



# SUG61005TB

## Lightning Surge Generators

## 使用说明书

Instruction manual

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## Prima Contact Information:

- ◆ Information about the product. Sale. Serve. and technical support

- In China, please call 4006-021-806

- Or you can sign in to [www.emcprima.com](http://www.emcprima.com), to find more detailed information

## General Security Summary



Please read this manual carefully before using the instrument!  
SUG61005TBgenerator up to 6000V output voltage (optional 7500V).  
Improper or careless handling can result in instrument destruction  
and personal injury

- The manual is an important part of the equipment and the user must always refer to the manual and follow all safety instructions and warnings.
- The manufacturer shall not be liable for any direct or indirect injury, loss or damage to persons, goods or equipment caused by the improper use of the equipment and accessories.

### Review

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### Warning:

- Lightning surge generators must be operated by authorized and professionally trained personnel.
- Lightning surge generators must be used for the purpose specified by the manufacturer.
- During the test, a person with a pacemaker could not operate the lightning surge Raw utensils.
- To ensure operational safety, only tested components, connectors, adaptations should be used etc.
- Make sure that the wiring is okay and that the instrument is not shorted before connecting the EUT!

Never open the lid and do not run the product with the outer cover or panel open.



## Warning:

- It is forbidden to operate before grounding.
- The user must be aware of the hazards that may occur during the test.
- EUT is connected to the power supply, the power supply L is connected to DC+, N is connected to DC-, PE is connected to the ground, and cannot be connected at will.
- If the EUT shows an interrupt signal, the test should be stopped and the EUT power switch should be turned off.
- When the EUT is turned on, there will be a current at the ground interface or pin (e.g. on the EUT power plug) or at the ground of the EUT itself, so that it is dangerous to touch.

## Test environment:

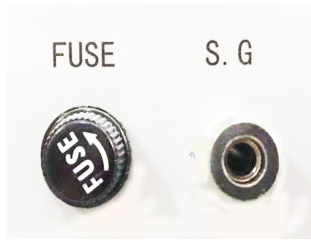
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## Warning:

- Do not operate in a humid environment.
- Do not operate in a flammable or explosive environment.
- Please keep the surface of the product clean and dry.
- Please ventilate appropriately.

There are several safety things you need to know about the product:



S. G grounding terminal and 3A fuse

▲The equipment must be grounded normally



High voltage indicator

▲When the high-voltage indicator light is on, it means that the machine is working, please pay attention to safety



Air switch

▲The coupling network supplies an overcurrent protection switch on the power supply of the test product.



▲The instrument model and production information are determined according to the nameplate number, and should not be damaged

## Preface

Thank you for using our lightning surge generator, this manual introduces the relevant information about operating the intelligent lightning surge generator. Please read this manual carefully before you start to use this instrument, so that you can operate the instrument proficiently. In particular, the pictures of the instrument in this manual are for reference only, and any product is subject to the actual product, and Prima reserves the right of final interpretation.

# Chapter I Product technical parameters

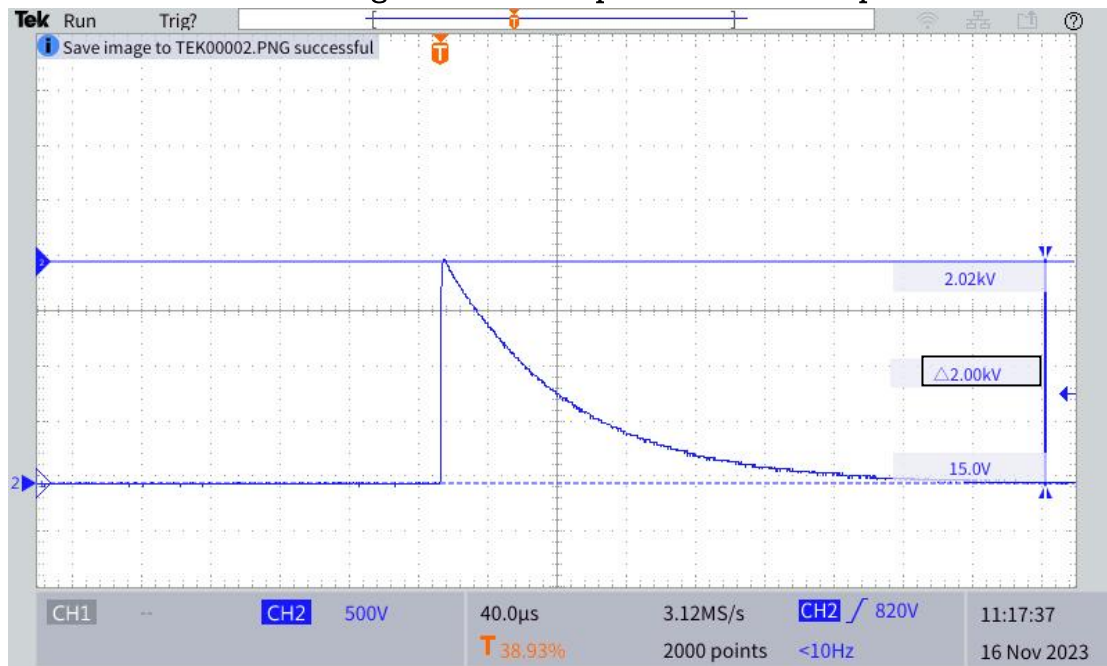
## 1.1 Technical parameters

|                             |                                                                                                                                                                                                                   |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lightning surge generators  | SUG61005TB                                                                                                                                                                                                        |
| Meets standards             | IEC 61000-4-5 GB/T17626.5                                                                                                                                                                                         |
| Open-circuit voltage waves  | 200V~6000V $\pm$ 10% (Optional 7500V、8000V)                                                                                                                                                                       |
| Voltage resolution          | 1V                                                                                                                                                                                                                |
| Stepping voltage            | 0V~6000V                                                                                                                                                                                                          |
| Step voltage resolution     | 1V                                                                                                                                                                                                                |
| Rise time                   | 1.2 $\mu$ s $\pm$ 30%                                                                                                                                                                                             |
| duration                    | 50 $\mu$ s $\pm$ 20%                                                                                                                                                                                              |
| Short-circuit current waves | 100A~ $\pm$ 3000A $\pm$ 10%                                                                                                                                                                                       |
| Rise time                   | 8 $\mu$ s $\pm$ 20%                                                                                                                                                                                               |
| duration                    | 20 $\mu$ s $\pm$ 20%                                                                                                                                                                                              |
| Output voltage polarity     | (+)Positive polarity、(-)Negative polarity、(+/-)First positive polarity followed by negative polarity、(-/+)First negative polarity followed by positive polarity、( $\pm$ )Positive and negative polarity switching |
| Interval                    | 5s~9999s(The minimum time depends on the experimental voltage)                                                                                                                                                    |
| Number of tests             | 1~60000c                                                                                                                                                                                                          |
| Phase synchronization       | 0° ~359° (45 HZ~65 HZ) (Syn、Asyn)                                                                                                                                                                                 |
| Trigger method              | Manual, Auto, and Interval trigger                                                                                                                                                                                |
| EUT Power                   | Automatically determine AC/DC display                                                                                                                                                                             |
| Coupling network parameters | Built-in single-phase three-wire coupling                                                                                                                                                                         |
|                             | UAC MAX 220V /16A UDC MAX 110V/10A                                                                                                                                                                                |
|                             | 9 $\mu$ F (Line-ground)、18 $\mu$ F (Line - Line)                                                                                                                                                                  |
|                             | Equivalent impedance 2 $\Omega$ 、12 $\Omega$                                                                                                                                                                      |
|                             | Automatic switching coupling                                                                                                                                                                                      |

| General parameters                                 |                                         |
|----------------------------------------------------|-----------------------------------------|
| Indication of the working status of the instrument | Front panel LED indication, LCD display |
| Display screen                                     | 10.1 inch touch screen                  |
| Language                                           | Chinese、English switch                  |
| Working power supply                               | AC 220V $\pm 10\%$ 50/60Hz              |
| Methods of Communication                           | RJ45(Optional) RS232                    |
| EUT power supply voltage injection                 | Aviation plug                           |
| Ambient temperature                                | 15℃~35℃ (Operating conditions)          |
| Relative humidity                                  | 30%~60% (Operating conditions)          |
| Pressure range                                     | 86kPa~106 kPa (Operating conditions)    |
| Instrument power                                   | 200W                                    |
| Overall dimensions                                 | 480*540*320mm                           |
| Weight                                             | 37kg                                    |

