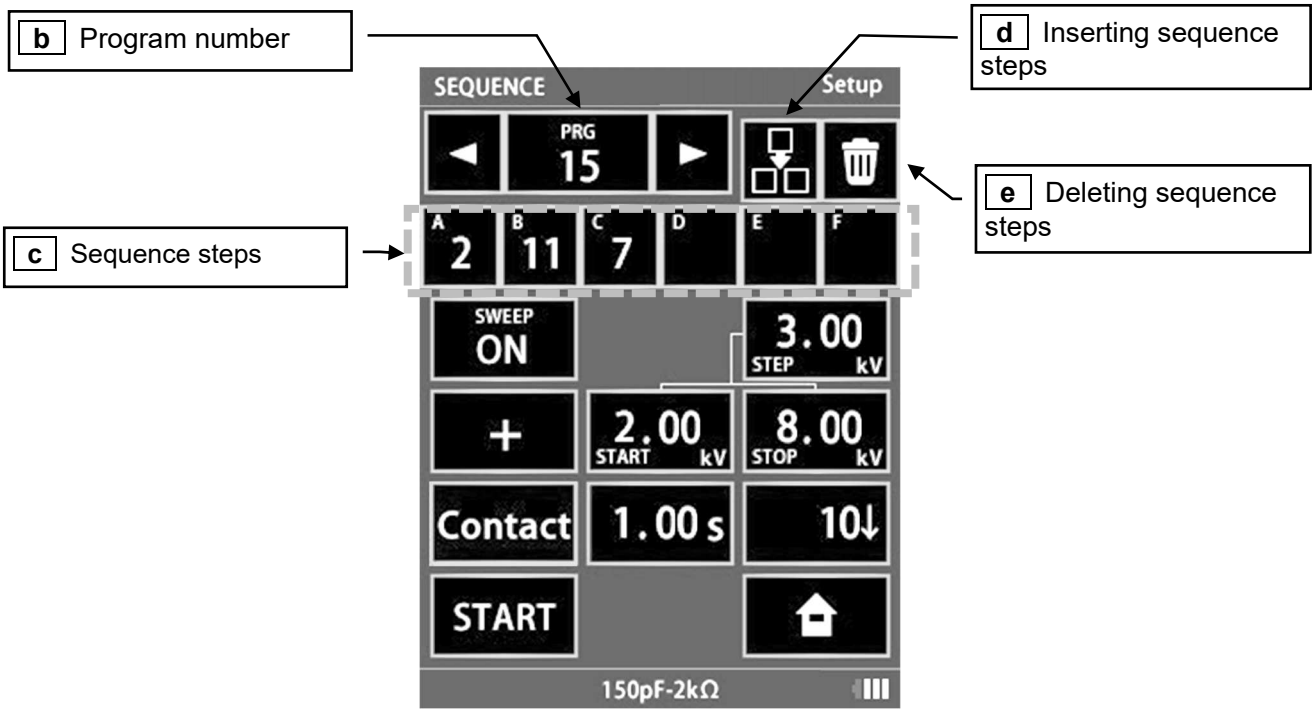


Figure 16-3. Creating a sequence program

You can create a sequence program by combining up to 6 test units from the manual test mode (units 『1』 to 『99』).

Sequence programs can be saved from **1** to **20** .

Touch the item you want to set to set each item.

b Program number

This is the number of the sequence program.

Tap 『◁ ▷』 to select the program number.

Tapping the program number will display the numeric keypad to select the program number.

c Sequence steps

The test unit numbers used in each step of the sequence program are displayed.

You can select up to 6 test units and assign them to sequence steps A to F. If no sequence step is selected, it will remain blank.

When a sequence step is tapped, a blue line appears. Touch again to move to the test unit selection screen and select the unit number you wish to set. Once the unit number is selected, the test unit is set for the selected sequence step.

d Inserting sequence steps

You can insert sequence steps.

When a sequence step is tapped, a blue line appears. Touch again to move to the test unit selection screen and select the unit number to be inserted. Once the unit number is selected, the test unit is inserted before the selected sequence step.

e Deleting sequence steps

You can delete sequence steps.

Tap to delete the selected sequence step.

The subsequent test units will shift forward.

Deleting a sequence step does not delete the corresponding test unit.

16－4. Test unit selection screen

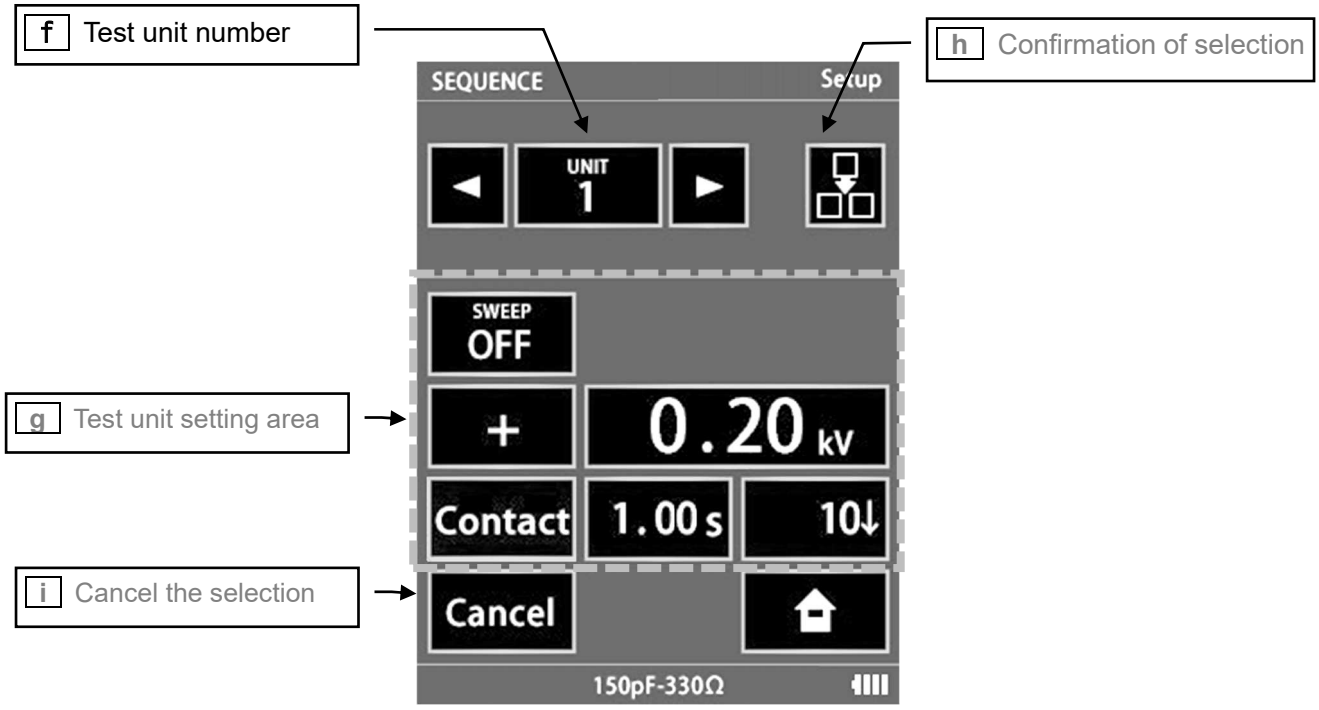


図 16-4. Test unit selection

Selects the test unit to be set for the selected sequence step.

f Test unit number

This is the number of the test unit.

Tap 『◃ ▹』 to select the test unit number.

Tapping the test unit number will display the numeric keypad to select the test unit number.

g Test unit setthing area

The contents of the selected test unit are displayed.

The contents of the test unit can be edited.

The setting conditions of the test unit always reflect the latest status.
Even if the selection of a test unit is discarded, the edited settings of the test unit are kept.

h Confirmation of selection

Confirms the selection of the test unit and returns to the Creating sequence program screen.

i Cancel selection

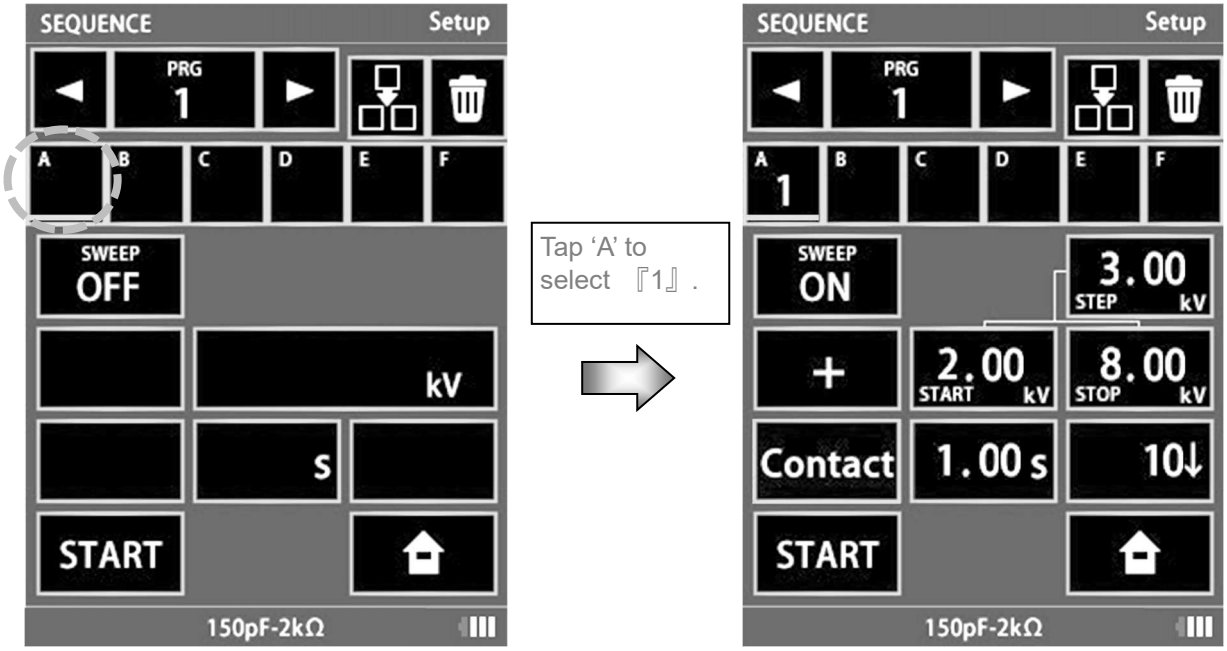
Discards the selection of the test unit and returns to the Create Sequence Program screen.

The setting conditions of the test unit always reflect the latest status.
Even if the selection of a test unit is discarded, the edited settings of the test unit are kept.

Create a sequence program by referring the next page.

Example 1: Creating a New Sequence Program

Select sequence program 1 to create a sequence. Initially, sequence steps A to F are empty.
Set test unit 『1』 as the first step.
With Sequence Step 'A' selected, touch Sequence Step 'A'. When the test unit selection screen appears, select 『1』 to confirm. 『1』 is entered in the Sequence Step frame, and the setting of 『1』 is displayed.



Example 2: Deleting a Sequence Program

To delete a test unit from a sequence step, select the sequence step to be deleted and tap the trash can icon.
The subsequent test units will shift forward.

