# SMM3000X Series
# Source Measure Unit

## Quick Start

EN01A




SIGLENT TECHNOLOGIES CO.,LTD

# Copyright Information

# Contents

# General Safety Summary

Carefully read the following safety precautions to avoid any personal injury or damage to the instrument and any products connected to it. To avoid potential hazards, please use the instrument as specified.

### Use the proper power cord

Only the power cord designed for the instrument and authorized by local government regulations should be used.

### Power supply

AC Input Voltages: 100 –240 V, 47–63 Hz.

### Use proper fuse

Fuse model: T3.15 A/250 V.

Make sure to use the correct type of fuse before turning on the instrument.

Do not connect the power cord before replacing the fuse.

Find out the reason why the fuse burned out before replacing the fuse.

### Ground the instrument

The instrument is grounded through the protective earth conductor of the power cord. To avoid electric shock, please make certain the instrument is grounded correctly before connecting its input or output terminals.

### Look over all terminal ratings

To avoid fire or electric shock, please look over all ratings and sign instructions of the instrument. Before connecting the instrument, please read the manual carefully to gain more information about the ratings.

### Maintain adequate ventilation

Inadequate ventilation may cause an increase in temperature, which may eventually damage the instrument. Maintain suitable ventilation and inspect the fan and intake regularly.

### Do not operate with suspected failures

If you suspect that there is damage to the instrument, please let qualified service personnel check it.

### Operate condition

Location: indoor, no strong light, dust-free, almost no Interfering pollution

Comparative humidity: ≤80%

Altitude: ≤2000 m

Temperature: 0℃ to 40℃

**Do not operate in an explosive atmosphere**

To avoid instrument or personal injury, do not operate the instrument in flammable and explosive environments.

**Keep the surface of the instrument clean and dry**

To avoid dust or moisture in the air affecting instrument performance, please keep the surface of the product clean and dry.

| | |
|---|---|
|  | **Warning: High voltage electric shock hazard!**<br>The SMM3000X series can forcibly generate a dangerous voltage of ± 210V on the High Force, High Sense, and Guard terminals. To prevent the risk of high voltage electric shock, please be sure to follow the following safety precautions during the use of the instrument. |

- Before performing a measure, confirm that the high voltage output interlock protection is enabled.
- Before connecting the instrument using the High Force, High Sense or Guard terminals, turn off the source output and confirm that the ON/OFF button is turned off. If not, press the ON/OFF button to turn off the source output and confirm that the HV (High Voltage) status indicator is not lit.
- If any capacitor is connected to the instrument, discharge that capacitor before connecting it.
- Warn workers in the vicinity of the instrument of possible hazardous conditions such as high voltage electric shock.

## Safety Terms and Symbols

**Terms used in this product.** These terms may appear in the product:

| | |
|---|---|
| DANGER | Indicates direct injury or hazards that may happen. |
| WARNING | Indicates potential injury or hazards that may happen. |
| CAUTION | Indicates potential damage to the instrument or other property that may happen. |

**Symbols used in this product.** These symbols may appear on the product:

Hazardous Voltage

Warning

Protective Earth Ground

Earth Ground

Power Switch

# Allgemeine Sicherheitsübersicht

Lesen Sie die folgenden Sicherheitshinweise sorgfältig durch, um Verletzungen oder Schäden am Gerät und an den daran angeschlossenen Produkten zu vermeiden. Um mögliche Gefahren zu vermeiden, verwenden Sie das Gerät bitte wie angegeben.

**Verwenden Sie ein geeignetes Netzkabel**

Verwenden Sie nur das für das Gerät vorgesehene und im jeweiligen Land zugelassene Netzkabel.

**Stromzufuhr**

AC-Eingangsspannungen: 100 -240 V, 47-63 Hz.

**Richtige Sicherung verwenden**

Sicherungsmodell: T3.15 A/250 V.

Stellen Sie sicher, dass Sie den richtigen Sicherungstyp verwenden, bevor Sie das Gerät einschalten.

Schließen Sie das Netzkabel nicht an, bevor Sie die Sicherung ausgewechselt haben.

Ermitteln Sie den Grund, warum die Sicherung durchgebrannt ist, bevor Sie die Sicherung austauschen.

**Erden Sie das Gerät**

Das Gerät ist über den Schutzleiter der Netzleitung geerdet. Um einen elektrischen Schlag zu vermeiden, vergewissern Sie sich bitte, dass das Gerät korrekt geerdet ist, bevor Sie die Eingangs- oder Ausgangsklemmen des Geräts anschließen.

**Überprüfen Sie die Nennwerte aller Klemmen**

Um Feuer oder einen elektrischen Schlag zu vermeiden, beachten Sie bitte alle Angaben und Hinweise auf dem Gerät. Bevor Sie das Gerät anschließen, lesen Sie bitte das Handbuch sorgfältig durch, um weitere Informationen über die Nennwerte zu erhalten.

**Für gute Belüftung sorgen**

Eine unzureichende Belüftung kann zu einem Temperaturanstieg führen, der schließlich das Gerät beschädigt. Sorgen Sie daher für eine gute Belüftung und überprüfen Sie regelmäßig die Ansaugung und den Lüfter.

**Betreiben Sie das Gerät nicht bei vermuteten Defekten**

Wenn Sie vermuten, dass das Gerät beschädigt ist, lassen Sie es vor dem weiteren Betrieb von qualifiziertem Servicepersonal überprüfen.

**Betriebsbedingungen**

Standort: innen, kein starkes Licht, staubfrei, fast keine störende Verschmutzung

Vergleichende Luftfeuchtigkeit: ≤80%

Höhenlage: ≤2000 m

Temperatur: 0℃ bis 40℃

**Betreiben Sie das Gerät nicht in explosionsgefährdeten Umgebungen**

Um Schäden am Gerät oder Personenschäden zu vermeiden, ist es wichtig, das Gerät nicht in explosionsgefährdeter Umgebung zu betreiben.

**Halten Sie die Produktoberflächen sauber und trocken**

Um den Einfluss von Staub und/oder Feuchtigkeit in der Luft zu vermeiden, halten Sie die Oberfläche des Geräts bitte sauber und trocken.

| | |
|---|---|
|  | **Warnung! Gefahr eines elektrischen Schlages durch Hochspannung!**<br>Die SMM3000X-Serie kann zwangsweise eine gefährliche Spannung von ± 210 V an den Klemmen High Force, High Sense und Guard erzeugen. Um die Gefahr eines elektrischen Hochspannungsschocks zu vermeiden, beachten Sie bitte unbedingt die folgenden Sicherheitsvorkehrungen bei der Verwendung des Geräts. |

- Vergewissern Sie sich vor der Durchführung einer Maßnahme, dass der Hochspannungsausgangsverriegelungsschutz aktiviert ist.
- Bevor Sie das Gerät über die Klemmen High Force, High Sense oder Guard anschließen, schalten Sie den Quellenausgang aus und vergewissern Sie sich, dass die Taste ON/OFF ausgeschaltet ist. Ist dies nicht der Fall, drücken Sie die Taste ON/OFF , um den Quellenausgang auszuschalten, und vergewissern Sie sich, dass die Statusanzeige HV (High Voltage) nicht leuchtet.
- Wenn ein Kondensator an das Gerät angeschlossen ist, entladen Sie diesen Kondensator, bevor Sie ihn anschließen.
- Warnen Sie Arbeiter in der Nähe des Geräts vor möglichen gefährlichen Bedingungen, wie z. B. einem elektrischen Schlag durch Hochspannung.

# Sicherheitsbegriffe und Symbole

**Begriffe auf dem Produkt.** Diese Begriffe können auf dem Produkt erscheinen:

| | |
|---|---|
| DANGER | Weist auf direkte Verletzungen oder Gefahren hin, die auftreten können. |
| WARNING | Weist auf mögliche Verletzungen oder Gefährdungen hin, die auftreten können. |
| CAUTION | Weist auf mögliche Schäden am Gerät oder an anderen Gegenständen hin, die eintreten können. |

**Symbole auf dem Produkt.** Diese Symbole können auf dem Produkt erscheinen:

Hazardous Voltage

Warning

Protective Earth Ground

Earth Ground

Power Switch

# General Care and Cleaning

### Care:

Do not store or leave the instrument in direct sunshine for extended periods.

### Cleaning:

Please clean the instrument regularly according to its usage.

Please perform the following steps to clean the instrument and joints.

1. Clean the loose dust on the outside of the instrument and joints with a soft cloth.
2. Disconnect the instrument from all power sources and then clean it with a soft damp cloth. For more thorough cleaning , a 75% isopropanol water solvent can be used.