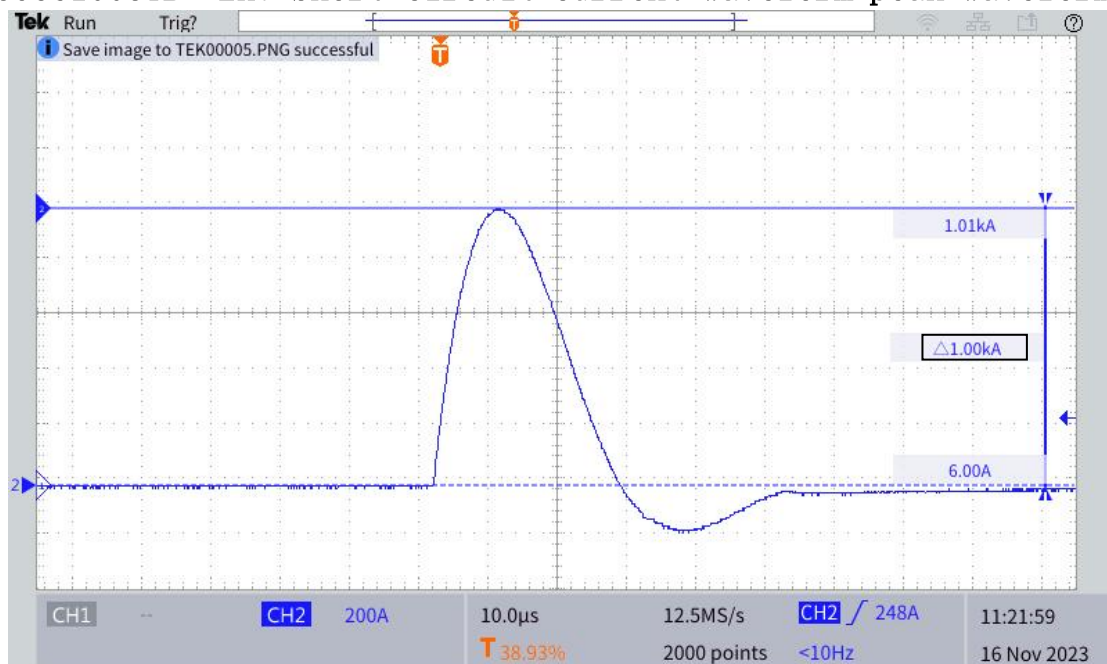
## 1.2 SUG61005TB The waveform sampled through the oscilloscope

### 【1】SUG61005TB+2kV Voltage waveform peak waveform plot:



As we can see from the figure, the oscilloscope's ordinate is 500V per grid, which is about 4 blocks, so the voltage amplitude of 2kV is 2.00kV. (Note: The oscilloscope looks at the  $\Delta$  value)

### 【2】SUG61005TB +2kV Short-circuit current waveform peak waveform plot:



The peak current is:1.00kA. (Note: The oscilloscope looks at the  $\Delta$  value)

## Chapter II SUG61005TB An overall introduction to the instrument

The SUG61005TB is specifically designed for the requirements of electromagnetic compatibility-surge (shock) (SUG) immunity testing. It provides a basis for evaluating the performance of electrical and electronic equipment power lines and internal connection lines when subjected to high-energy transient disturbances caused by lightning strikes from switches and natural environments. The DUT can be tested by using an external coupling/decoupling network for the surge test of the communication port. It is widely used in household appliances, LED lighting, semiconductor devices, communication equipment, module production and electronic components.

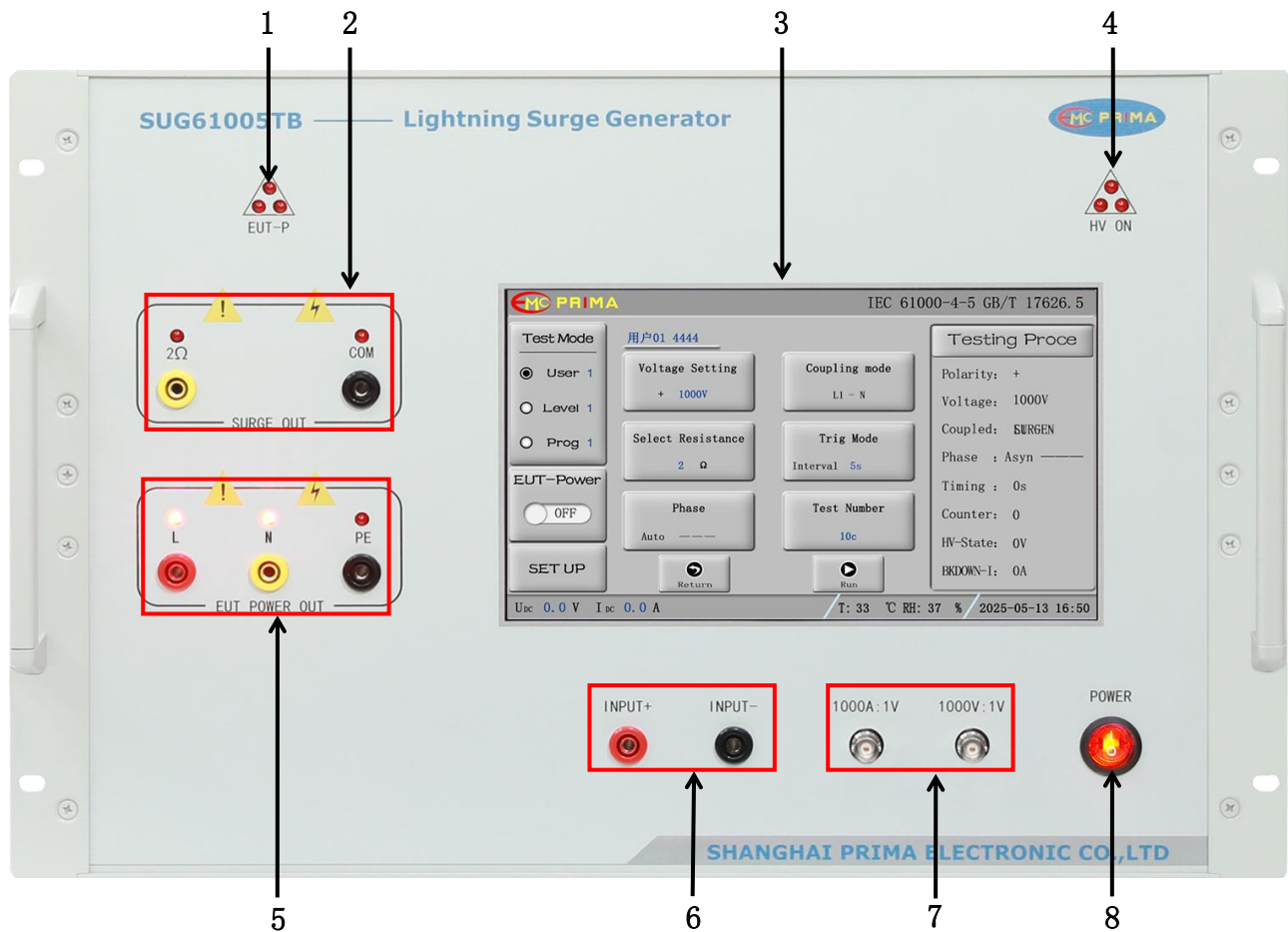
### 2.1 Diagram of the whole machine



#### SUG61005TB Overall diagram

In the figure, SURGE OUT is the output test of the source of the instrument; L, N, PE are the output of the coupling end; INPUT+, INPUT-, 1000A:1V, 1000V:1V are the built-in differential probes and current transformers of the instrument through 1000 times attenuation output.