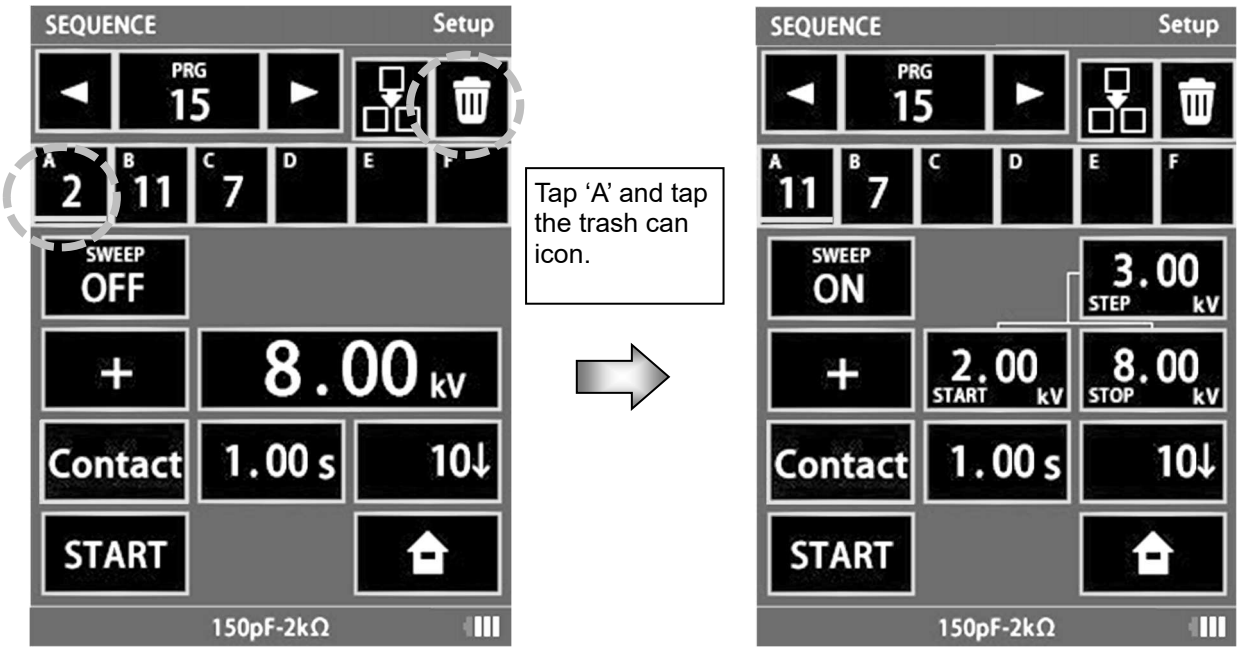


Figure 16-5. Example of creating a new sequence program, deleting a sequence program

Example 3: Inserting a Sequence Program

To insert a test unit into a sequence step, select the sequence step and tap the insert icon.
Touching the insertion mark displays the test unit selection screen, select the test unit number to be inserted and confirm.
The inserted unit will appear before the selected step, and the following steps will shift backward.

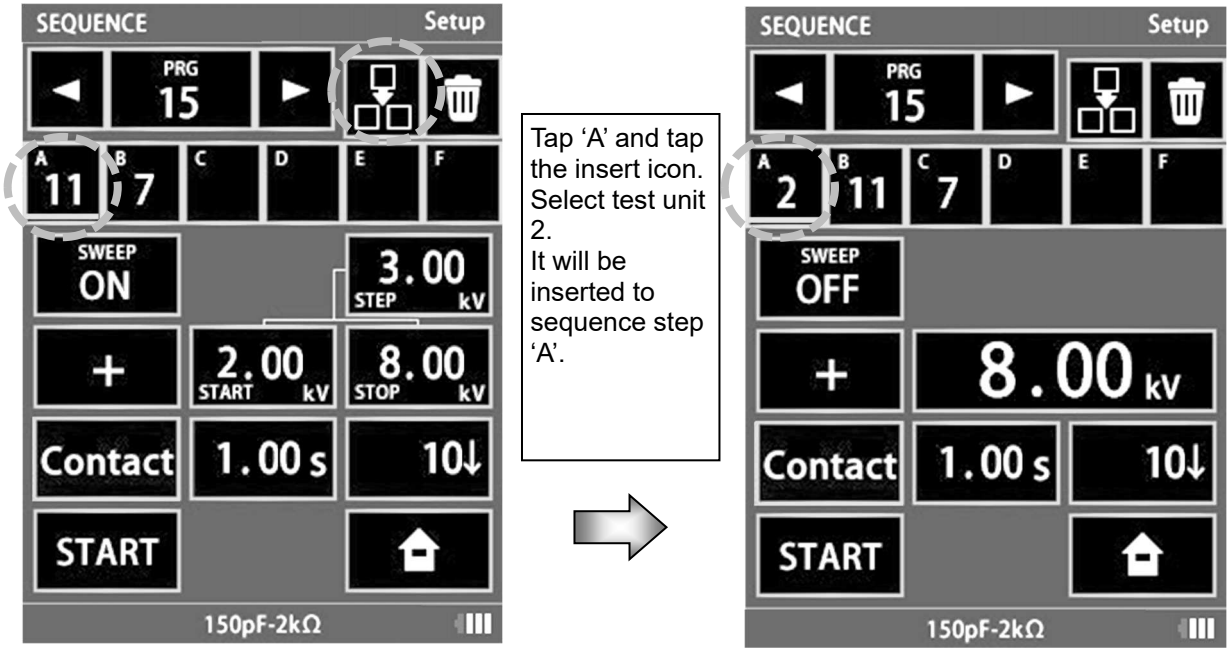


Figure 16-6. Example of inserting a sequence program

The basic test flow is the same as in the standard and manual test modes.
➔ Refer to **15. TEST EXECUTION**.

16－5.Sequence Program Execution

⚠WARNING

- Once the sequence program is executed, the voltage will be generated at the high-voltage output connector and ESD Gun, so be extremely careful.
- Make sure that no one is near the testing environment, and that all preparations for the discharge test are complete.

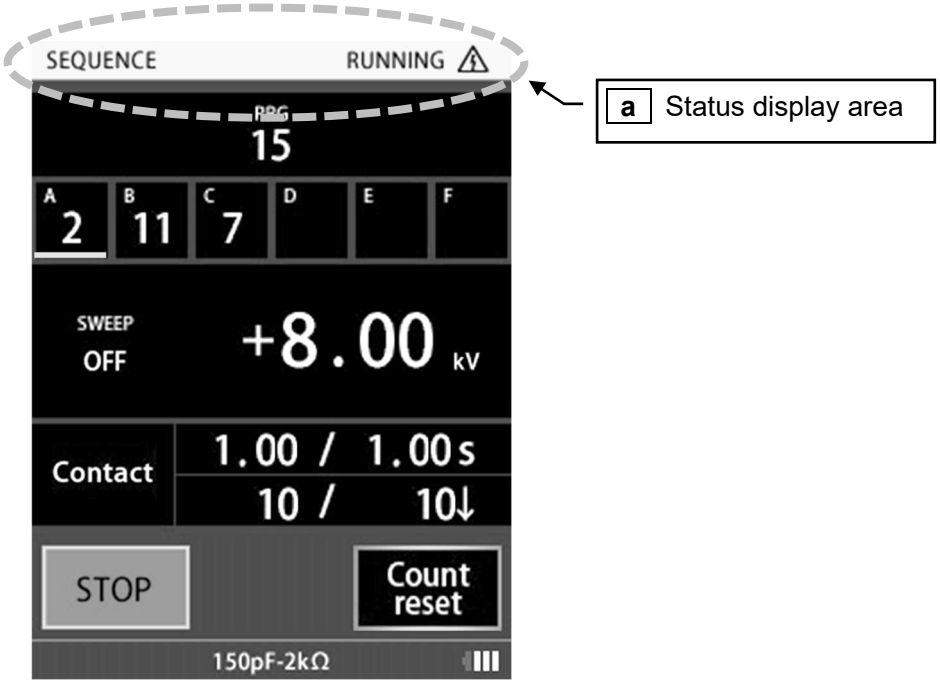


Figure 16-7. Sequence test mode execution screen

1） When 『START』 is tapped, high voltage is output from the main unit to the ESD Gun.
➔The display changes from 『START』 to 『STOP』, and **a** the status display area turns yellow and a high-voltage warning symbol is displayed.
➔ **a** Status display area will display 『READY』⇒『TRIG WAIT』. (Trigger input waiting state)

2） Inputting the specified trigger starts discharge testing.
➔ **a** Status display area will display 『RUNNING』.

3） After each test step is completed, the test equipment will return to standby state. To proceed to the next test step, input the trigger again.

➔ **a** Status display area:
『TRIG WAIT』 ⇒ (Input trigger manually) ⇒ 『RUNNING』 ⇒ 『TRIG WAIT』 ⇒ (Input trigger manually) ⇒ Execute the next test step

Continuous mode

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 for inputting the trigger after starting the test.
➔ **a** Status display area will display 『CONTINUE』.

This works for both the trigger switch and external trigger.

If the next step is set to air discharge mode (『Air』), continuous mode will be disabled.

4) Once the specified number of discharges is completed, the test equipment will return to standby state.
➔ **a** Status display area will display 『TRIG WAIT』.
Inputting the discharge trigger again restarts the test.

16－6. Ending the Test

⚠WARNING

Even after the set number of discharges has been completed, the test equipment will still be waiting for the next trigger input, so the internal high-voltage power supply will not turn off. Always tap 『STOP』 after finishing the test.

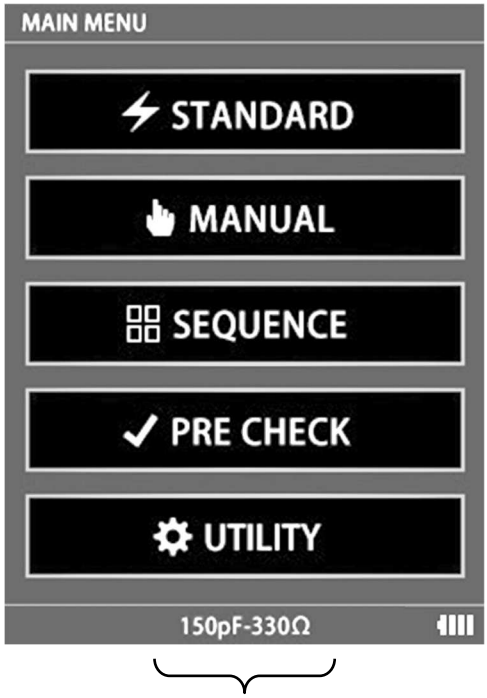
Tapping 『STOP』 stops the test, turns off the internal high-voltage power supply, and the high-voltage warning symbol in **a** the status display area will go out.

17. AUTOMATIC RECOGNITION FUNCTION FOR DISCHARGE MODULES

The automatic recognition function for discharge modules identifies the type of discharge module attached to the ESD Gun.

17－1. Operation of Automatic Recognition Function

This function automatically recognizes and identifies the type of discharge module when the discharge module is replaced or when the test equipment is turned on.



Discharge module identification display

Figure 17-1. Main menu screen

17－2. Discharge module identification

Below (Table 17-1. Discharge modules that can be automatically recognized) is a table showing the types of discharge modules and their corresponding recognition display.

The test cannot be started unless the discharge module is attached.

Table 17-1. Discharge modules that can be automatically recognized

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

18. DISCHARGE DETECTION FUNCTION

The discharge detection function detects actual discharge during air discharge mode.
This function is always enabled and cannot be disabled.

18－1.Operation of Discharge Detection Function

The discharge detection function operates only in air discharge mode.

Once the discharge trigger is activated and the discharge relay inside the gun is turned on, the discharge detection begins.

The detection process stops when a discharge is detected, the trigger switch is turned off, or the set time for automatic trigger-off elapses.

When a discharge is detected, the function behaves according to the utility settings, as shown below (Table 18-1. Operation when discharge is detected).

Table 18-1. Operation when discharge is detected

Item	When discharge is detected	When discharge is not detected	Function setting by utility
Buzzer	Short beep	No sound	Selectable
Discharge count	Counts	Does not count, even with trigger input	Selectable

The discharge detection function works by detecting the return current from the built-in high-voltage power supply during ESD.
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.
In addition, certain types of discharge modules attached to the ESD Gun may not allow for discharge detection.

