SDM4000A Series
Digital Multimeter

User Manual

EN01A

TELONIC
TEST INSTRUMENTS & POWER SUPPLIES
ISO 9001 QUALITY MANAGEMENT
UKAS MANAGEMENT SYSTEMS 0015
ESTABLISHED OVER 50 YEARS - SINCE 1966
01189 786911 TELONIC.CO.UK



SIGLENT TECHNOLOGIES CO., LTD.

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1 Copyright and Statement

Copyright

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Trademark Information

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Statement

- **SIGLENT** products are protected by patent laws in and outside of the P.R. China.
- **SIGLENT** reserves the rights to change the specification and price.
- Information in this publication replaces all previous corresponding published material.
- Contents in this manual are not allowed to be copied, extracted or translated in any form or by any means without **SIGLENT**'s permission.

2 General Safety Summary

Read the following safety precautions carefully to avoid any personal injuries or damages to the instrument and any products connected to it. To avoid potential hazards, please use the instrument as specified.

2.1 Safety Instructions

Use proper power line.

It's only allowed to use the special power line which is approved by local state. Unqualified rated cables cannot be used to replace detachable power cables.

Ground the instrument.

The instrument is grounded through the protective earth conductor of the power line. The ground conductor must be connected to the earth to avoid electric shock. Make sure the instrument is grounded correctly before connecting its input or output terminals.

Connect the signal wire correctly.

The potential of the signal wire is float to the earth, so do not touch the signal wire while connected to high voltage.

Observe all terminal ratings.

Please observe all ratings and sign instructions on the instrument to avoid fire or electric shock. Before connecting the instrument, please read the manual carefully to gain more information about the ratings.

Do not operate with suspected failures.

If you suspect that the product is damaged, please contact **SIGLENT**'s qualified service personnel to inspect it. Any repair and adjustment to the product or replacing a component should be done by qualified personnel only.

Avoid circuit or wire exposure.

Don't touch exposed contacts or components when the power is on.

Don't operate without covers.

Don't operate the instrument with covers or panels removed.

Use proper fuse.

It's only allowed to use the specified fuse for the instrument.

Use proper over-voltage protection.

Make sure there is no over-voltage (like voltage caused by thunder and lightning) reaching to the instrument, otherwise the operator may suffer an electric shock.

Antistatic protection.

Static electricity will cause damages to the instrument, so test in antistatic areas as far as possible. Ground its inner and outer conductors to release the static electricity temporarily before connecting the cable to the instrument.

Keep good ventilation.

Improper ventilation will cause the rise of the instrument's temperature. Keep good ventilation and check the vent and fan regularly when using it.

Keep the surface of the instrument clean and dry.

Do not operate in wet or damp conditions.

Do not operate in flammable or explosive environment.

Instructions not to position the equipment so that it is difficult to operate the disconnecting instrument.

The disturbance test of all the models meets the limit values of A in the standard of EN 61326-1:2021 and UL 61010-2-030:2018.

2.2 Environmental Specifications

Table 2-1 Environmental specifications

Parameter	Specification
Indoor or Outdoor Use	Indoor use
Altitude	≤2000 m
OperatingTemperature	0° C to 50 °C
Relative Humidity	0% to 60% (non-condensing)
Power Supply	AC 200 V to 240 V 50/60 Hz or AC 100 V to 120 V 50/60 Hz, 30 VA MAX
Mains Supply Voltage Fluctuations	±10%
Overvoltage Category	CAT II
Wet Locations (if applicable)	Dry location only
Degree of Pollution	II

Notes:

- **Overvoltage Category II (Measurement Category II)** applies to equipment connected to the AC line via a detachable cord and plug, such as household appliances, portable tools, and other portable equipment. It corresponds to the local-level mains (wall sockets).
- **Degree of Pollution II** refers to a working environment that is dry and non-conductive pollution occurs. Occasional temporary conductivity caused by condensation is expected.

Input terminal protection limitation

Protection limitation is defined for the input terminal:

1. Main input (HI and LO) terminal

HI and LO terminals are used for Voltage, Resistance, Capacitance, Continuity, Frequency, Diode and temperature measurement. Two protection limitations are defined:

- HI-LO protection limitation: 1000 VDC or 750 AVC. It's the maximum measurable voltage. The limitation can be expressed as 1000 Vpk.
- LO-ground protection limitation: LO terminal can "float" 400 Vpk relative to the ground safely. The maximum protection limitation of HI terminal relative to the ground is 1000 Vpk. Therefore, the sum of the "float" voltage and the measured voltage can't exceed 1400 Vpk.

2. Sampling (HISense and LOSense) terminal

HISense and LOSense are used for 4-wire Resistance measurement. Two protection limitations are defined:

- HISense-LOSense protection limitation: 200 Vpk.
- LOSense-LOSense protection limitation: 2 Vpk.

3. Current input (I) terminal

- SDM4075 series: I and LO terminals are used for current measurement. The front panel fuse provides a maximum protection limit of 10 A for the current flowing through the I terminal, while the rear panel current terminal fuse provides a protection limit of 3 A.
- SDM4065 series: I and LO terminals are used for current measurement. The front panel fuse provides a maximum protection limit of 10 A for the current flowing through the I terminal, while the rear panel current terminal fuse provides a protection limit of 2 A.
- SDM4055 series: I and LO terminals are used for current measurement. The rear panel fuse provides a maximum protection limit of 10 A for the current flowing through the I terminal.

⚠ CAUTION

Voltage on the current input terminal corresponds to voltage on LO terminal. To keep good protection, only use the fuse of specified type and level to replace this fuse.

IEC Measurement Category II Overvoltage Protection

SDM4000A digital multimeter provides overvoltage protection for line-voltage mains connections meeting both of the following conditions to avoid the danger of electric shock:

1. The HI and LO input terminals are connected to the mains under Measurement Category II conditions as following.
2. The maximum line voltage of the mains is 300 VAC.

⚠ WARNING

IEC Measurement Category II includes electrical devices connected to mains at an outlet on a branch circuit, such as most small appliances, test equipment, and other devices that plug into a branch outlet or socket.

SDM4000A is capable of making measurements with the HI and LO inputs connected to mains in such devices or the branch outlet itself. However, the HI and LO terminals of SDM4000A can't be connected to mains in permanently installed electrical devices such as the main circuit-breaker panels, sub-panel disconnected boxes and permanently wired motors. Such devices and circuits are prone to exceed the protection limits of SDM4000A.

⚠ CAUTION

Voltages above 300 VAC only can be measured in circuits that are isolated from mains. However, there may be transient overvoltage in circuits that are isolated from mains. SDM4000A is able to withstand occasional transient overvoltage up to 2500 Vpk. Please don't use this instrument to measure circuits that transient overvoltage may exceed this level.

2.3 Safety Terms and Symbols

Terms in this manual. Terms may appear in this manual:

WARNING	**WARNING** statements indicate the conditions and behaviors that could result in injury or loss of life.
CAUTION	**CAUTION** statements indicate the conditions and behaviors that could result in damage to this product or other properties.
CAT II (300 V)	IEC Measurement Category II. Inputs may be connected to mains (up to 300 VAC) under Category II overvoltage conditions.

Terms used on the instrument. Terms may appear on the instrument:

DANGER	indicates an injury or hazard that may immediately happen.
WARNING	indicates an injury or hazard that may not immediately happen.
CAUTION	indicates that a potential damage to the instrument or other property might occur.

Symbols used on the instrument. Symbols may appear on the instrument:



Hazardous Voltage



Warning



Protective Earth Ground



Test Ground



Chassis Ground



ETL Logo

2.4 General Care and Cleaning

Care:

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

To avoid damage to the instrument or probes, please do not expose them to fog, liquid, or solvents.

Cleaning:

Clean the instrument and test leads regularly according to usage frequency.

- Wipe the external dust of the instrument and test leads by a soft rag. Be careful not to scratch the transparent plastic protective screen when cleaning the liquid crystal screen.
- Use a soft rag that has been soaked by water to clean the instrument after cutting off the power. Or use 75% isopropyl alcohol of water solvent to get a more thorough cleaning.

⚠ CAUTION

- To prevent the surface of the instrument or test leads from damages, please don't use any corrosive or chemical cleaning reagents.
- Please make sure the instrument is already dry before restarting it to avoid short circuits or personal injuries caused by water.

2.5 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.

3 First Steps

3.1 Delivery Checklist

First, verify that all items listed on the packing list have been delivered. If you note any omissions or damage, please contact your nearest **SIGLENT** customer service center or distributor as soon as possible. If you fail to contact us immediately in case of omission or damage, we will not be responsible for replacement.

3.2 Quality Assurance

The multimeter has a 3-year warranty (1-year warranty for probe and accessories) from the date of shipment, during normal use and operation. **SIGLENT** can repair or replace any product that is returned to the authorized service center during the warranty period. We must first examine the product to make sure that the defect is caused by the process or material, not by abuse, negligence, accident, abnormal conditions, or operation.

SIGLENT shall not be responsible for any defect, damage, or failure caused by any of the following:

a) Attempted repairs or installations by personnel other than **SIGLENT**.

b) Connection to incompatible devices/incorrect connection.

c) For any damage or malfunction caused by the use of non-**SIGLENT** supplies. Furthermore, **SIGLENT** shall not be obligated to service a product that has been modified. Spare, replacement parts and repairs have a 90-day warranty.

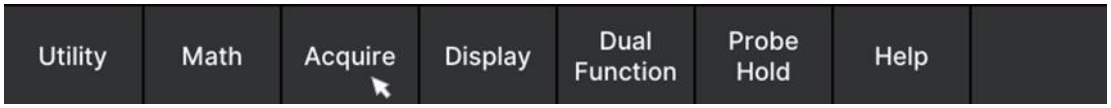
The multimeter's firmware has been thoroughly tested and is presumed to be functional. Nevertheless, it is supplied without a warranty of any kind covering detailed performance. Products not made by **SIGLENT** are covered solely by the warranty of the original equipment manufacturer.

3.3 Maintenance Agreement

We provide various services based on maintenance agreements. We offer extended warranties as well as installation, training, enhancement and on-site maintenance, and other services through specialized supplementary support agreements. For details, please consult your local **SIGLENT** customer service center or distributor.

4 Document Conventions

For convenience, text surrounded by a box border is used to represent the button of the front panel. For example, Function represents the " Function " button on the front panel. Text with character shading is used to represent menus, options, and virtual buttons that can be selected by your finger touch or by knob on the front panel. For example, Acquire represents the "Acquire" menu on the display screen.



For the operations that contain multiple steps, the description is in the form of "Step 1 > Step 2 >...". As an example, follow each step in the sequence to enter the LCD test interface:

Utility > Test Manager > LCD Test

Press the Utility button on the front panel as step 1, touch the Test Manager option on the screen as step 2, and touch the LCD Test option on the screen as step 3 to enter the LCD test interface.

The descriptions of the operations in this manual are illustrated in terms of gestures to touch the display; the same operations can be realized by using buttons and knob on the front panel, or by clicking with the mouse in the Web Remote Interface.

The precautions in this article provide important information, each of which is indicated by the icon .

5 Introduction of SDM4000A

5.1 Instrument at a Glance

The SDM4000A series dual-display digital multimeter, is designed to meet user requirements for high accuracy, multiple functions, and automatic measurement. The product integrates basic measurement functions, multiple mathematical operation functions, capacitance measurement, temperature measurement, and other features.

The SDM4000A series holds a TFT-LCD display screen with 480*800 high resolutions. Its clear keyboard layout and operation hints make it easier and agility to use. Besides, it supports multi-interface such as USB Device, USB Host, LAN and optional USB-GPIB interface, which can meet users' demand furthest.

Main Features:

- Dual-display function: synchronously display two kinds of characteristics of the same signal.
- Continuity and Diode tests.
- Thermocouple and thermistor temperature sensor testing function, with built-in cold terminal compensation for thermocouple.
- Plenty of math operations such as Max, Min, Average, Standard deviation, Limits, dB/dBm and Relative value; support bar, trend and histogram display functions.
- Enable to store data and configuration in U disk.
- Support USB Device, USB Host, LAN, and USB-GPIB (optional) interfaces.
- Support 16 channels scanner card, provide effective solutions for multi-point testing and multi signal measurement (SDM4075A-SC / SDM4065A-SC / SDM4055A-SC).
- Support standard SCPI and control software on PC, compatible with the latest widely used multimeter command sets.
- Equipped with upper computer software, which can control the device and scanner card through the upper computer.
- Support recording and saving historical measurement results.
- 256 MB Nand Flash, supports storage of various types of files such as readings, images, configuration files.
- Provide Chinese and English menu, and built-in help system for easy information retrieval.
- Support an intelligent laboratory management system based on BS architecture and LAN connection, with hardware compatible with the original experimental system for secondary development.

5.2 Models

Model		Description
SDM4075A Series	SDM4075A	7½-digit high-precision multimeter, with rear panel input terminals
	SDM4075A-SC	7½-digit high-precision multimeter, with 16-channel scanner card
SDM4065A Series	SDM4065A	6½-digit high-precision multimeter
	SDM4065A-RE	6½-digit high-precision multimeter, with rear panel input terminals
	SDM4065A-SC	6½-digit high-precision multimeter, with 16-channel scanner card
SDM4055A Series	SDM4055A	5½-digit high-precision multimeter
	SDM4055A-SC	5½-digit high-precision multimeter, with 16-channel scanner card

Note: For policy and regulatory reasons, the scanner models SDM4065A-RE, SDM4065A-SC and SDM4055A-SC is not available in some regions, please contact the local distributor for more information.

5.3 Specifications

Parameter	SDM4075A Series	SDM4065A Series	SDM4055A Series
Digits of resolution	7 ½	6 ½	5 ½
Count	11,000,000 count	2,200,000 count	220,000 count
Max reading rate	50k rdgs/s	50k rdgs/s	4.8k rdgs/s
Measurement functions	DCV, ACV, DCI, ACI, 2-wire resistance, 4-wire resistance, Capacitance, Continuity, Diode, Frequency, Period, Temperature		
DCV	100 mV to 1000 V	200 mV to 1000 V	200 mV to 1000 V
ACV	100 mV to 750 V	200 mV to 750 V	200 mV to 750 V
DCI	1 μA to 10 A	200 μA to 10 A	200 μA to 10 A
ACI	100 μA to 10 A	200 μA to 10 A	20 mA to 10 A
2-wire and 4-wire resistance	10 Ω to 1 GΩ	200 Ω to 100 MΩ	200 Ω to 100 MΩ
Capacitance	1 nF to 100 mF	2 nF to 100 mF	2 nF to 10 mF
Continuity	1 kΩ	2 kΩ	2 kΩ
Diode	5 V	4 V	4 V
Frequency, Period	3 Hz to 1 MHz	3 Hz to 1 MHz	20 Hz to 1 MHz
Temperature	RTD, Thermocouple		
Statistical graphics	Numberical, Histogram, Bar meter, Trend chart		
Memory	2 million readings	2 million readings	2 million readings
Data log	√	√	√
Digitize	√	√	×
Scanner card	○ (SDM4075A-SC only)	○ (SDM4065A-SC only)	○ (SDM4055A-SC only)
Display	5" TFT-LCD touch screen	5" TFT-LCD touch screen	5" TFT-LCD touch screen

√: Standard

○: Optional

×: Not supported

6 Quick Start

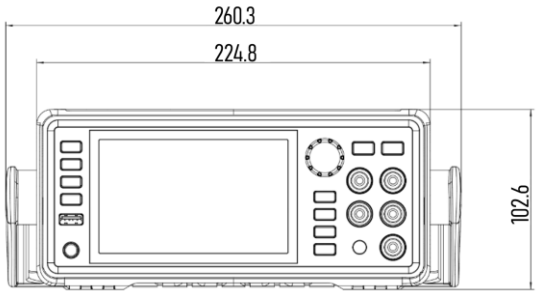
This chapter introduces the preparation work for using the SDM4000A digital multimeter, and introduces the front panel, rear panel, display screen, etc. of the digital multimeter.

This chapter contains the following topics:

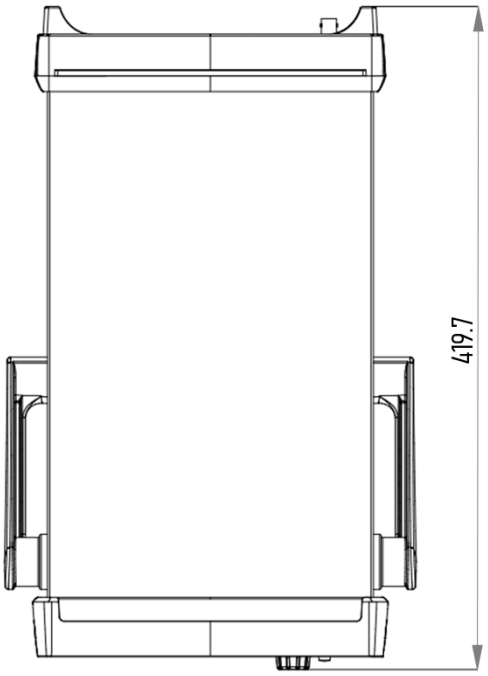
- Mechanical Dimension
- To adjust the Handle
- Panel Introduction
- User Interface
- Scanner Card (SC1016)
- To Use the Built-in Help System
- Replace the Power Fuse

6.1 Mechanical Dimension

6.1.1 SDM4075A Series



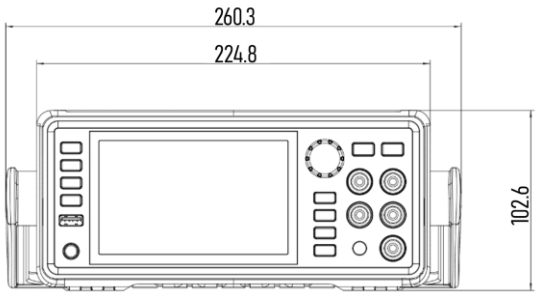
Front View



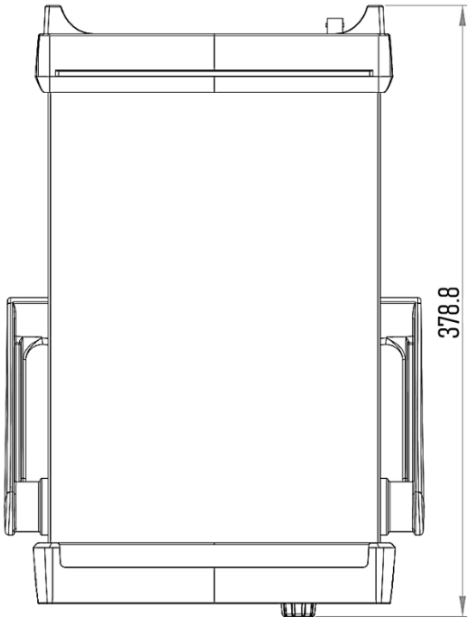
Top View

Unit: mm

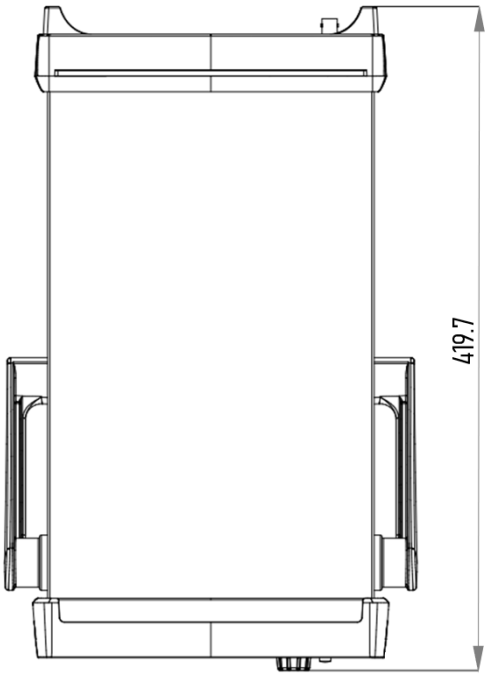
6.1.2 SDM4065A Series



Front View



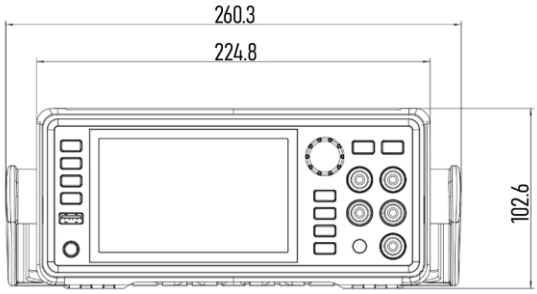
Top View (SDM4065A / SDM4065A-SC)



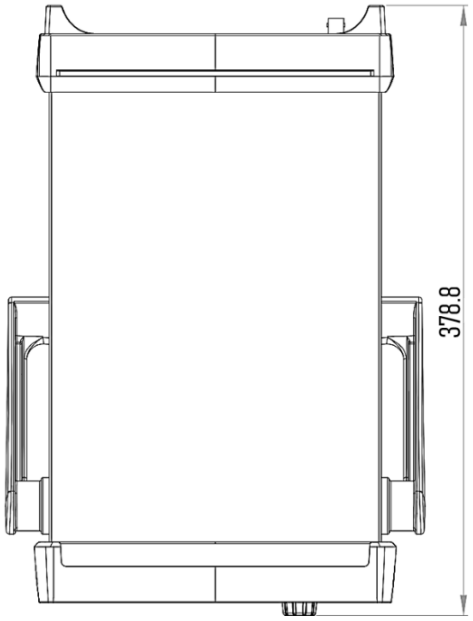
Top View (SDM4065A-RE)

Unit: mm

6.1.3 SDM4055A Series



Front View

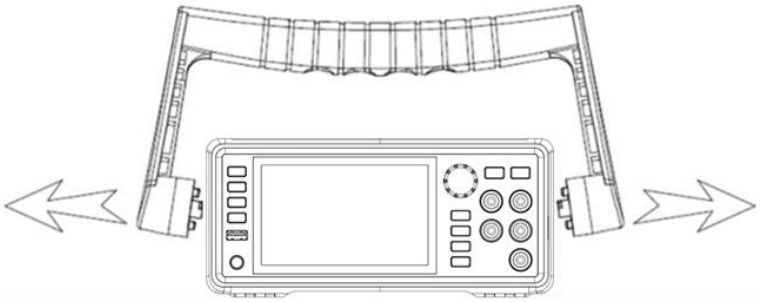


Top View

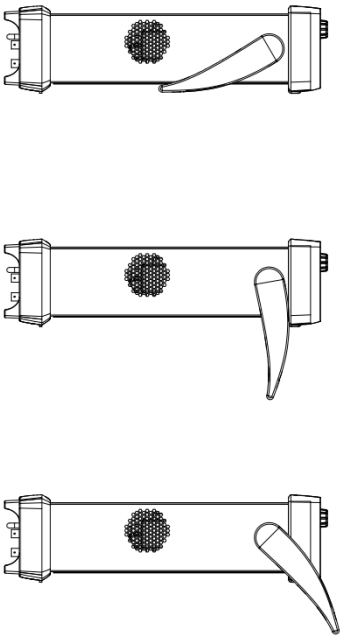
Unit: mm

6.2 To adjust the Handle

Please grip the handle by the two sides and pull it outward to adjust the handle position of SDM4000A. Then rotate the handle to the appropriate position. Please operate as the following figure:



Handle Adjustment



Viewing Position



Carrying Position

6.3 Panel Introduction

The SDM4000A digital multimeter features a clean and intuitive front panel, with buttons and connectors logically grouped for straightforward operation.