## 2.2 Front panel



SUG61005TB Front panel view

|   |                        |   |                     |
|---|------------------------|---|---------------------|
| 1 | EUT-P                  | 5 | EUT POWER OUT port  |
| 2 | SURGE COM port         | 6 | INPUT+ INPUT-       |
| 3 | 10.1 inch touch screen | 7 | 1000V: 1V 1000A: 1V |
| 4 | HV ON                  | 8 | POWER               |

1. EUT-P :The EUT power output indicator is controlled by the OFF/ON power supply of the sample product on the touch screen interface, and the light indicates that the EUT power is on, and the non-light means that the EUT power is off;

Note:The EUT POWER IN power supply on the rear panel is switched on and off by air, and the power supply OFF/ON control relay is transferred to the EUT POWER OUT on the front panel. The EUT-P light is on, which only means that the test power supply OFF/ON control relay is closed, If the EUT-P light is on and there is no output of EUT POWER OUT on the front panel, please check whether there is a power connection at the EUT POWER IN and whether the air switch is on;

2. **SURGE COM port:**  $2\Omega$  surge output and corresponding indicator. When Surge Out is selected for coupling mode and  $2\Omega$  is selected for internal resistance, the corresponding indicator light is on, indicating that the lightning surge waveform is output from this port;

3. **10.1 inch touch screen:** Parameter setting and operation;

4. **HV ON:** The indicator light is on to indicate that the instrument is running, and the indicator is not on means that the instrument is in standby mode;

5. **EUT POWER OUT port:** When the EUT IN is connected to the alternating current, the air switch and the power supply of the sample are turned on, and the EUT POWER OUT (referred to as EUT OUT, the same below) outputs the corresponding alternating current; When the EUT IN is connected to the direct current, the air switch and the power supply of the test product are turned on, and the corresponding direct current is output by the EUT OUT.

After the corresponding coupling mode is selected, the LED of the corresponding port is on, indicating that the high-voltage pulse will be superimposed on the output of the port. If L-N is selected, the corresponding LEDs of L and N are on, if L and N at EUT IN have input 220V AC, the lightning surge voltage is superimposed on AC 220V and output from the L and N ports at EUT OUT; If the inputs of L and N at EUT IN are DC, the lightning surge voltage is superimposed on the DC voltage and output from the L and N ports at EUT OUT; If the EUT IN does not inject voltage, there is no external voltage superposition, and the lightning surge voltage is output directly from the L and N ports at the EUT OUT;

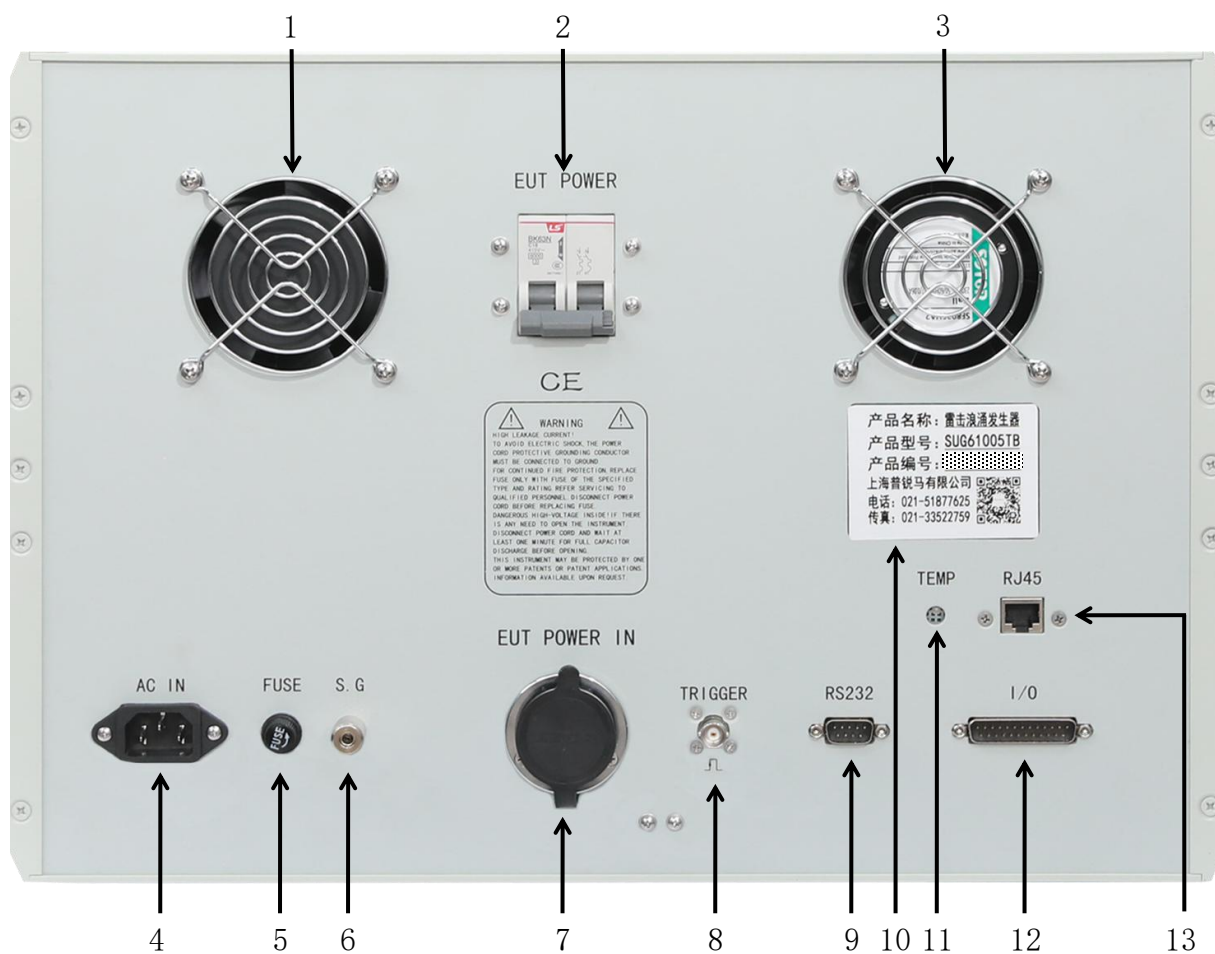
6. **INPUT+ INPUT- :** The input of the built-in voltage probe (1000:1), INPUT+ represents the positive of the input, and INPUT- represents the negative of the input. See Chapter 5 for details on how to use it;

7. **1000V:1V 1000A:1V :** Output of built-in voltage probe (1000:1) (for reference only). The port can be connected to an oscilloscope via coaxial cable to test the voltage waveform;

Built-in current probe (1000: 1) output (for reference only). The port can be connected to an oscilloscope via a coaxial cable to test the current waveform. See Chapter 5 for details on how to use it;

8. **POWER:** Instrument power supply switch.

## 2.3 Rear panel



SUG61005TB Back panel view

|   |              |    |                      |
|---|--------------|----|----------------------|
| 1 | Fan          | 8  | TRIGGER              |
| 2 | EUT POWER    | 9  | RS232                |
| 3 | Fan          | 10 | Instrument nameplate |
| 4 | AC IN        | 11 | TEMP                 |
| 5 | FUSE         | 12 | I/O                  |
| 6 | S.G          | 13 | RJ45                 |
| 7 | EUT POWER IN |    |                      |

1. **Fan:** Internal heat dissipation of the instrument;
2. **EUT POWER:** Air switch. It serves to protect the decoupling circuit;
3. **Fan:** Internal heat dissipation of the instrument;
4. **AC IN:** The input socket for the power supply of the instrument is AC 220V  $\pm 10\%$  50/60Hz;
5. **FUSE:** Main unit power supply fuse;
6. **S.G:** The grounding port of the instrument needs to be grounded during its operation;
7. **EUT POWER IN:** Power interface for supplying power to the test sample:  
Allowed inputs: AC U<sub>max</sub>:220V, single-phase I<sub>max</sub>: 16A; DC U<sub>max</sub>:110V  
I<sub>max</sub>: 10A;
8. **TRIGGER:** External trigger (expansion port, currently inactive);
9. **RS232:** Communication with the upper computer software (optional);
10. **Instrument nameplate:** The model, serial number and other relevant information of the equipment;
11. **TEMP:** Temperature and humidity sensor port, used for collecting data and displaying it on the screen;
12. **I/O:** Extended use (Extended port, currently unavailable);
13. **RJ45:** Communication with the upper computer software (optional).