19. PRE-CHECK

The test equipment can check the operations of the main unit and the ESD Gun.
It is recommended to perform the operation check as pre-check before the test. Note that this is not a calibration of the test equipment.

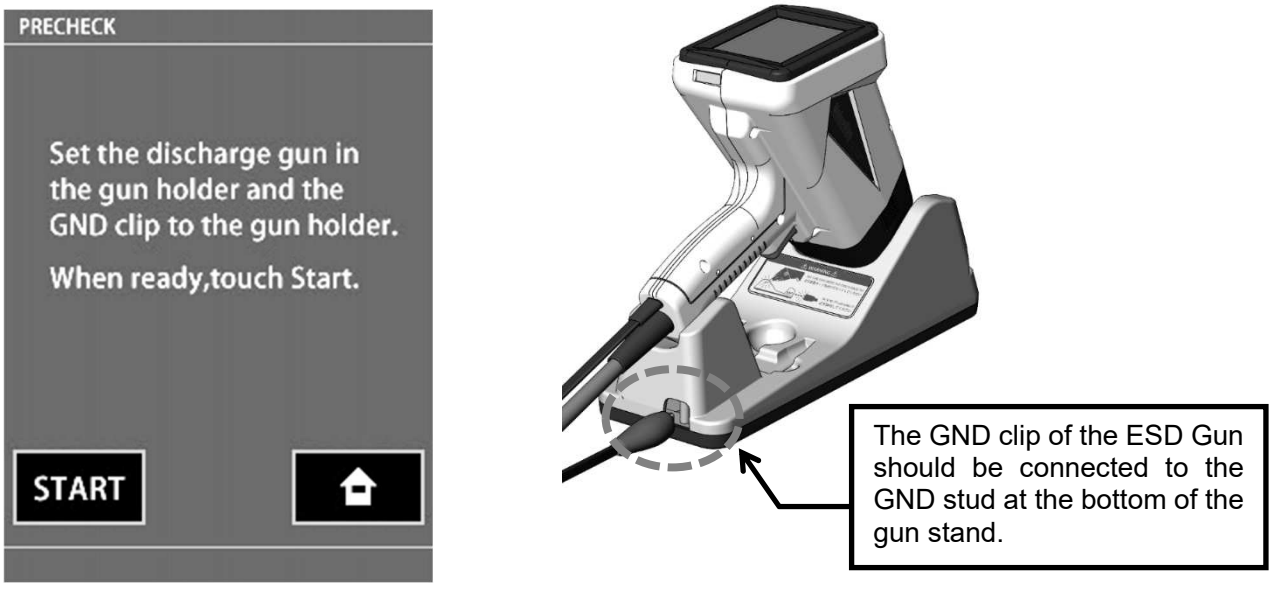
The pre-check is executed by following the instructions displayed on the ESD Gun's touch panel LCD. The gun stand included with the ESS-PS1 is used for the pre-check. The gun stand is equipped with a pre-check terminal, which must be contacted with the discharge tip attached to the ESD Gun. When setting the ESD Gun on the gun stand, be sure to attach the conical-type discharge tip used for contact discharge tests.
Normally, the pre-check covers up to ±30 kV, but if an output voltage limit is set, the check will be limited to the set voltage.

19－1. Pre-check Preparation

⚠WARNING

- Up to 30 kV of high voltage will be generated at the high-voltage output connector and the ESD Gun, so be extremely careful.
- Make sure no one is near the ESD Gun and that all pre-check preparations are complete.

Attach the conical-type discharge tip to the ESD Gun and set it on the gun stand.
Connect the GND clip of the ESD Gun to the GND stud of the gun stand.
Tap 『PRE CHECK』 on the main menu to switch to the pre-check screen.



Pre-check screen **Connection to gun stand**

Figure 19-1. Pre-check preparation

⚠ Make sure that the ESD Gun is securely set on the gun stand and that the GND clip is properly connected to the GND stud. Failure to do so may result in an inaccurate check.

19－2. Pre-check Execution

When 『START』 is tapped, high voltage is output from the main unit to the ESD Gun.
The display changes from 『START』 to 『STOP』, and **a** the status display area turns yellow and a high-voltage warning symbol is displayed.
During the pre-check, the output voltage of the built-in high-voltage power supply and the dielectric strength of the test equipment are checked.
The check covers from ±2 kV to 30 kV, and the check results are displayed in **b** High-voltage output and dielectric strength check results.
After the check is complete, the discharge relay's operation is checked.
The discharge relay operation check includes 20 discharges to check that the correct number of discharges have been performed. The check results are displayed in **c** Relay check results.
If 『STOP』 is tapped during the pre-check, the pre-check will be suspended.

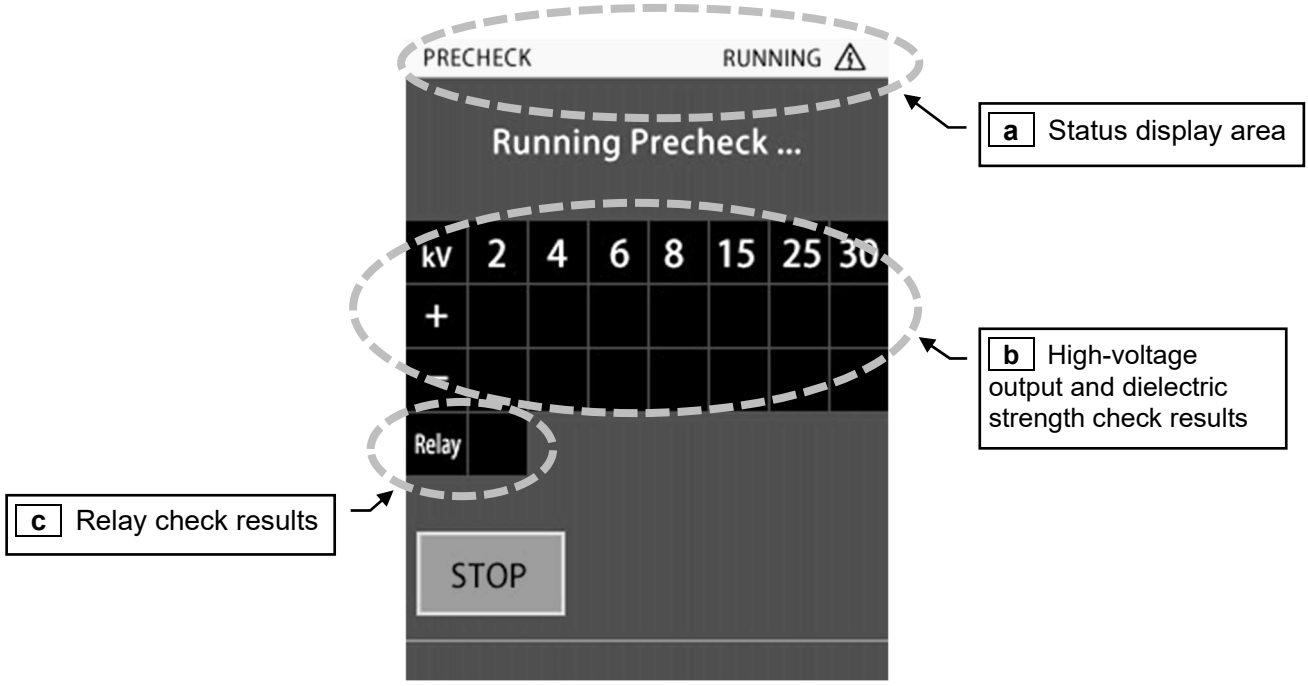


Figure 19-2. Pre-check execution screen

Make sure that the ESD Gun is securely set on the gun stand and that the GND clip is properly connected to the GND stud. Failure to do so may result in an inaccurate check.

19－3. Results Display

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

When the Pre-check is Successfully Completed

A screen will be displayed indicating that the pre-check was completed successfully, with (✓) shown next to the completed items (Figure 19-3. Pre-check results display①). This completes the pre-check.
Tap the home button to return to the main menu.

Figure 19-3. Pre-check results display①

When Any Problematic Items are Found

If an issue is detected during the pre-check, the screen will display (✓) next to successfully completed items and (×) next to any problematic items (Figure 19-4. Pre-check results display②).

If an issue occurs during the high-voltage output or dielectric strength check, no further checks will be performed for voltages higher than the one where the issue occurred.

Figure 19-4. Pre-check results display②

19－4. Causes and Solutions for Pre-check Problematic Items

If problematic items are found during the pre-check, this may indicate a fault in the test equipment. The cause of the fault depends on which checks caused the problem.
The following table shows the list of causes of faults for each check and their solutions.

Table 19-1. Causes and solutions for pre-check problematic items

If any problematic items are found in the high-voltage output and dielectric strength check	
Situation	There may be an abnormality in the high-voltage output of the ESS-PS1. There may be insulation failure inside the ESD Gun. **The check for the voltage at which the problem occurred is marked with "×".**
Cause	-The high-voltage power supply of the ESS-PS1 is abnormal. -Insulation failure inside the ESD Gun. -The discharge relay inside the gun has deteriorated.
Solution	-Use the output voltage limit in the utility. Example: If a problem occurs at 20 kV, setting the output voltage limit to 15 kV may solve the problem. In that case, perform the pre-check again. -Repair the test equipment. Refer to ➔ **32. NOISE LABORATORY SUPPORT NETWORK** .
If any problematic items are found in the discharge relay operation check	
Situation	The output in the ESD Gun may be unstable.
Cause	-There is a contact failure in the discharge channel of the ESD Gun. -The discharge tip came off the pre-check terminal during the check. -The discharge relay inside the gun has deteriorated.
Solution	-Clean the discharge tip. -Ensure that the discharge tip is in contact with the pre-check terminal and perform the pre-check again. -Repair the test equipment. Refer to ➔ **NOISE LABORATORY SUPPORT NETWORK** .

20. UTILITY

In the utility section, you can configure various settings for the test equipment, including general settings and special functions.
When 『UTILITY』 is selected from the main menu, the utility general setting 1 screen is displayed.

20－1.Utility Menu

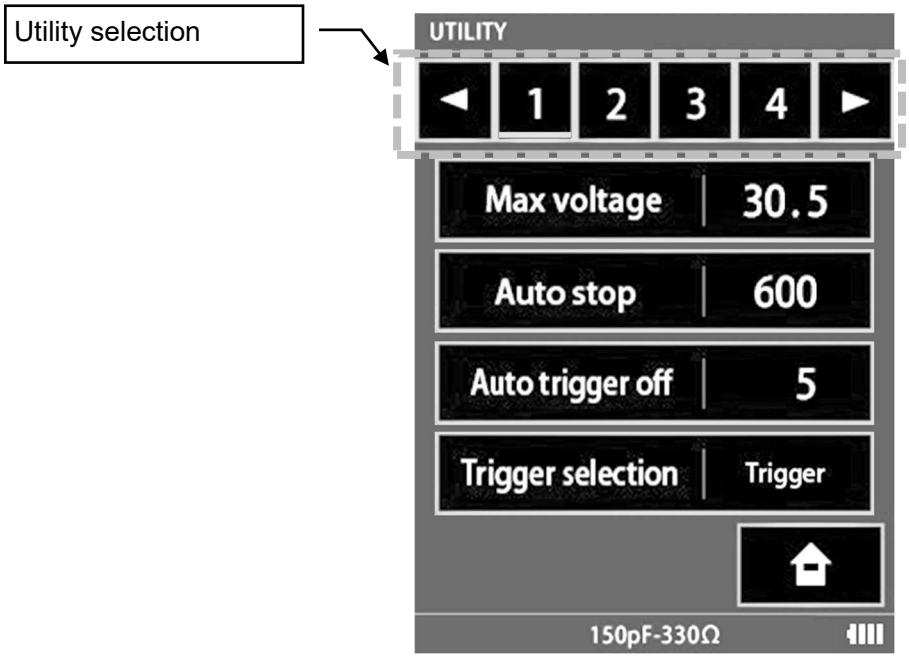


Figure 20-1. Utility menu screen

In the utility menu screen, you can switch between different utility screens by either tapping the utility number or 『◃ ▹』 next to the number.