6.3.1 SDM4075A Series

Front Panel:



Figure 6-1 SDM4075A/SDM4075A-SC front panel

A. **Power Key** Short/long press the key to turn on/off the instrument.

B. **USB Host** Through this interface, the current instrument state or measurement data can be stored to an external device, and previously stored instrument states or firmware upgrade files can be read from the external device.

C. **Menu Operation Buttons** Press any button to activate the corresponding menu.

D. **Touchable Display Screen** Display the menu and measurement parameter settings for the current function, system status, and prompt messages. Related operations can be achieved by touching the screen area with your fingers.

E. **Knob** Turn the knob clockwise or counterclockwise to move the cursor, press to select the menu item where the cursor is located.

F. **Trigger and Measurement Function Buttons.**

G. **Left/Right Directional Buttons** Move the cursor, with the same function as counterclockwise or clockwise rotation of the knob.

H. **Signal Input Terminals** The measured signal (device) will be connected into the multimeter through these terminals. Connection methods vary depending on the measurement target. For details, please refer to the "Measurement connection" for the respective measurement function.

I. **Front/Rear Switch** Used to switch between front panel/rear panel terminal block (SDM4075A), or front panel terminal block/scanner card (SDM4075A-SC)

Rear Panel:



Figure 6-2 SDM4075A rear panel



Figure 6-3 SDM4075A-SC rear panel

A. **Power Socket** The multimeter accepts two types of AC supplies. Please use the power cord provided in the accessories to connect the multimeter to the AC power through this socket.

⚠ CAUTION

A proper voltage scale must be first selected (through the Voltage Selector) before power connection.

B. **Power Fuse** Refer to "6.8 Replace the Power Fuse" for fuse type and replacement instructions.

C. **AC Voltage Selector** Select a proper voltage scale (110 V or 220 V) according to the AC supply used.

D. **USB Host.**

E. **USB Device** Connect the PC through this interface. You can use SCPI commands or PC software to control multimeter remotely.

F. **LAN** Through this interface, the multimeter can be connected to the network for remote control.

G. **VMC Output** The multimeter outputs a 5 V pulse from this port every time it completes a sampling.

H. **Ext Trigger** Trigger the multimeter by connecting a trigger pulse through the [EXT TRIG] connector. Note the external trigger source must be selected.

I. **Chassis Ground Screw**.

J. **Instrument Lock Hole** You can use the safety lock (please purchase it yourself) to lock the multimeter in a fixed place if necessary.

K. **Rear Panel Signal Input Terminals (SDM4075A)** The measured signal (device) will be connected into the multimeter through these terminals. Connection methods vary depending on the measurement target. For details, please refer to the "Measurement connection" for the respective measurement function.

L. **Scanner Card (SDM4075A-SC)** Equipped with a 16-channel external inspection card. For details, please refer to the "6.6 Scanner Card (SC1016)".

6.3.2 SDM4065A Series

Front Panel:



Figure 6-4 SDM4065A / SDM4065A-SC front panel



Figure 6-5 SDM4065A-RE front panel

A. **Power Key** Short/long press the key to turn on/off the instrument.

B. **USB Host** Through this interface, the current instrument state or measurement data can be stored to an external device, and previously stored instrument states or firmware upgrade files can be read from the external device.

C. **Menu Operation Buttons** Press any button to activate the corresponding menu.

D. **Touchable Display Screen** Display the menu and measurement parameter settings for the current function, system status, and prompt messages. Related operations can be achieved by touching the screen area with your fingers.

E. **Knob** Turn the knob clockwise or counterclockwise to move the cursor, press to select the menu item where the cursor is located.

F. **Trigger and Measurement Function Buttons**

G. **Left/Right Directional Buttons** Move the cursor, with the same function as counterclockwise

or clockwise rotation of the knob.

H. **Signal Input Terminals** The measured signal (device) will be connected into the multimeter through these terminals. Connection methods vary depending on the measurement target. For details, please refer to the "Measurement connection" for the respective measurement function.

I. **Front/Rear Switch (SDM4065A-RE)** Used to switch between front panel/rear panel signal input terminals

Rear Panel:



Figure 6-6 SDM4065A rear panel

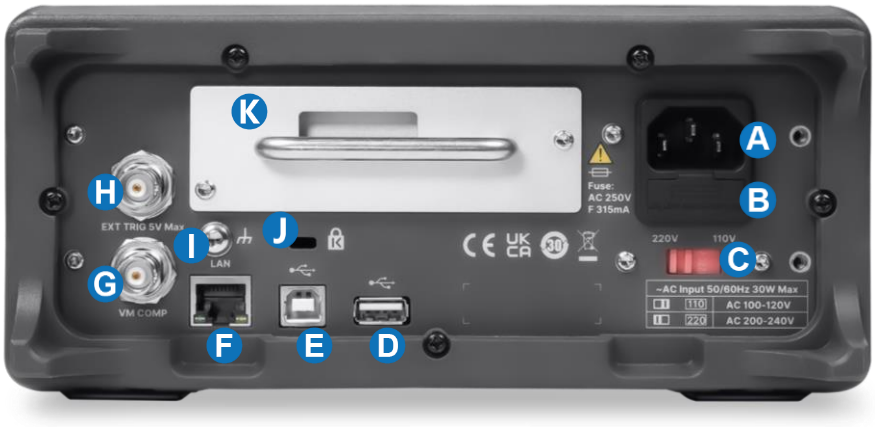


Figure 6-7 SDM4065A-SC rear panel



Figure 6-8 SDM4065A-RE rear panel

A. **Power Socket** The multimeter accepts two types of AC supplies. Please use the power cord provided in the accessories to connect the multimeter to the AC power through this socket.

> **CAUTION**
>
> A proper voltage scale must be first selected (through the Voltage Selector) before power connection.

B. **Power Fuse** Refer to "6.8 Replace the Power Fuse" for fuse type and replacement instructions.

C. **AC Voltage Selector** Select a proper voltage scale (110 V or 220 V) according to the AC supply used.

D. **USB Host**

E. **USB Device** Connect the PC through this interface. You can use SCPI commands or PC software to control multimeter remotely.

F. **LAN** Through this interface, the multimeter can be connected to the network for remote control.

G. **VMC Output** The multimeter outputs a 5V pulse from this port every time it completes a sampling.

H. **Ext Trigger** Trigger the multimeter by connecting a trigger pulse through the [EXT TRIG] connector. Note the external trigger source must be selected.

I. **Chassis Ground Screw**

J. **Instrument Lock Hole** You can use the safety lock (please purchase it yourself) to lock the multimeter in a fixed place if necessary.

K. **Scanner Card (SDM4065A-SC)** Equipped with a 16-channel external inspection card. For details, please refer to the "6.6 Scanner Card (SC1016)".

L. **Rear Panel Signal Input Terminals (SDM4065A-RE)** The measured signal (device) will be

connected into the multimeter through these terminals. Connection methods vary depending on the measurement target. For details, please refer to the “Measurement connection” for the respective measurement function.

6.3.3 SDM4055A Series

Front Panel:



Figure 6-9 SDM4055A/SDM4055A-SC front panel

A. **Power Key** Short/long press the button to turn on/off the instrument.

B. **USB Host** Through this interface, the current instrument state or measurement data can be stored to an external device, and previously stored instrument states or firmware upgrade files can be read from the external device.

C. **Menu Operation Buttons** Press any softkey to activate the corresponding menu.

D. **Touchable Display Screen** Display the menu and measurement parameter settings for the current function, system status, and prompt messages. Related operations can be achieved by touching the screen area with your fingers.

E. **Knob** Turn the knob clockwise or counterclockwise to move the cursor, press to select the menu item where the cursor is located.

F. **Trigger and Measurement Function Buttons**

G. **Left/Right Directional Buttons** Move the cursor, with the same function as counterclockwise or clockwise rotation of the knob.

H. **Signal Input Terminals** The measured signal (device) will be connected into the multimeter through these terminals. Connection methods vary depending on the measurement target. For details, please refer to the "Measurement connection" for the respective measurement function.

Rear Panel:



Figure 6-10 SDM4055A rear panel



Figure 6-11 SDM4055A-SC rear panel

A. **Power Socket** The multimeter accepts two types of AC supplies. Please use the power cord provided in the accessories to connect the multimeter to the AC power through this socket.

CAUTION

A proper voltage scale must be first selected (through the Voltage Selector) before power connection.

B. **Power Fuse** Refer to "6.8 Replace the Power Fuse" for fuse type and replacement instructions.

C. **AC Voltage Selector** Select a proper voltage scale (110 V or 220 V) according to the AC supply used.

D. **USB Host**

E. **USB Device** Connect the PC through this interface. You can use SCPI commands or PC software to control multimeter remotely.

F. **LAN** Through this interface, the multimeter can be connected to the network for remote control.

G. **VMC Output** The multimeter outputs a 5 V pulse from this port every time it completes a sampling.

H. **Ext Trigger** Trigger the multimeter by connecting a trigger pulse through the [EXT TRIG] connector. Note the external trigger source must be selected.

I. **Chassis Ground Screw**

J. **Instrument Lock Hole** You can use the safety lock (please purchase it yourself) to lock the multimeter in a fixed place if necessary.

K. **Scanner Card (SDM4055A-SC only)** Equipped with a 16-channel external inspection card. For details, please refer to the "6.7 Scanner Card (SC1016)".

6.3.4 Front Panel Buttons and Knob Instruction

Menu Operation Buttons

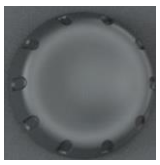
Home — Measurement menu button, press to return to the menu interface, where you can set measurement functions and corresponding parameters related to the functions.

Menu — Function selection menu button, press to enter mune interface, where you can select or set parameters about Utility, Math, Acquire, Display, Dual Function, Probe Hold and Help.

Utility — System function menu button, press to display utility menu, where you can set the system functions about Store/Recall, File Management, I/O Config, Test Management, System Setting and Date Time Edit.

Help — Provide help information.

Knob



Rotate the knob clockwise/counterclockwise to move the cursor, press down to select the menu item where the cursor is located or turn on/off the menu item function.

Trigger and Measurement Functions Buttons

Single — Single Trigger.

Run/Stop — Auto Run/Stop.

Acquire — Set up functions such as Acquire, Trigger Setting, VMC Out, and Save Readings.

Function — Open the measurement function selection menu to select the following measurement functions:

DCV	DC voltage measurement	Freq	Frequency measurement
ACV	AC voltage measurement	Cont	Continuity measurement
DCI	DC current measurement	⊣▷⊢	Diode measurement
ACI	AC current measurement	Temp	Temperature measurement
Ω2W	2-wire resistance measurement	Sensor	Sensor measurement
Ω4W	4-wire resistance measurement	Period	Period measurement
⊣⊢	Capacitance measurement	Scanner	Enable scanner card function

6.4 Start the Multimeter

Before connect the instrument to a power source, please select the AC voltage in the AC voltage selector on the rear panel of your multimeter according to the power supply. Then connect the power cord as shown in the following figure.

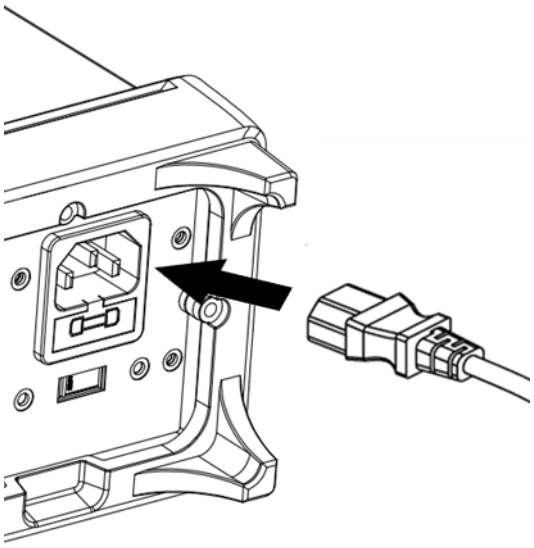


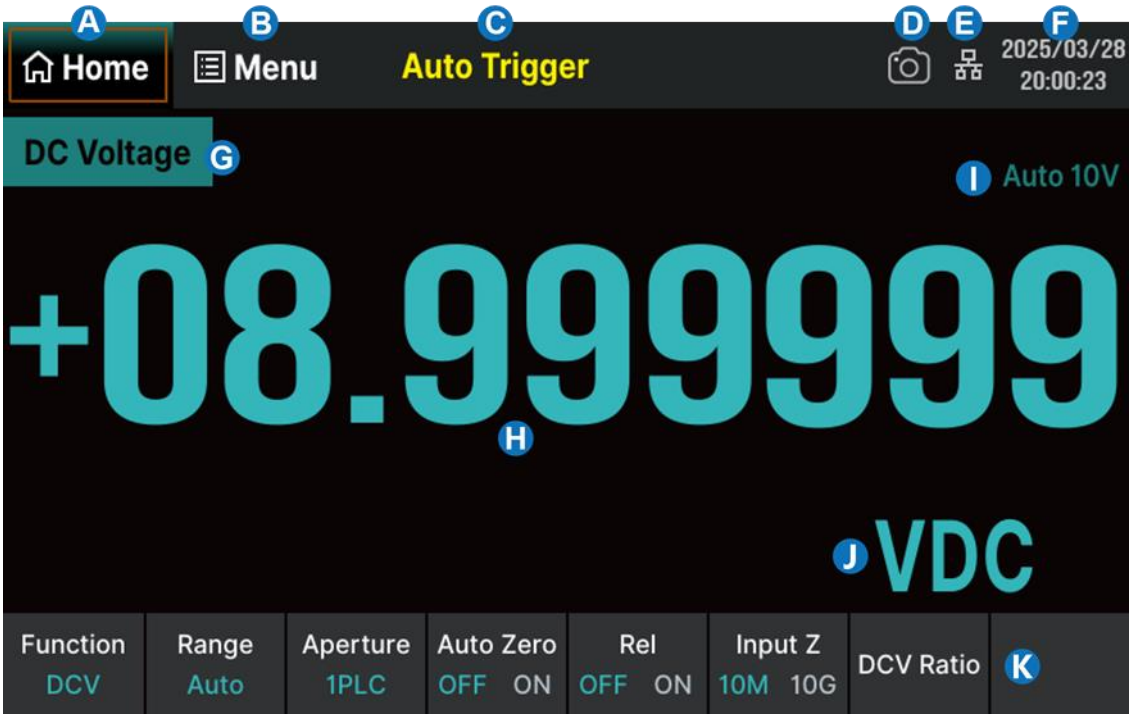
Figure 6-12 Connect power cord

After connecting the power cord and powering on the instrument, press the power button on the front panel. Then, check whether the instrument starts up normally. If it does not start, perform the following troubleshooting steps:

1. Check that the power cord is properly connected.
2. Check that the front panel power switch is firmly pressed.
3. If the instrument still does not start after the above checks, check whether the fuse has blown. If necessary, replace the fuse by following the procedure in "6.8 Replace the Power Fuse".
4. If the instrument still does not start after all the above checks, contact **SIGLENT**.

6.5 User Interface

Home interface:



A. Home: Functionally equivalent to the "Home" button on the left side of the front panel, touch to return to the home interface. The orange box indicates that the "Home" item is currently selected.

B. Menu: Functionally equivalent to the Menu button on the left side of the front panel, touch to enter the Menu interface.

C. Trigger status: Display the current trigger status. Touch to set Single, Run/Stop, which is equivalent to the Single and Run/Stop buttons on the front panel, and the screen displays the trigger parameter setting menu.

D. Quick screenshot identification. Touch to capture the current screen image and save it to local storage or external USB storage device. For detailed settings, please refer to "7.4.1.6 Screen Shot".

E. LAN status icon. indicates that the LAN cable is connected, indicates that it is not connected; Touch on this icon to set LAN.

F. Date and time display area: Display the current date and time, touch to set the date and time. For detailed settings, please refer to "7.4.6 Date Time Edit".

G. Measurement function. Touch the field area to select the measurement function.

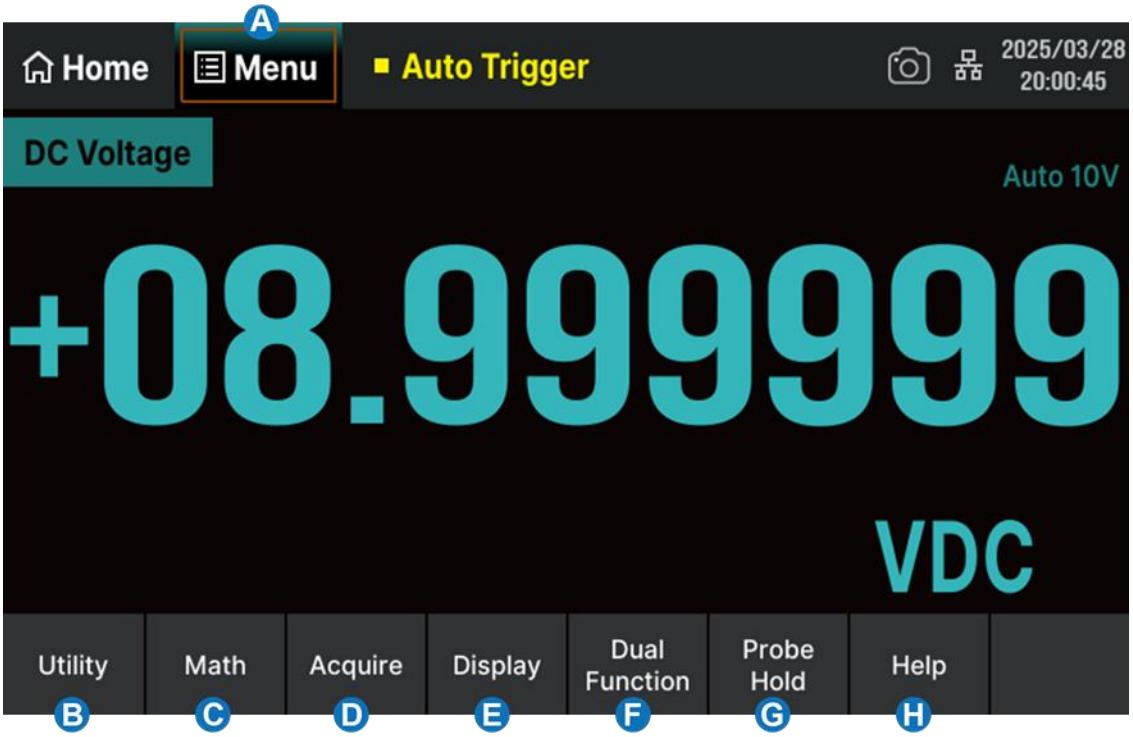
H. Measurement result.