NOTE:

- To avoid damage to the surface of the instrument and joints, please do not use any corrosive liquid or chemical cleansers.
- Make sure that the instrument is completely dry before restarting it to avoid potential short circuits or personal injury.

# General Inspection

- ### Inspect the shipping container

Keep the original shipping container and cushioning material until the contents of the shipment have been completely checked and the instrument has passed both electrical and mechanical tests.

The consigner or carrier will be responsible for damages to the instrument resulting from shipment. SIGLENT will not provide free maintenance or replacement if the instrument has been damaged in shipment.

- ### Inspect the instrument

If there are instruments found damaged, defective, or have failed any electrical and / or mechanical tests, please contact SIGLENT.

- ### Check the accessories

Please check the accessories according to the packing list. If the accessories are incomplete or damaged, please contact your SIGLENT sales representative.

# Considerations

To ensure that the SMM3000X can work normally, please conduct necessary inspection before using it.

## Input Power Requirement

SMM3000X requires power supply: AC 100–240 V, 47–63 Hz.

## Electrical Check

Please use the power cord provided as accessory and connect the instrument to AC power. Check the power as the following steps:

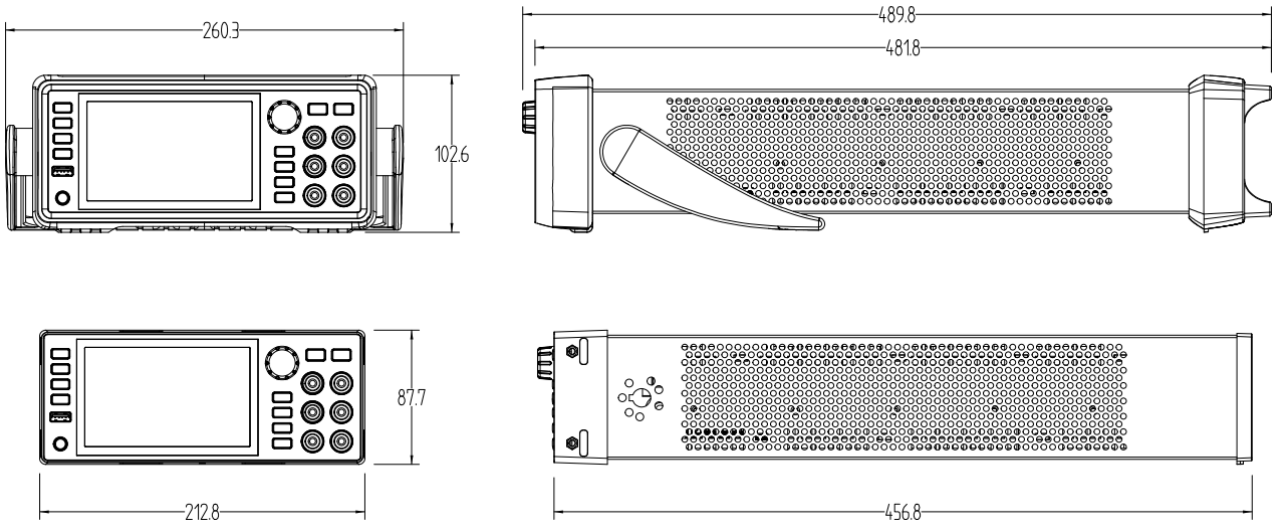
1. Connect the power supply

| | |
|---|---|
| ⚠ | **Warning**<br>To avoid electric shock, please make sure that the instrument is grounded correctly. |

2. Turn on the power switch

Turn on the power switch to enter boot interface, and system return to the default settings after a while.

# Mechanical Dimensions




Unit: mm

# Preparation Before Use

## Connect AC Power

The SMM3000X allows the power supply of AC 100 – 240 V , 47 – 63 Hz. Please use the power cord provided as accessory and connect the instrument to AC power. Before powering on, please confirm that the fuse is working properly.

## Output Check

The output check includes voltage check in condition of all channels with no load and current check in condition of short circuit so as to make sure that the instrument correctly responds to operation of the front panel.

**Voltage output check:**

1. Within no load, turn on the power, and set the channel source output mode Source to voltage, set the source output value to 1 V, set the Limit to 100 uA, and set the trigger mode to Auto;
2. Press the ON/OFF button corresponding to the channel to turn on the channel output, and the channel will work in constant voltage mode. Check the voltage readback value.

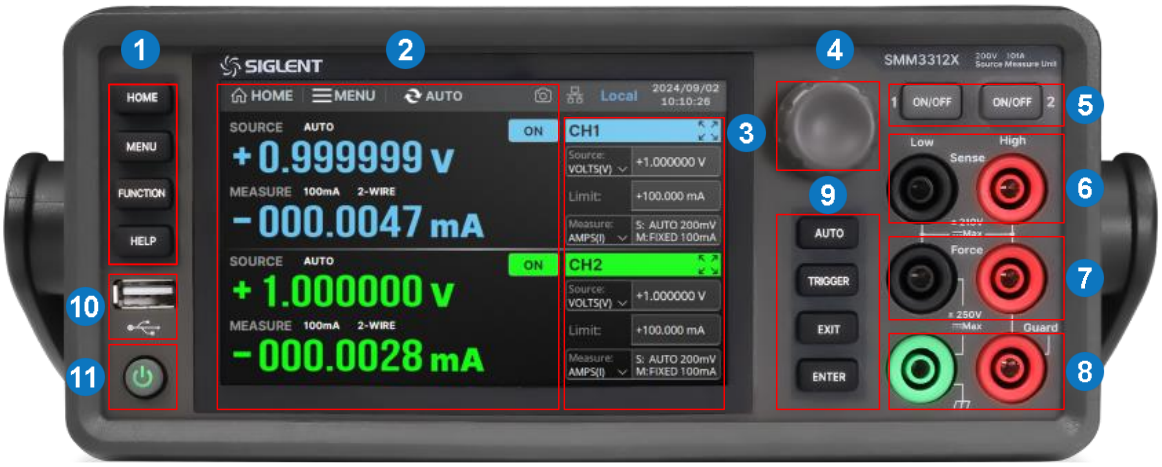
**Current output check:**

1. Turn on the power, and set the channel source output mode Source to current, set the source output value to 100 μA, set the Limit to 1 V, and set the trigger mode to Auto;
2. Use an insulated wire to connect the High Force terminal and Low Force output terminal of the channel and short-circuit them;
3. Press the ON/OFF button corresponding to the channel to turn on the channel output, and the channel will work in constant current mode. Check the current readback value.

**Note:** For the settings of output voltage and current, please refer to the "Apply DC Source Output" section in the "Basic Operations" chapter later.

# Panel Introduction

## Front Panel




1. Shortcut panel buttons
2. Display area Display the source output and measure status, system parameters, menu options, and prompt information of the channel, etc
3. Setting area Set the source output and measure parameters of the channel
4. Knob When setting parameters, rotating the knob can quickly move the cursor position, and pressing the knob can set the parameter value
5. CH1/CH2 ON/OFF switch
6. CH1 Sense terminal
7. CH1 Force terminal
8. CH1 Ground terminal and Guard terminal
9. Shortcut function buttons
10. USB-A port
11. Power switch

### Shortcut Panel Buttons

HOME : Press this button to directly return to the main interface.

MENU : Press this button to enter menu interface, in which you can make settings about system functions.

FUNCTION : Press this button to enter the function setting interface, in which you can make some settings about math expression, composite limit test and limit test functions.

HELP : Press this button to enter the help interface.

### Shortcut Function Buttons

AUTO : Press this button to start repeat (continuous) measure. If a repetitive measure is in progress, pressing stops the repetitive measure.

TRIGGER : Press this button to start a single output/measure or to start the trigger system.

EXIT : Press this button to exit the current interface or dialog box and return to the previous interface.

ENTER : Press the button to confirm your value.