1 General setting 1:『1』
Set the operation limits and trigger settings for the test equipment.
For more information, refer to ➔**20－2. General Setting 1 『1』**.

2 General setting 2 『2』
Set the optional settings and the language displayed on the touch panel LCD.
For more information, refer to ➔**20－3. General Setting 2 『2』**.

3 Buzzer setting 『3』
Set various operation sounds.
For more information, refer to ➔**20－4. Buzzer Setting 『3』**.

4 Initialize settings 『4』
Initialize all settings to factory defaults.
For more information, refer to ➔**20－5. Initialize Settings 『4』**.

20－2.General Setting 1 『1』

In the general setting, you can set operation limits and trigger settings for the test equipment.
Touch the item you want to set to set each item.

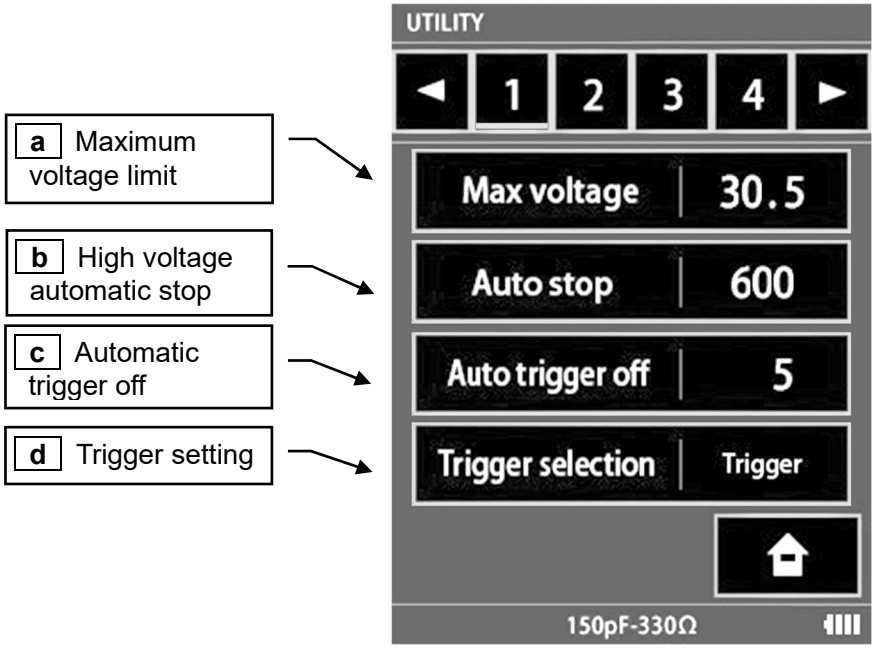


Figure 20-2. General setting 1

a Maximum voltage limit: 『Max voltage』

The maximum output voltage of this test equipment is 30.5 kV, but an upper limit can be set.
Tap this to display the numeric keypad for setting the upper voltage limit.
The set range is from 0.2 to 30.5 kV in 0.1 kV increments.
If you enter more than 30.5 kV, the upper voltage is set to 30.5 kV.
If you enter less than 0.2 kV, the upper voltage is set to 0.2 kV.

b High voltage automatic stop: 『Auto stop』

This sets the time for which automatic high-voltage shutoff and 『ERROR 5 Auto Stop』 is displayed when no operation occurs after tapping 『START』 to turn on the high voltage.
Tap this to display the numeric keypad for setting the time until the high voltage OFF.
The set range is from 1 to 600 seconds in 1 second increments.
Decimal points are ignored even if tapped.
If you enter more than 600 seconds, the high voltage automatic stop time is set to 600 seconds.
Entering '0' disables the automatic stop function.

c Automatic trigger OFF: 『Auto trigger off』

This sets the time for which automatic high-voltage shutoff and 『ERROR 3 Auto Trigger OFF』 is displayed when the trigger is held on but no discharge is detected.
Tap this to display the numeric keypad for setting the time until the trigger OFF.
The set range is from 1 to 10 seconds in 1 second increments.
Decimal points are ignored even if tapped.
If you enter more than 10 seconds, the automatic trigger OFF time is set to 10 seconds.
If you enter less than 1 second, the time is set to 1 second.

d Trigger setting: 『Trigger selection』

Set the discharge trigger settings. Each tap switches between 『Trigger』 and 『External trigger』.

『Trigger』	Uses the ESD Gun's trigger switch as the discharge trigger.
『External trigger』	Uses the electrical signal input from the【AUX】 connector on the rear panel of the ESS-PS1 as the discharge trigger. For more information, refer to ➔**22－1. AUX Connector**.

20－3.General Setting 2 『2』

In the general setting 2, you can set accessory operations, display language, and discharge count settings. Touch the item you want to set to set each item.

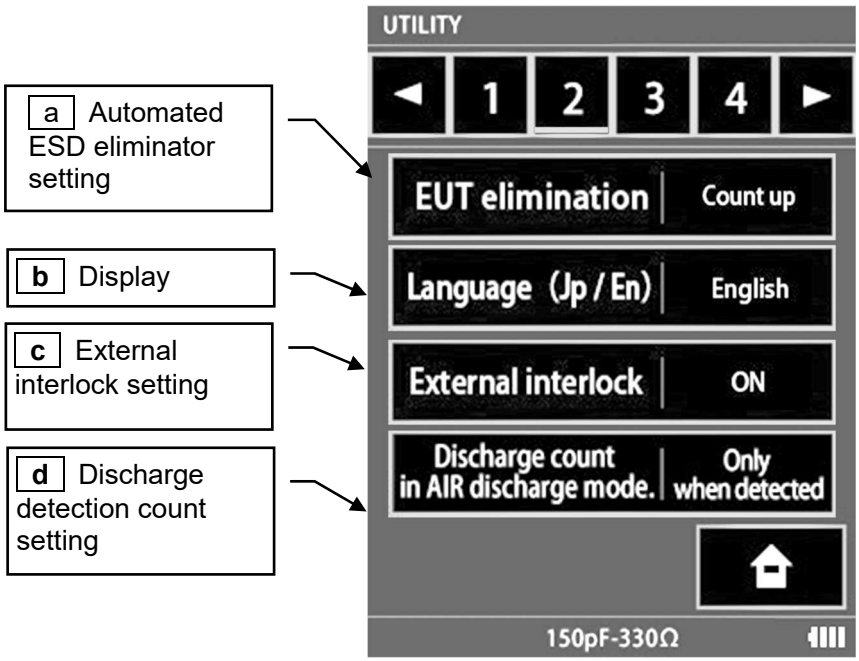


Figure 20-3. General setting 2

a Automated ESD eliminator setting 『EUT elimination』

If you have connected **the optional automated ESD eliminatior (01-00013B)** to the 【AUX】 terminal on the rear panel of the ESS-PS1, you can specify its operation.

Tap to toggle through the following options: 『OFF』 → 『Eliminate electric charge at count up』 → 『Eliminate electric charge every time (External)』 → 『OFF』.

『OFF』	The ESD eliminator is not used. When the ESD eliminator is connected, it is left open.
『Eliminate electric charge at count up』	Electric charge elimination is performed only when the number of discharge operations specified in the discharge frequency setting has been completed.
『Eliminate electric charge every time (External)』	Electric charge elimination is performed in each discharge operation. If the interval between discharges is less than 1 second, the behavior is the same as the "Eliminate electric charge at count up".

b Display language setting: 『Language (Jp / En)』

Set the display language for the screens.
Each tap switches between 『English』 and 『日本語 (Japanese)』.

c External interlock setting:『External interlock』

This enables or disables the external interlock from the 【AUX】 terminal on the rear panel.
Each tap switches between 『ON』 and 『OFF』.

『ON』	Enables the external interlock.
『OFF』	Disables the external interlock.

d Discharge count setting in air discharge mode: 『Discharge count in AIR discharge mode』

Set discharge count conditions during air discharge tests.
Each tap switches between 『Only when a discharge is detected』 and 『ALL』.

『Only when a discharge is detected』	Counts the number of discharges only when a discharge is detected.
『ALL』	Counts the discharge whenever the trigger is turned off, regardless of whether a discharge is detected.

20－4. Buzzer Setting 『3』

In the utility screen 3, you can set various operation sounds (buzzer ON/OFF).
Touch the item you want to set to set each item.

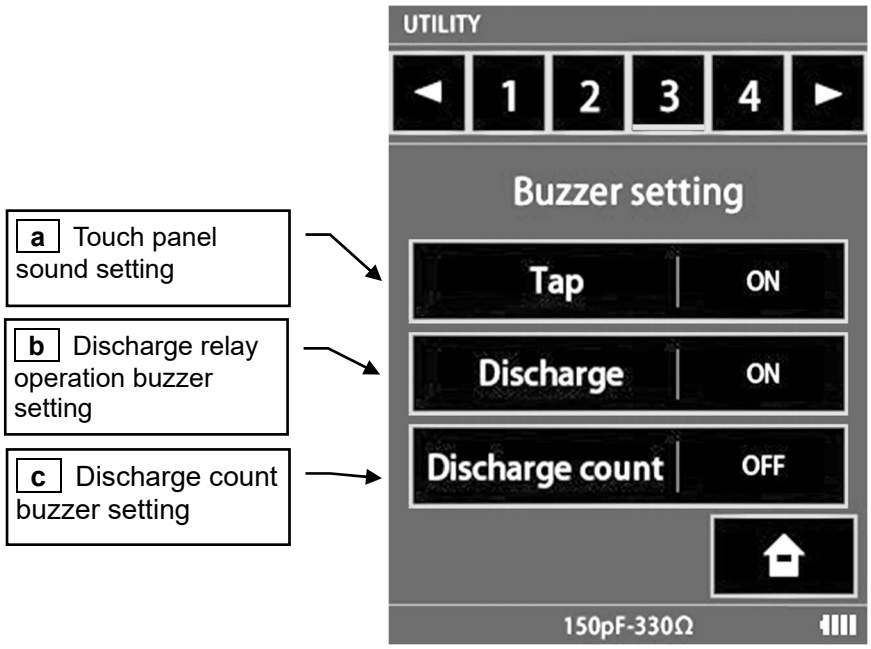


Figure 20-4. Buzzer setting

a Touch panel sound setting: 『Tap』

Turn the touch panel operation sound ON or OFF.
Each tap switches between 『ON』 and 『OFF』.

『ON』	A sound is played when the touch panel on the ESD Gun is touched.
『OFF』	No sound is played even when the touch panel on the ESD Gun is touched.

b Discharge relay operation buzzer: 『Discharge』

Turn the buzzer sound ON or OFF during discharge operation.
Each tap switches between 『ON』 and 『OFF』.

『ON』	The buzzer sounds during discharge operation. In contact discharge mode, the buzzer sounds during discharge operation. In air discharge mode, the buzzer sounds when the trigger switch is pressed.
『OFF』	The buzzer does not sound during discharge operation.

c Discharge count buzzer: 『Discharge count』

Turn the buzzer sound ON or OFF when the discharge count increases.
Each tap switches between 『ON』 and 『OFF』.

ON	The buzzer sounds when the discharge count increases. In air discharge mode, the sound timing depends on the settings in general setting 2 『Discharge count in AIR discharge mode』.
OFF	The buzzer does not sound when the discharge count increases.

20－5. Initialize Settings 『4』

In the utility screen 4, you can initialize various settings to factory defaults.
Tap 『Execution』 to perform the initialization. Once the initialization is completed, the buzzer will sound twice. Executing an initialization will erase all saved test units and sequence programs, and return utility settings to factory defaults.