I. Current range in use. Touch to pop-up range selection menu.

J. Unit of the measurement result, where: V – denotes voltage unit; DC – denotes DC current.

K. Operation menu: Select the measurement function and set the parameters for this function.

Menu interface:



A. "Menu" is currently selected, Menu interface is currently displayed.

B. Utility: Performs settings for storage/recall, file management, I/O configuration, test management, system setup, date and time edit, and service. The function is equivalent to the Utility button on the front panel.

C. Math: Enable/disable statistics, limits, dB/dBm, and relative value functions.

D. Acquire: Acquire mode (Continue/Data Log/Digitize) setting, trigger setting, VMC output setting, and saving readings.

E. Display: Display mode (Number/Bar/Trend /Histogram) and customized display accuracy can be set.

F. Dual Function: When turned on, the second measurement function can be selected to measure the two characteristics of the same input signal simultaneously.

G. Probe Hold: Up to 8 readings can be generated.

H. Help: Built-in help system, you can view the help information about measurement function, math, dual function, save and recall, teach support.

6.6 Scanner Card (SC1016)

SDM4075A-SC, SDM4065A-SC and SDM4055A-SC support 16 channels scanner card for multi-point and multi signal testing.

Table 6-1 Scanner card SC1016 measurement and test line connection

Items	No. of wires	Number of channels
DCV, ACV[1]	2 wires (H, L)	12 (CH1~CH12) (125 VAC, 110 VDC)
DCI, ACI[2]	2 wires (H, L)	4 (CH13~CH16) (2 A range only)
2-wire R, etc.[3]	2 wires (H, L)	12 (CH1~CH12)
4-wire R	4 wires (H, L, HS, LS)	6 (CH1~CH6 for HI/LO) (CH7~CH12 for HS/LS)

Notes:

[1] In 200 V range, the input signal is limited to 125 VAC and 110 VDC.

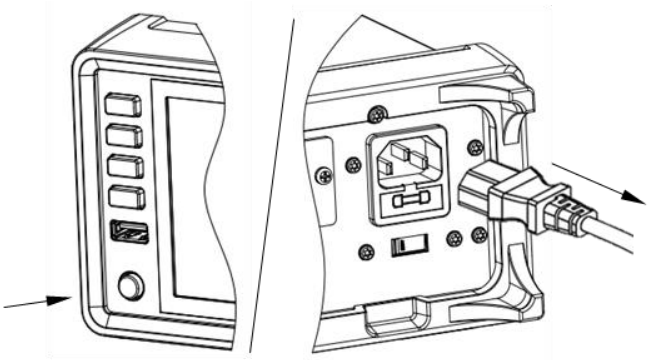
[2] Continuous current limited: <2.2 A. Accuracy: ± (3% of reading +0.02% of range).

[3] There are capacitance, diode, continuity, frequency/period, temperature (thermocouple) and temperature (2-wire RTD). The No. of wires and the No. of channels are the same with 2-wire resistance.

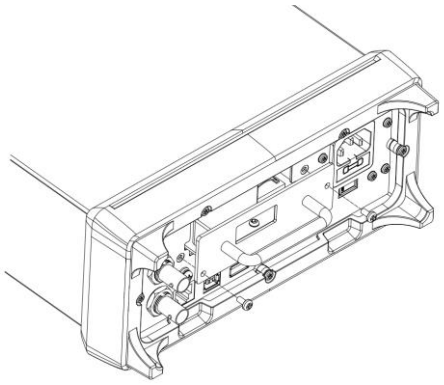
Operation Steps:

1. **Scanner Card Installation**

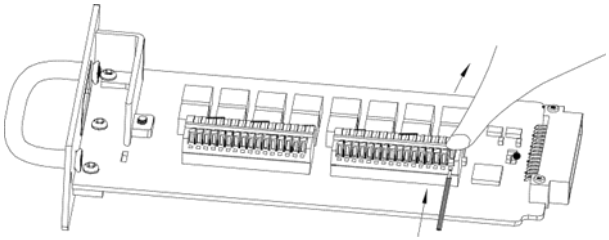
   1) Turn off the power and pull out the power cord.



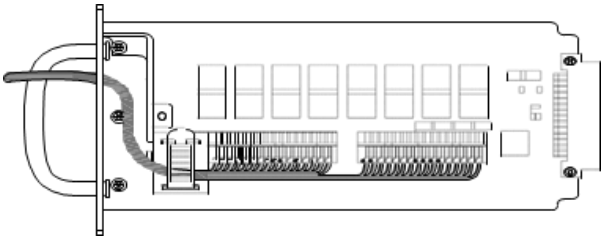
2) Unscrew the two screws and take out the cover plate of the slot.



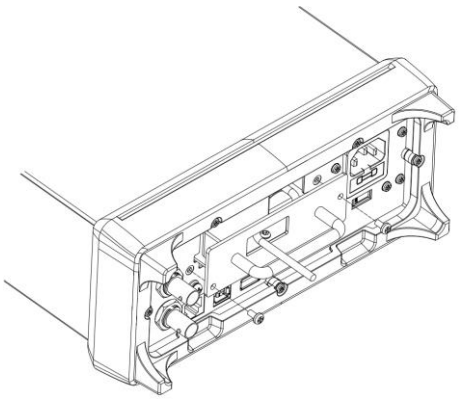
3) Press the connector button with your finger, and then insert the connecting line.



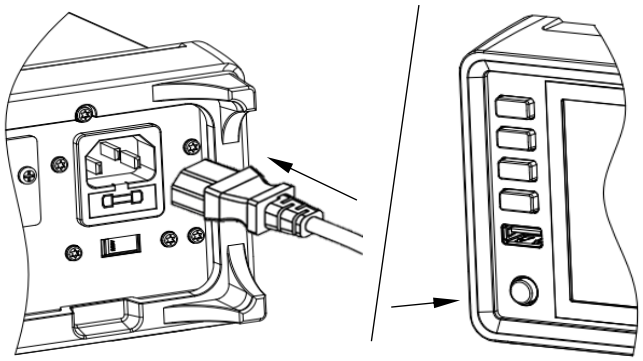
4) Lead out the connecting line from the opening of the cover plate as shown in the figure, and then fix the connecting line on the cable fixing base.



5) Insert the scanner card SC1016 into the body along the guide rail, and lock the two screws again.

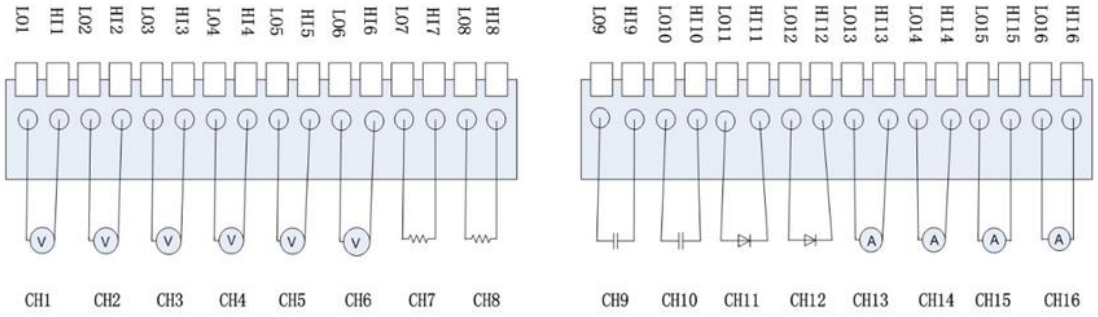


6) Plug in the power cord and turn it on.



2. Measurement connection method

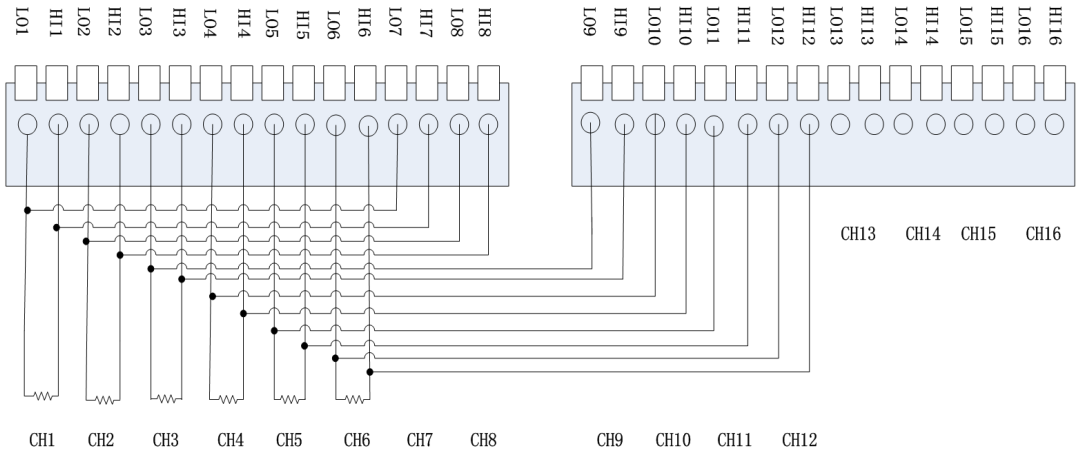
1) 2-wire measurement mode [1] (voltage, current, 2-wire resistance, capacitance, frequency/ period, continuity, diode, temperature).



Note:

[1] Each channel of CH1~CH12 can be used for switching measurement of voltage, 2-wire resistance, capacitance, frequency, continuity, diode, temperature, etc. CH13~CH16 channels are fixed for current measurement below 2.2 A.

2) 4-wire measurement mode



6.7 To Use the Built-in Help System

To obtain the built-in help information for this product, select the item that needs help, press the Help button on the front panel or touch Help on the screen to enter the help system interface, and view the corresponding help information.

The built-in help information is listed as the following:

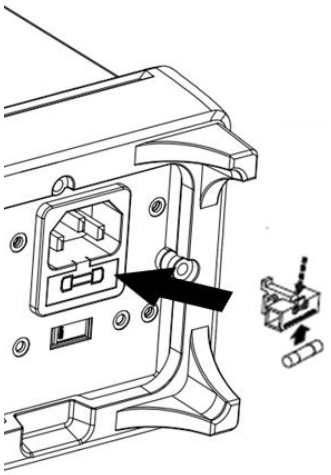
1. Basic measurement
2. Math function
3. Dual display function
4. Save and recall
5. Teach support

For details, please refer to “7.8 Help System”.

6.8 Replace the Power Fuse

The multimeter is already installed with a power fuse (0218.315MXP) before leaving factory. This fuse is a slow melting, explosion-proof, 315 mA, 5x20 mm fuse. If you need to replace the fuse, please follow the steps below to replace it:

1) Turn off the multimeter and remove the power cord.
2) Press down the block tongue using a straight screwdriver (in the direction of the dotted arrow in the figure) and pull out of the fuse seat.
3) Select a proper voltage scale.
4) Replace a specified fuse.
5) Reinstall the fuse seat into the slot.



Replace the Power Fuse

7 Front Panel Operations

This chapter introduces how to use the functions of the multimeter from the front panel.

The chapter contains the following topics:

- Measurement Configuration
- Basic Measurement Functions
- Dual-display Function
- Utility
- Trigger and Acquire
- Math Function
- Display
- Help System

7.1 Measurement Configuration

Most measurement parameters are user-defined. Changing a measurement parameter will change the measurement precision and speed as well as the input impedance. An appropriate measurement parameter based on the actual application will ensure faster measurement or higher measurement precision.

The default measurement configurations of the multimeter can ensure the accuracy of the measurement results in most cases. Users can directly use these defaults for any measurement or modify the parameters of the measurement function as required.

Measurement parameters can be quickly set through the Function button on the front panel.

The parameters for different measurement function differ, see table below:

Table 7-1 Measurement parameter

Functions	Parameters
DCV	Range, Aperture, Speed**, DC impedance, Auto Zero
ACV	Range, Speed**, AC filter
DCI	Range, Aperture, Speed**, Auto Zero
ACI	Range, Speed**, AC filter
Ω2W	Range, Aperture, Speed**, Auto Zero
Ω4W	Range, Aperture, Speed**, Auto Zero
Cap	Range
Cont	Threshold resistance
Diode	Threshold voltage
Freq/Preiod	Range, Gate time
Temp	N/A
Sensor	Only support DCI, DCV, Ω2W, Ω4W measurement functions

Note**: SDM4055A/SDM4055A-SC only.

7.1.1 Range

SDM4000A provides auto and manual range selecting modes. In auto mode, the multimeter selects a proper range automatically according to the input signal; in manual mode, user manually selects the appropriate range according to the measurement requirements. Auto range provides operational convenience, while manual range offers higher reading accuracy. The default range mode is Auto.

The multimeter range can be set as follows:

1. Use Auto range

Set the range mode to "Auto". The multimeter will automatically select the appropriate range for measurement based on the input signal. When the signal amplitude is unknown, it is recommended to use the auto range function. Compared with manual ranging, auto ranging is more convenient, but it results in slower measurements.

2. Set the range manually

After selecting measurement function, touch the Range menu to see the range setting options for this function, as shown in the following figure (taking DCV measurement as an example). Press the menu buttons corresponding to the range to achieve the corresponding range configuration.

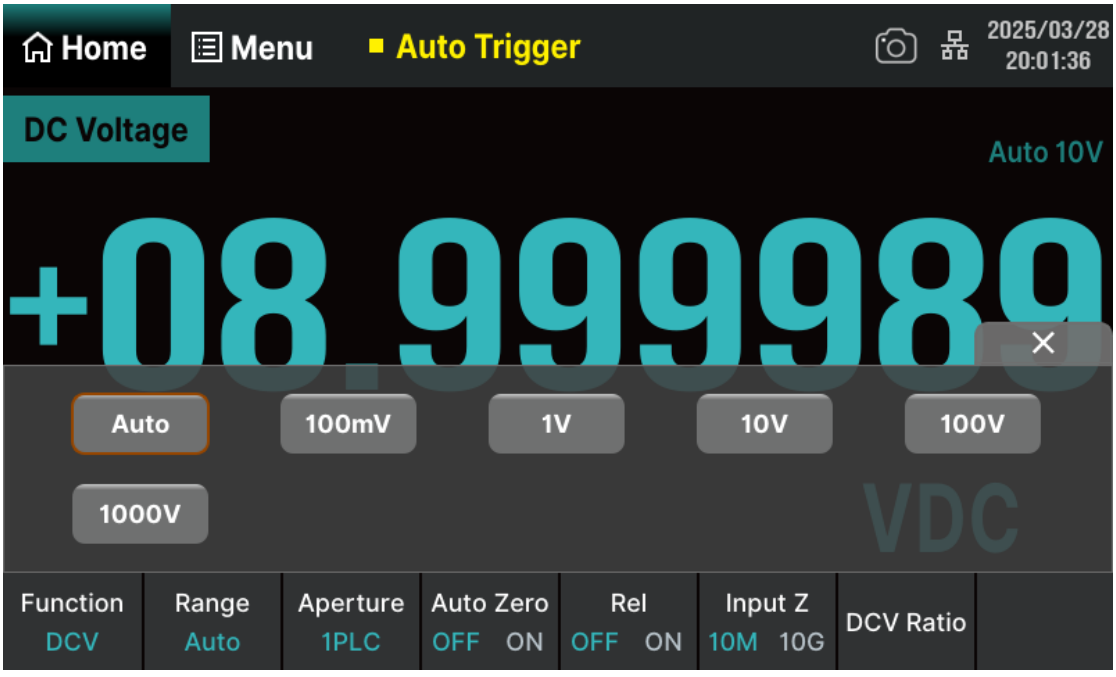


Figure 7-1 Range selection menu

In addition to setting the range through the menu option Range, touching the range field on the multimeter interface will bring up the range options, and touching the menu key of the

corresponding range will realize the corresponding range configuration.

Note:

1. “OVERLOAD” will be displayed when the input signal exceeds the current range.
2. After power on, remote reset, and startup with default factory settings, the range is set to Auto by default.
3. Auto mode is recommended if you are not sure about the measurement range in order to protect the instrument and obtain accurate data.
4. The range of CONT and Diode measurements are fixed.

Table 7-2 SDM4075A series range configure

Function	Range	Max Resolution	Inout Protection
DCV	Auto, 100 mV, 1 V, 10 V, 100 V, 1000 V	10 nV (on 100 mV range)	All ranges provide 1000 V input protection. All ranges except 1000 V range have 20% overrange.
ACV	Auto, 100 mV, 1 V, 10 V, 100 V, 750 V	10 nV (on 100 mV range)	All ranges provide 750 V input protection. All ranges except 750 V range have 20% overrange.
DCI	Auto, 1 μA, 10 μA, 100 μA, 1 mA, 10 mA, 100 mA, 1 A, 3 A, 10 A	0.1 pA (on 1 μA range)	All ranges provide 10 A input protection. All ranges except 10 A range have 20% overrange.
ACI	Auto, 100 μA, 1 mA, 10 mA, 100 mA, 1 A, 3 A, 10 A	10 pA (on 100 μA range)	All ranges provide 10 A input protection. All ranges except 10 A range have 20% overrange.
Ω2W Ω4W	Auto, 10 Ω, 100 Ω, 1 kΩ, 10 kΩ, 100 kΩ, 1 MΩ, 10 MΩ, 100 MΩ, 1 GΩ	1 μΩ (on 10 Ω range)	All ranges provide 1000 V input protection. All ranges have 20% overrange.
Cap	Auto, 1 nF, 10 nF, 100 nF, 1 μF, 10 μF, 100 μF, 1 mF, 10 mF, 100 mF	10 fF (on 1 nF range)	All ranges provide 1000 V input protection. All ranges have 20% overrange.
Cont	Fixed range: 1 kΩ	0.01 kΩ	1000 V input protection
Diode	Fixed range: 5 V	10 μV	1000 V input protection
Freq Period	100 mV, 1 V, 10 V, 100 V, 750 V		All ranges provide 750 V input protection.

Table 7-3 SDM4065A series range configure

Function	Range	Max Resolution	Inout Protection
DCV	Auto, 200 mV, 2 V, 20 V, 200 V, 1000 V	100 nV (on 200 mV range)	All ranges provide 1000 V input protection. All ranges except 1000 V range have 10% overrange.
ACV	Auto, 200 mV, 2 V, 20 V, 200 V, 750 V	100 nV (on 200 mV range)	All ranges provide 750 V input protection. All ranges except 750 V range have 10% overrange.
DCI	Auto, 200 μA, 2 mA, 20 mA, 200 mA, 2 A, 10 A	0.1 nA (on 200 μA range)	All ranges provide 10 A input protection. All ranges except 10 A range have 10% overrange.
ACI	Auto, 200 μA, 2 mA, 20 mA, 200 mA, 2 A, 10 A	0.1 nA (on 200 μA range)	All ranges provide 10 A input protection. All ranges except 10 A range have 10% overrange.
Ω2W Ω4W	Auto, 200 Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 10 MΩ, 100 MΩ	100 μΩ (on 200 Ω range)	All ranges provide 1000 V input protection. All ranges have 10% overrange.
Cap	Auto, 2 nF, 20 nF, 200 nF, 2 μF, 20 μF, 200 μF, 2 mF, 20 mF, 100 mF	10 fF (on 2 nF range)	All ranges provide 1000 V input protection. All ranges have 10% overrange.
Cont	Fixed range: 2 kΩ	0.01 Ω	1000 V input protection
Diode	Fixed range: 4 V	10 μV	1000 V input protection
Freq Period	200 mV, 2 V, 20 V, 200 V, 750 V		All ranges provide 750 V input protection.

Table 7-4 SDM4055A series range configure

Function	Range	Max Resolution	Inout Protection
DCV	Auto, 200 mV, 2 V, 20 V, 200 V, 1000 V	100 nV (on 200 mV range)	All ranges provide 1000 V input protection. All ranges except 1000 V range have 10% overrange.
ACV	Auto, 200 mV, 2 V, 20 V, 200 V, 750 V	100 nV (on 200 mV range)	All ranges provide 750 V input protection. All ranges except 750 V range have 10% overrange.
DCI	Auto, 200 μA, 2 mA, 20 mA, 200 mA, 2 A, 10 A	0.1 nA (on 200μA range)	All ranges provide 10 A input protection. All ranges except 10 A range have 10% overrange.
ACI	Auto, 20 mA, 200 mA, 2 A, 10 A	0.1 μA (on 20 mA range)	All ranges provide 10 A input protection. All ranges except 10 A range have 10% overrange.
Ω2W Ω4W	Auto, 200 Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 10 MΩ, 100 MΩ	100 μΩ (on 200 Ω range)	All ranges provide 1000 V input protection. All ranges have 10% overrange.
Cap	Auto, 2 nF, 20 nF, 200 nF, 2 μF, 200 μF, 10 mF	100 fF (on 2 nF range)	All ranges provide 1000 V input protection. All ranges have 10% overrange.
Cont	Fixed range: 2 kΩ	0.01 Ω	1000 V input protection
Diode	Fixed range: 4 V	10 μV	1000 V input protection
Freq Period	200 mV, 2 V, 20 V, 200 V, 750 V		All ranges provide 750 V input protection.