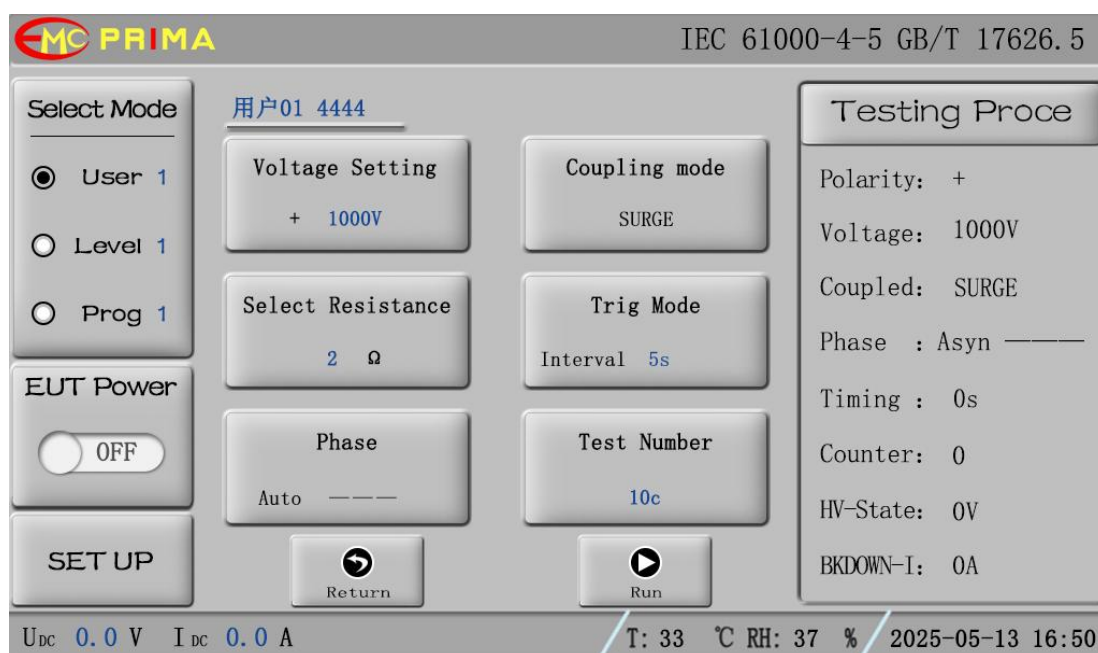
## Chapter III SUG61005TB Interface operations

### 3.1 Boot interface

After the instrument is connected to the working power, turn on the power switch to display the interface. Press "Click to enter" to enter the parameter setting interface.



### 3.2 Parameter setting interface



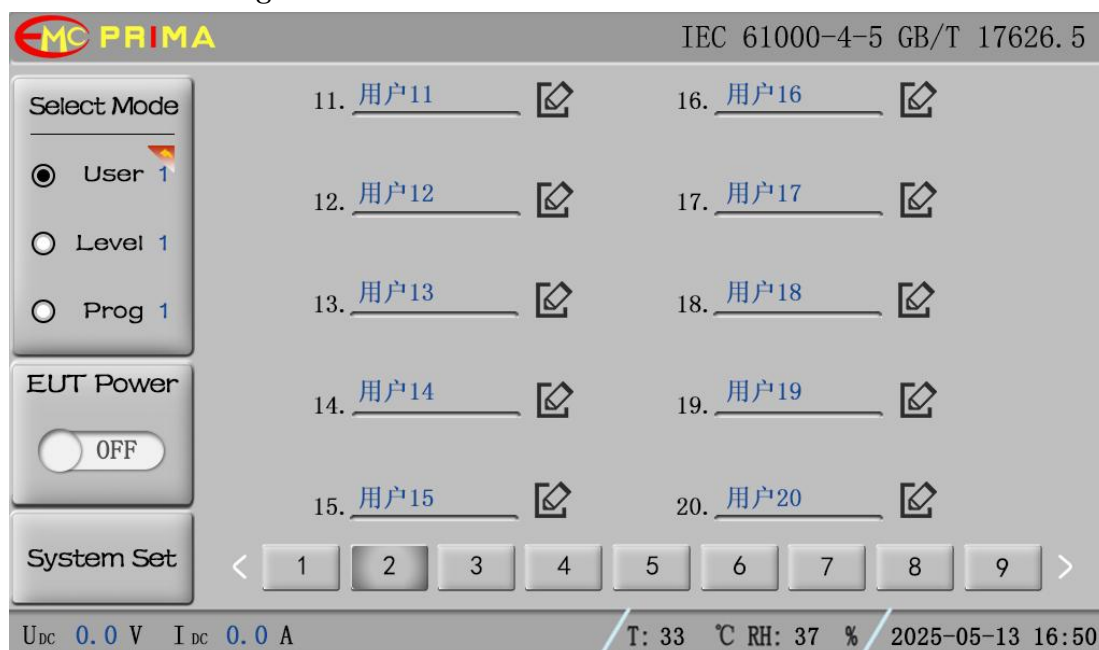
**Mode selection:**

4 level modes: Level1...Level4

In accordance with the mode stipulated in the IEC61000-4-5 GB/T17626.5 standard. The voltage cannot be changed in this mode.

90 user-defined modes: User1...User90

Each user mode parameter is independent. Once set, it can be directly called next time. Click on the blue words to enter the parameter setting interface. Click on the symbol on the right to customize the mode name. The custom name will be displayed above the parameter Settings.



6 programming patterns: Each program can be customized with up to 16 experimental steps, and the programming mode can also be customized with a mode name.

**Number of tests:** The number of tests can be set from 1~60,000 times;

**Testing proce:** Display the current operating status and parameters, etc;

**EUT POWER:**

"ON" indicates that the EUT POWER supply is turned on. Connect the EUT POWER IN on the rear panel and the EUT Power OUT on the front panel of the instrument. At the same time, the type of EUT power supply, AC or DC, and the corresponding voltage and current values will be displayed below. (The device has a built-in decoupling network inside, and the devices in the network will have certain internal friction.) It is normal for there to be a current display before the test sample

is connected, and when the current value exceeds 16A, the EUT power supply will be automatically cut off.

"OFF" indicates that the EUT power supply is in the off state;

The EUT POWER IN POWER supply ON the rear panel passes through the air switch, and the test sample power OFF/ON control relay is transmitted to the EUT Power OUT on the front panel. The status changes to "ON" only indicates that the OFF/ON control relay of the test sample POWER supply is closed. If there is no output of EUT POWER OUT on the front panel at this time, please check whether there is a power connection at EUT Power IN or whether the air switch is in the open state.

### Voltage set:

The screenshot shows a 'Voltage Set' dialog box with the following fields and options:

- Polarity:** Five radio button options: ☒ +, ☐ -, ☐ +/-, ☐ -/+, and ☐ ±.
- Voltage:** A text input field containing '1000V' followed by a range '( 200 ~ 6000 )'.
- Boost Pressure :** A text input field containing '0V' followed by a range '( 0 ~ 6000 )'.
- Clamp ingVoltage:** A text input field containing '5000V' followed by a range '( 200 ~ 6000 )'.
- At the bottom, there are two buttons: 'Return' (with a circular arrow icon) and 'OK' (with a checkmark icon).

Clicking on this area will lead you to the polarity selection interface, where you can choose from five methods:

**Single Positive Polarity (+):** Output Positive Polarity Surge;

**Single negative polarity (-):** Output Negative Polarity Surge;

**First positive and then negative (+/-):** output positive polarity surge, output negative polarity surge after satisfying the number of tests;

**First negative and then positive (-/+):** output negative polarity surge, output positive polarity surge after satisfying the number of tests;

**Positive and negative polarity switching (±) :** Test the positive polarity surge once first, and then test the negative polarity surge

once;

**Voltage:** Click on this area to enter the voltage to be tested in the pop-up interface. Please note that the voltage cannot be changed in the national standard mode;

The voltage setting range is 200~6000V;

**Stepping voltage:** 0~6000V, After testing the set voltage, the voltage test will be automatically increased. If this function is not needed, please set it to 0;

**Max voltage:** 200~6000V, When the step voltage setting is greater than 0V and the test voltage is greater than or equal to the set upper limit voltage, the instrument will automatically stop running.

If the voltage is set at 1000V and tested 5 times, the boost voltage is set at 500V and the limit voltage is set at 2000V. Run the instrument and test it 5 times at 1000V, 5 times at 1500V and 5 times at 2000V before stopping the operation.

## Coupling Set:

**Coupling Mode Settings**

Coupling Mode: ☒ Surge Out ☐ Calibrate ☐ Coupled

Standard type: ☐ ICE ☐ Other

Resistance: ☒ 2 Ω ☐ 12 Ω

High: ☐ L1 ☐ N

Low: ☐ N ☐ PE

Return OK

**Surge Out:** The source output has an internal resistance of 2 Ω.

**Coupling:** For the output at the coupling end, after selection, you can check the box at L1, N, and PE below to make the surge output from the selected port. Note that since the "N" at the high end and the "N" at the low end cannot be selected simultaneously, when choosing one "N", the other "N" needs to be unselected.

**Standard type:** The national standard allows for the setting of internal resistance based on the selected channel restrictions, while other standards have no restrictions.