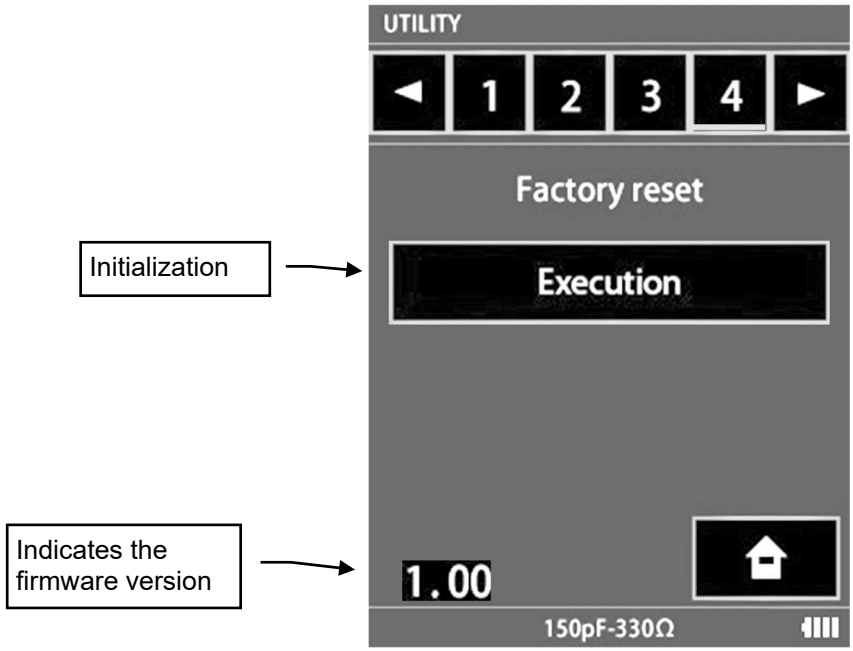


Figure 20-5. Initialize settings

Note that once the settings are initialized, all saved manual test units and sequence programs are erased.

21. FRONT PANEL LED DISPLAY OF ESS-PS1

The front panel of the ESS-PS1 is equipped with two status LEDs that display the status of the battery and indicate abnormal conditions with the test equipment.

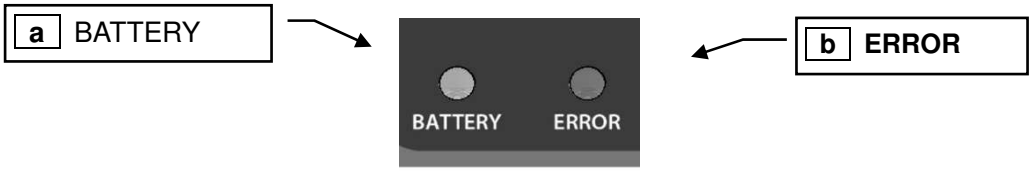


Figure 21-1. Front panel LED

a 【BATTERY】 (Color: Orange)

The status of the built-in battery is displayed by lighting and blinking.

① Fully charged: LED lighting
Indicates that the AC adapter is connected and the battery is fully charged. The LED will turn off once the AC adapter is disconnected.

② Charging: LED blinking (1-second intervals).
Indicates that the AC adapter is connected and the battery is being charged.
The LED blinks at 1-second intervals.

③ ERROR: LED blinking (0.5-second intervals)
If an error occurs with the battery or the AC adapter, the LED blinks at about 0.5-second intervals, a faster blinking pattern than during charging.

If ERROR occurs, turn off the test equipment, disconnect the AC adapter, and check the status of the DC jack and the AC adapter. If the situation does not change, there may be a malfunction. Please contact the dealer where you purchased the product or the NoiseKen Customer Service Center. Refer to ➔**32. NOISE LABORATORY SUPPORT NETWORK**.

b 【ERROR】 (Color: Red)

This LED lights up when the following errors occur with the test equipment:

① Fan failure or forced fan stop
The LED will light up if the fan on the rear panel of the ESS-PS1 malfunctions or is forced to stop due to external factors, such as foreign objects obstructing the fan blades.

② Discharge module unattached during high-voltage output
If the discharge module is not attached , the LED will light up. It will also light up if the connection between the ESD Gun and the ESS-PS1 is disconnected .

If ERROR occurs, turn off the test equipment, disconnect the AC adapter, and check the connection of the discharge module, the ESD Gun, and the status of the fan on the rear panel. If no issues are found, the test equipment may be malfunctioning. Please contact the dealer where you purchased the product or the NoiseKen Customer Service Center. Refer to ➔**32. NOISE LABORATORY SUPPORT NETWORK**.

22. AUXILIARY INTERFACE

22－1.AUX Connector

This is a 15-pin DSUB female connector used for input/output of the warning lamp (Model: 11-00014B), the automated ESD eliminator (Model: 01-00013B), and control signal lines.
When using both the warning lamp and the automated ESD eliminator (both are optional), use the AUX connector junction box (model: 05-00052A).

Table 22-1. AUX connector pin layout

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

- Connecting the warning light (Model: 11-00014B)
  An optional warning light (Model: 11-00014B) can be connected.
  When 『START』 is tapped and the high-voltage power is active, the warning light will light up.

- Connecting the automated ESD eliminator (Model: 01-00013B)
  An optional automated ESD eliminator (Model: 01-00013B) can be connected.
  The electric charge elimination operations can be set in the utility menu. Refer to **20－3. General Setting 2 『2』**.

Table 22-2. Electrical specifications of AUX connector input terminals

Electrical specifications of external input terminals (common to all input terminals)	
H (High) level input voltage	5 V to 24 V
L (Low) level input voltage	0 V to 0.5 V
Input impedance	7 kΩ min.　10 kΩ typ.
Minimum pulse duration	100 ms or more

Note: Do not apply a voltage exceeding 24 V to the external input terminals, as this may cause damage.

- External trigger input
  This allows external trigger input using the external trigger input function.
  Select 『EXTERNAL』 in the setting by operating the display on the ESD Gun.
  To input an external trigger, input a high level (5 V to 24 V) with a pulse time of 100ms or longer. For the specifications of input terminals, refer to **Table 22-2. Electrical specifications of AUX connector input terminals.**
  The following types of signals can be used as the external trigger input.
  -Contact output
  -PNP open collector output
  -Voltage output
  When using contact output or PNP open collector output, use the [Pin No.7 External Trigger Input Power Supply].

- External interlock input
  Connecting an external emergency stop switch or similar device to this external interlock input will activate the interlock.
  You can enable or disable the external interlock in the utility menu. Refer to **20－3. General Setting 2 『2』**.
  When the external interlock is enabled in the utility menu, 『ERROR 1 External Interlock Error』 will appear, and the test will not proceed unless either [Pin No. 9 External Interlock Power Supply] or a high level (5 V to 24 V) is input to [Pin No.10 External Interlock Input] terminal.
  For the specifications of input terminals, refer to Table 23.2 Electrical specifications of AUX connector input terminals.
  The following types of signals can be used as the external interlock input.
  -Contact output
  -PNP open collector output
  -Voltage output
  When using contact output or PNP open collector output, use the [Pin No.9 External Interlock Power Supply].

22－2.Optical Communication Connector

This is an optical connector for PC communication (interface), allowing the test equipment to communicate with a PC.

23. ERROR DISPLAY

In addition to the ERROR display LED on the front panel of the ESS-PS1, error messages are displayed on the touch panel LCD of the ESD Gun. Details of each error are shown below (**Table 23-1. Error list**).

Table 23-1. Error list

ERROR 1	
Description of error	External interlock error The external interlock is in an open state.
How to clear error	Tap 『OK』.
How to prevent error	Properly connect the AUX connector and external interlock, or disable the external interlock. Refer to ➔ **20—3. General Setting 2 『2』.**
ERROR 2	
Description of error	Trigger switch error The discharge trigger is in a constant input state.
How to clear error	Tap 『OK』.
How to prevent error	Release the discharge trigger from the constant input state.
ERROR 3	
Description of error	Auto trigger OFF The trigger was not operated for longer than the set time, and auto trigger OFF occurred.
How to clear error	Tap 『OK』.
How to prevent error	Reduce the idle time. Extend the time to automatic trigger OFF. Refer to ➔ **20—2. General Setting 1 『1』.**
ERROR 4	
Description of error	Remote control error Communication with the PC could not be confirmed.
How to clear error	Tap 『OK』.
How to prevent error	Check the communication connector, optical fiber cable, and PC software.

ERROR 5	
Description of error	Auto stop No operation was performed for longer than the set time, and automatic stop occurred.
How to clear error	Tap 『OK』.
How to prevent error	Reduce the idle time. Extend or disable the time to automatic stop. Refer to ➔ **20－2. General Setting 1 『1』**.
ERROR 6	
Description of error	High-voltage power supply error The output of the high-voltage power supply could not be confirmed.
How to clear error	Tap 『OK』.
How to prevent error	If this error occurs, the test equipment may be malfunctioning. For repairs, refer to ➔ **32. NOISE LABORATORY SUPPORT NETWORK**.
ERROR 7	
Description of error	Max voltage error An attempt was made to output a voltage exceeding the maximum set voltage.
How to clear error	Tap 『OK』.
How to prevent error	-Set the voltage lower than the maximum voltage setting. Increase the maximum voltage setting. Refer to ➔ **20－2. General Setting 1 『1』**.
ERROR 8	
Description of error	Waveform unit error The discharge module is not attached, or the GT-31S is malfunctioning.
How to clear error	Tap 『OK』.
How to prevent error	Correctly attach the discharge module. If the error persists even when correctly attached, the test equipment may be malfunctioning. For repairs, refer to ➔ **32. NOISE LABORATORY SUPPORT NETWORK**.

ERROR 9	
Description of error	Battery power is low This error is displayed when the battery is low. Even during testing, the power may shut off due to low battery level.
How to clear error	Tap 『OK』. ERROR9 will occur only once during power-on. It will occur again when the power of the test equipment is turned on again.
How to prevent error	Charge the battery. Refer to ➔ **10－2. Connecting the AC Adapter**. If this error occurs even after charging, the test equipment may be malfunctioning. For repairs, refer to ➔ **32. NOISE LABORATORY SUPPORT NETWORK** .
ERROR 10	
Description of error	FAN error Fan failure or forced fan stop This error is displayed when if the fan on the rear panel of the ESS-PS1 malfunctions or is forced fan stop.
How to clear error	Tap 『OK』. The fan on the rear panel of the ESS-PS1 malfunctions or is forced to stop due to external factors, such as foreign objects obstructing the fan blades. If the fan does not return to normal, the error will be displayed again even if you tap 『OK』.
How to prevent error	If ERROR occurs, turn off the test equipment, disconnect the AC adapter, and check the status of the fan on the rear panel. If no issues are found, the test equipment may be malfunctioning. For repairs, refer to ➔ **32. NOISE LABORATORY SUPPORT NETWORK**