7.1.2 Speed

SDM4055A series can set the measurement speed to three modes: Fast, Medium, and Slow, with corresponding speeds of 4800 rdgs/s, 50 rdgs/s, and 5 rdgs/s (0.01/1/10 PLC).

When measuring DCV, DCI, ACV, ACI, 2WR, or 4WR, select the Speed in the menu to see the setting options, as shown in the following figure (using DCV measurement as an example). Touch the corresponding menu key to achieve the corresponding configuration.

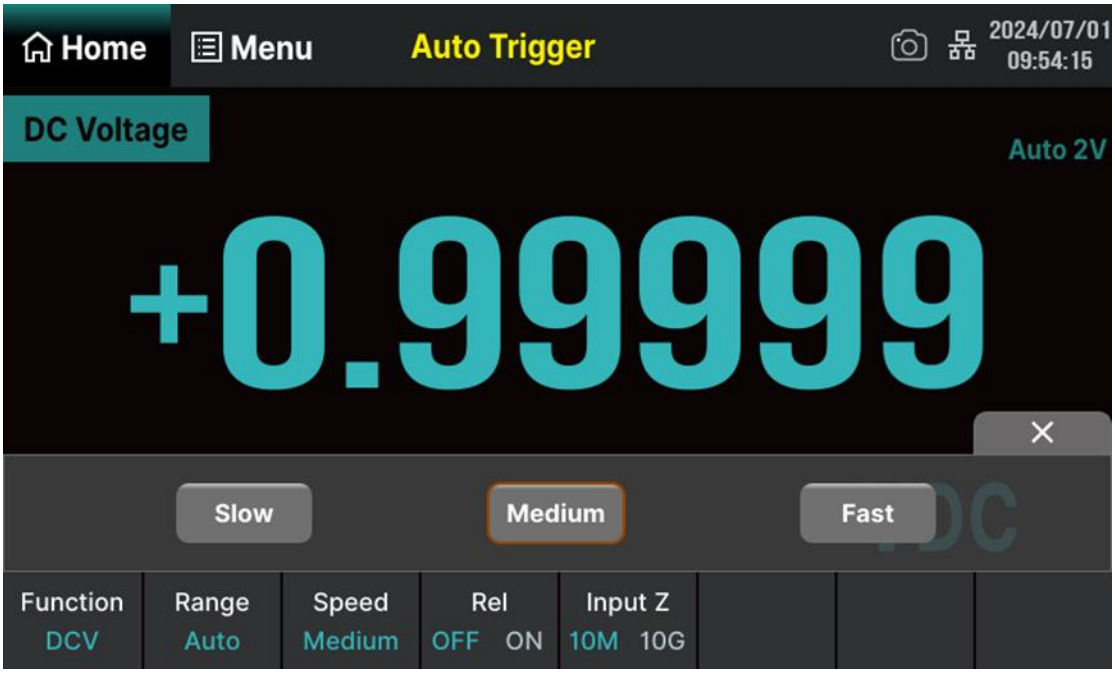


Figure 7-2 Speed selection menu

7.1.3 Aperture

The aperture refers to the sampling period of the instrument's analog-to-digital converter on the input signal during the measurement period. The bigger the aperture is, the slower the measurement speed will be and the higher the resolution will be; the smaller the aperture is, the faster the measurement will be and the lower the resolution will be. The aperture applies to DCV, DCI, Ω2W and Ω4W measurements.

Multimeter express the aperture by the power line cycles, the unit is PLC.

The multimeter will automatically detect the power frequency when starting up. When the frequency is 50Hz, the aperture can be set to 0.001 PLC, 0.01 PLC, 0.1 PLC, 1 PLC, 10 PLC, and 100 PLC. The default is 10 PLC.

When measuring DCV, DCI, Ω2W and Ω4W, touch Aperture in the menu to see the setting options, as shown in the following figure (taking DCV measurement as an example). Touch the desired menu buttons on the screen to set aperture.

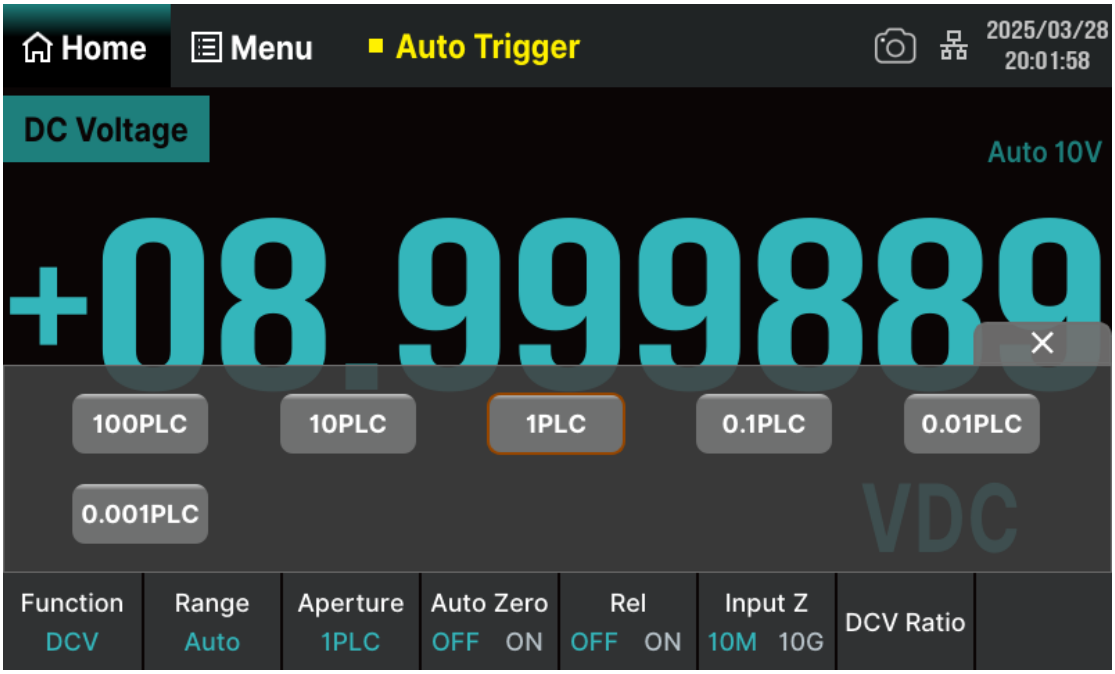


Figure 7-3 Aperture selection menu

7.1.4 Auto Zero

Auto Zero applies to DCV, DCI, Ω2W and Ω4W measurements. When the Auto Zero function is set to "ON", the multimeter internally disconnects the input signal and measured circuit after each measurement, and takes a zero reading. It then subtracts the zero reading from the preceding reading (displaying the difference between the measurement value and zero value during the measurement), in order to reduce the impact of offset voltage from input circuit on measurement result.

Enter the specific measurement function and touch Auto Zero in the menu to perform the setting, as shown in Figure 7-4 (taking DCV measurement as an example).

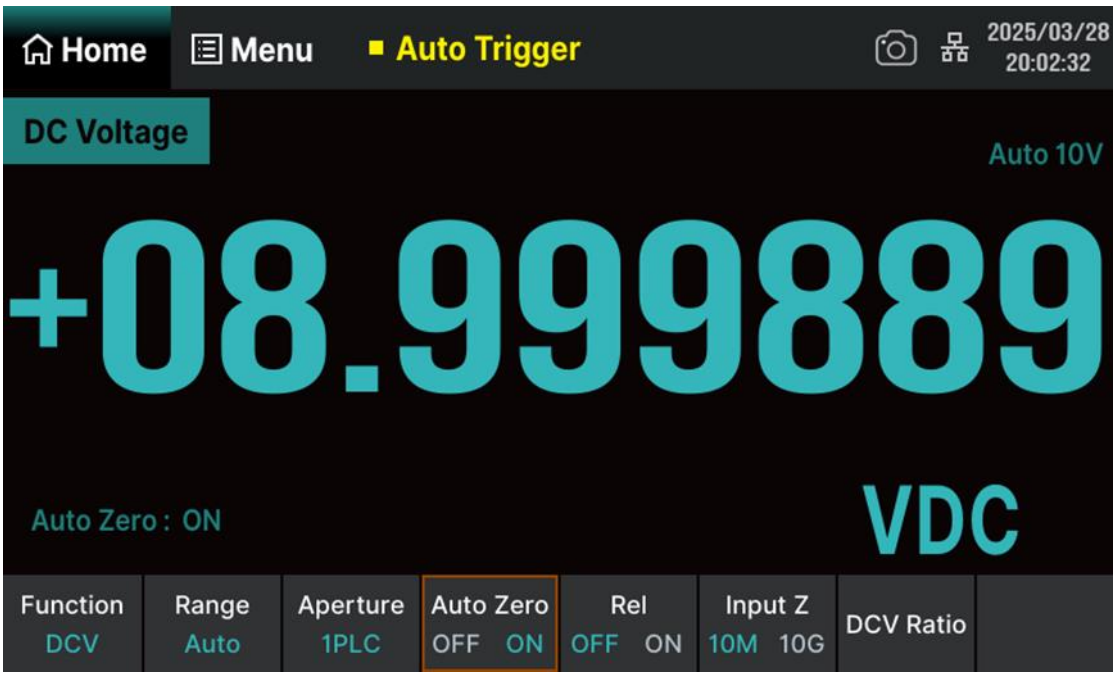


Figure 7-4 Set Auto Zero

7.1.5 DC Impedance

The DC impedance setting is applicable to the DCV measurement function. The factory default value is “10 MΩ”, which is stored in non-volatile memory. When using the following ranges, select “10 GΩ” to minimize the loading error introduced by the multimeter to the device under test.

SDM4075A series: 100 mV, 1 V, 10 V

SDM4065A series: 200 mV, 2 V, 20 V

SDM4055A series: 200 mV, 2 V, 20 V

Touch Input Z set the DC impedance during DCV measurement. Repeatedly touch Input Z to switch between 10M or 10G, as shown in the following figure.

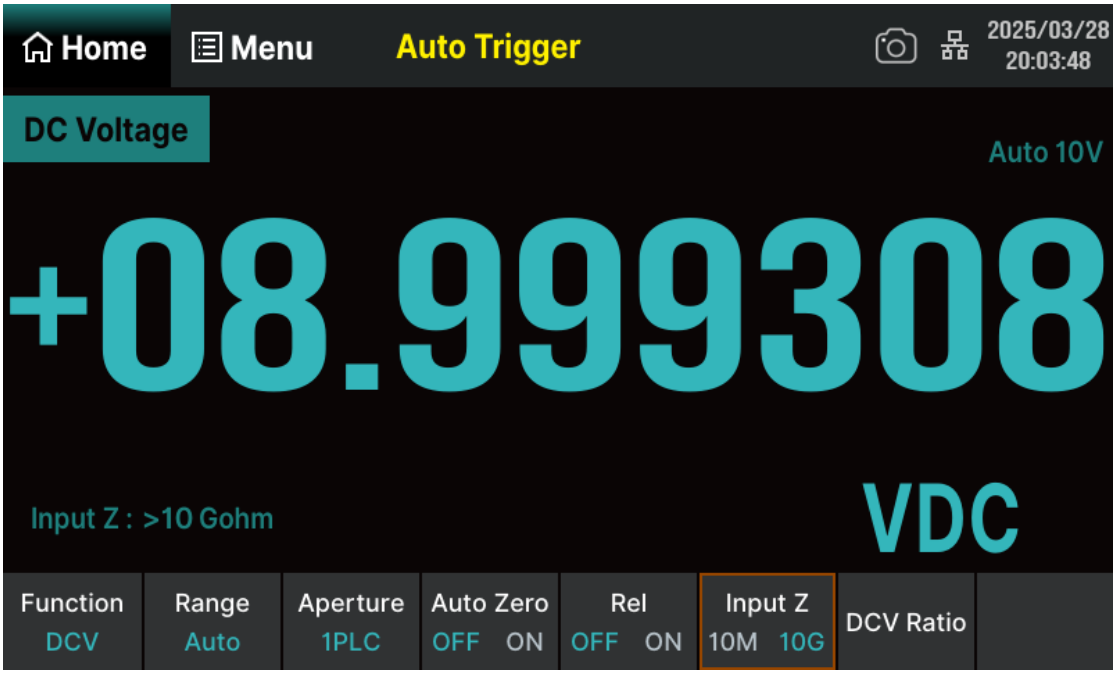


Figure 7-5 Choose DC input impedance

- When “10 MΩ” is selected, the “10M” indicator illuminates, and the input impedance for all ranges is 10 MΩ.
- When “10 GΩ” is selected, the “10G” indicator illuminates, and the input impedance settings by range are as follows:
  - SDM4075A Series: For the 100 mV, 1 V, and 10 V ranges, the input impedance is set to “>10 GΩ”; for the 100 V and 1000 V ranges, the input impedance remains “10 MΩ”.
  - SDM4065A Series: For the 200 mV, 2 V, and 20 V ranges, the input impedance is set to “>10 GΩ”; for the 200 V and 1000 V ranges, the input impedance remains “10 MΩ”.
  - SDM4055A Series: For the 200 mV, 2 V, and 20 V ranges, the input impedance is set to “>10 GΩ”; for the 200 V and 1000 V ranges, the input impedance remains “10 MΩ”.

7.1.6 AC Filter

AC filter applies to ACV and ACI measurements. It can optimize the low-frequency accuracy and minimize the AC settling time.

SDM4075A series and SDM4065A series provide three types of AC filters: >3 Hz, >20 Hz, >200 Hz. The factory default value is “>20 Hz”, which is stored in non-volatile memory.

During the measurement process, the type of AC filter should be selected based on the frequency of the input signal. Normally, you should choose the highest frequency filter with a frequency less than the measured signal frequency, because higher frequency filters result in faster measurements. For example, when measuring signals in the range of 20 Hz to 200 Hz, a 20 Hz filter is used. If measurement speed is not an issue, choosing a lower frequency filter will result in more stable measurements, depending on the signal that you are measuring.

For ACV or ACI measurement, touch Filter in the menu to show the setting options, as shown in Figure 7-6 (taking ACV measurement as an example). Then touch the filter key to activate the corresponding configuration.

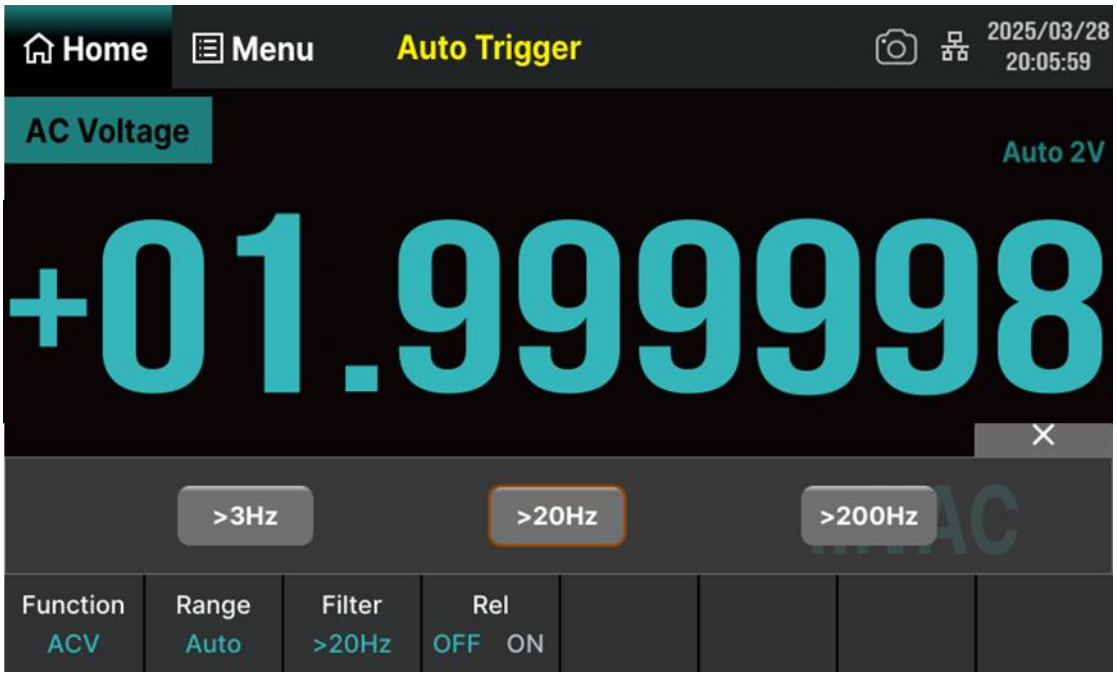


Figure 7-6 Set AC filter

7.1.7 Threshold Resistance

When performing a continuity test, you need to set the threshold resistance value for the test circuit. When continuity measurement function is enabled, touch Threshold, and then touch the value to set the desired value through the pop-up numeric keypad.

- When the test circuit has a resistance lower than the threshold value, the circuit is considered as connected, the multimeter screen will display the measured resistance and the buzzer sounds (if buzzer is on).
- When the test circuit has a resistance higher than the threshold value, the circuit is considered as open and the multimeter screen will display "OPEN".



Figure 7-7 Measured resistance lower than threshold resistance

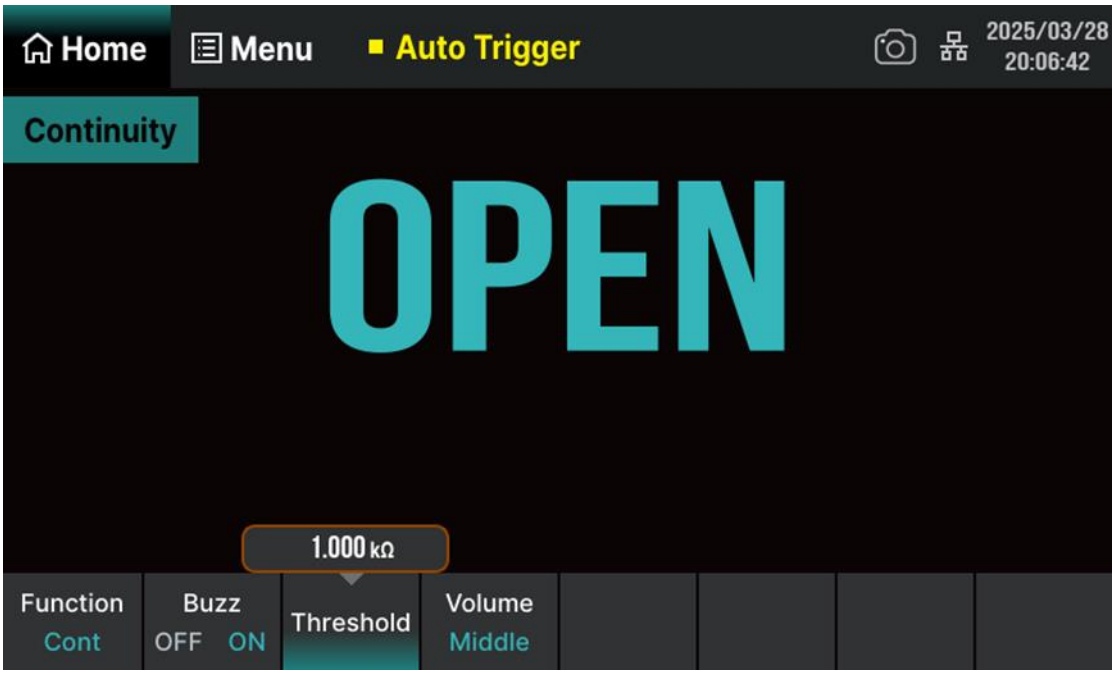


Figure 7-8 Measured resistance higher than threshold resistance

Table 7-5 Threshold resistance setting

Model	Settable Value	Factory Default Value
SDM4075A / SDM4075A-SC	0 Ω to 1000 Ω	10 Ω
SDM4065A / SDM4065A-RE / SDM4065A-SC	0 Ω to 2000 Ω	50 Ω
SDM4055A / SDM4055A-SC	0 Ω to 2000 Ω	50 Ω

Note: The factory default value of the threshold resistance is stored in non-volatile memory.

7.1.8 Threshold Voltage

When performing a Diode test, you need to set the threshold voltage value for the test circuit. When diode measurement function is enabled, touch Threshold, and then touch the value to set the desired value through the pop-up numeric keypad.

- When the test circuit has a voltage lower than the threshold value, the multimeter screen will display the measured voltage and the buzzer sounds (if buzzer is on).
- When the test circuit has a voltage higher than the threshold value, the multimeter screen will display "OPEN".