## Rear Panel

Rear panel of dual channel model:

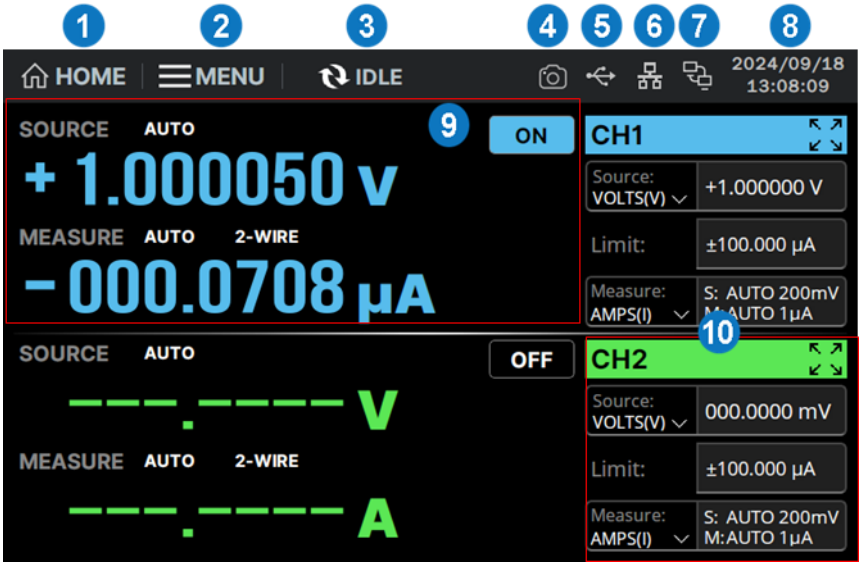

1. Certification mark
2. CH2 source/measure terminals Include Sense terminals, Force terminals, Ground terminal and Guard terminal
3. USB-A port
4. Digital I/O port
5. Fan vents
6. AC power socket and AC input voltage description
7. LAN port
8. USB-B port

Rear panel of single channel model:


1. Certification mark
2. USB-A port
3. Digital I/O port
4. Fan vents
5. AC power socket and AC input voltage description
6. LAN port
7. USB-B port

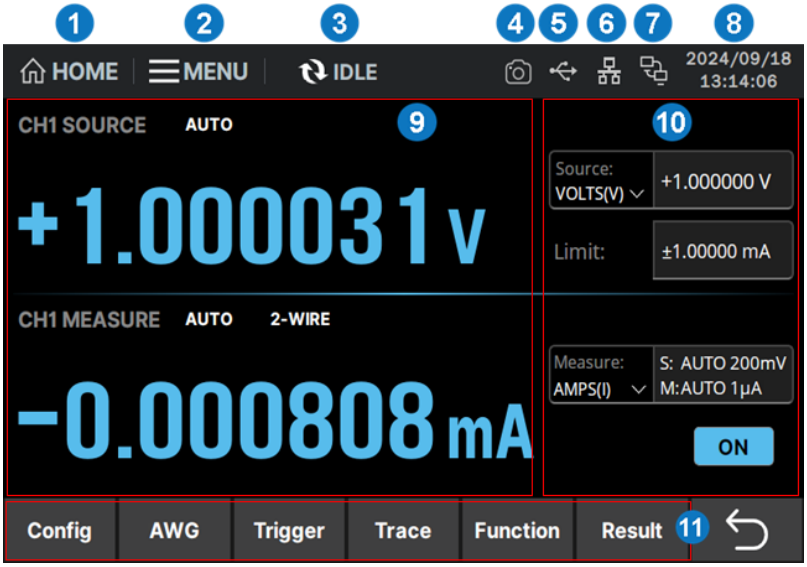
# User Interface

User interface of dual channel model:




1. HOME  Return to the main interface
2. MENU  Enter the menu interface, in which can make settings about system functions
3. Trigger system  Display trigger status (AUTO/ARM/IDLE); Click to enter the trigger parameter setting and trigger system control interface
4. Dump screen and save it locally
5. External USB access status icon  indicates that a USB device is detected
6. LAN status icon  indicates that the LAN cable is connected,  indicates that it is not connected; Click on this icon to set LAN
7. Remote control status icon  indicates the instrument is in remote control
8. Date and time  Display the current date and time, click to make settings
9. Measure display  Display measure value, source and measure status information Click "ON/OFF" to turn on/off the channel
10. Channel settings  Set the source output mode, output value, and limit value, as well as the measure mode, measure speed, and measure range; Click on the CH1 / CH2 to enter the single channel setting interface

User interface of single channel model:




1. HOME Return to the main interface
2. MENU Enter the menu interface, in which can make settings about system functions
3. Trigger system Display trigger status (AUTO/ARM/IDLE); Click to enter the trigger parameter setting and trigger system control interface
4. Dump screen and save it locally
5. External USB access status icon indicates that a USB device is detected
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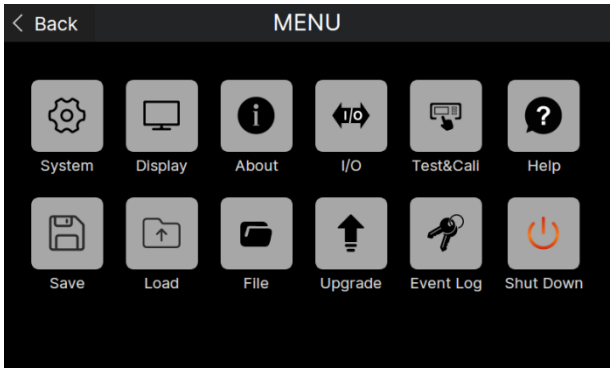
7. Remote control status icon indicates the instrument is in remote control
8. Date and time Display the current date and time, click to make settings
9. Measure display Display measure value, source and measure status information
10. Channel settings Set the source output mode, output value, and limit value, as well as the measure mode, measure speed, and measure range; Click "ON/OFF" to turn on/off the channel
11. Menu bar Click to enter the detailed settings interface of the channel functions

## Single Channel Settings

For dual channel model, click on the CH1 or CH2 area on the main interface to enter the single channel settings interface, in which you can make basic settings for a single channel, or use the menu bar at the bottom of the interface to perform more detailed functional settings for the selected channel. You can also switch to the channel you want to set by clicking the CH1 SOURCE or CH1 MEASURE area on the single channel interface.

## Menu




Press the MENU button on the front panel or the MENU on the user interface to enter the menu selection interface, where you can view and set the following items:

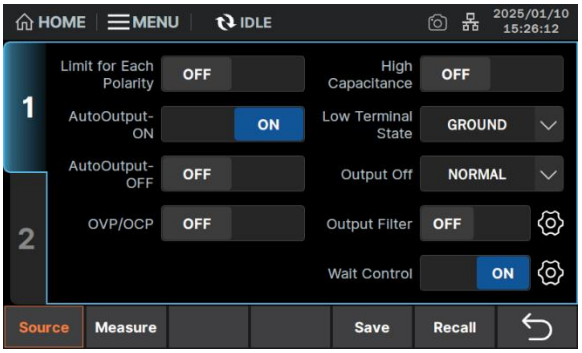
- System: Basic system settings. You can set PLC, sound, power-on state, power-on mode, automatic and manual clearing of timestamp, SCPI type and resetting configurations.
- Display: Screen display settings. You can set display digits, language, backlight brightness, screensaver, and the function of Immediate V/I Update by Knob.
- About: Display version information. You can view information about product: product name, serial number, BKF version, software version, FPGA version, hardware version, start-up times, and running time.
- I/O: Set the output data of voltage/current/resistance/source/time/state and I/O ports.
- Test&Cali: Self-test functions, including screen test, key test, LED test, temperature monitor and hardware unit test.
- Help: Enter the help interface.
- Save: Save measure data, mathematical operations data, limit test results, trace buffer data, and system configuration data to local storage or USB drive.
- Load: Load saved system files to apply to system configuration.
- File: File Browser. You can browse, edit or manage images (JPG), data (CSV), and other files saved on a USB drive or locally.
- Upgrade: Version upgrade function. You can upgrade the instrument by using the version files (ADS,

CFG) downloaded from the official website.

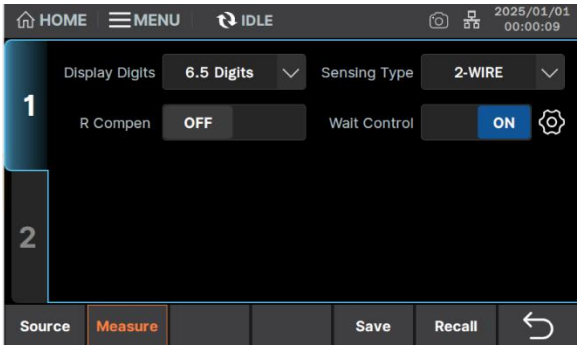
- Event Log: Error/warning event log. You can set the error/warning event to display, clear, and save the information to a local file or USB drive.
- Shut Down: Shut down the instrument.