24. SPECIFICATIONS

24－1.ESD Simulator ESS-PS1

ESS-PS1 Main Unit

Parameter	Function/Performance
Output polarity	Positive/Negative
Output voltage	0.20 kV to 30.0 kV (max. 30.5 kV) 0.20 kV to 10.00 kV: set in 0.01 kV steps 10.0 kV to 30.0 kV: set in 0.1 kV steps
Tolerance	0.20 kV to 2.0 kV ±10% 2.0 kV to 30.0 kV ±5%
Repetition cycle “INTERVAL”	0.05 s to 600.0 s ±10% or manual 0.05 s to 9.99 s: set in 0.01 s steps 10.0 s to 600.0 s: set in 0.1 s steps
Discharge count “COUNT”	1 to 60,000 times: set in 1 step increments, or continuous
ESD mode	Contact discharge/Air discharge
Trigger setting	Trigger switch/External trigger
Standard test mode	Selectable between IEC/ISO standards IEC 61000 - 4-2 Contact discharge mode: 2.0 kV, 4.0 kV, 6.0 kV, 8.0 kV Air discharge mode: 2.0 kV, 4.0 kV, 8.0 kV, 15.0 kV ISO 10605 Test voltages: 2.0 kV, 4.0 kV, 6.0 kV, 8.0 kV, 15 kV, 20 kV, 25 kV
Manual test mode	Contact/Air discharge mode: Adjustable from 0.20 kV to 30.5 kV Sweep function available/Up to 99 test units can be saved
Sequence test mode	Up to 6 steps per sequence program Up to 20 sequence programs can be saved
Available ESD Gun	GT-31S
Charging resistance	10 MΩ
AUX connector	Connection for optional warning light (11-00014B), automated ESD eliminator (01-00013B), and control signal input/output
Optical communication connector	Optical connector for PC communication (serial interface)
Power supply	DC 19 V/3.4 A
Operating temperature range	+15°C to +35°C
Operating humidity range	20%RH to 60%RH (no condensation)
Storage temperature range	-10°C to +50°C
Storage humidity range	0%RH to 85%RH (no condensation)
External dimensions	(W) 180 mm x (H) 124 mm x (D) 270 mm (excluding protrusions)
Weight	Approx. 3.0 kg

Battery

Type of battery	Rechargeable lithium-ion battery
Rated voltage	DC 14.4 V
Rated capacity	3.40 Ah
Charging time (reference)	3 hours (at ambient temperature 25° C)

AC Adapter

Rated input	AC 100 V to AC 240 V ±10%, 50 Hz - 60Hz/1.7 A
Rated output	DC 19.0 V/3.42 A
External dimensions	(W) 95 mm × (H) 50 mm × (D) 25.4 mm (excluding cable and connector)
Weight	Approx. 270 g

24－2. ESD Gun GT-31S

Parameter	Function/Performance
Output polarity	Positive/Negative
Output voltage	0.20 kV to 30.5 kV
Compliance standards	The compliance standard of this product varies depending on the discharge module. For more information, refer to➔**3－2. Compliance Standards Based on Combinations** and **Table 11-1. Discharge Module and Corresponding Test Standards**.
Discharge module (Energy storage capacitor and discharge resistance)	The discharge module of this product cannot be disassembled to maintain performance and prevent misuse. Check and maintain performance with periodic calibration by the NoiseKen Customer Service Center. ・150 pF, 330 Ω
Charging resistor	Built into the discharge module and ESD Gun.
Discharge current parameters (contact discharge)	Refer to the following sections. ➔**24－3. Discharge Parameters and Waveform (150 pF-330 Ω, 330 pF-330 Ω)** ➔**24－4. Discharge Parameters and Waveform (150 pF-2000 Ω, 330 pF-2000 Ω)**
Holding time	5 seconds or more *Pay attention to the surrounding environment and dirt. For more information, refer to ➔**26. AIR DISCHARGE TEST** and **27. HOW TO CLEAN ESD GUN GT-31S**
Operation panel	Color LCD touch panel (resistive film type)
Available ESD Simulator	ESS-PS1
Operating temperature range	+15°C to +35°C
Operating humidity range	20%RH to 60%RH (no condensation) *In air discharge mode, the test results may be affected by the ambient humidity. For more information, refer to **26. AIR DISCHARGE TEST**.
Storage temperature range	-10°C to +50°C
Storage humidity range	0%RH to 85%RH (no condensation)
Size	(W) 90 mm × (H) 246 mm × (D) 236 mm (excluding discharge tip) Cable: approx. 2 m
Weight	Approx. 1.5 kg (including cable)

*1 Discharge modules are managed by serial number, so provide the serial number when calibrating. For more information, refer to➔ **29. CALIBRATION**.

24－3. Discharge Parameters and Waveform (150 pF-330 Ω, 330 pF-330 Ω)

Setting voltage [kV]	1st peak current [A] ±10%	Rise time [ns]	2nd peak current [A] -20% / +40%	Current value I_1 [A] ±30% (150 pF: at 30 ns) (330 pF: at 65 ns)	Current value I_2 [A] ±30% (150 pF: at 60 ns) (330 pF: at 130 ns)
2	7.5	0.7 to 1.0	4.5	4.0	2.0
4	15.0	0.7 to 1.0	9.0	8.0	4.0
6	22.5	0.7 to 1.0	13.5	12.0	6.0
8	30.0	0.7 to 1.0	18.0	16.0	8.0
15	56.25	0.7 to 1.0	33.8	30.0	15.0

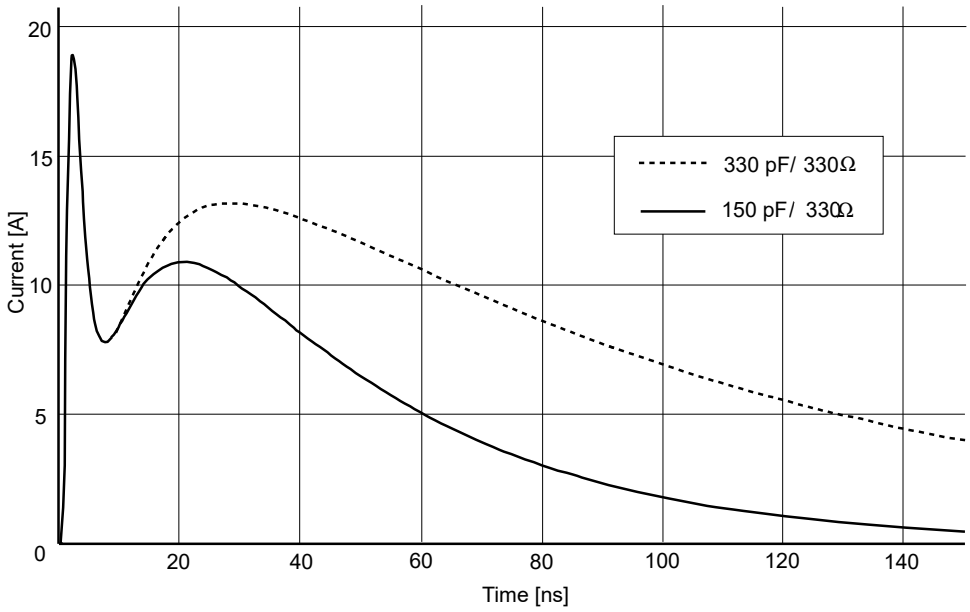


Figure 24-1. 330 Ω discharge waveform (reference)

The parameters in the table are based on ISO 10605 3rd Edition, with the second peak current value specified in IEC 61000-4-2 Ed.3 (ISO 10605 standard does not specify the second peak current value). The 2nd peak current value is defined as “the maximum current value in the time range 10ns-40ns from the waveform reference point.

For IEC 61000-4-2 Ed.2 & Ed.3, the tolerance for peak current value is ±15% and the rise time is 0.8 ns ±25%.

24−4. Discharge Parameters and Waveform (150 pF-2000 Ω, 330 pF-2000 Ω)

Setting voltage [kV]	Peak current [A] -0%, +30%	Rise time [ns]	Current value I_1 [A] ±30% (150 pF: at 180 ns) (330 pF: at 400 ns)	Current value I_2 [A] ±50% (150 pF: at 360 ns) (330 pF: at 800 ns)
2	7.5	0.7 to 1.0	0.55	0.30
4	15.0	0.7 to 1.0	1.10	0.60
6	22.5	0.7 to 1.0	1.65	0.90
8	30.0	0.7 to 1.0	2.20	1.20
15	56.25	0.7 to 1.0	4.125	2.25

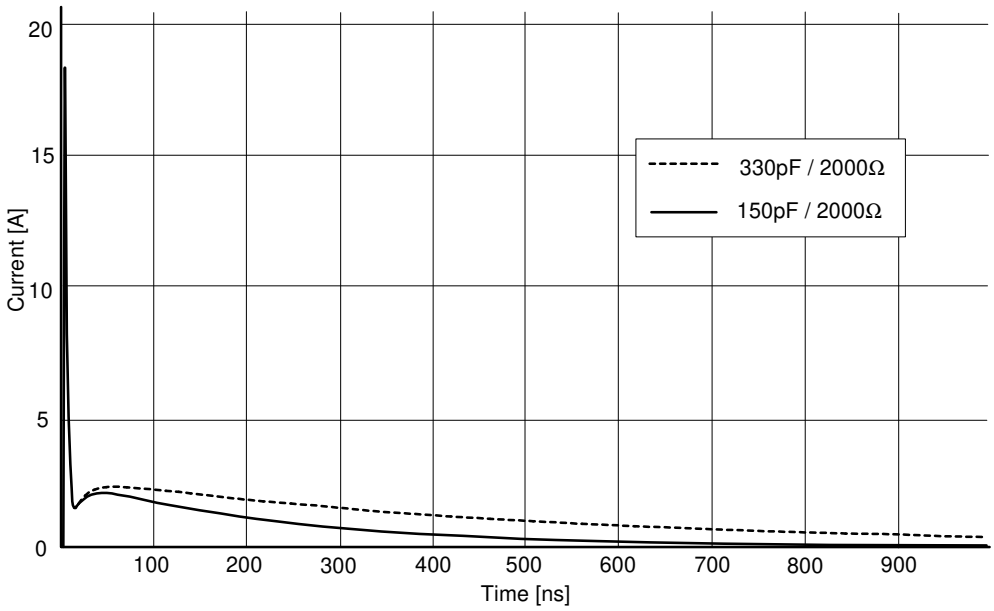


Figure 24-2. 2 kΩ discharge waveform (reference)

25. WAVEFORM CHECK

25－1. Equipment and Setup for Waveform Check

To check the output discharge current waveform of the test equipment, devices such as a Faraday cage, a target, and an oscilloscope (with a frequency range of at least 2 GHz for IEC 61000-4-2 and at least 1 GHz for ISO 10605) as shown in the figure below are required.

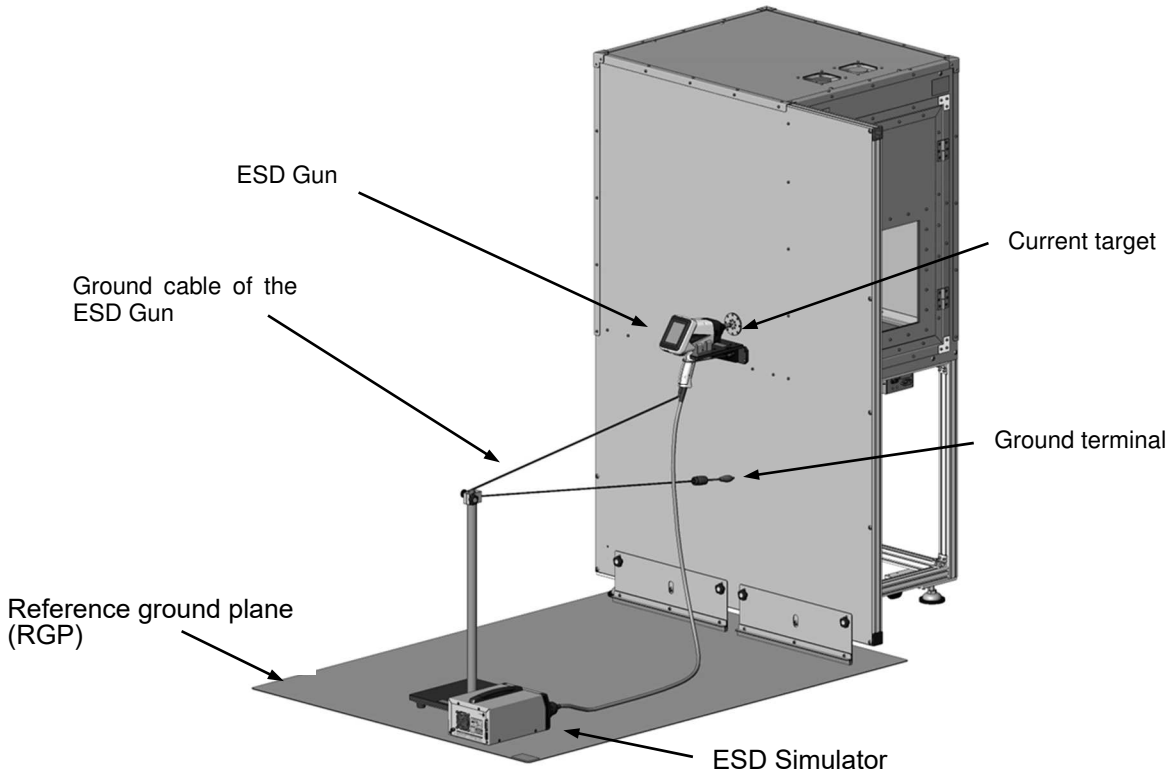


Figure 25-1. Example of equipment and setup for waveform check

25－2. Accessories for Waveform Check

Name	Model
Faraday cage *1	FC-300
RGP for FC-300	03-00138A
Target mounting plate *1	03-00118A
RGP for 03-00118A	03-00119A
Load resistor (target)	06-00094A
Attenuator (20 dB SMA type) ×2 *2	00-00022A
Coaxial cable (SMA - SMA 1.0 m) *2	02-00157A
Conversion connector (SMA to BNC)	02-00133A
GND cable stand	03-00129A
ESD Gun holder	03-00128A

*1 Choose one of the Faraday cage or target mounting plate.