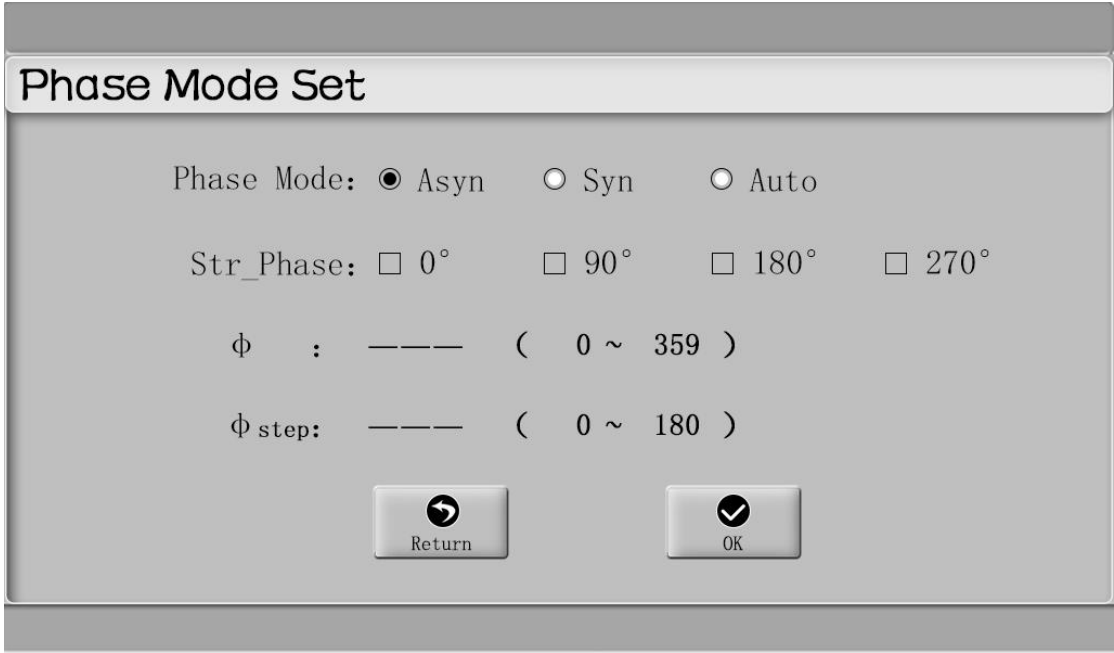
**Trigger method:**

**Manual:** In the operation interface, after the device is charged, it can be manually clicked to trigger the output lightning surge waveform;

**Automatic:** After the device is charged, the lightning surge waveform will be automatically output until the set number of experiments is completed;

**Interval:** The interval between experiments is set by the user, and the lightning surge waveform is output according to the interval time.

Phase set:



Phase Mode Set

Phase Mode: ☒ Asyn    ☐ Syn    ☐ Auto

Str\_Phase: ☐ 0°    ☐ 90°    ☐ 180°    ☐ 270°

φ :    ——— ( 0 ~ 359 )

φ step:    ——— ( 0 ~ 180 )

Return    OK

Select the specific phase of the AC power supply for the surge voltage test product.

**Asyn:** The phase size is randomly superimposed. If the sample is DC or tested without power, asynchronous testing must be selected.

**Syn:** It will detect the power phase of the test product. The surge voltage is coupled to the set phase. If the EUT is DC or has no voltage during synchronous phase operation, it will prompt "Please turn on the power of the test sample.". (This function can only operate when voltage is injected into the EUTIN. Please confirm before the experiment)

**Auto:** Test four standard phases.

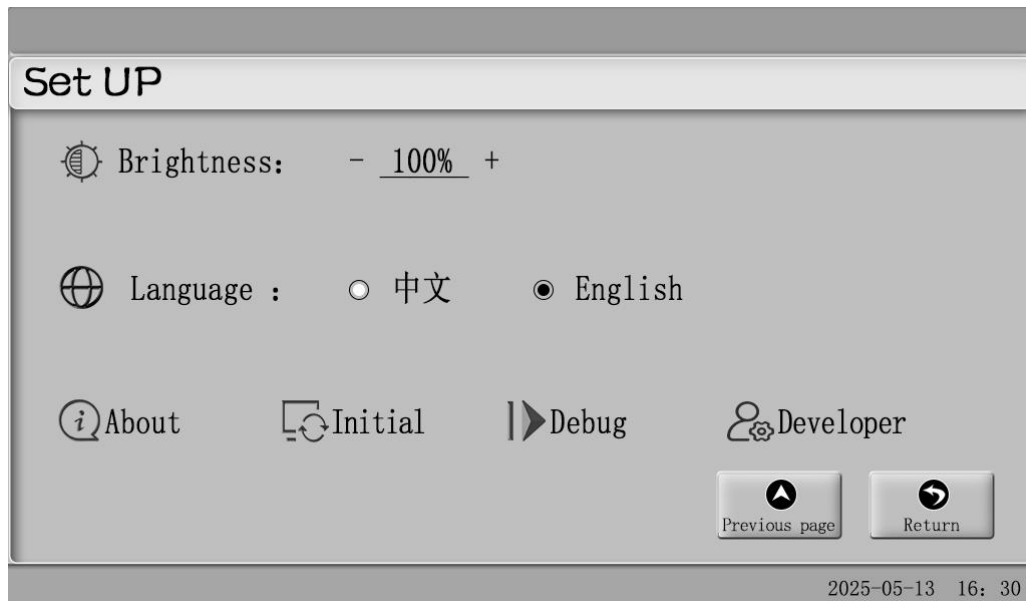
**Ψ:** The initial phase can be set from 0~359° ;

**Ψstep:** The step phase can be set from 0~90° ;

The instrument first superimposes the output according to the phase set Ψ. After the test times are completed, press Ψstep to add the phase and continue the output until the phase exceeds 359° and stops. If Ψ is set to 0° , Ψstep is set to 90° , the test is conducted 5 times, and the instrument tests 0° , 90° , 180° and 270° each 5 times.

**System Set:**

After clicking, the following interface will pop up



**Backlight adjustment:** Adjust the screen brightness.

**Language:** There are two language modes to choose from: Chinese and English.

**About the equipment:** Record the detailed information of the instrument.

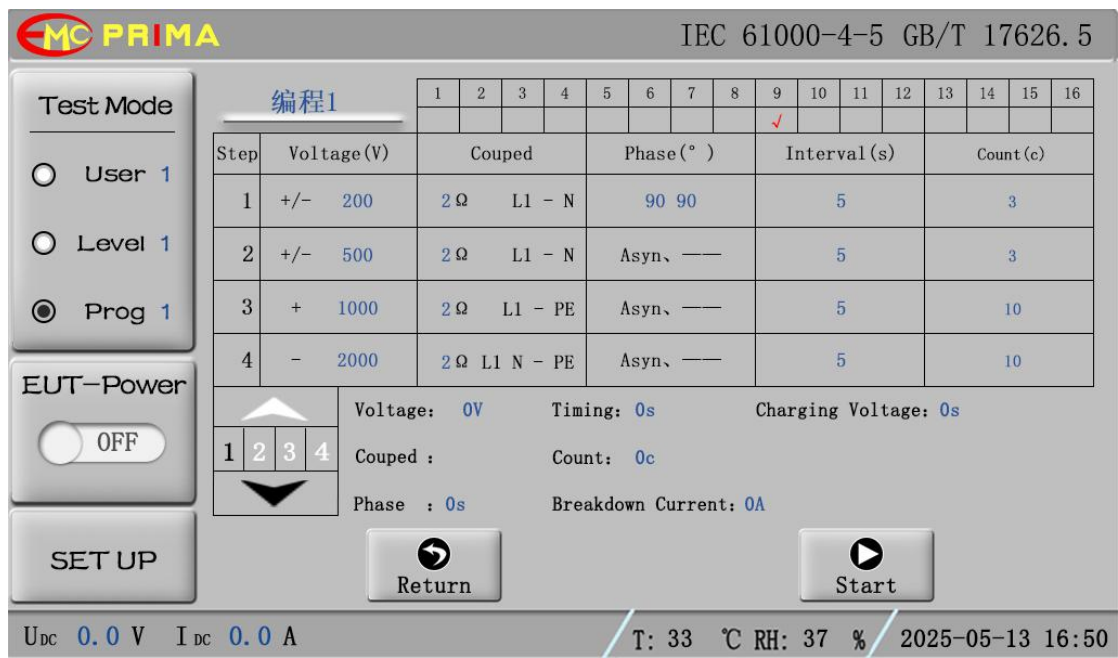
**Factory Settings:** Clear the set parameters and return to the factory state.