## Config

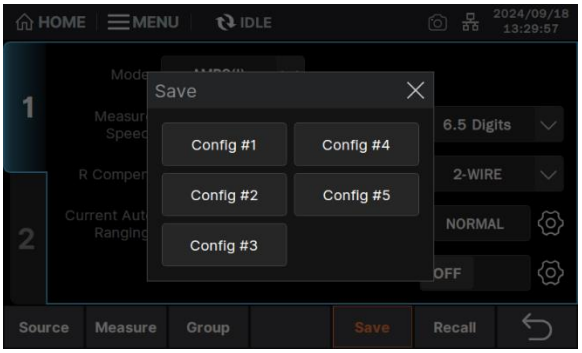
Press Config to enter the channel configuration interface and make settings for the following functions:



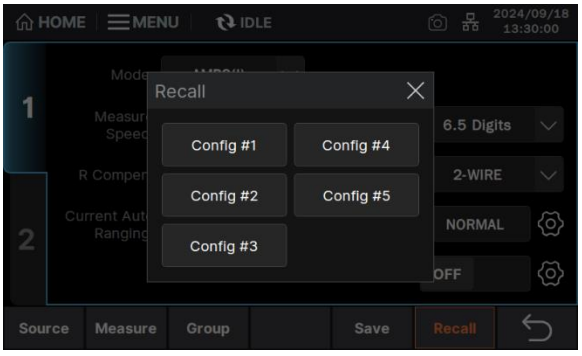

Source: Source output settings: Make the settings about the limit for each polarity, auto output on function, auto output off function, OVP/OCP, high capacitance mode, low terminal state, output off state, output filter and wait control.




Measure: Measure settings: Make the settings about display digits, resistance compensation, sensing type (2-wire or 4-wire) and wait control.



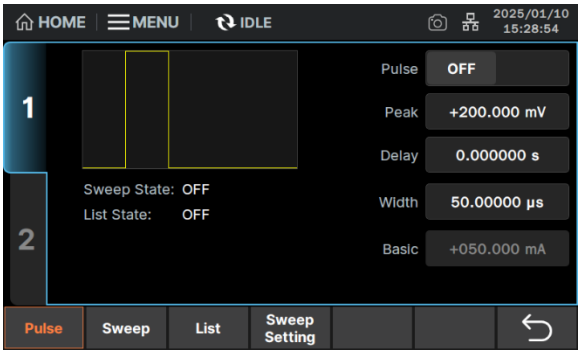

Save: Save Settings: Save all channel settings in Source and Measure to Config #1-5.



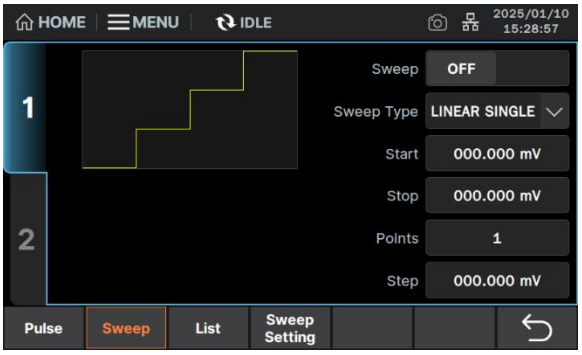

Recall: Recall settings: Recall channel settings saved in Config #1-5 and set to Source and Measure for all channels.

## AWG

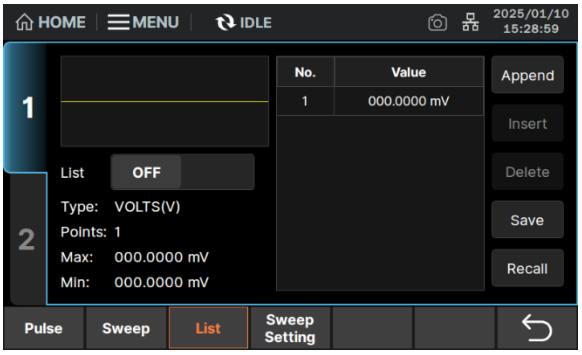
Press AWG to enter the setting interface, in which you can enter the interface of Pulse, Sweep, List and Sweep Setting to make settings. The introduction of each setting interface is described below:



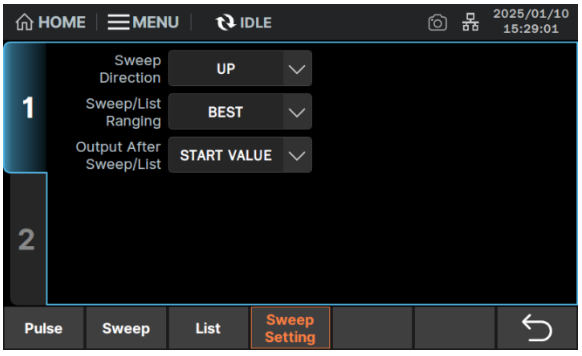

Pulse: Pulse parameter settings: Set peak value, delay, and pulse width of the pulse. Basic displays the maximum current value allowed for continuous output when the pulse output is not triggered in pulse mode.




Sweep: Sweep parameter settings: Set sweep output on or off, and set parameters including sweep type, start value, stop value, points, and step value.



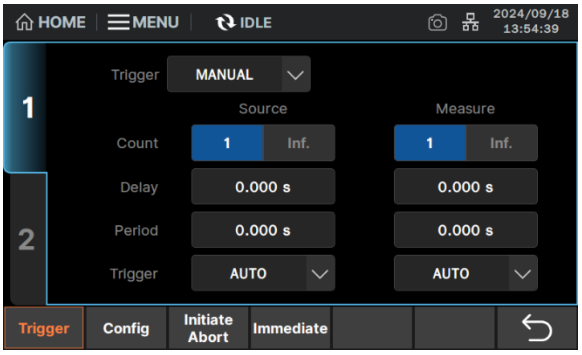

List: List sweep settings: Set list sweep output on or off; Edit list data, such as appending a row, inserting a row, or deleting a row; Display the output waveform of the list data and the statistical information. You can save the list data (CSV format) to local or USB drive by pressing Save , or recall list data saved locally or USB drive (CSV format) by pressing Recall .



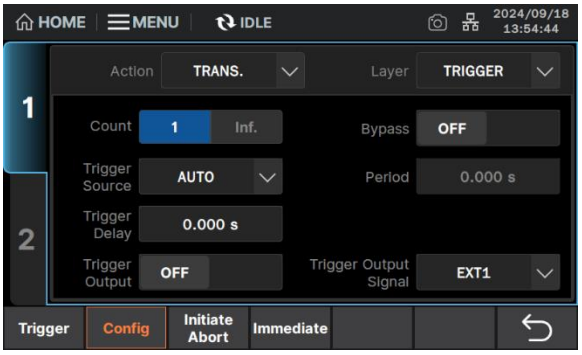

Sweep Setting: Set sweep direction, sweep/list ranging mode and the value applied after the source channel completes the sweep/list output.

## Trigger

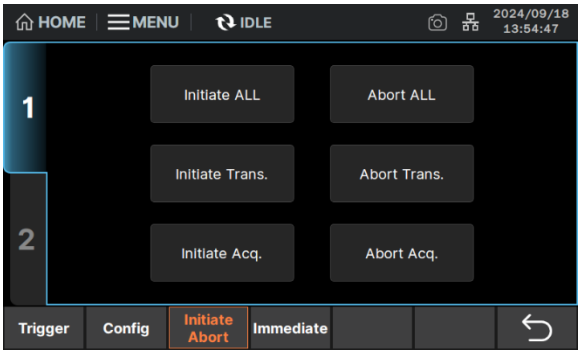
Press Trigger to enter the trigger setting interface, in which you can set trigger parameters and control trigger status:



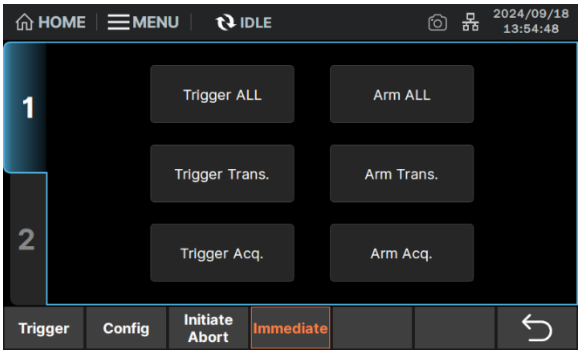

Trigger: Trigger parameter settings: Set trigger type and set the parameters according to the trigger type, including trigger count, trigger delay, trigger period and trigger source.




Config: Detailed trigger parameter settings: Specify action mode and setting layer; Set the count number of trigger; Turn on/off bypass function; Set trigger source, period of TIMER events, trigger delay and trigger output signal; Turn on/off trigger output.