*2 These are the same as the accessories that come with the 06-00094A model.

ISO 10605 and IEC 61000-4-2 Ed.2 do not require a reference grounding plane.

26. AIR DISCHARGE TEST

26－1. ESD (ESD) Immunity Test According to IEC Standards

The IEC 61000-4-2 standard defines CONTACT and AIR discharges. These are different in both test procedures and the behavior of the ESD Simulator. Special attention should be paid to environment conditions (temperature/humidity) during air discharge tests.

In contact discharge tests, the surrounding environment has little effect.

26－2. Requirements for Air Discharge Test

IEC 61000-4-2 specifies the "holding time" as a requirement for air discharge tests.
The holding time is defined as "the time interval during which the reduction of output voltage due to leakage remains within 10% before discharge," and it must be "at least 5 seconds."

26－3. Operation of the ESD Simulator During Air Discharge Test

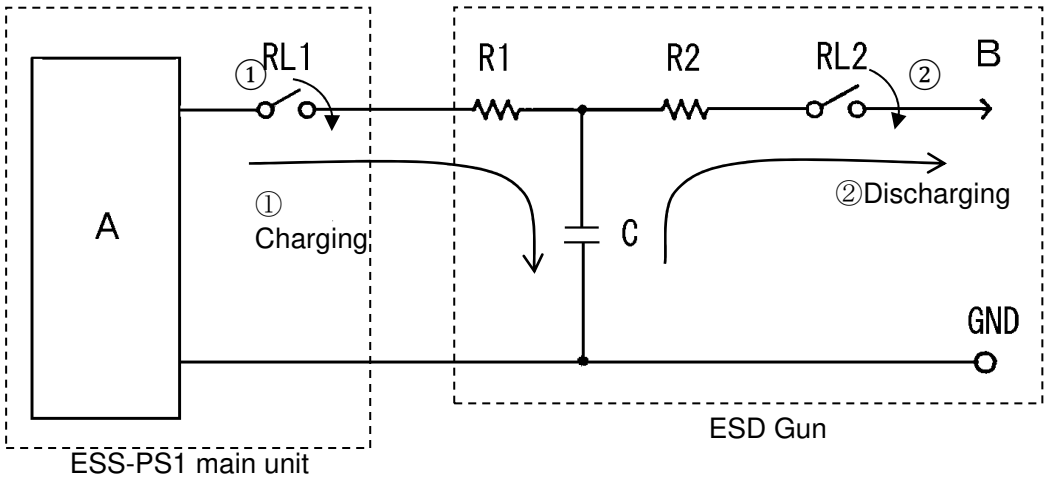
The basic circuit of the ESD Simulator is shown below (Figure 26-1. Basic circuit of the .

① The voltage generated by the high-voltage power supply (A) is transmitted through the charging relay (RL1) and charging resistor (R1) to charge the charge/discharge capacitor (C).
➔ **This corresponds to the 『START』 state on the test equipment.**

② When the discharge relay (RL2) switches on, the voltage (charge) stored in the charge/discharge capacitor (C) charges the discharge tip (B).
➔ **This corresponds to pressing and holding the trigger switch on the test equipment.**

③ Quickly move the ESD Gun to contact with the EUT.
➔**Regardless of whether discharge occurs, it is required to make contact with the EUT.**

④ The holding time must be satisfied between steps ② and ③.
➔ **It is not necessary to wait more than 5 seconds between steps ② and ③ during actual testing.**



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 26-1. Basic circuit of the ESD Simulator

26－4.Charge Leakage During Air Discharge Test

As mentioned earlier, even when the test is started, the charging relay (RL1) remains on. If the ESD Gun had an ideal insulation resistance (∞Ω), there would be no leakage of charge stored in the charge/discharge capacitor (C). However, in reality, insulation materials have finite resistance, so leakage is inevitable. This resistance typically ranges between 10^{13} Ω to 10^{16} Ω and is sensitive to environmental conditions (especially humidity) and surface contamination, potentially causing the holding time requirement to not be met. In general, it should be noted that higher humidity causes more moisture in the atmosphere and more surface moisture on the insulation material, resulting in a lower resistance value.

For this reason, keeping the surface of the insulation material clean is important. Generally, clean surface maintains a higher insulation resistance while dirty or stained surface has a lower resistance.

For GT-31S cleaning, refer to ➔**27. HOW TO CLEAN ESD GUN GT-31S**.

Periodic cleaning is recommended to keep the ESD Gun clean.

26－5.Air Discharge Test and Humidity

In many cases, air discharge tests involve spark discharge. Spark discharge occurs when the air undergoes dielectric breakdown, allowing current to flow, so it is highly influenced by atmospheric conditions. The discharge path has resistance, and the longer the discharge distance, the greater the resistance.

① When humidity is high:

The air contains more moisture, making discharge easier.

➔ **Discharge occurs over relatively long distances, resulting in lower peak current values and a tendency for the current waveform to rise more slowly.**

② When humidity is low:

The air contains less moisture, making discharge harder.

➔ **Discharge occurs over relatively short distances, resulting in higher peak current values and a tendency for the current waveform to rise faster.**

26－6. Temperature/Humidity requirements

IEC 61000-4-2 specifies the range for ambient temperature and relative humidity during air discharge tests.

Ambient Temperature: 15°C to 35°C

Relative Humidity: 30% to 60%

The figure below (**Figure 26-2. Ambient temperature, relative humidity, and moisture contents in air (absolute humidity)**) shows the ambient temperature, relative humidity, and absolute humidity (g/m³).

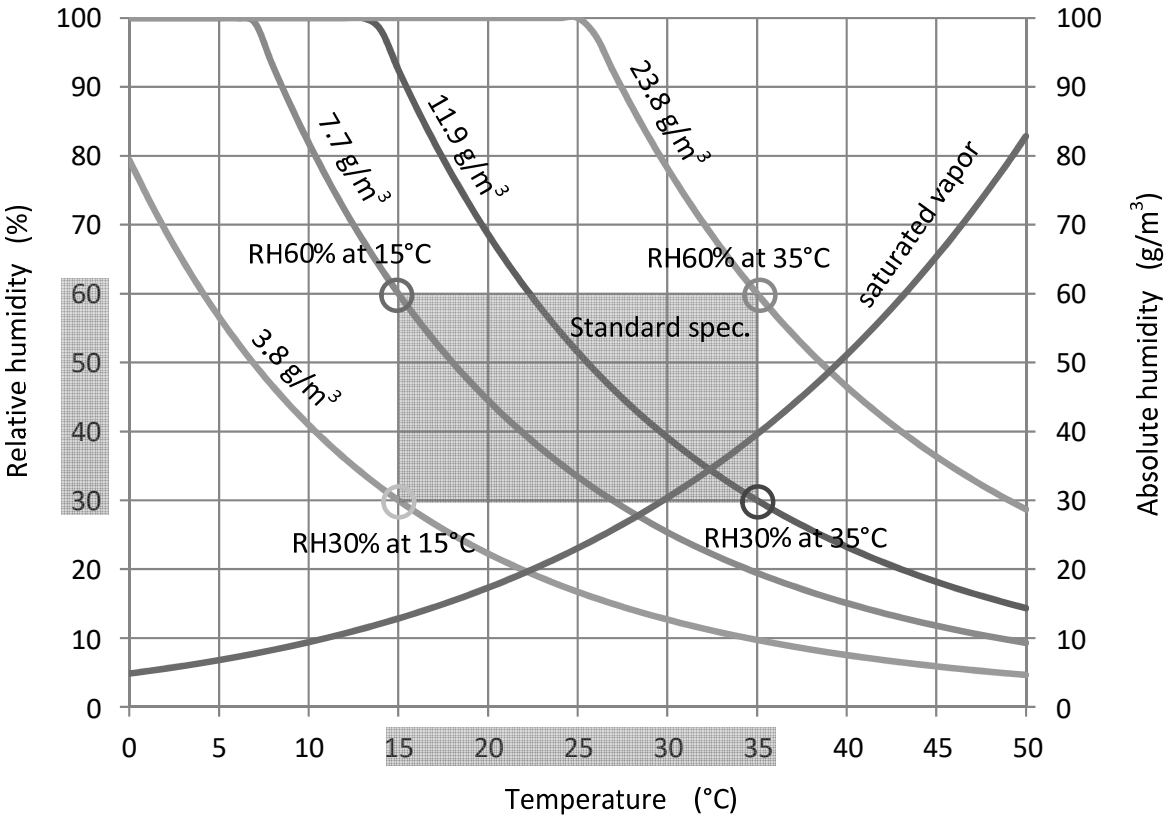


Figure 26-2. Ambient temperature, relative humidity, and moisture contents in air (absolute humidity)

As shown, even within the range specified by IEC 61000-4-2 (the middle area of the graph), there can be a significant difference in absolute humidity between the lower limit (15°C/30%) and the upper limit (35°C/60%), with up to a sixfold difference.

When absolute humidity is high, discharge occurs over longer distances, resulting in lower peak current values and slower waveform rise times, potentially making the test less demanding. The long discharge distance also makes the test less reproducible. Therefore, it is preferable to perform air discharge tests in lower absolute humidity environments.

ISO 10605, the standard for automotive electronics, states that "a relative humidity range of 20% to 30% is preferable" for testing. (The specified relative humidity range in ISO 10605 is 20% to 60%.)

27. HOW TO CLEAN ESD GUN GT-31S

27－1. Importance of Cleaning

The ESD Simulator generates high voltage up to 30 kV, and in order to conduct stable testing with high voltage, it is necessary to keep the surface of the test equipment clean. Therefore, periodically clean the surface of the ESD Gun following the method described below.