**Previous page:** Switch to other Settings interfaces.

**Return:** Return to the parameter setting interface.

3.3 Programming mode interface settings

The interface to enter the programming mode is as follows:



1. The top 1 of the table shows the parameters and status of the current operation, the font is blue when running, and gray when stopped.
2. The checkbox status in the first column of the table is whether the step of the row is selected (each row is called a step, √ select the step), click each row to enter the parameter interface to set the parameters of the step, Determine the parameter that represents the saved setting, and cancel to discard the adjustment of the parameter. The background color of the runtime checkbox will change, green for the currently running step, gray for the step that has not been run or not selected, and white for the step that has run completely.
3. The up arrow at the bottom of the table is to turn one page forward, and the down arrow is to turn one page backward, for a total of two pages and 8 steps.

## Chapter IV Experimental wiring and test procedures

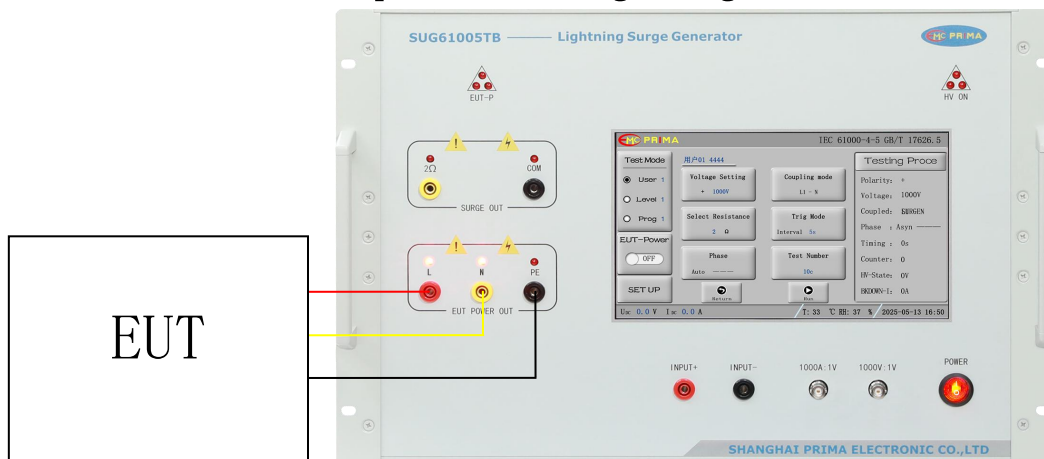
### 4.1 Test wiring

#### 1. Superimposed surge test on the power supply side

As shown in the figure below, the plug out of the line with an input voltage of 220V in the isolation transformer is connected to the AC power supply. The output socket is connected to the rear panel of the instrument via an EUT cable, EUT POWER IN. When the air switch of the isolation transformer is turned on, the voltage is output to the EUT POWER IN. The front panel of the instrument L, N, PE is connected to the EUT.



Rear panel wiring diagram

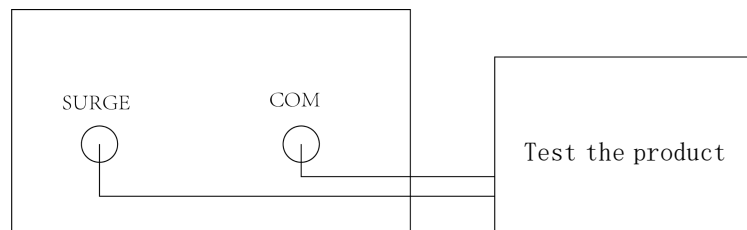


Front panel wiring diagram

If you need to test DC products, you need to connect the DC regulated power supply to EUT POWER IN, then the output L, N, PE are DC current.

## 2.Direct test surge

If the test product does not need to test the surge in the live state, it can be directly connected to the test product through SURGE and COM. or L N received the test product,  $12\Omega$  impedance is required to connect to the 2nd terminal of the LPE, Since the product is not charged test, In this case, it is necessary to remove the power supply at the EUT POWER IN on the rear panel.



## 4.2 Test Steps

1、 Connect the cable according to the content of section 4.1.1 and turn on the power of the instrument; If it is an insulation withstand voltage test or a direct surge test, skip the following steps and directly set the parameters to run the test. If a surge is applied to the power cord, continue with the following steps.

2、 Set the parameters according to the parameter settings in section 3.2 and the parameters to be tested. For alternating current, it is generally stipulated that 5 surges are superimposed at  $0^\circ$ ,  $90^\circ$ ,  $180^\circ$  and  $270^\circ$ , and the test interval is 60s. The DC test was carried out with 5 surges at a 60s interval.

3、 After setting the parameters, turn on the power of the test product, let the test product work normally, and then run the instrument. If there is no power supply when the test product is turned on, please check whether the air switch is turned on and whether the voltage at the EUT POWER IN on the rear panel is normal.

1、 4、 After the test is completed, turn off the power of the sample and turn it off.

## Chapter V Built-in differential probes and current transformers are used

SUG61005TB instruments have built-in differential probes and current transformers with 1000:1 attenuation ratios. The output voltage and current waveforms can be measured directly from an oscilloscope.



Built-in probe wiring area of the instrument

**INPUT+、INPUT-:** The high-voltage input of the differential probe is connected to the line to be inspected.

**1000V:1V:** The output of the differential probe is attenuated by a factor of 1000 and is directly connected to the oscilloscope test voltage. **INPUT+、INPUT-、1000V:1V** Together, they form a single differential probe.

**1000A:1V:** The output terminal of the current transformer after 1000 times attenuation is directly connected to the oscilloscope to test the current.

### 5.1 Oscilloscope settings

The oscilloscope detection waveform is generally set to the probe ratio of 1000X, the trigger mode is normal trigger, do not set to automatic trigger, and the abscissa is generally set to 20~50us a grid to ensure that the trigger level is within the voltage range, otherwise the waveform cannot be detected.

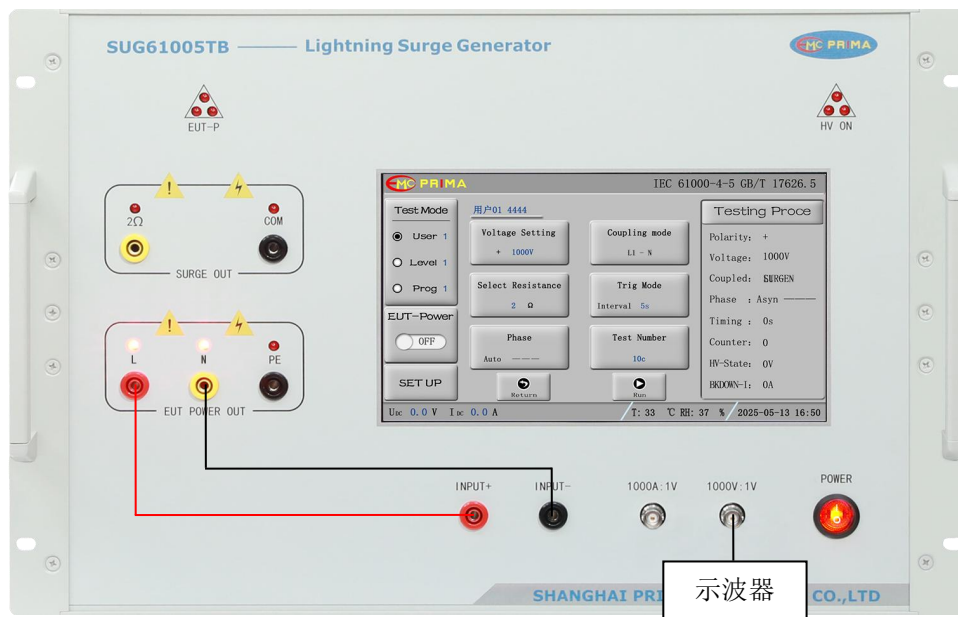
### 5.2 Use of built-in differential probes

U(1000:1) is connected to the oscilloscope, **INPUT+** is connected to the port to be tested via the test lead, and **INPUT-** is connected to another port to be tested via the test line.

**a:** Test the source-side waveform with a differential probe

**INPUT+** is connected to the SURGE (SUG61005TB) port via a test lead, **INPUT-** is connected to the COM port via a test lead, U (1000:1) connects to the oscilloscope, runs the instrument to detect the waveform after setting the oscilloscope.