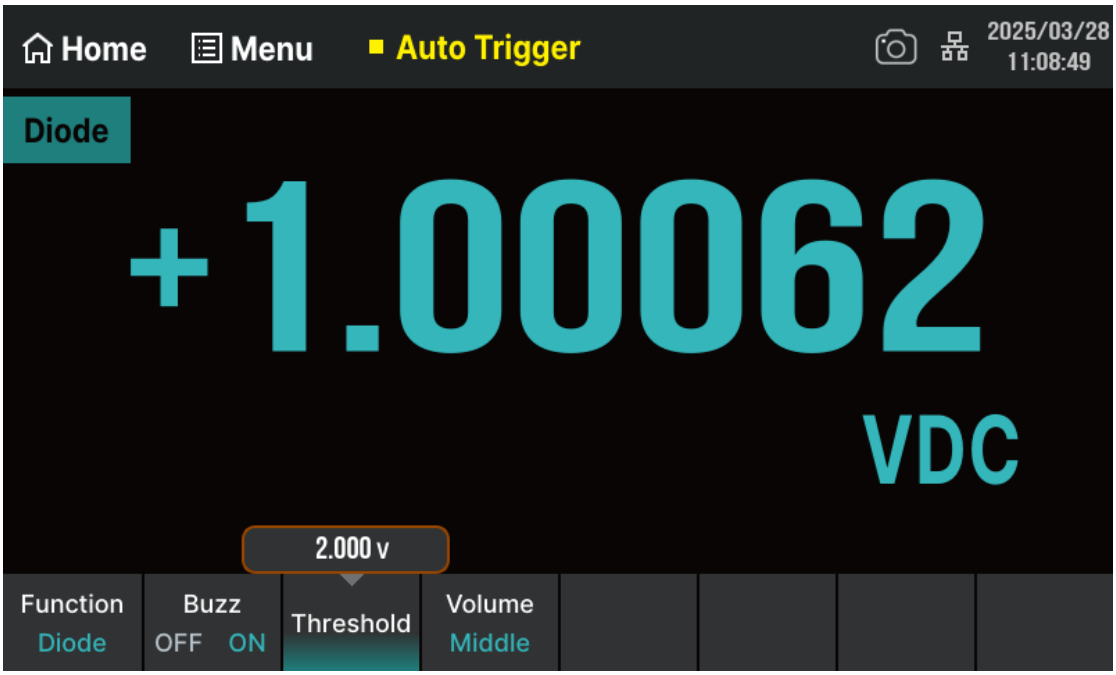


Figure 7-9 Measured voltage lower than threshold value

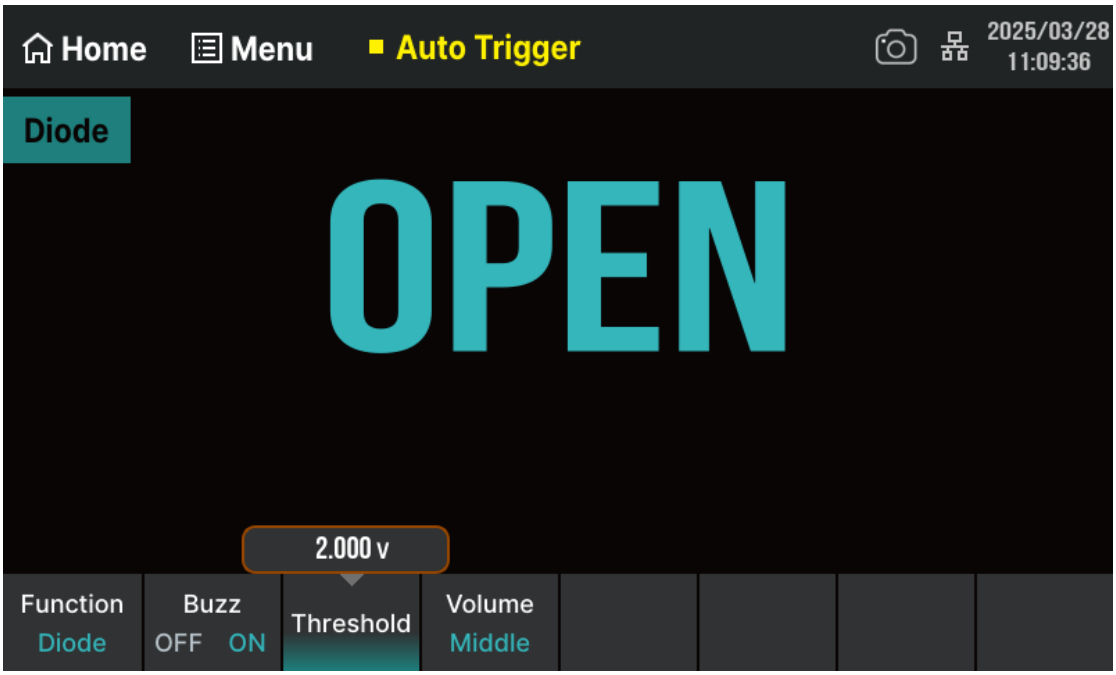


Figure 7-10 Measured voltage higher than threshold value

Table 7-6 Threshold voltage setting

Model	Settable Value	Factory Default Value
SDM4075A / SDM4075A-SC	0 V to 5 V	2 V
SDM4065A / SDM4065A-RE / SDM4065A-SC	0 V to 4 V	2 V
SDM4055A / SDM4055A-SC	0 V to 4 V	2 V

Note: The factory default value of the threshold voltage is stored in non-volatile memory.

7.1.9 Gate Time

When performing Freq/Period measurement, you need to set the gate time value. The gate time value determines the resolution of low-frequency measurements. The longer the gate time, the higher the low-frequency measurement resolution and the lower the measurement rate; On the contrary, the lower the low-frequency measurement resolution, the higher the measurement rate.

For Freq/Period measurement, touch Gate Time to show the setting options, as shown in Figure 7-11 (taking Freq measurement as an example). The gate time can be set to 1 ms, 10 ms, 100 ms or 1 s, and the default is 100 ms. You can select a desired gate time by touching the corresponding key.

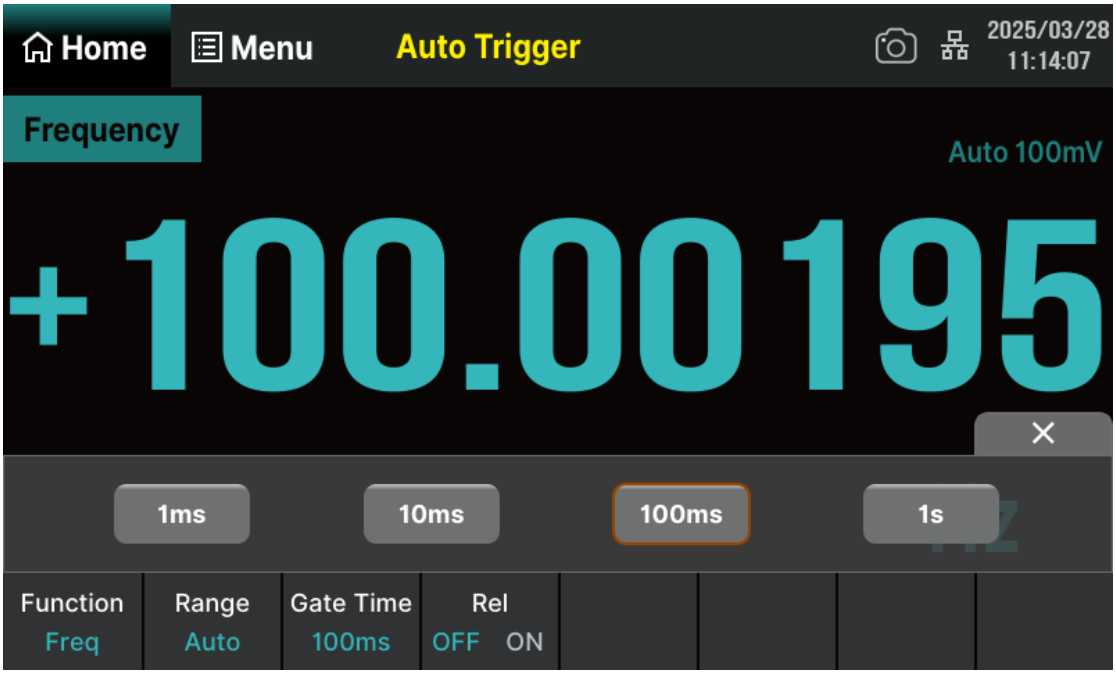


Figure 7-11 Set gate time

7.2 Basic Measurement Functions

SDM4000A digital multimeters have following basic functions:

- To Measure DC Voltage
- To Measure AC Voltage
- To Measure DC Current
- To Measure AC Current
- To Measure Resistance
- To Measure Capacitance
- To Measure Frequency and Period
- To Measure Continuity
- To Measure Diode
- To Measure Temperature
- User-defined Sensor Measurement
- Scanner Card

7.2.1 To Measure DC Voltage

Operating Steps:

1. Make connection

Refer to the following figure to connect the test leads and the measured signal under test.

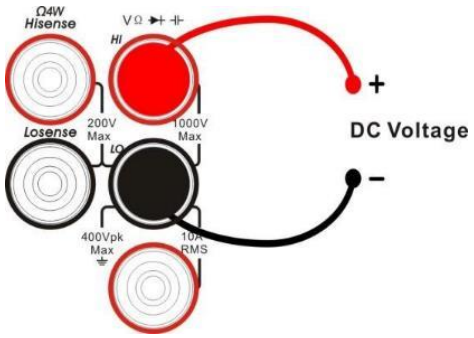


Figure 7-12 DCV measurement wiring reference

2. Enable the DCV measurement

Press Function button on the front panel and then touch the DCV menu item on the screen, or touch Home > Function > DCV on the screen to enter the DC voltage measurement interface, as shown in the following figure.

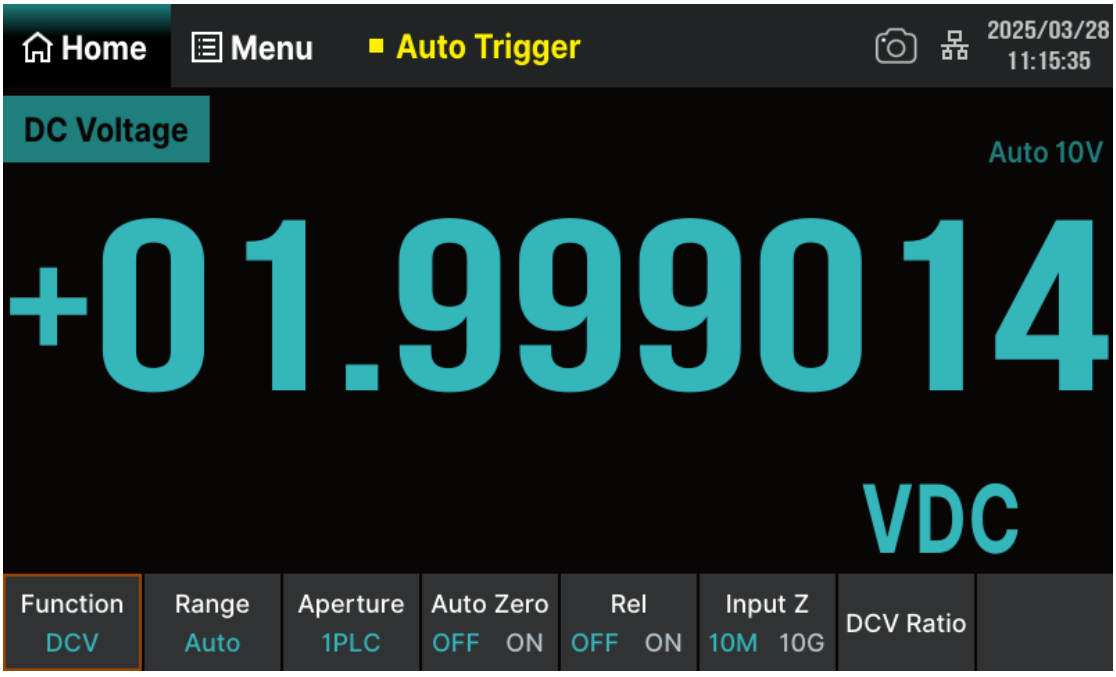


Figure 7-13 DC voltage measurement interface

3. Set the range

Touch Range on the screen to set the range for measurement. Please refer to “7.1.1 Range” for

range setting.

4. Set measurement speed (SDM4055A series only)

Touch Speed to select a speed for measurement. Choosing "Slow" provides the best noise suppression and resolution, but the measurement speed is the slowest. Please refer to “7.1.2 Speed” for speed setting.

5. Set the aperture (SDM4075A series and SDM4065A series)

Touch Aperture to select an aperture for measurement. Please refer to “7.1.3 Aperture” for aperture setting.

6. Auto zero setting

Touch Auto Zero on the screen to enable or disable this function. Please refer to “7.1.4 Auto Zero” for auto zero setting.

7. Specify the DC input impedance

Touch Input Z to set the DC input impedance value. Please refer to “7.1.5 DC Impedance” for input impendence setting. If you do not need to modify this parameter, please proceed to the next step directly.

8. Set the relative value (optional operation)

Touch Rel to enable or disable relative math function. When the function is enabled, the reading displayed is a value which comes from the result of actual measurement value subtracts the relative value that has been set. The default relative value is the measurement value when the function is enabled. For details, please refer to “7.6.5 Relative Value”.

9. Read the measurement value

The multimeter measures the input signal according to the current measurement settings and displays the measurement result on the screen.

10. Make math operation (advanced operation)

You can perform math operation (Statistics, Limits, dBm, dB and Rel) on every DCV measurement reading. For details, please refer to “7.6 Math Function”.

11. Display the graph (advanced operation)

You can analyze the measurement data by using Bar, Trend or Histogram display. For details, please refer to “7.7 Display”.

DCV Ratio Measurement

SDM4075A/SDM4075A-SC supports DCV ratio measurement. When the DCV ratio function is enabled, the multimeter can measure two DC voltages at the same time, using one voltage as the reference voltage and measuring the ratio of the other voltage to the reference voltage. The wiring method for DCV ratio measurement is shown in Figure 7-14.

Note: When DCV ratio measurement is enabled, Auto Zero function is disabled.

Operating Steps:

1. Make connection

Connect the measured signal and reference signal as shown in the following figure.

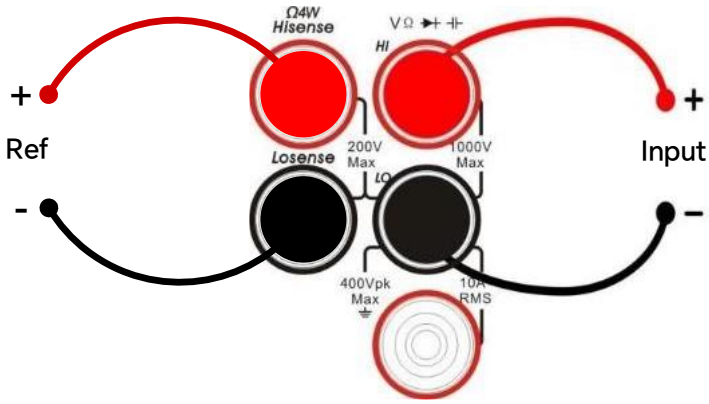


Figure 7-14 DCV Ratio measurement connection

2. Enable DCV ratio measurement function

After enabling the DCV measurement function, touch DCV Ratio in the DCV measurement interface menu to enter the DCV Ratio measurement menu interface, as shown in Figure 7-15. Touch DCV Ratio > On to enable the DCV ratio measurement function, and the screen displays the ratio of DCV ratio measurement.

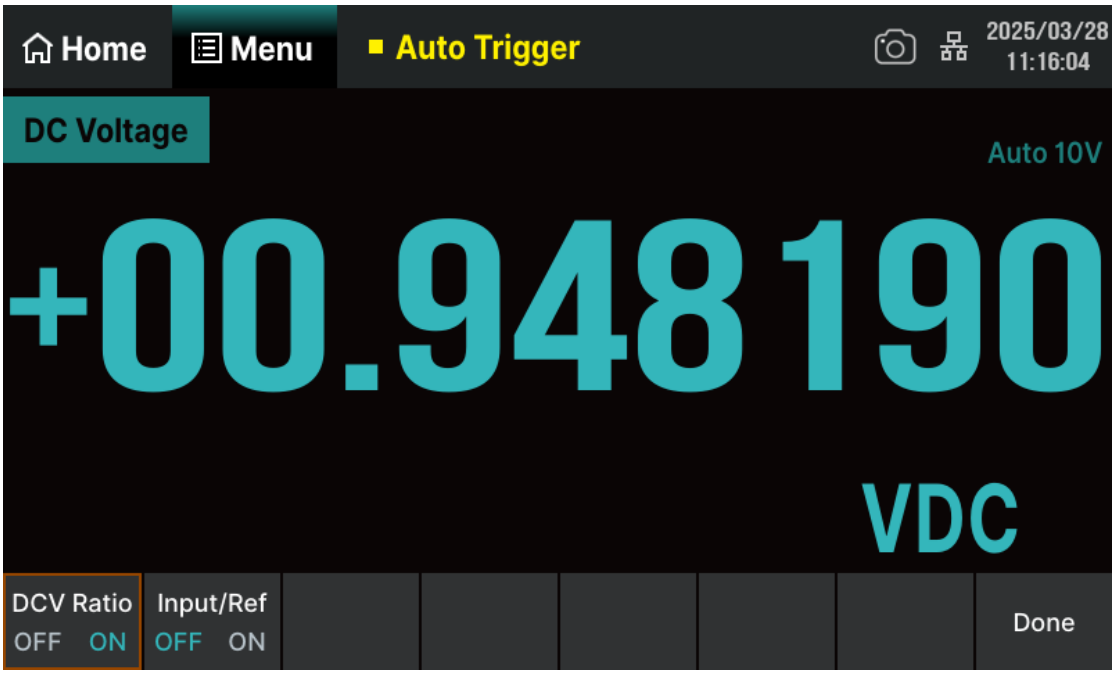


Figure 7-15 DCV Ratio measurement menu interface

Touch Input/Ref > ON to display the current input voltage value and reference voltage value. As shown in the following figure.

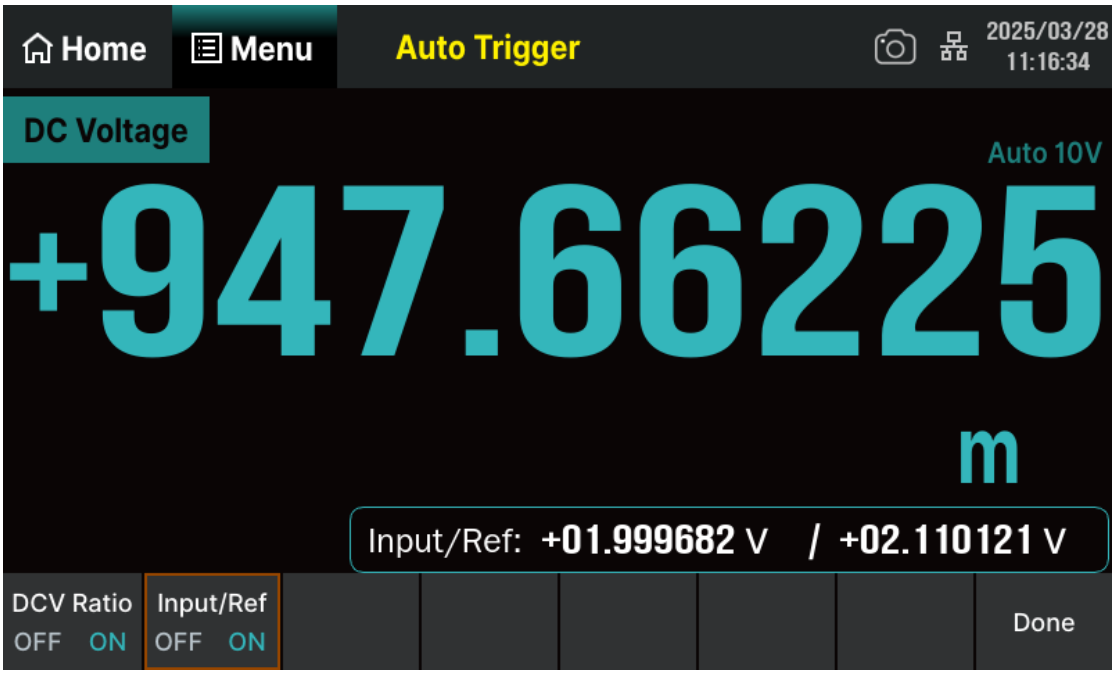


Figure 7-16 Display DCV Input/Ref value

3. Read the measurement value

The multimeter measures the input signal according to the current measurement settings and displays the measurement result on the screen.