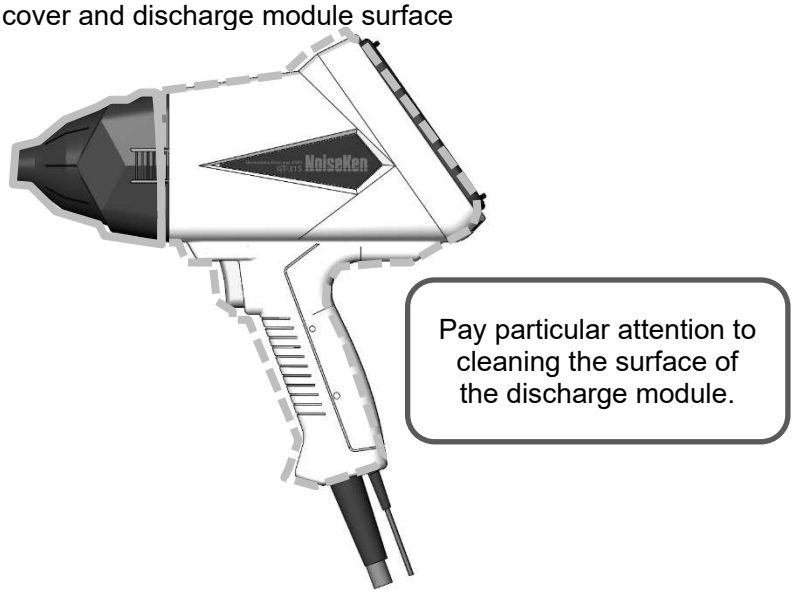
A clean surface has a high surface resistance and no hygroscopic contamination, making it less susceptible to humidity and allowing for stable and reproducible testing.
A contaminated surface has a low surface resistance and may be easily affected by humidity due to hygroscopic contamination, leading to unstable and non-reproducible testing.

27－2. Area to Clean

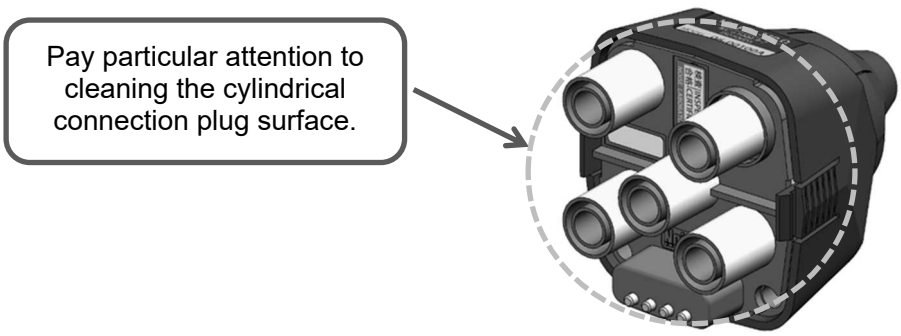
For the ESD Gun GT-31S, we recommend cleaning the areas indicated below. The areas outlined with dotted lines should be cleaned, and the areas outlined with solid lines should be cleaned with particular care.

* Cleaning not required for the area into which you cannot insert your fingers.

① Body cover and discharge module surface



② Surface of the discharge module connection plug



27－3.Cleaning Procedure

Use the following items for cleaning:

-Anhydrous alcohol (Anhydrous ethanol): Containing at least 99.5% ethanol.

-Rags: Clean, disposable rags that leave minimal paper dust or fibers (commercially available disposable paper rags are recommended).

Dampen the rag with a small amount of anhydrous alcohol and gently wipe the areas to be cleaned.

Do not use neutral detergents.
Neutral detergents contain surfactants that can create a film on the cleaned surface, which absorbs moisture and makes the surface hygroscopic, potentially making it more susceptible to humidity.

27－4.Cleaning Frequency

Clean the ESD Gun at the start of each test.

It is especially important to clean the ESD Gun during periods when there is an increase in humidity.

28. RELATED ACCESSORIES

28－1.Discharge Module and Discharge Tip

Product name	Model name	Description
ISO accessory set for GT-31S	GT-ISOSET-A	Set of 3 discharge modules (06-00101A, 102A, 103A) and discharge tip 12-00009A
CR for GT-31S (150p-330)	06-00100A	IEC 61000-4-2 Ed.2.0 & Ed.3.0 ISO 10605 2nd & 3rd Ed. *GT-31S standard accessory
CR for GT-31S (150p-2k)	06-00101A	ISO 10605 1st & 2nd & 3rd Ed.
CR for GT-31S (330p-330)	06-00102A	ISO 10605 2nd & 3rd Ed.
CR for GT-31S (330p-2k)	06-00103A	ISO 10605 1st & 2nd & 3rd Ed.
Discharge tip (conical-type)	12-00007A	For contact discharge test
Discharge tip (round-type)	12-00008A	For air discharge test
Discharge tip (spherical-type, 30 mm)	12-00009A	For air discharge test exceeding 15 kV

28－2.Other accessories

Product name	Model name	Description
Warning light	11-00014B	
Automated ESD eliminator	01-00013B	
AUX connector junction box	05-00052A	
Optical interface unit	07-00022A	For PC connection

Many other accessories are also available.
Please contact your sales agent or the Noise Laboratory service office for details.

29. CALIBRATION

The test equipment allows for testing in compliance with both IEC and ISO standards by changing the discharge module attached to the ESD Gun.
Therefore, when requesting calibration for the test equipment, please specify the combination of (1) the ESD Simulator, (2) the ESD Gun, and (3) the discharge module.

Please confirm the serial numbers (S/N) for each as indicated below (**Figure 29-1. Location of the serial number of each unit**) and proceed with your calibration request.

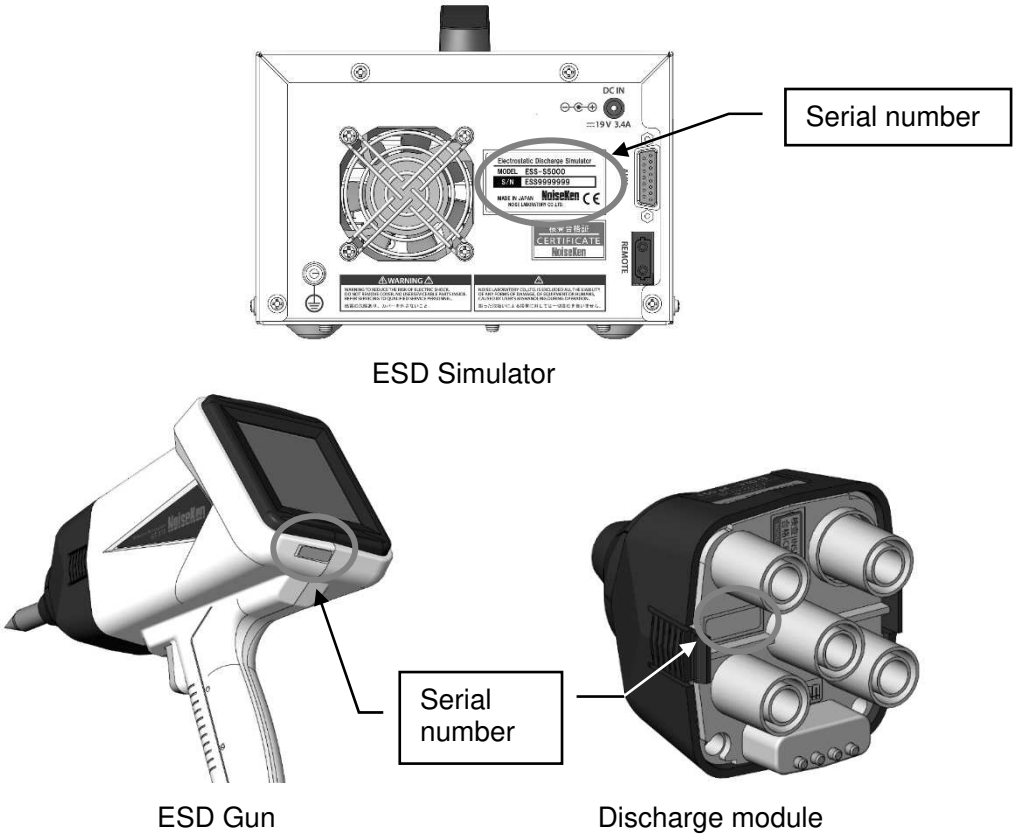


Figure 29-1. Location of the serial number of each unit

30. WARRANTY

Repair Service Warranty

This repair service warranty applies to the repair services provided for maintaining the designated functions and performance of NoiseKen products.

1. Warranty coverage
   This warranty applies to NoiseKen products and their accessories.
   If the cover, case, or other parts of the product are opened by the customer without permission, the product will no longer be covered by the warranty.

2. Technical and labor costs
   If any failure occurs in NoiseKen products within the warranty period, repair services will be provided free of charge based on the terms of the warranty. If the warranty period has expired, the customer will be responsible for the actual costs of the technical and labor expenses required for the repair.

3. Ownership of Replaced Parts
   All defective parts replaced during the repair process will become the property of NoiseKen. For paid repairs, unless otherwise requested, the defective parts will be collected and disposed of by NoiseKen.

4. Limitation of Liability
   In the event of damage caused by failure of NoiseKen products or repair services, our liability for compensation is limited to cases where the damage results from intentional or negligent actions by NoiseKen. In such cases, the maximum amount of compensation will be limited to the amount paid by the customer for the purchase of the product. However, under no circumstances shall NoiseKen be held liable for any loss of profit, third-party claims for damages, or indirect damages—whether directly or indirectly caused by the failure of the product or the repair services provided by NoiseKen.

5. Incorrect, missing, or damaged products
   In the event that an incorrect product, missing part, or damage occurs in a product purchased from NoiseKen and the product is unusable, NoiseKen shall not bear any responsibility for losses such as lost profits, operational damages, other consequential damages, special damages, indirect or punitive damages, or damages based on claims for compensation made against the customer by third parties.

6. Refusal to provide repair services
   NoiseKen may not accept a repair order in the following cases.
   - The product was manufactured more than 5 years ago.
   - The product was delivered more than 8 years ago.
   - The required parts for the repair are no longer manufactured and no substitutes are available.
   - The product has been modified, repaired, or altered without the involvement of NoiseKen.
   - The product is severely damaged and cannot maintain its original form.

Product Warranty

For failures occurring within the warranty period, we will repair or replace the product free of charge. The decision regarding the repair method will be made by NoiseKen. This product warranty is valid in Japan only.

1. Applicable products
   This warranty applies to NoiseKen products and their accessories.

2. Warranty period
   The warranty period is one year from the date of delivery.
   For the same location and defect, the warranty period for repaired parts is 6 months from the date of repair completion.

3. Exclusions
   Notwithstanding the above, the following situations will be excluded from the free warranty service:

   - ✧ Replacement of consumable parts, such as high-voltage relays (in used products)
   - ✧ Failures or damage resulting from mishandling
   - ✧ Failures or damage caused by modifications not involving NoiseKen
   - ✧ Failures or damage caused by repairs performed by non-certified individuals
   - ✧ Failures or damage caused directly or indirectly by natural disasters, wars, riots, civil unrest, or other uncontrollable forces
   - ✧ Failures or damage caused by transportation, vibration, dropping, or impact after delivery
   - ✧ Failures or damage caused by the usage environment
   - ✧ If the product is taken outside of Japan

31. MAINTENANCE

1. If repair, maintenance, or internal adjustments are required, these tasks should be performed only by qualified service engineers.
2. Customers should limit their maintenance activities to cleaning the exterior and checking functionality.
3. For products with replaceable fuses, make sure that the power switch on both the product and any connected equipment is turned off before inspection or replacement, and the power supply is disconnected.
4. Before cleaning, turn off the power switch on both the product and any connected equipment (if present), and disconnect the power supply.
   Follow the specified cleaning method regularly to maintain the product's performance.
   ➔ **27 HOW TO CLEAN ESD GUN GT-31S**
5. Do not open covers of the test equipment unless explicitly authorized.

32. NOISE LABORATORY SUPPORT NETWORK

- If a symptom which seems a trouble is found, inform the model name and serial number of the product together with the symptom to Noise Laboratory or your nearest sales agent of Noise Laboratory.
- When the product is returned to Noise Laboratory, write the state of the trouble, contents of your request, model name and serial number in a repair order, and pack the product and repair order sheet in the former package of equivalent suitable for transit and send them back.

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E-mail: sales@noiseken.com
http://www.noiseken.com

33. 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

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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
10040 Druento (TO), Italy

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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