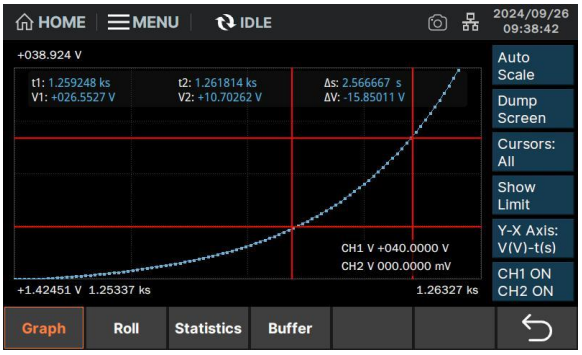

Initiate Abort: Initiate or abort the specified action on the specified channel, and you can select initiate all, abort all, initiate transient, abort transient, initiate acquisition or abort acquisition. “Initiate" means to initiate action (go to the Arm layer of the triggering system); “Abort" means to abort action (return to the idle layer of the triggering system).



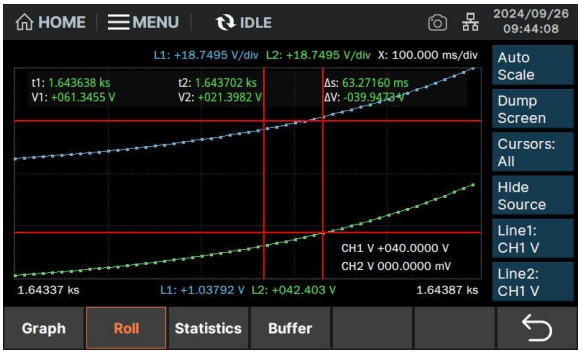

Immediate: Immediate the specified action on the specified channel, and you can select trigger all, ARM all, trigger transient, ARM transient, trigger acquisition and ARM acquisition. “Immediate” means sending an immediate trigger command at the ARM or trigger layer.

## Trace

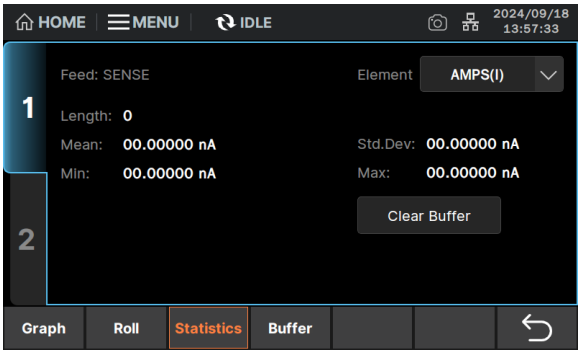
Press Trace to enter the trace interface, in which you can view Graph view, Roll view, trace statistics results, and trace buffer.



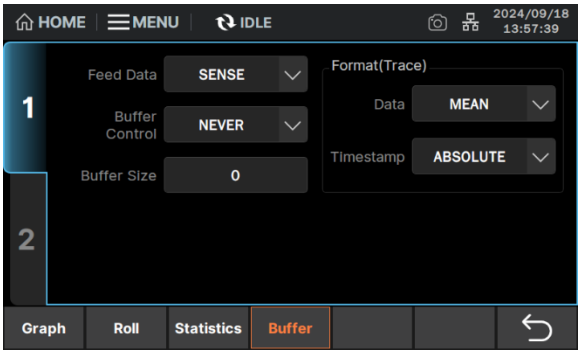

Graph view: Display and set channel status and output values, X-axis/Y-axis data type and coordinate type, cursor data, auto scale the graph view and perform screen dump and save.




Roll view: Display and set channel status and output values, Y-axis data types, cursor data, auto scale the roll view and perform screen dump and save.



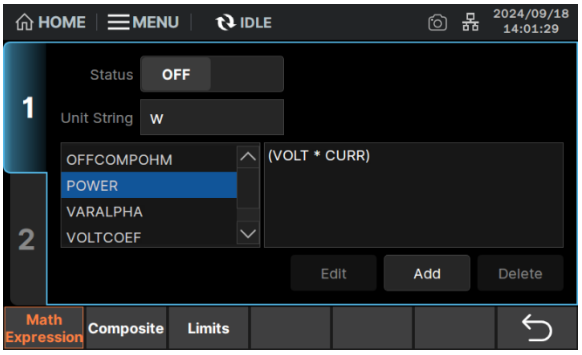

Statistics: Display statistics results, including data length, mean, standard deviation, maximum and minimum values of the graph for the specified data type. You can clear the cached data by pressing Clear Butter.



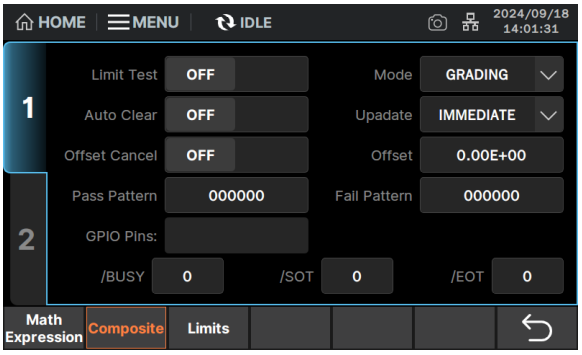

Buffer: Trace buffer. Specify the type of feed data, set the trace buffer control mode and size, and set the trace data and timestamp data formats for the elements of the trace statistics output.

## Function

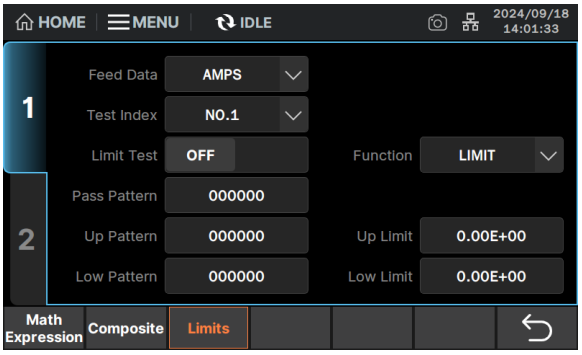
Press Function or FUNCTION on the front panel to enter the function setting interface, in which you can make settings about math expression function and limit test function.




Math Expression: You can set the math expression for calculating measure data. Unit String is the unit of the result of the math expression. You can select the math expression for data calculation listed in the area below the Unit String field and edit the math expression in the area on the right.



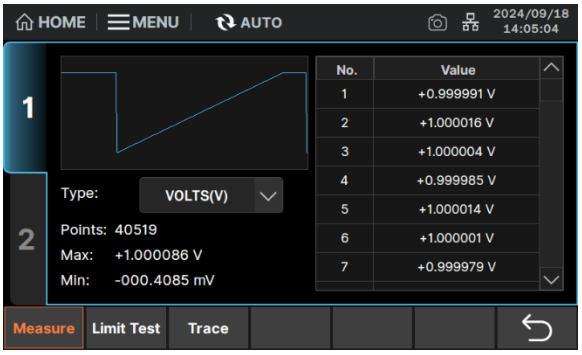

Composite: Composite limit test function. You can turn on composite limit test function and set patameters including limit test mode (GRADING or SORTING), auto clear limit test results (ON or OFF), update mode, offset, pass/fall pattern and the DIO pins assigned to the outputs of the bit mode.



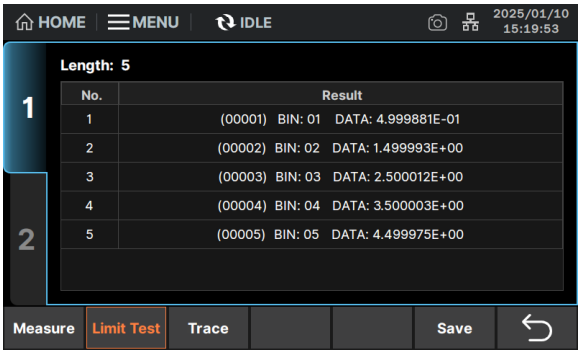

Limits: Limit test s function. The following parameters can be set for a limit test that is part of a composite limit test: feed data type, test index number, limit test switch, function mode (LIMIT or COMPLIANCE), pass/up/low pattern bit mode, and up/low limit value.