7.2.2 To Measure AC Voltage

Operating Steps:

1. Make connection

Refer to the following figure to connect the test leads and the measured signal under test.

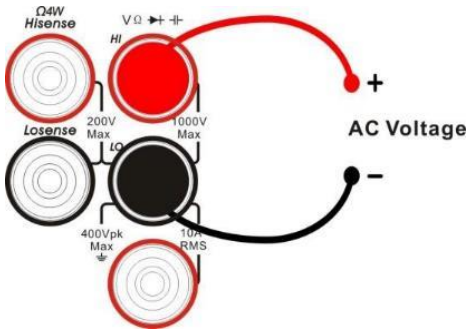


Figure 7-17 ACV measurement wiring reference

2. Enable the ACV measurement

Press Function button on the front panel and then touch the ACV menu item on the screen, or touch Home > Function > ACV on the screen to enter the AC voltage measurement interface, as shown in the following figure.

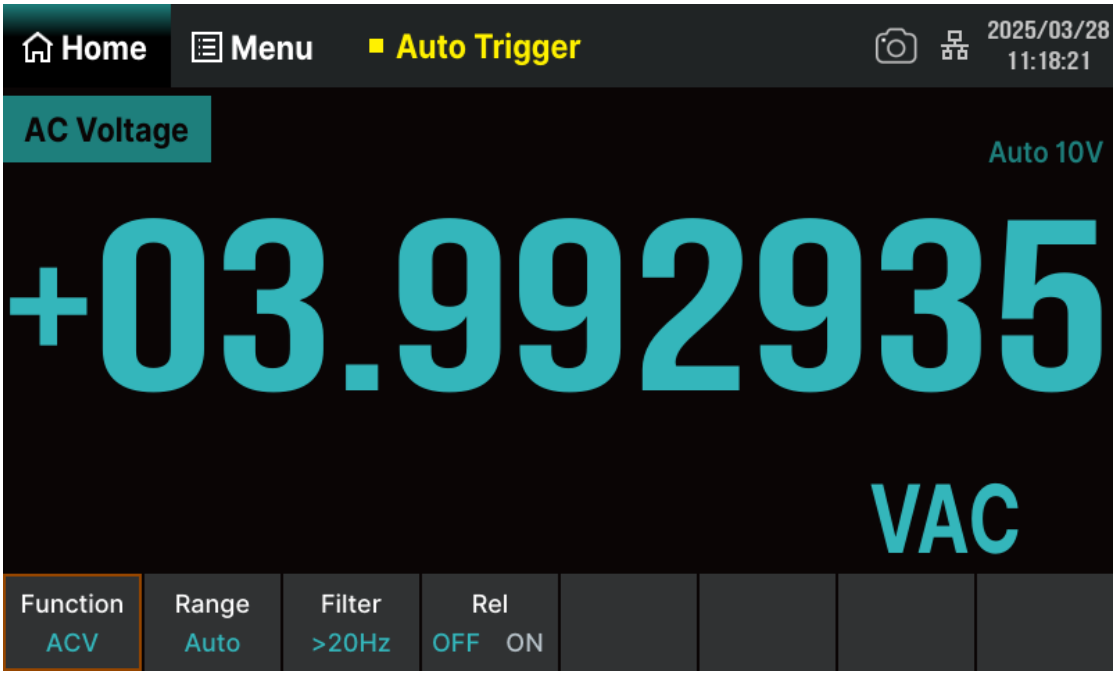


Figure 7-18 AC voltage measurement interface

3. Set the range

Touch Range on the screen to set the range for measurement. Please refer to “7.1.1 Range” for

range setting.

4. Set measurement speed (SDM4055A series only)

Touch Speed to select a speed for measurement. Choosing "Slow" provides the best noise suppression and resolution, but the measurement speed is the slowest. Please refer to “7.1.2 Speed” for speed setting.

5. Set the filter (SDM4075A series and SDM4065A series)

Touch Filter and select the filter for the measurement. The instrument provides three different AC filters: >3 Hz, >20 Hz and >200 Hz, you should generally select the highest frequency filter whose frequency is less than that of the signal you are measuring. Please refer to “7.1.6 AC Filter” for filter setting.

6. Set the relative value (optional operation)

Touch Rel to enable or disable relative math function. When the function is enabled, the reading displayed is a value which comes from the result of actual measurement value subtracts the relative value that has been set. The default relative value is the measurement value when the function is enabled. Please refer to “7.6.5 Relative Value” for relative value setting.

7. Read the measurement value

The multimeter measures the input signal according to the current measurement settings and displays the measurement result on the screen.

8. Make math operation (advanced operation)

You can perform math operation (Statistics, Limits and Rel) on every ACV measurement reading. For details, please refer to “7.6 Math Function”.

9. Display the graph (advanced operation)

You can analyze the measurement data by using Bar, Trend or Histogram display. For details, please refer to “7.7 Display”.

7.2.3 To Measure DC Current

Operating Steps:

1. Make connection

Refer to the following figure to connect the test leads and the measured signal under test.

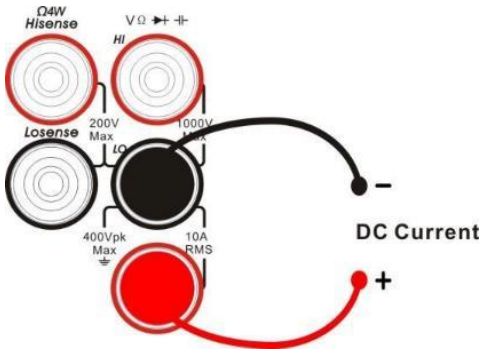


Figure 7-19 DCI measurement wiring reference

2. Enable the DCI measurement

Press the Function button on the front panel and then touch the DCI menu item on the screen, or touch Home > Function > DCI on the screen to enter the DC current measurement interface, as shown in the following figure.

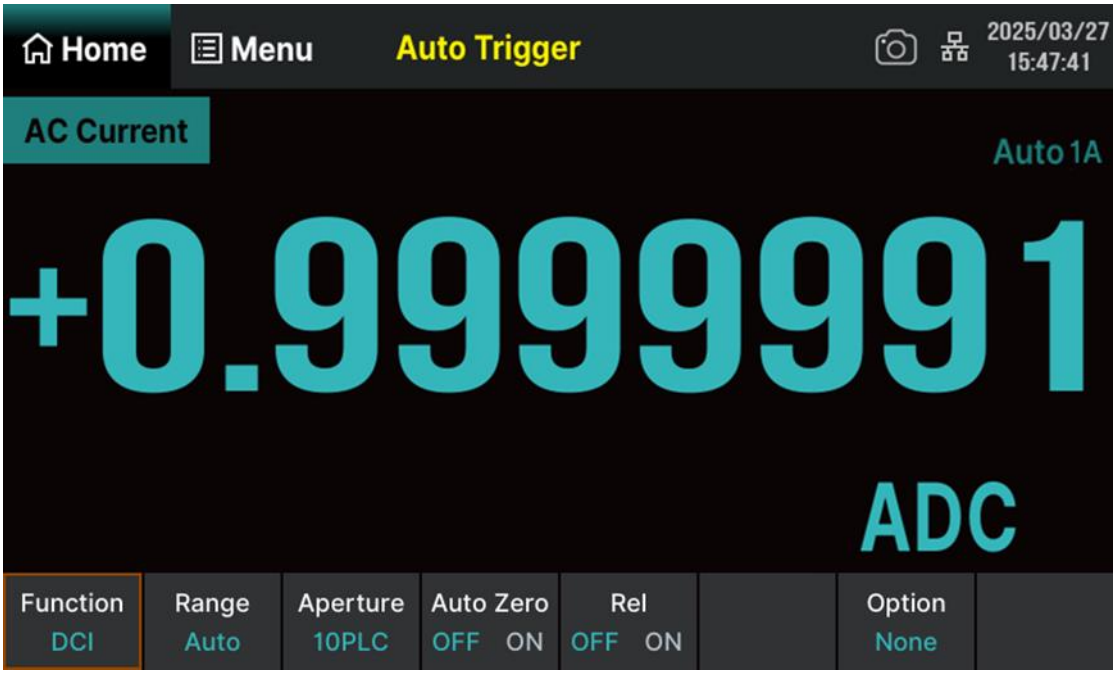


Figure 7-20 DC current measurement interface

3. Set the range

Touch Range on the screen to set the range for measurement. Please refer to “7.1.1 Range” for

range setting.

4. Set measurement speed (SDM4055A series only)

Touch Speed to select a speed for measurement. Choosing "Slow" provides the best noise suppression and resolution, but the measurement speed is the slowest. Please refer to “7.1.2 Speed” for speed setting.

5. Set the aperture (SDM4075A series and SDM4065A series)

Touch Aperture to select an aperture for measurement. Please refer to “7.1.3 Aperture” for aperture setting.

6. Auto zero setting

Touch Auto Zero on the screen to enable or disable this function. Please refer to “7.1.4 Auto Zero” for auto zero setting.

7. Set the relative value (optional operation)

Touch Rel to enable or disable relative math function. When the function is enabled, the reading displayed is a value which comes from the result of actual measurement value subtracts the relative value that has been set. The default relative value is the measurement value when the function is enabled. Please refer to “7.6.5 Relative Value” for relative value setting.

8. Read the measurement value

The multimeter measures the input signal according to the current measurement settings and displays the measurement result on the screen.

9. Make math operation (advanced operation)

You can perform math operation (Statistics, Limits and Rel) on every DCI measurement reading. For details, please refer to “7.6 Math Function”.

10. Display the graph (advanced operation)

You can analyze the measurement data by using Bar, Trend or Histogram display. For details, please refer to “7.7 Display”.

7.2.4 To Measure AC Current

Operating Steps:

1. Make connection

Refer to the following figure to connect the test leads and the measured signal under test.

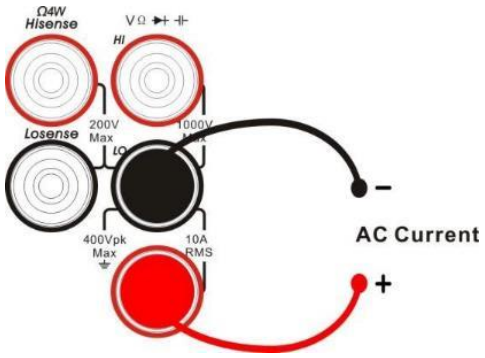


Figure 7-21 ACI measurement wiring reference

2. Enable the ACI measurement

Press the Function button on the front panel and then touch the ACI menu item on the screen, or touch Home > Function > ACI on the screen to enter the AC current measurement interface, as shown in the following figure.

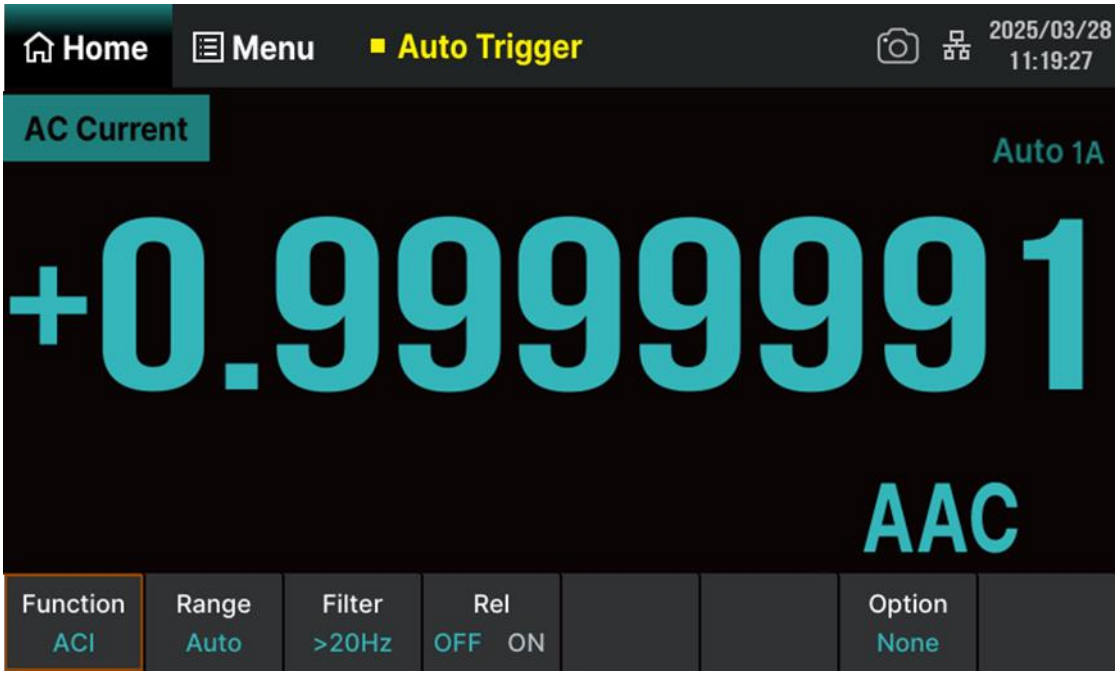


Figure 7-22 AC current measurement interface

3. Set the range

Touch Range on the screen to set the range for measurement. Please refer to “7.1.1 Range” for

range setting.

4. Set measurement speed (SDM4055A series only)

Touch Speed to select a speed for measurement. Choosing "Slow" provides the best noise suppression and resolution, but the measurement speed is the slowest. Please refer to “7.1.2 Speed” for speed setting.

5. Set the filter (SDM4075A series and SDM4065A series)

Touch Filter and select the filter for the measurement. The instrument provides three different AC filters: >3 Hz, >20 Hz and >200 Hz, you should generally select the highest frequency filter whose frequency is less than that of the signal you are measuring. Please refer to “7.1.6 AC Filter” for filter setting.

6. Set the relative value (optional operation)

Touch Rel to enable or disable relative math function. When the function is enabled, the reading displayed is a value which comes from the result of actual measurement value subtracts the relative value that has been set. The default relative value is the measurement value when the function is enabled. Please refer to “7.6.5 Relative Value” for relative value setting.

7. Read the measurement value

The multimeter measures the input signal according to the current measurement settings and displays the measurement result on the screen.

8. Make math operation (advanced operation)

You can perform math operation (Statistics, Limits and Rel) on every ACI measurement reading. For details, please refer to “7.6 Math Function”.

9. Display the graph (advanced operation)

You can analyze the measurement data by using Bar, Trend or Histogram display. For details, please refer to “7.7 Display”.

7.2.5 To Measure Resistance

SDM4000A provides 2-wire and 4-wire resistance measurements. When the measured resistance is lower than 100 KΩ, the 4-wire resistance measurement is recommended to reduce the measurement error caused by test lead resistance and contact resistance between the probe and the testing point because these two resistances cannot be ignored any more, compared to the measured resistance.

Operating Steps:

1. Make connection

Refer to the following figure to connect the test leads and the measured signal under test.

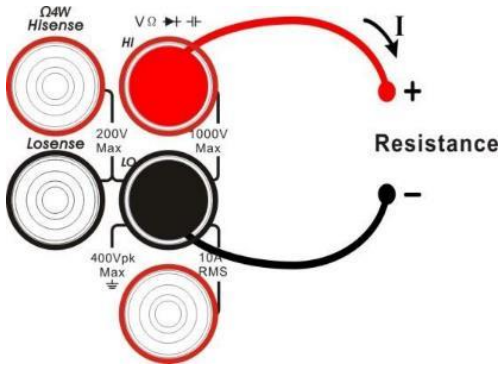


Figure 7-23 Ω2W measurement wiring reference

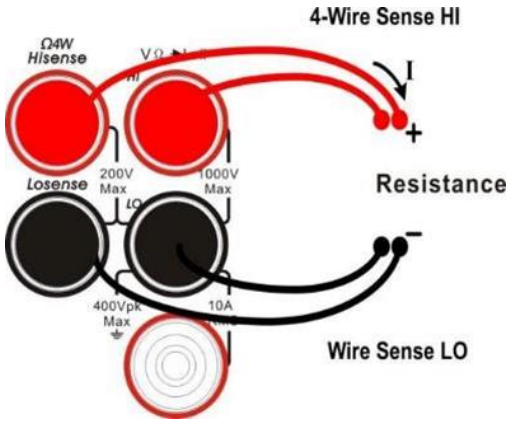


Figure 7-24 Ω4W measurement wiring reference

2. Enable 2-wire / 4-wire resistance measurement

Press the Function button on the front panel and then touch the Ω2W menu item on the screen, or touch Home > Function > Ω2W on the screen to enter the 2-wire resistance measurement interface, as shown in the following figure.

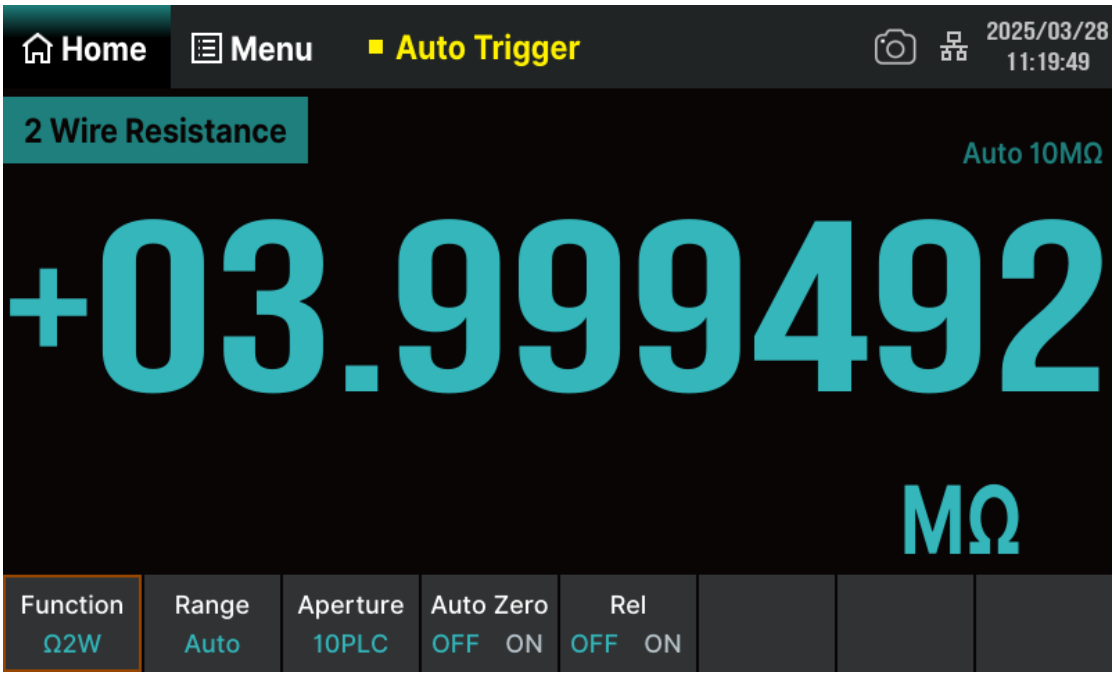


Figure 7-25 2-wire resistance measurement interface

Press the Function button on the front panel and then touch the Ω4W menu item on the screen, or touch Home > Function > Ω4W on the screen to enter the 4-wire resistance measurement interface, as shown in the following figure.

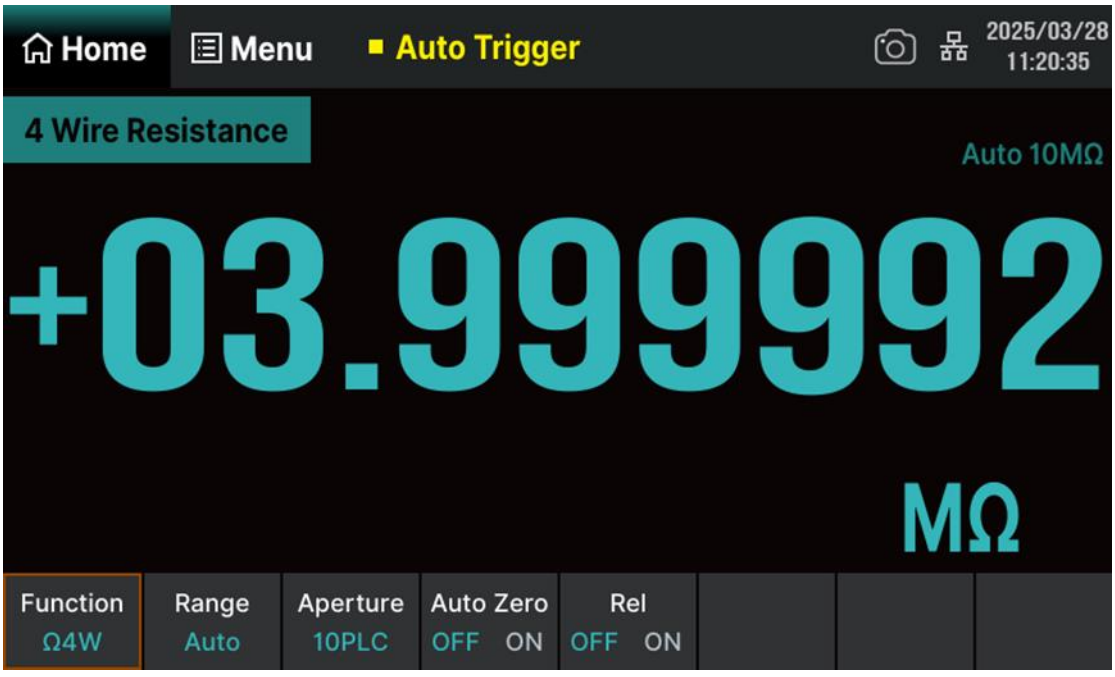


Figure 7-26 4-wire resistance measurement interface

3. Set the range

Touch Range on the screen to set the range for measurement. Please refer to “7.1.1 Range” for

range setting.