**b:** Test the coupling waveform with a differential probe



After the instrument is matched with the single-phase coupling network, the waveform of the coupling network can be captured by the built-in differential, and the coupling end can be set on the instrument coupling interface. INPUT+ is connected to the coupling port via the test lead, INPUT- is connected to another coupling port via a test lead, U(1000:1) connects to the oscilloscope, sets the oscilloscope and runs to capture the waveform.

**c:** Differential probes are used to test waveforms across the product

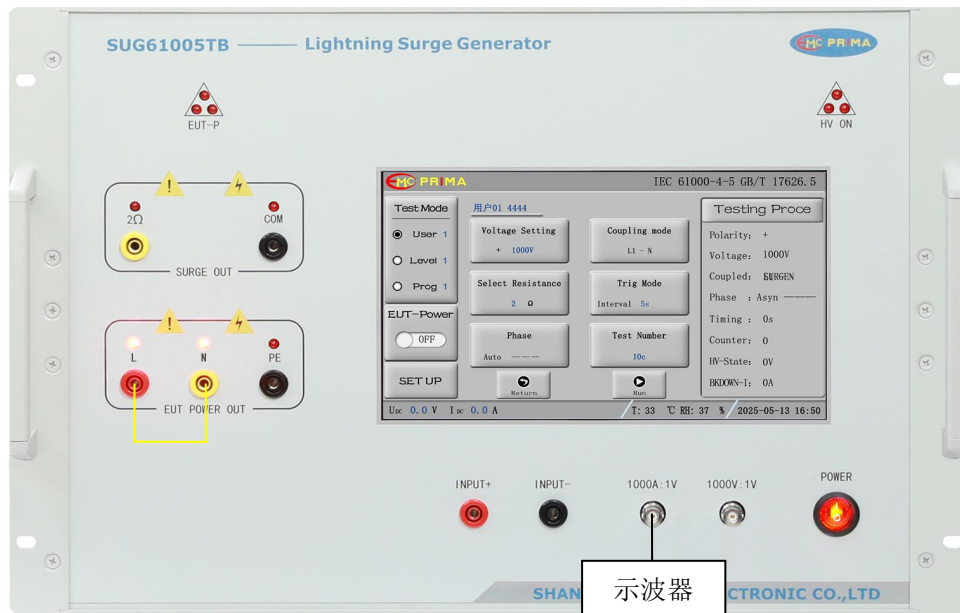
When testing the product, the waveform can be captured by the built-in differential capture, INPUT+ is connected to the product port through the test line, INPUT- is connected to another port of the product through the test line, and U (1000:1) is connected to the oscilloscope, and the oscilloscope is set up to run to grab the waveform of the product end.

### 5.3 Use of built-in current transformer

**a:** The source waveform is tested with a current transformer

I(1000:1) connect to the oscilloscope, L, N ports are directly shorted with short wires, and run to grab the waveform after setting the oscilloscope.

The figure below SUG61005TB test the short-circuit waveform, shorting with the 10cm long yellow wire of the accessory, if the short-circuit is in source mode, it should be replaced with an 18uF capacitor in parallel at both ends of SURGE and COM.



**b:** The coupled end-end waveform is tested with a current transformer

After the instrument cooperates with the single-phase coupling network, the coupling network waveform can be captured through the built-in current transformer, the coupling end is set up in the instrument coupling interface, the coupling end is directly short-circuited, I (1000:1) is connected to the oscilloscope, and the oscilloscope is set up to run and capture the waveform.

Note: The EUT POWER IN cannot be connected to the power supply after grabbing the waveform coupling network at the coupling end, otherwise the power supply will be directly short-circuited after shorting the coupling terminal.

Test the L-N short-circuit current waveform at the coupling end, short the L-N terminal with the 10cm long yellow wire of the accessory, and pay attention not to connect the EUT POWER IN terminal to the power supply to prevent the L-N power supply from short-circuiting.

**c:** Test the product current with a current transformer

## Chapter VI Judgment of the results of the experiment

The results of the experiment should be recorded separately according to the working conditions and functional requirements of the DUT, so that the equipment can be evaluated by the equipment manufacturer and the user. As:

- a、 Under the specified conditions, the equipment can work normally;
- b、 During the experiment, the device experienced a temporary decrease in performance or loss of function, but later recovered on its own;
- c、 Temporary degradation or loss of function of the equipment can only be restored after operator intervention or system reset;
- d、 The device has irreparably degraded performance or loss of functionality due to damage to components, affected software, or loss of data.

## Chapter VII Handling common faults

| Fault phenomenon                                                           | Processing                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| It doesn't turn on                                                         | Check whether it is connected to the power supply, check whether the fuse is burned out and wind<br>Whether the fan rotates, if the fan has rotated, disassemble the machine and turn on the power on/off<br>The source red LED is not lit             |
| Before the ON state of the test power supply<br>Panels L-N have no voltage | Check whether the EUT POWER IN input voltage; Whether the air switch is closed or not                                                                                                                                                                  |
| Tap the screen unresponsive or<br>The click area is offset                 | The screen needs to be recalibrated, as described on the next page                                                                                                                                                                                     |
| A blue screen appears                                                      | Recalibrate the screen, see the instructions on the next page for calibration                                                                                                                                                                          |
| "Error to turn on the sample" appears                                      | Whether the phase is set incorrectly, the L-N output is AC power<br>Set the phase to synchronous or asynchronous. The L-N output is straight<br>The current or no output voltage must be set to asynchronous, otherwise<br>This failure prompt appears |
| High pressure anomalies                                                    | Contact Prima Aftermarket                                                                                                                                                                                                                              |
| Open the power supply of the test product and open it                      | The air switch should be at least 16A and above                                                                                                                                                                                                        |
| The power supply of the test product is leaked<br>Protectors               | An isolation transformer is added to the EUT input power supply                                                                                                                                                                                        |

If the fault cannot be eliminated in time, please contact Prima After-sales Service Center (China)

**Tel: 021-51877625**



When the touch screen is invalid and the clicked area is offset, you need to recalibrate the screen, and if the above interface appears by mistake, you also need to recalibrate the screen. The operation method is to click the screen 10~20 times very quickly, and the buzzer will enter the blue screen interface above after ringing. The "+" sign will appear in the corner of the screen interface, click "+" will appear in other corners, click "+" again, and the instrument will enter the main interface and return to normal after clicking in order. Click on the wrong click and follow the steps above to set it up again.

## Appendix A: Overview of lightning strikes

(Informational Appendices)

Illustrate

Reference standards:GB/T17626.5 / IEC 61000-4-5

### A.1 Formation of surges

#### A.1.1 Power system switching transients

Power system switching transients can be classified into transients related to the following operations:

- a) Major power system switching disturbances, such as capacitor bank switching.
- b) Smaller layout, switching, action, or load changes in the power distribution system.
- c) A resonant phenomenon associated with a switching device, such as a thyristor.
- d) Various system faults, such as short circuits and arc faults in the ground system of the equipment combination.

#### A.1.2 Lightning strike transients

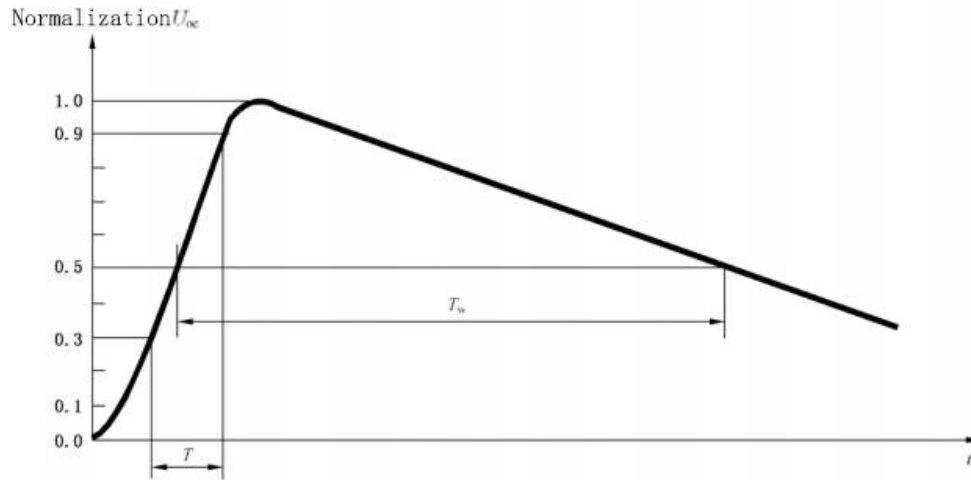
The main mechanisms of surge voltage generated by lightning strikes are as follows:

- a) Direct lightning, which strikes an external (outdoor) circuit and injects a large current through the ground resistance or the voltage generated by the impedance of the external circuit.

b) Indirect lightning (i. e., an electromagnetic field generated by lightning strikes between or in clouds or lightning strikes on nearby objects) that induce voltages and currents on conductors inside and outside buildings.