## Result

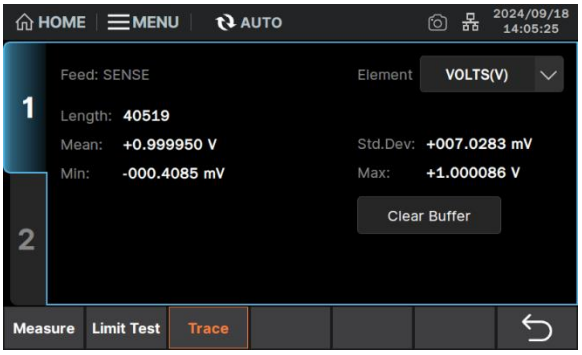
Press Result to enter the result display interface, in which you can view the measure results, limit test results, and trace statistics results.




Measure: Display measure results, including the specified type of measure data, the number of data points, and the maximum and minimum Y-axis values of the graph.




Limit Test: Display limit test results, including data length and limit test data containing the following information: data index number, two-digit number (BIN), and limit test data (DATA).




Trace: Display trace statistics results, including data length, mean, standard deviation, maximum and minimum values of the graph for the specified data type. You can clear the cached data by pressing Clear Butter .

# Basic Operations

## Source Output and Measure Settings

The SMM3000X series consists of a single-channel model and a dual-channel model. The dual-channel model has two sets of independent adjustable output sources and measure terminals. SMM3000X provides screen touch, front panel buttons and knob to output voltage/current or measure voltage/current/resistance, and supports multiple functions such as sweep output, pulse output, arbitrary waveform generation, limit test, etc.

### CV and CC mode

The source output of SMM3000X series supports constant voltage and constant current modes. When Source is set to voltage (VOLTS (V)), Limit is the current set value. If the output load impedance is greater than the value obtained by dividing the voltage set value by the current set value, the SMM3000X will operate in constant voltage mode (CV). If the output load impedance is less than the value obtained by dividing the voltage set value by the current set value, the SMM3000X will operate in constant current mode (CC).

- In constant voltage mode, the output current value is less than the set value, and the voltage value is controlled through the front panel. The voltage value is maintained at the set value. It will return to constant current mode when the output current value reaches the set value.
- In constant current mode, the output current value is the set value and is maintained at the set value. At this time, the voltage value is less than the set value. It will return to constant voltage mode when the output current value is less than the set value.

### Apply DC Source Output

The CH1 and CH2 outputs of the dual-channel model are independently controlled, and both CH1 and CH2 have a set of source/measure terminals, including Force, Sense, Guard, and ground terminals. The terminals of CH1 are located on the front panel, while those of CH2 are located on the rear panel.

Operation steps:

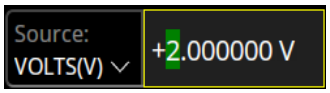
1. Use the knob to move the field pointer to Source mode, and the border of the selected field will be white. Press the knob or ENTER button to enter the source mode setting, rotate the knob to select VOLTS (V), and press the knob or ENTER button to confirm the setting.


2. Use the knob to move the field pointer to the Source value area on the right, and then press the knob

to change the field border from white to yellow. You can set the source value by pressing or rotating the knob.

a) The selected position in the field is blue, indicating that it is in move mode, in move mode rotate the knob to move the position to any digit;


b) Press the knob, the currently selected position turns green, indicating that it is in editing mode, rotating the knob in editing mode can change the numerical value. If a decimal point is selected, rotating the knob can change its position;




c) When the Source value is set, press the knob, and when the field border changes from yellow to white, the Source value is confirmed and applied.

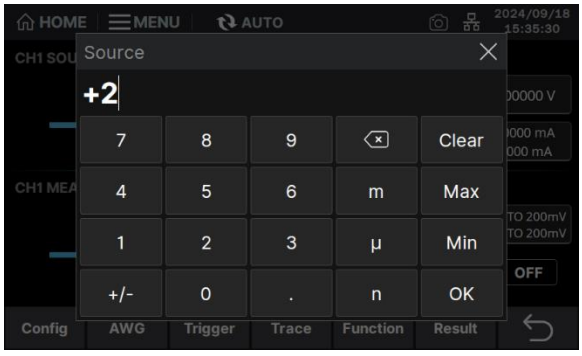

In addition, you can press MENU -> Display -> Immediate V/I Update by Knob to turn on the "Immediate V/I Update by Knob" function to apply the real-time Source value set by the knob before final confirmation.

3. If you do not use the knob input in step 2, you can also tap the screen at the Source value or press ENTER button to open the numeric keypad and set the Source value via the knob or touch panel. Set the Source value to +2 V as an example:

a) Touch the Source value area on the screen, or press ENTER button to open the virtual keypad;

b) Touch Clear to clear the historical value;

c) Touch +/- to select the positive sign and input “2”, then touch OK to confirm the settings;




d) If the input value is in units (m/µ/n), after entering the number, touch m / µ / n to confirm the setting without touching "OK".

The above steps take touch screen input as an example, and the same settings can be made by moving the field pointer with the knob and pressing the knob to confirm.

4. Use the knob to move the field pointer to the Limit value to the right of Limit: and then set and fix the

value via the touch screen, or by using the knob or the ENTER button to set and confirm the value.


5. Press ON/OFF button of CH1 to turn on channel 1 output and the channel indicator light will turn on.
6. When CH1 is in output state, press ON/OFF button to turn off the output and the indicator light will turn off.

Measure Settings

1. Use the knob to move the field pointer to Measure made, then press the knob or the ENTER button to set the Measure mode. Rotate the knob to select measure mode as VOLTS(V), (OHMS(R), AMPS(I) or WATTS(P). Press the knob or the ENTER button to confirm the setting.


2. Use the knob to move the field pointer to the range to the right of Measure: and then press the knob or the ENTER button to set the range. If VOLTS(V) is selected, rotate the knob to Source Volts and press the knob to select the range mode as AUTO (automatic range adjustment) or FIXED (fixed range). If AUTO is selected, the minimum range value for AUTO mode can be set in the right field; if FIXED is selected, the range value for FIXED mode can be set in the right field.
3. If measuring current, select AMPS(I) in Measure mode and enter the range setting interface to select the range mode as AUTO or FIXED in the Measure Amps field and set the range in the right field.
4. If measuring resistance, select OHMS(R) in Measure mode and enter the range setting interface to set the range mode from OFF to AUTO, V/I or FIXED in the Measure ohms field and set the range value for FIXED range mode or the minimum and maximum ranges for AUTO range mode in the right field. For V/I mode, the channel performs the measure using the current source/measure conditions, and the resistance value is calculated based on V/I.

   As an example of applying the output of a DC source to measure current:

   - S: Indicate the range used for constant voltage output and source voltage measure of the voltage source.
   - M: Indicate the range used for current measure of the voltage source.
5. When the channel is enabled, press TRIGGER to make a single measure of the DC source bias output, step-scan output, pulse bias output, or pulse-scan output; press AUTO to make repeated (continuous) measures of the DC source bias output of the Source value.

## Trigger Settings

The SMM3000X series allows you to set detailed trigger parameters and control the trigger system. Trigger mode can be applied independently to two actions: transient (source output) and acquisition (measure). These two actions can be started simultaneously or separately. For dual-channel models, both channels can also perform synchronous or asynchronous actions.

### Select Action Mode

- ALL: Select the actions of transient and acquisition.
- Trans.: Select the action of transient (source output) only.
- Acq.: Select the action of acquisition (measure) only.

### Trigger Source

- AUTO: Automatically select the trigger source that best suits the current operating mode.
- BUS: Use the trigger command from the remote interface.
- TIMER: Use an internally generated signal at each interval set by the Period parameter.
- INT1, INT2: Use signals from internal bus 1 or 2 respectively.
- LAN: Use LXI for triggering.
- EXTn: Use signals from the DIO pin n. EXTn is the output port of the Digital I/O D-sub connector on the rear panel.

### Trigger Command

- Trigger: Indicates the trigger layer. Arm indicates the Arm layer, IDLE indicates the idle layer, and Action indicates the action layer.
- Initiate: Initiate to go to the Arm layer of the trigger system.
- Abort: Abort to return to the idle layer of the trigger system.
- Immediate Trigger: Select the trigger layer to send an immediate trigger command.
- Immediate Arm: Select the Arm layer to send an immediate trigger command.

### Trigger Types and Parameters

- Trigger type: AUTO (automatic trigger), SYNC (synchronized trigger), TIMER (timer trigger), MANUAL (manual trigger).
- Count: The count of the trigger. This value is set automatically when the trigger type is AUTO. For other trigger types, set the count required for each source output and measure correctly and manually.
- Delay: Trigger delay value. This value is 0 when the trigger type is AUTO. When the trigger mode is

not AUTO, you can set the delay value.