4. Set measurement speed (SDM4055A series only)

Touch Speed to select a speed for measurement. Choosing "Slow" provides the best noise suppression and resolution, but the measurement speed is the slowest. Please refer to “7.1.2 Speed” for speed setting.

5. Set the aperture (SDM4075A series and SDM4065A series)

Touch Aperture to select an aperture for measurement. Please refer to “7.1.3 Aperture” for aperture setting.

6. Auto zero setting

Touch Auto Zero on the screen to enable or disable this function. Please refer to “7.1.4 Auto Zero” for auto zero setting.

7. Set the relative value (optional operation)

Touch Rel to enable or disable relative math function. When the function is enabled, the reading displayed is a value which comes from the result of actual measurement value subtracts the relative value that has been set. The default relative value is the measurement value when the function is enabled. Please refer to “7.6.5 Relative Value” for relative value setting.

8. Read the measurement value

The multimeter measures the input signal according to current measurement settings and displays the measurement result on the screen.

9. Make math operation (advanced operation)

You can perform math operation (Statistics, Limits and Rel) on every resistance measurement reading. For details, please refer to “7.6 Math Function”.

10. Display the graph (advanced operation)

You can analyze the measurement data by using Bar, Trend or Histogram display. For details, please refer to “7.7 Display”.



- If the measured resistance is small, Rel operation is recommended in order to reduce the error caused by test lead.
- Both ends of the measured resistance should be placed far away from your hands and desks that can conduct electricity; otherwise, the measurement result might be inaccurate. The greater the measured resistance is, the greater the affect will be.

7.2.6 To Measure Capacitance

Operating Steps:

1. Make connection

Refer to the following figure to connect the test leads and the measured signal under test.

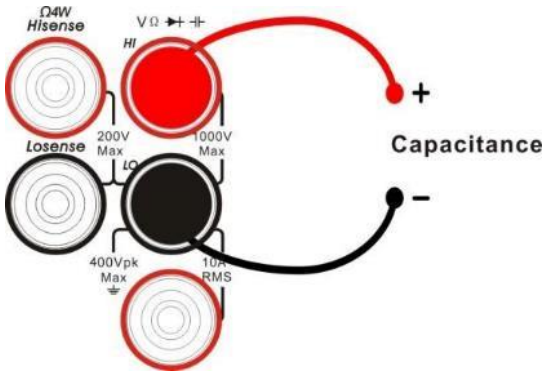


Figure 7-27 Capacitance measurement wiring reference

2. Enable capacitance measurement

Press the Function button on the front panel and then touch the ⊣⊢ on the screen, or touch Home > Function > ⊣⊢ on the screen to enter the capacitance measurement interface, as shown in the following figure.



Figure 7-28 Capacitance measurement interface

3. Set the range

Touch Range on the screen to set the range for measurement. Please refer to “7.1.1 Range” for range setting.

4. Set the relative value (optional operation)

Touch Rel to enable or disable relative math function. When the function is enabled, the reading displayed is a value which comes from the result of actual measurement value subtracts the relative value that has been set. The default relative value is the measurement value when the function is enabled. Please refer to “7.6.5 Relative Value” for relative value setting.

5. Read the measurement value

The multimeter measures the input signal according to the capacitance measurement settings and displays the measurement result on the screen.

6. Make math operation (advanced operation)

You can perform math operation (Statistics, Limits and Rel) on every capacitance measurement reading. For details, please refer to “7.6 Math Function”.

7. Display the graph (advanced operation)

You can analyze the measurement data by using Bar, Trend or Histogram display. For details, please refer to “7.7 Display”.

Please short contact the two feet of an electrolytic capacitor by using a test lead before measuring the electrolytic capacitor.

7.2.7 To Measure Frequency and Period

Operating Steps:

1. Make connection

Refer to the following figure to connect the test leads and the measured signal under test.

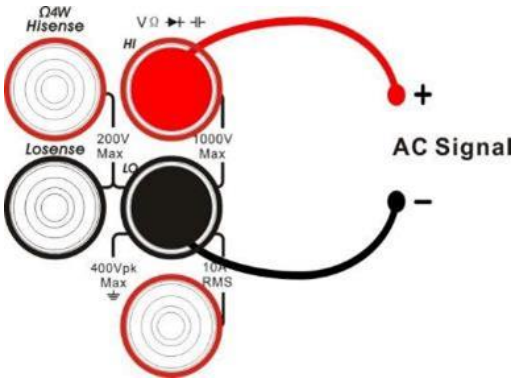


Figure 7-29 Frequency/period measurement wiring reference

2. Enable Freq/Period measurement

Press the Function button on the front panel and then touch the Freq on the screen, or touch Home > Function > Freq on the screen to enter the frequency measurement interface, as shown in the following figure.

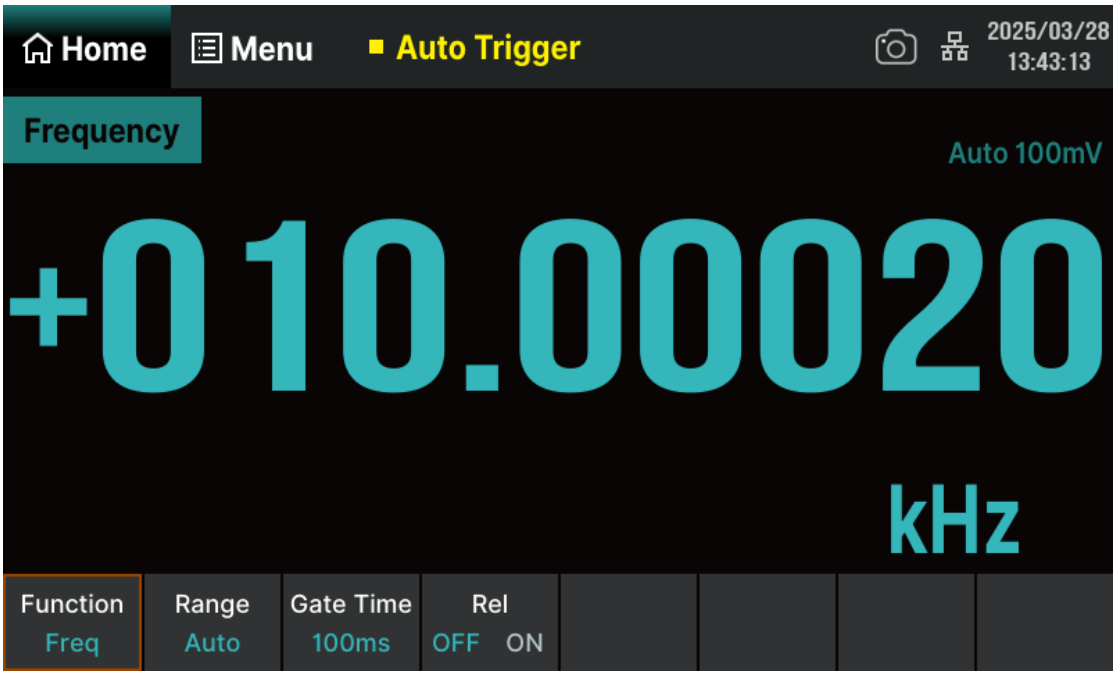


Figure 7-30 Frequency measurement interface

Press the Function button on the front panel and then touch the Period on the screen, or

touch Home > Function > Period on the screen to enter the period measurement interface, as shown in the following figure.

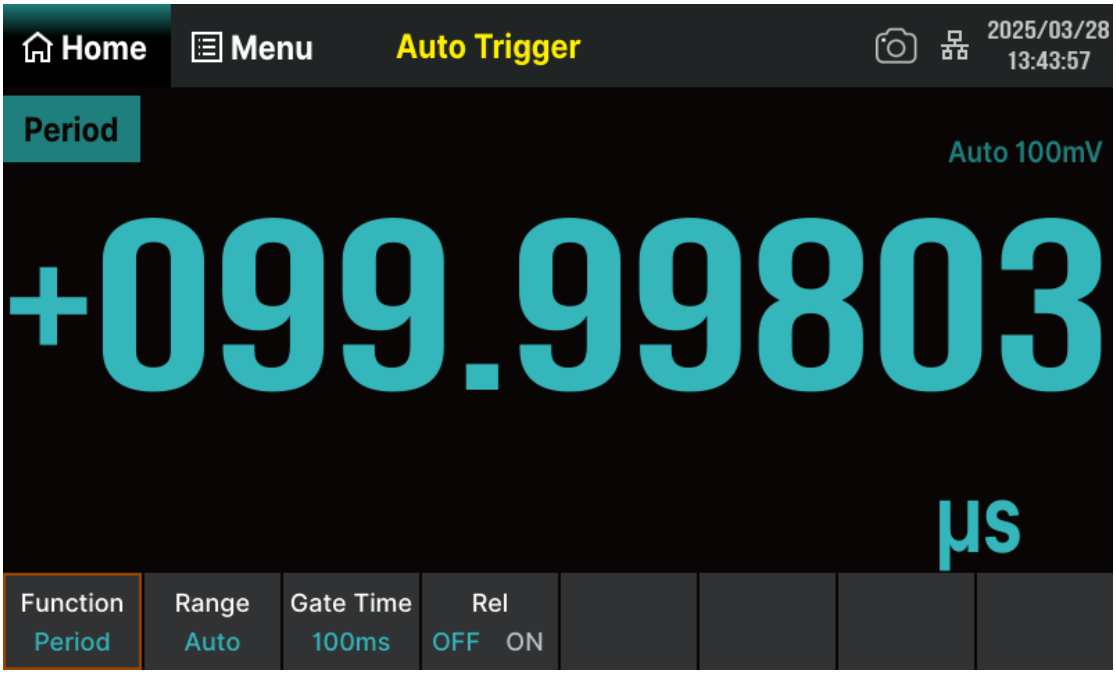


Figure 7-31 Period measurement interface

3. Set the range

Touch Range on the screen to set the range for measurement. Please refer to "7.1.1 Range" for range setting.

4. Set the gate time

Touch Gate Time to set the gate time value. The length of the gate time determines the resolution of the low frequency measurement. The longer the gate time, the higher the low frequency measurement resolution and the lower the measurement rate; conversely, the lower the low frequency measurement resolution and the higher the measurement rate. For the gate time setting, refer to "7.1.9 Gate Time".

5. Set the relative value (optional operation)

Touch Rel to enable or disable relative math function. When the function is enabled, the reading displayed is a value which comes from the result of actual measurement value subtracts the relative value that has been set. The default relative value is the measurement value when the function is enabled. Please refer to "7.6.5 Relative Value" for relative value setting.

6. Read the measurement value

The multimeter measures the input signal according to the current measurement settings and displays the measurement result on the screen.

7. Make math operation (advanced operation)

You can perform math operation (Statistics, Limits and Rel) on every frequency/period measurement reading. For details, please refer to “7.6 Math Function”.

8. Display the graph (advanced operation)

You can analyze the measurement data by using Bar, Trend or Histogram display. For details, please refer to “7.7 Display”.

7.2.8 To Measure Continuity

Continuity test measures the resistance of the circuit under test with a 1 mA current to determine whether the circuit is complete. When the measured resistance in the test circuit is below the set threshold resistance, the instrument determines that the circuit is continuous; the multimeter screen displays the measured resistance, and the buzzer emits a continuous beep (with the buzzer enabled). When the measured resistance in the circuit under test is above the threshold resistance value, the circuit is determined to be open, and the screen displays "OPEN".

Operating Steps:

1. Make connection

Refer to the following figure to connect the test leads and the measured signal under test.

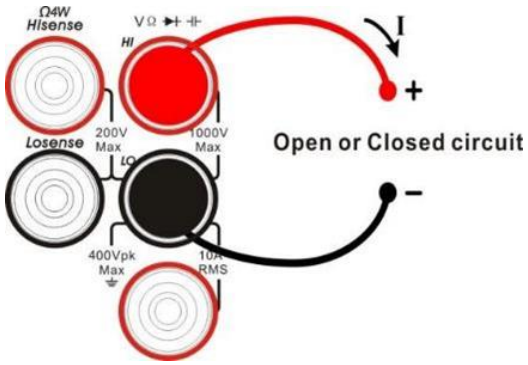


Figure 7-32 Continuity measurement wiring reference

2. Enable continuity measurement

Press the Function button on the front panel and then touch the Cont on the screen, or touch Home > Function > Cont on the screen to enter the continuity measurement interface, as shown in the following figure.

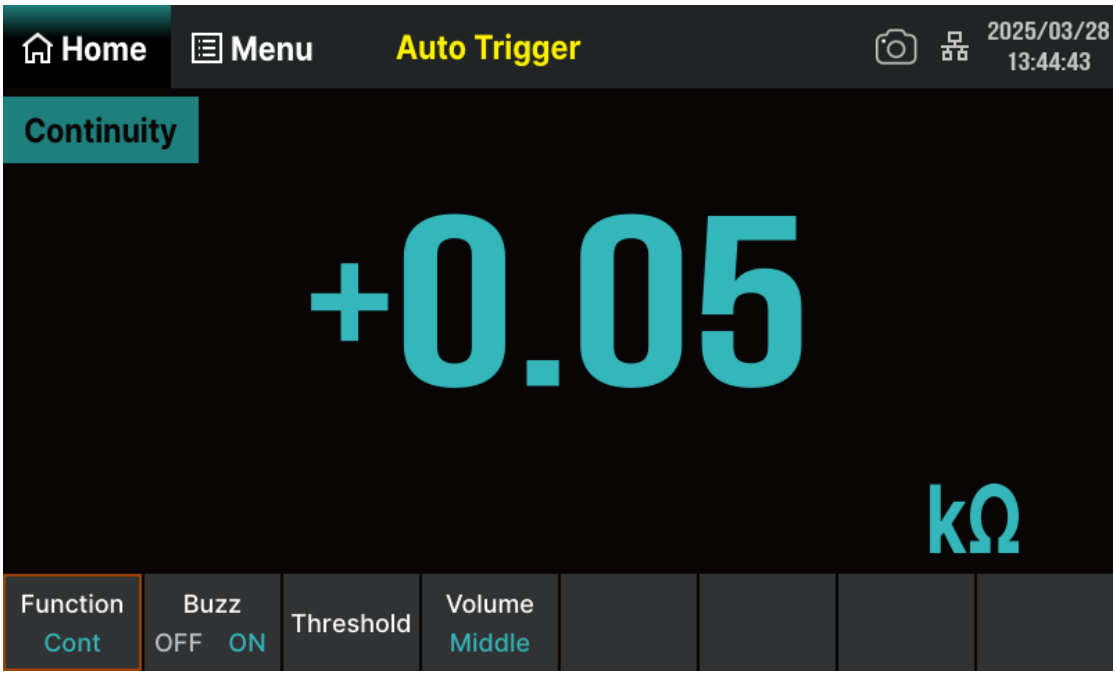


Figure 7-33 Continuity measurement interface

3. Set the buzz

Touch Buzz > ON/OFF to enable or disable the buzzer function. When the buzzer is enabled, if the input signal falls below the threshold, the diode is circuit is continuous; the multimeter screen displays the measured resistance, and the buzzer emits a continuous beep.

4. Set the threshold value

Touch Threshold on the screen menu and touch the pop-up value box to set the desired value through the pop-up numeric keypad. For details, please refer to “7.1.7 Threshold Resistance”.

5. Read the measurement value

The multimeter measures the input signal according to the current measurement settings and displays the measurement result on the screen.

6. Make math operation (advanced operation)

You can perform math operation (Statistics, Limits) on every continuity measurement reading. For details, please refer to “7.6.5 Relative Value”.

7. Display the graph (advanced operation)

You can analyze the measurement data by using Bar, Trend or Histogram display. For details, please

refer to “7.7 Display”.

CAUTION

Before testing continuity, please cut off the power and discharge all the high-voltage containers to avoid damages to the Multimeter.

7.2.9 To Measure Diode

Diode test measures the forward voltage drop of a diode with a 1 mA current. When the measured voltage drop falls below the set threshold, the buzzer emits a continuous beep (with the buzzer enabled).

Operating Steps:

1. Make connection

Refer to the following figure to connect the test leads and the measured signal under test.

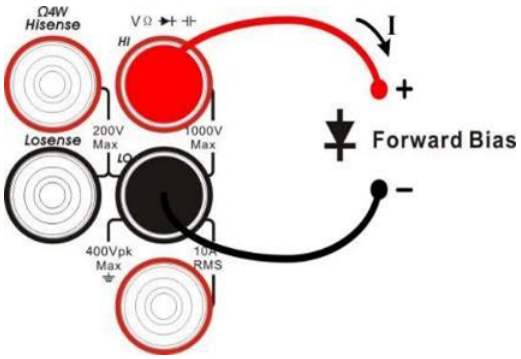


Figure 7-34 Diode measurement reference

2. Enable diode measurement

Press the Function button on the front panel and then touch the on the screen, or touch Home > Function > to enter the diode measurement interface, as shown in the following figure.

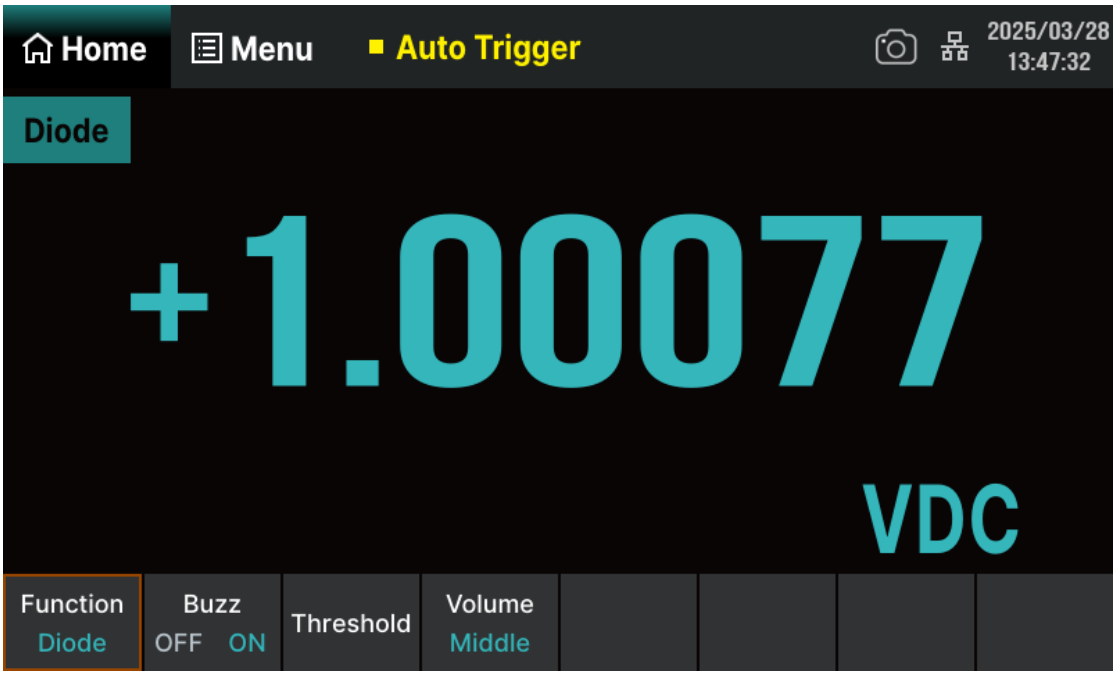


Figure 7-35 Diode measurement interface

3. Set the buzz

Touch Buzz > ON/OFF to enable or disable the buzzer function. When the buzzer is enabled, if the input signal falls below the threshold, the diode is judged as conducting; the multimeter screen displays the measured voltage, and the buzzer emits a continuous beep.

4. Set the threshold value

Touch Threshold on the screen menu and enter the desired value (threshold) in the pop-up menu. For details, please refer to “7.1.8 Threshold Voltage”.

5. Read the measurement value

The multimeter screen displays the measured voltage value when the diode is connected; otherwise, the screen displays "OPEN".

6. Evaluate the results of measurement

Reverse the probes and measure the forward voltage drop on the diode again. Evaluate the diode according to the following rules:

- If the multimeter displays “OPEN” when in reverse bias model, it indicates that the diode is normal.
- If the multimeter shows voltage about 0 V and the instrument beeps persistently when in forward and reverse bias model, it indicates that the diode is short.