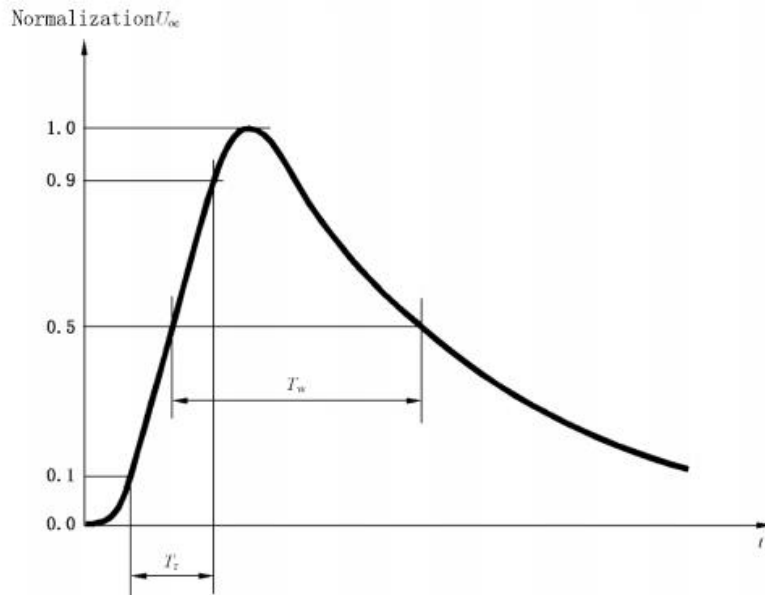
c) A lightning current discharged directly to ground in the vicinity, which generates an induced voltage when coupled to the common ground path of the device's combined grounding system. When lightning protection devices are in motion, voltage and current can change rapidly and may be coupled to internal circuitry

## A.2.2 10/700μs Voltage waveform – Definition of 5/320 μs current waveform parameters



Wavefront time:  $T_i = 1.67 \times T = 10 \times (1 \pm 30\%) \mu s$

Duration time :  $T_d = T_w = 700 \times (1 \pm 20\%) \mu s$



Wavefront time:  $T_i = 1.25 \times T_r = 5 \times (1 \pm 20\%) \mu s$

Duration time :  $T_d = T_w = 320 \times (1 \pm 20\%) \mu s$

## A.3 Apply a surge in the laboratory

The experiment should be carried out according to the experimental plan, which should specify the experimental configuration, which should include the following:

——— Experimental Level (Voltage):

——— Number of surges:

Unless otherwise specified in the relevant product standards, the surge pulse times applied to the DC power supply terminal and the interconnection line shall be 5 times of positive and negative polarity, and the surge pulses of positive and negative polarity shall be applied 5 times each at 0°, 90°, 180° and 270° phases for the AC power port;

——— The time interval between successive pulses, 1 minute or less.

——— Typical operating status of EUT.

——— The site where the surge is applied.

The power port (DC or AC) may be an input or output port

Concentrate: For surge tests at the output port, it is only recommended to perform the surge on the output port through which the surge is likely to enter the EUT (For example, switching of high-power loads). For low-voltage (voltage not more than 60V) DC input/output terminals, If the secondary circuit (isolated from the AC power port) is not subject to transient overvoltages (such as DC secondary circuits filtered by reliable ground and capacitance, When the peak value of the ripple is less than 10% of the DC component), there is no need to perform a surge test on the low-voltage DC input/output. In the case of several identical lines, it may be possible to simply select a certain number of lines for typical measurements. If an experiment with a faster repetition rate than 1/min causes the DUT to malfunction, and when the

test is performed at a 1/min repetition rate, the DUT is working properly, then a repetition rate of 1/min is used for testing. When performing a line-to-ground experiment, if nothing else specifies, the experiment should be performed on each wire in turn.

The experimental procedure should take into account the nonlinear current-voltage characteristics of the device under test, so the experimental voltage should be gradually increased from the low level to the experimental level specified in the product standard or experimental plan/report. And no more than it, all lower grades (including the chosen experimental grade) should meet the requirements.

When experimenting with a device with secondary protection, the output voltage of the generator should be increased to just below the breakdown value of the primary protection.

If there is no actual working source, it can be simulated.

For acceptance experiments, equipment that has not previously applied a surge should be used, or protective devices should be replaced prior to the experiment.

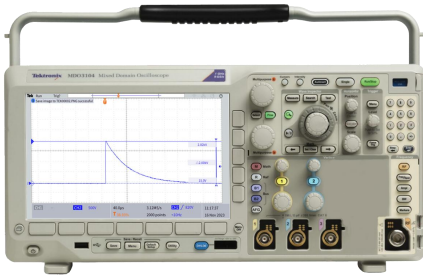
## Appendix B: Product calibration

This product is a precision instrument, in order to use it better for users, the company recommends that the parameter performance of this instrument be calibrated at least 1 year/1 time after purchasing this instrument. You can calibrate your instrument in a variety of ways.

### 1. Self-calibration

After the customer has the following tools, it can be self-calibrated by the customer; If you have any objections to the self-calibration results, you can contact the Prima after-sales service department for telephone guidance.

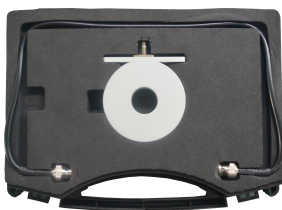
Calibration tool (Note: The following images are for reference only)



Oscillograph



Differential probes



Current loops



### 2. Entrust third-party calibration

Customers can go to a third-party testing center for calibration.

### 3. Return to the factory for calibration.

Please contact Prima's after-sales service department for more information.

## Appendix C: Annex

### Schematic diagram



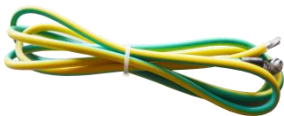
EUT line



Test line



Connecting cables



Grounding wire



Short wiring



Power cord



3A fuse

## Daily maintenance and cleaning

### Daily maintenance:

When storing or placing the instrument, do not expose it to direct sunlight for a long time; When not in use for a long time, please disconnect the power supply; Do not pile up debris on the instrument.

### Cleaning:

The instrument is checked frequently according to the operation. Clean the outer surface of the instrument as follows:

1. Use a soft-textured cloth to wipe off the dust from the instrument.

When cleaning the LCD, be careful not to scratch the monitor.

2. Use a soft cloth moistened with water to clean the instrument, taking care to disconnect the power supply. For a more thorough cleaning, you can use an alcohol wipe.

## Warranty

Prima warrants that this product is warranted for a period of two years from the date of purchase. If a defect is proven within the warranty period, Prima will repair the faulty product (And there are no charges for parts and labor), All replacement parts, modules and products are owned by Prima.

In order to receive the service promised in this warranty statement, the customer must notify Prima of the problem before the expiration of the warranty period and make appropriate arrangements for the repair to be carried out. It is the customer's responsibility to pack and ship the product in question to the Prima after-sales service center.

This warranty statement does not apply to any defect, malfunction or damage caused by improper use or insufficient maintenance. Prima is not obligated under this warranty statement to provide the following services:

1. repair of damage caused by installation, repair or maintenance of the product by a person outside Prima;
2. repair damage caused by improper use or connection with incompatible devices;
3. repair any damage or malfunction caused by the use of a power

supply not supplied by Prima;

4. Repair of products that have been altered or disassembled without permission.

This warranty statement relating to this product is made by Prima and is intended to be in lieu of other warranties, express or implied. In the event of a breach of this warranty statement, Prima is responsible for repairing or replacing the defective product for the customer, which is the sole and exclusive remedy available to the customer, In no event shall Prima and its agents be liable for any indirect, special, incidental or consequential damages, whether or not advised of them.

## Prima After-sales repair center (China)

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Tel: 19901806582

Add: 5007, Block B, Veterans Business Building, Yintian Industrial Zone, Xixiang, Bao'an District, Shenzhen

Tel: 19901806603

Add: Room 706, Building 4, Yard 49, Badachu RD, Shijingshan District, Beijing

Tel: 19901806587

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