- Period: Trigger period, i.e. interval of TIMER event, only applicable to TIMER event. When the trigger type is TIMER and MANUAL, you can set the period value.
- Trigger: When the trigger type is AUTO and SYNC, the value is AUTO. When the trigger type is TIMER, the value is TIMER. When the trigger type is MANUAL, the value can be selected as AUTO, BUS, TIMER, INT1, INT2, LAN, EXT7-12.

### Steps for Trigger Settings

1. Enter the CH single-channel setup interface, and click Trigger to enter the trigger setting interface, there are four interface options: Trigger, Config, Initiate Abort and Immediate in the menu bar at the bottom of the interface;
2. In the Trigger interface, set trigger type and finish setting the parameters for the source and Measure columns, such as Count, Delay, Period and Trigger;
3. In the Config interface, specify the Action mode and setting Layer, and finish setting the parameters by the Action and Layer. Some of the settings, such as Count, Trigger Delay, Period, and Trigger Source, are synchronized with the Trigger interface;
4. In the Initiate Abort interface, initiate or abort the specified action of the current channel;
5. In the Immediate interface, execute Immediate Trigger and Immediate Arm for the specified action of the current channel.

### Quick Trigger Settings

In the field 

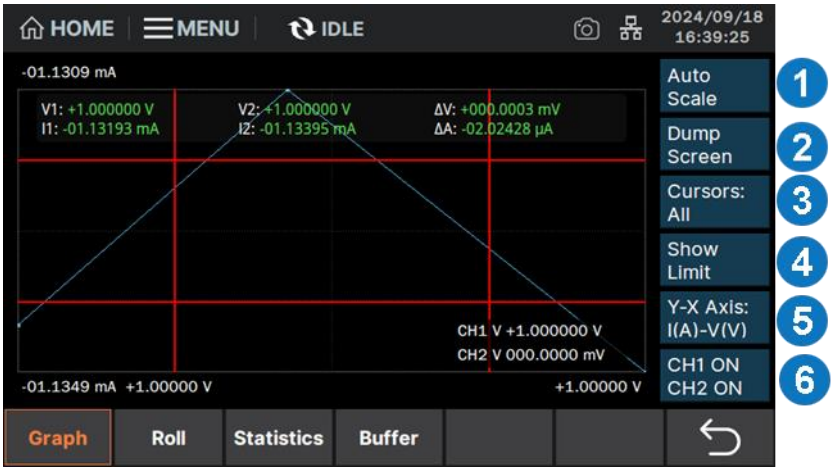
, 

, or 

at the top of the user interface, use the knob to move the field pointer to these field areas, then press the knob to perform Auto, Trigger, Initiate, Abort, Immediate Trigger, or Immediate ARM for the specified action on the specified channel. In addition, repetitive (continuous) measures can be initiated by pressing the front panel AUTO button, and a single output/measure can be initiated by pressing the front panel TRIGGER button.

## View Display

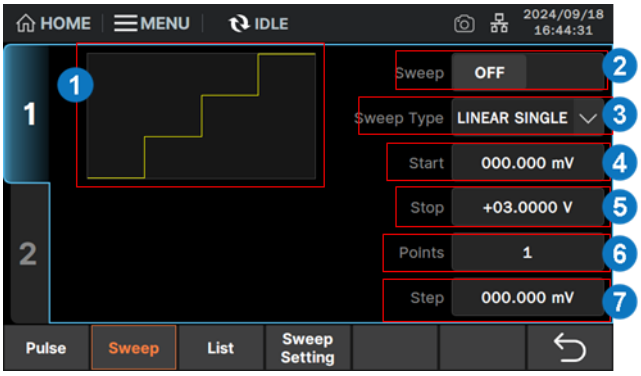
SMM3000X supports graph view and roll view. Graph View displays measure results or mathematical results on XY graphs (such as I-V, I-t, V-t curves, etc.) on channel 1/2. Roll view draws I-t, V-t R-t, and P-t curves. Taking the Graph view as an example to introduce:

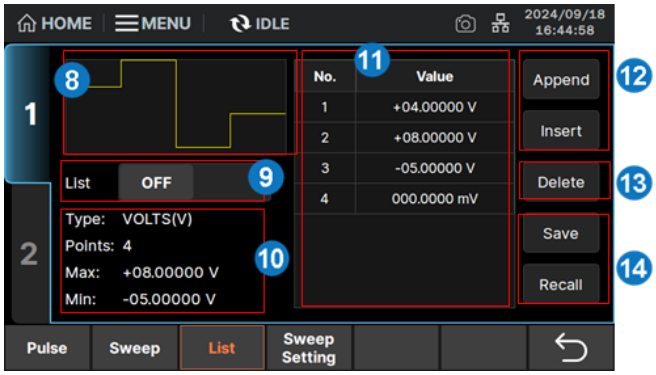



1. Auto Scale: Change the graphic scale to automatically fit the trace in the graphic
2. Dump Screen: Dump screen to JPEG file, and save to local storage
3. Cursors Hide/Hori/Vert/All: Hide or show the position and distance of X cursor1 and X cursor2, show the position and distance of Y cursor1 and Y cursor2, and show X, Y Cursors at the same time
4. Hide/Show Source/Limit: Hide or show the source setting value / limit value for channel 1 and channel 2
5. Y-X Axis: Select the data type and coordinate type (LINEAR/LOG) for the X-axis and Y-axis
6. CH1/2 ON/OFF: Set graph display status ON or OFF

## List Sweep Voltage Settings

The SMM3000X series has sweep and list sweep functions that can be used as a sweep source or a list sweep source, and supports the following sweep operations:




1. Display the set sweep output waveforms
2. Sweep: Turn on or off the sweep output
3. Sweep Type: Set the type of the sweep output data (LINEAR/LOG, SINGLE/DOUBLE)
4. Start: Set the start value of sweep
5. Stop: Set the stop value of sweep
6. Points: Set the number of points to sweep
7. Step: Set the sweep step value (incremental step value), not applicable to LOG sweep
8. Display the set list sweep output waveform
9. List: Turn on or off the list sweep output
10. Display the type of the data (Type), data points (Points), maximum value (Max) and minimum value (Min)
11. Display list data, including data index number and output value
12. Append/Insert: Append a row below the list or insert a row above the list
13. Delete: Delete the selected row from the list
14. Save/Recall: Save or recall the list data

Steps for applying sweep measure:

1. Set the source output mode to VOLTS (V) or AMPS (I);
2. Set the measure mode to AMPS (I), VOLTS (V), OHMS (R), or WATTS (P);
3. Set the sweep source (output), including:
   a) Set the pulse parameters, in AWG -> Pulse interface. Turn on pulse output, and set delay and width values;
   b) Set the sweep parameters in AWG -> Sweep interface. Turn on sweep output, set sweep type, and the sweep output waveform displayed on the left side will change accordingly; set sweep start, stop, points, and step values. The number of sweep points and the step value interact with each other. The sweep output waveform displayed on the left changes with the settings.
4. In Trace -> Graph interface, set the suitable Y-X axis;
5. Press ON / OFF button to turn on the channel with the sweep output set, and then press TRIGGER button to trigger a sweep output measure;
6. The graph view shows the results of the measure, press Auto Scale to adapt the trace to the graph scale.

## Save and Recall

SMM3000X supports saving source and measurement settings to internal storage or external USB drive, and recalling files saved in internal storage or external USB drive to restore settings. The following is the description of the save and recall functions

The settings that can be saved and recalled include the following:

- Source output and measure settings (Config)
- List sweep settings
- Dump screen
- Menu Interface Save/Load

Steps for saving or recalling settings of Source and Measure:

1. Complete the settings in the Config -> Source interface and Config -> Measure interface;
2. Press Config -> Save to save the settings set in step 1 to Config #1-5;
3. Press Config -> Recall to recall the settings saved in Config #1-5 and apply them to all channels.

If no settings have been saved in Config #1-5, the default settings will be applied when recalled.

Steps for saving or recalling list sweep settings:

1. Complete the settings in the AWG -> List interface;
2. Press Save to save the list data as a CSV file. After setting the file name, the file will be stored on an internal storage or external USB drive;
3. Press Recall to recall CSV or list file data from internal storage or external USB drive for list sweep.

Steps for dumping the screen:

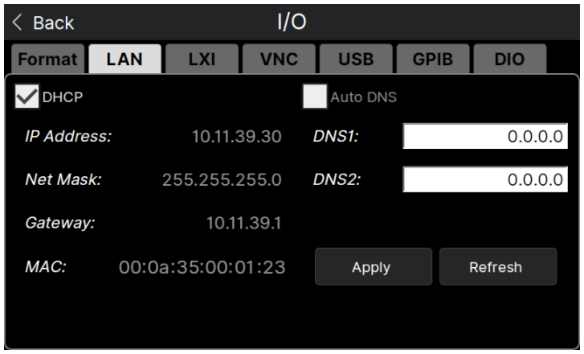
1. In the upper right corner of the user interface, there is an icon  that can be pressed to dump the current screen to an internal file, which is automatically named after the current time;
2. In the Trace -> Graph interface and Trace -> Roll interface, press Dump Screen to dump the graph to internal file.

## I/O Settings

The SMM3000X series is configured with LAN, VNC, USB, GPIB and DIO ports and supports configuration of the information on these interfaces for connection and control of the instrument, and supports LXI control. Below are the operation steps for each connection method.

### LAN Setting

1. Connect the LAN port on the rear panel to the local network using an Ethernet cable;
2. Press MENU button or MENU on the user interface to enter the menu interface, and press the I/O corresponding menu button to enter the I/O setting interface;
3. Press the knob, the selected field turns yellow. Use the knob to move the field pointer to LAN , then press the knob again to enter the LAN setting interface and set DHCP to ☑ or ☐ ;
   - ☑ : Automatically obtain IP address, subnet mask, and gateway based on the current access network.
   - ☐ : Users manually set the IP address, subnet mask, and gateway. These values can be set by moving the knob to the address field, pressing the knob and using the numeric keypad to complete the address setting.




4. After setting DHCP, IP address, subnet mask, and gateway, press Apply to apply the settings;
5. Press Back on the interface to exit the network setting interface and return to the menu interface. Press Back on the interface again to return to the main interface.

### VNC Setting

Port: 5900-5999 selectable.

### USB Setting

Connect to the computer through the USB-B port on the back panel for communication.

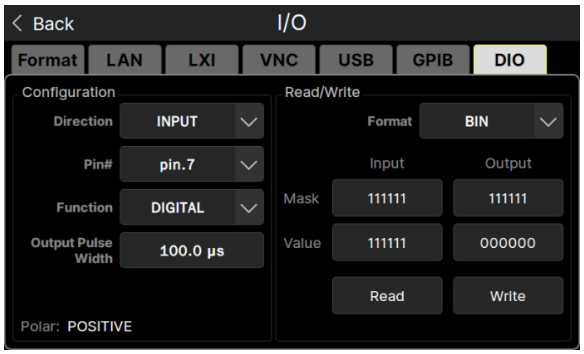
Display resource information when USB is connected

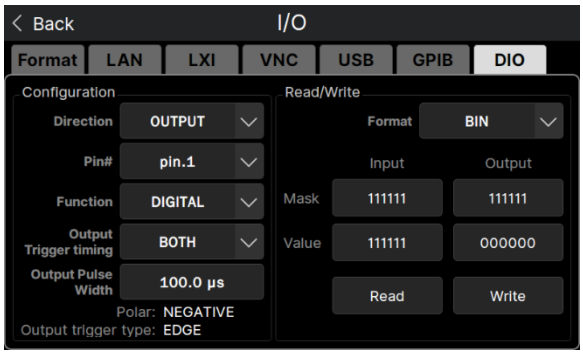
### GPIB Setting

Address: 0-30 selectable.

### DIO Setting

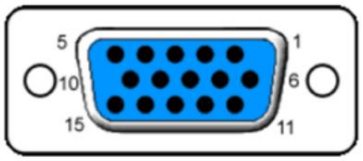
- Direction: Select the digital I/O port to set up. The left figure below shows the INPUT view and the right shows the OUTPUT view.




- Pin#: Digital I/O pin number, pin.1-6 is output, pin.7-12 is input.
- Function: Select the function of the specified pin for digital signal input/output (DIGITAL) and trigger input/output (TRIGGER).
- Output Trigger timing: Set the timing of output trigger, AFTER, BEFORE, or BOTH can be set.
- Output Pulse Width: Set the pulse width of output trigger, 10 µs~10 ms can be set.
- Polar: Show the polarity of input/output function.
- Output trigger type: Show the type of output trigger.
- Format: Set the format of the values in Mask and Value, binary (BIN), decimal (DEC), or hexadecimal (HEX) can be set.
- Mask: Mask value, the code type of the unused bits of the Digital I/O ports.
- Value: Values set to the Digital I/O ports.
- Read: Read the mask value/value currently set to the Digital I/O ports.
- Write: Write the specified mask value/value to the Digital I/O ports.

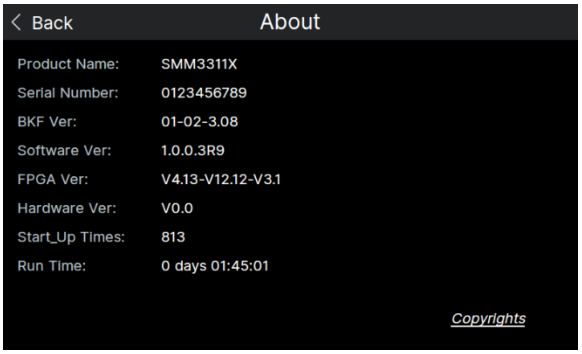
Digital I/O




| | |
|---|---|
| Output: pin.1-6 | Pull up the internal 4.7 kΩ resistor to 5 V, falling edge/low level effective |
| Input: pin.7-12 | TTL CMOS driver input, rising edge/high level effective |
| 13 pins | +5 V output, maximum current 50 mA, no fuse |
| 14 pins | Safety interlock pin: After high-level activation (connected to pin 13), the output voltage is >42 V |
| 15 pins | GND |
| Maximum input voltage | 5.25 V |
| Minimum input voltage | -0.25 V |
| Maximum logic L input voltage | 0.25 V |
| Minimum logic H input voltage | 2 V |
| Maximum source current | 1 mA@Vout = 0 V |
| Maximum sink current | 10 mA@Vout = 5 V |
| Maximum number of simultaneously triggered units (using Digital I/O) | 8 |

## Version Imformation

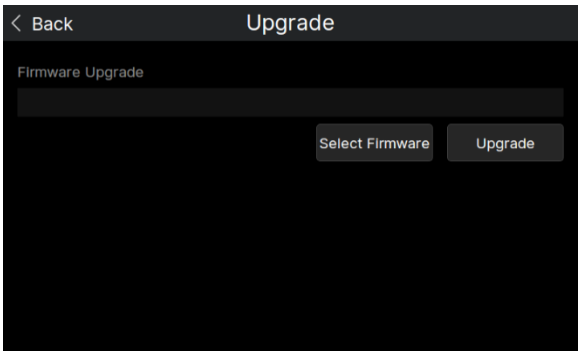
Press MENU button or MENU of the user interface to enter the menu interface, select About to enter the version information display interface. The version information includes: product name, serial number, BKF version, software version, FPGA version, hardware version, start-up times, and running time.




## System Upgrade

Please follow the steps below to upgrade the firmware:

1. Download the firmware upgrade package from the official website;
2. Copy the .ADS file in the upgrade package to the root directory of the U disk;
3. Insert the U disk into the USB-A port of the front panel or rear panel;
4. Press MENU button or MENU of the user interface, then press the Upgrade corresponding menu button to enter the upgrade interface;
5. Press Select Firmware to enter the external USB drive storage interface, select the upgrade file, and press OK to confirm;
6. Press Upgrade to start the upgrade, and an upgrade progress bar will pop up. The instrument will reboot after a successful upgrade, and if it fails, it will pop up a failure alert box.




NOTE:

Any operation that interrupts the upgrade process may cause upgrade failure or even the machine cannot be restarted. Do not remove the U disk or make any changes to the power supply during the upgrade process.

# Remote Control

Based on the SCPI (Standard Commands for Programmable Instruments) command set, SMM3000X supports remote control by communicating with computers through the USB and LAN ports on the back panel. Please refer to the “SMM3000X series programming guide” for remote control methods, syntax conventions, and related SCPI commands.

### Web Function

SMM3000X can be connected to LAN network to provide remote instrument access. After LAN connection, open Google Chrome and directly enter the IP address set on the SMM3000X to enter the web interface, which can achieve remote control of the instrument.

# More Information

You can obtain the instrument information and installation status of all options through Utility menu, for more information of this product, please refer to the following manuals (you can also download them from the SIGLENT web site: https://int.siglent.com/):

- SMM3000X series user manual: Provides detailed introductions of the functions of this instrument.
- SMM3000X series programming guide: Provides detailed introductions of the SCPI commands and programming of this instrument.
- SMM3000X series data sheet: Provides the main characteristics and specifications of this instrument.

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