- If the multimeter shows “OPEN” when in forward and reverse model, it indicates that the diode is open.

7. Make math operation (advanced operation)

You can perform math operation (Statistics, Limits) on every diode measurement reading. For details, please refer to “7.6 Math Function”.

8. Display the graph (advanced operation)

You can analyze the measurement data by using Bar, Trend or Histogram display. For details, please refer to “7.7 Display”.

⚠ CAUTION

- Before testing diode, please cut off the power and discharge all the high-voltage containers to avoid damages to the multimeter.
- When performing diode measurements, use the shortest possible leads to connect the diode under test to the multimeter to avoid errors caused by the lead loop picking up radiated electromagnetic signals.

7.2.10 To Measure Temperature

SDM4000A supports two types of temperature sensor measurements: RTD and thermocouple sensors. After connecting the temperature probe and multimeter according to the wiring reference, the temperature measurement function is enabled and the measured voltage or resistance value is converted to the corresponding temperature reading by the built-in probe parameter table.

Operating Steps:

1. Make connection

Refer to the following figure to connect the test leads and the measured signal under test.

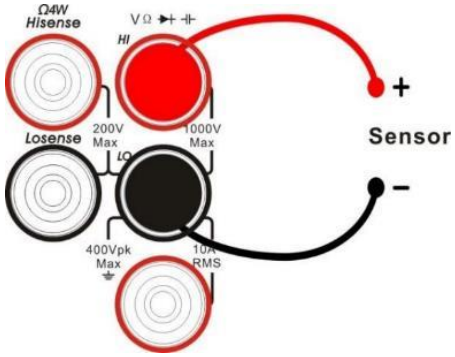


Figure 7-36 Temperature measurement wiring reference

2. Enable temperature measurement

Press the Function button on the front panel and then touch the Temp on the screen, or touch Home > Function > Temp on the screen to enter the temperature measurement interface, as shown in the following figure.

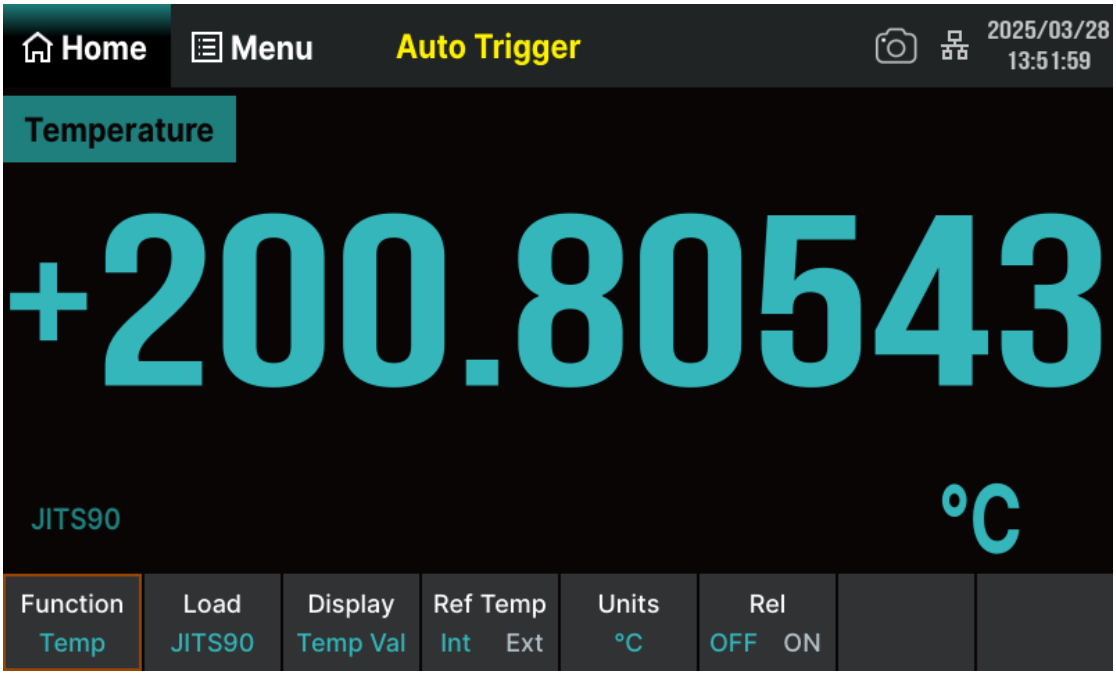


Figure 7-37 Temperature measurement interface

3. Set the type of sensor

Touch Load , and then select the corresponding sensor type according to the accessed measured object (for parameters such as the working range and accuracy of different sensors, please check the datasheet of the multimeter), and select JITS90 by default. the sensor type selection interface is shown in the following figure.

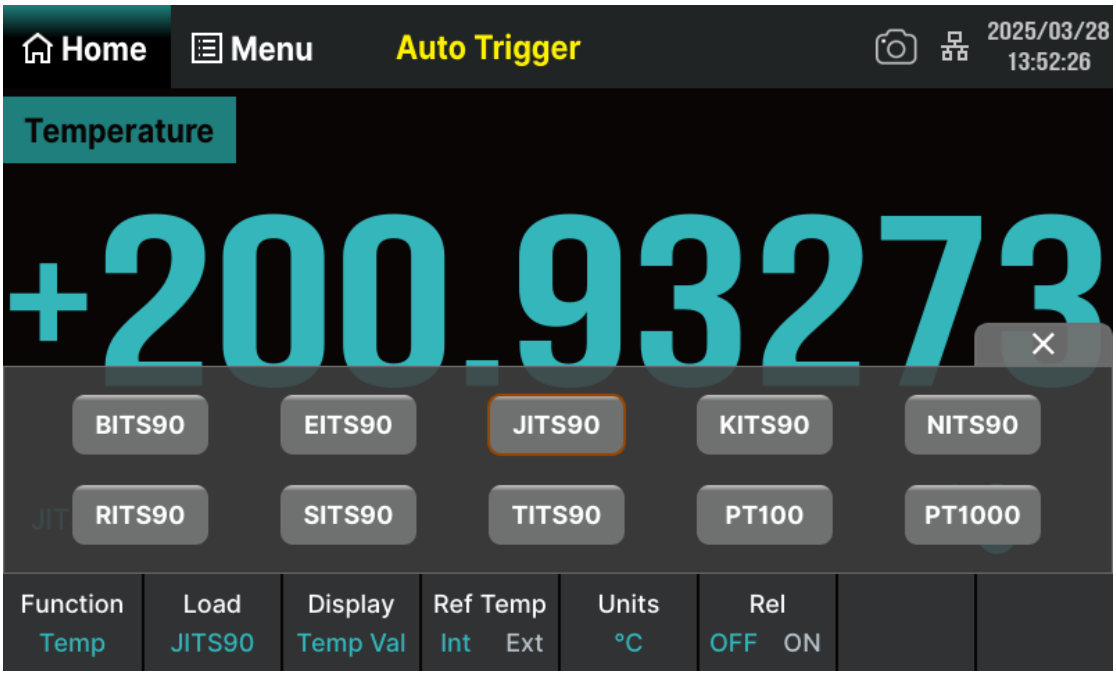


Figure 7-38 Sensor type selection interface

4. Select the display mode

Touch Display on the screen menu to select the display mode. When set to Temp , only the temperature value is displayed; when set to All , both the temperature value (main display) and the actual measured value (secondary display) are shown.

5. Set the reference temperature

Touch Ref Temp on the screen menu to set the reference temperature to be in the internal/external state. When selecting an external state, reference values can be set on the numeric keypad interface. The default reference value is 0.

6. Select temperature unit

Touch Units on the screen menu to select the unit for temperature measurement. SDM4000A supports three units: ℃, ℉, and K. As shown in the following figure.

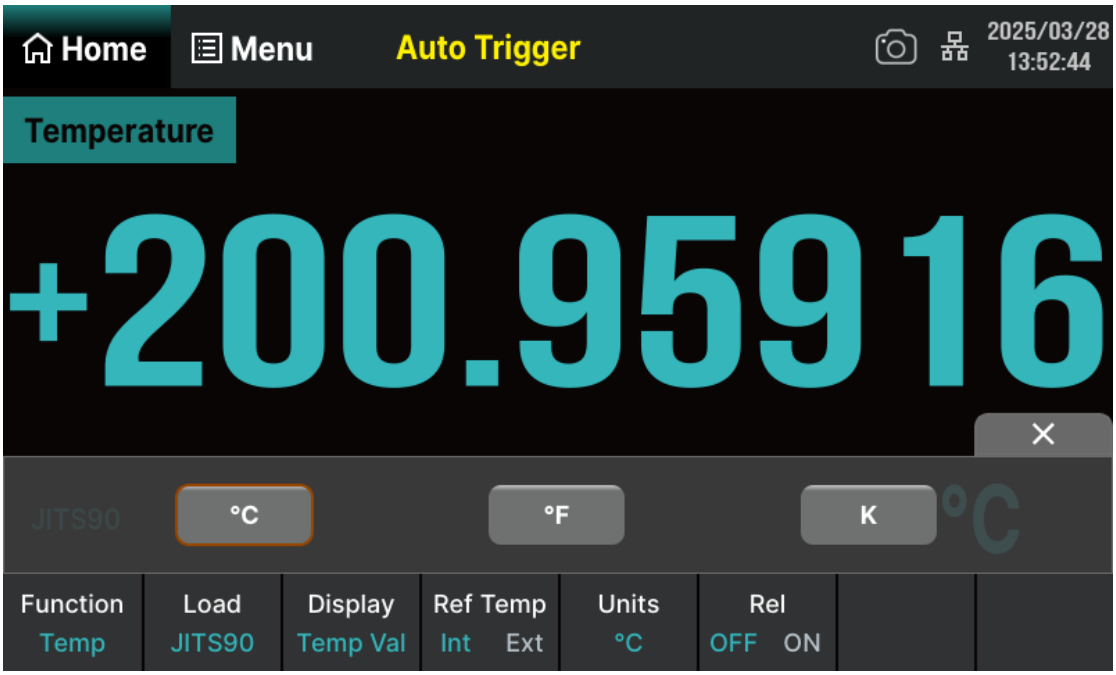


Figure 7-39 Temperature unit selection interface

7. Set the relative value (optional operation)

Touch Rel to enable or disable relative math function. When the function is enabled, the reading displayed is a value which comes from the result of actual measurement value subtracts the relative value that has been set. The default relative value is the measurement value when the function is enabled. Please refer to “7.6.5 Relative Value” for relative value setting.

8. Read the measurement value

The multimeter measures the input signal according to the current measurement settings and displays the measurement result on the screen.

10. Make math operation (advanced operation)

You can perform math operation (Statistics, Limits and Rel) on every measurement reading. For details, please refer to “7.6 Math Function”.

11. Display the graph (advanced operation)

You can analyze the measurement data by using Bar, Trend or Histogram display. For details, please refer to “7.7 Display”.

7.2.11 User-defined Sensor Measurement

The sensor measurement function can convert the measured physical quantities (pressure, flow rate, temperature, etc.) into easily measurable physical quantities such as voltage, current, resistance, etc. for measurement. Users only need to input the response curve in advance, and the multimeter will use internal algorithms for numerical conversion and correction, ultimately displaying the measured physical quantity on the screen. You can freely edit and modify the display unit of the measured physical quantity.

Operating Steps:

1. Enable Sensor measurement

Press Function button on the front panel and then touch Sensor on the screen, or touch Home > Function > Sensor on the screen to enter the sensor measurement interface, as shown in the following figure.

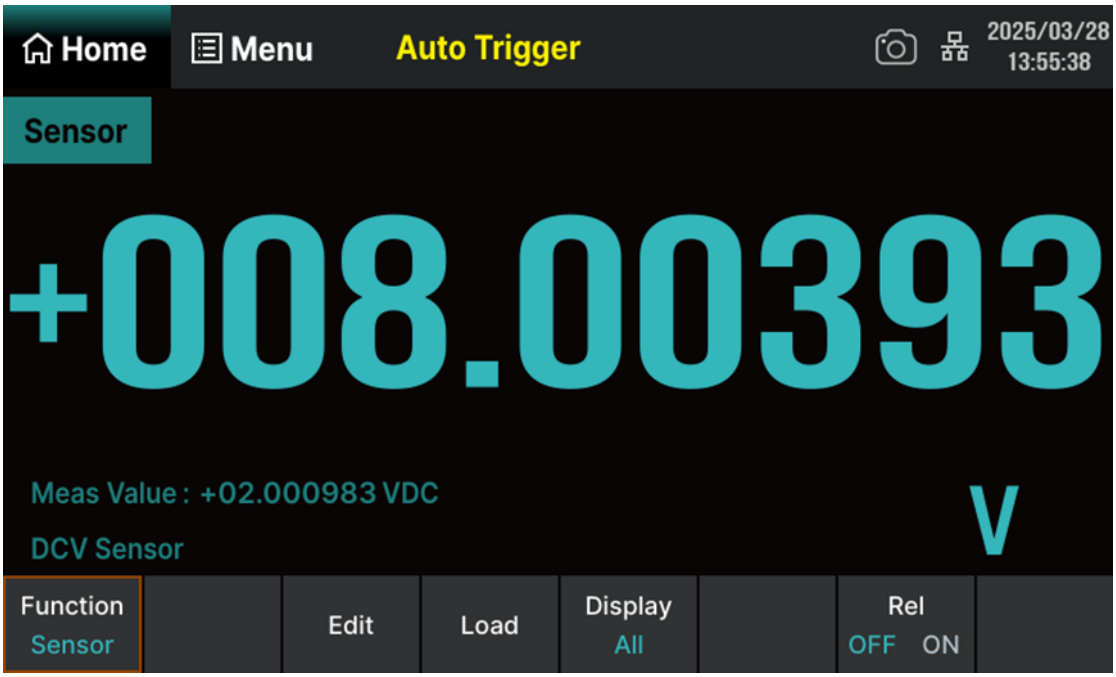


Figure 7-40 Sensor measurement interface

2. Make connection

Connect the test leads with the measured signal according to the defined sensor type, referring to the wiring reference in the corresponding basic measurement function description.

3. Edit configuration file

Touch Edit on the screen menu to enter the modification interface of the configuration file

options, which allows you to modify the currently opened or stored sensor configuration file.

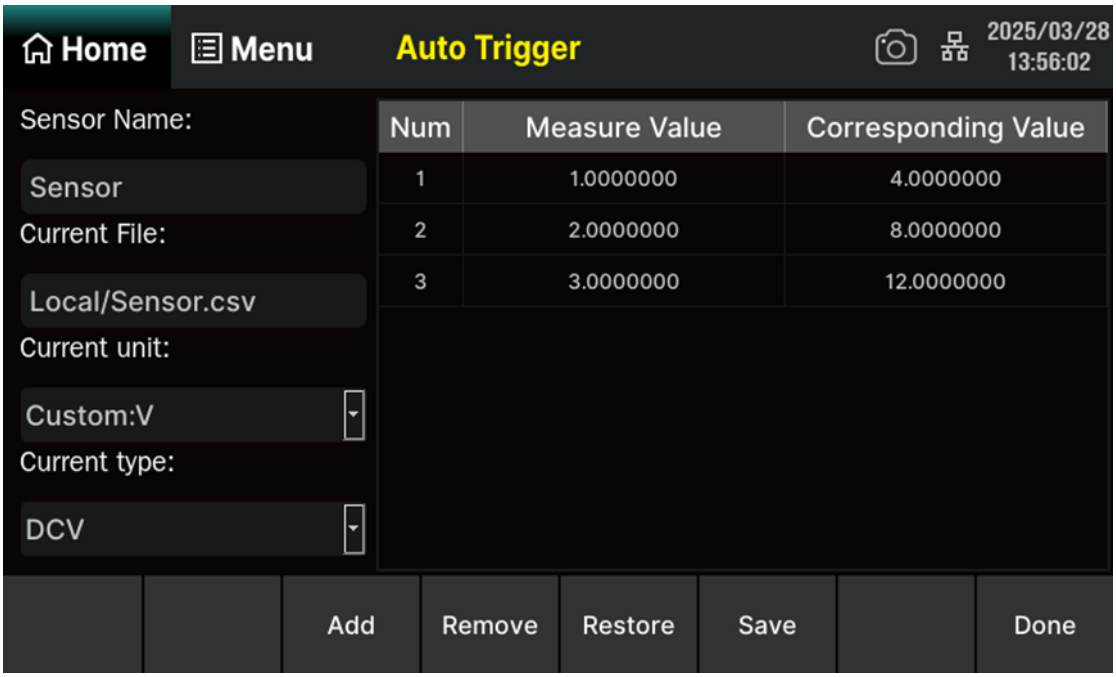


Figure 7-41 Modification interface for configuration file options

- Sensor Name: Touch the field area to bring up the virtual keyboard and edit the name, touch Enter to confirm the changes.
- Current File: The storage path of the currently opened sensor configuration file, touch to set the path.
- Current unit: Select the unit used for the measurement result. When “Custom” is selected, you can enter the desired unit characters in the pop-up virtual keyboard.
- Current type: Set the measurement type of the sensor.
- Measure Value/Corresponding Value: Set the data pair for the sensor response curve.
- Add: Insert a group above the selected data pair or add a group at the bottom of the data pair.
- Remove: Remove the selected data pair.
- Restore: Restore the previous step.
- Save: Save the current sensor configuration.
- Finish: Finish the file configuration and exit the current setup screen.

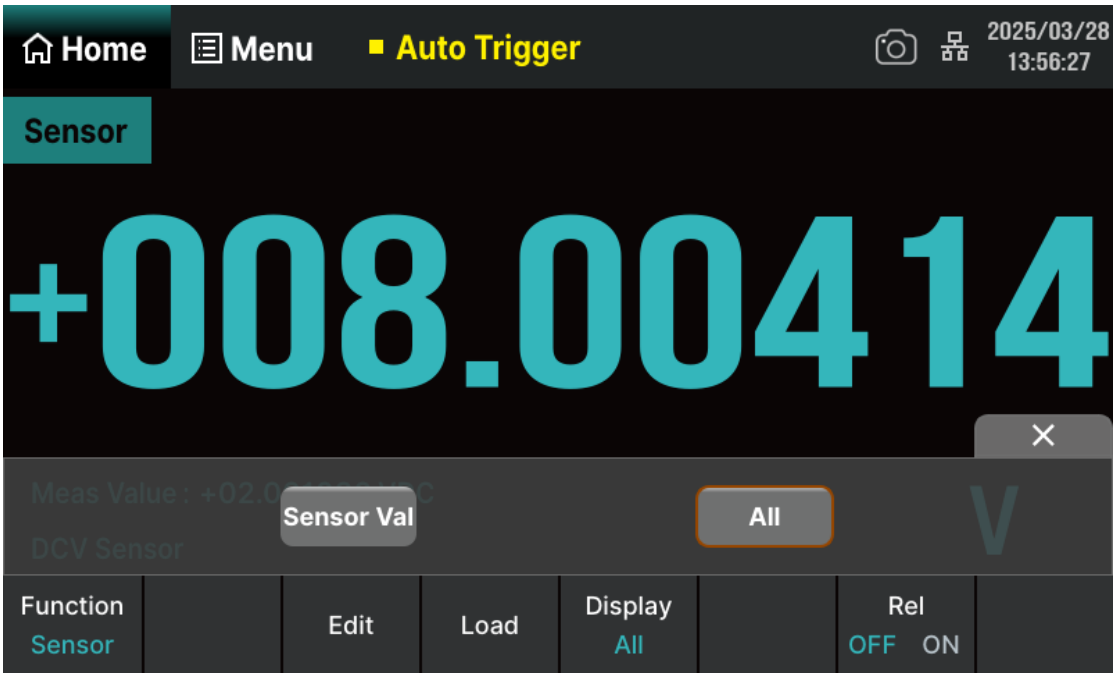
4. Load configuration file

Touch Load on the screen menu to load the internal non-volatile storage space or sensor configuration files already stored in the USB drive. Please refer to the instructions in "Store/Recall" for details.

5. Select the Display Mode

Touch Display on the screen menu to select the display mode. The multimeter supports two display modes: Sensor Val and All.

- **Sensor Val**: The screen only displays temperature values;
- **All**: The screen displays both the corresponding value (main display) and the measured value (secondary display). The corresponding value refers to the actual value of the measured physical quantity.



6. Set the relative value (optional operation)

Touch Rel to enable or disable relative math function. When the function is enabled, the reading displayed is a value which comes from the result of actual measurement value subtracts the relative value that has been set. The default relative value is the measurement value when the function is enabled. Please refer to “7.6.5 Relative Value” for relative value setting.

7.2.12 Scanner Card

After installing the scanner card according to "6.6 Scanner Card (SC1016)" chapter, press Function button on the front panel of the multimeter and then touch Scanner ; or touch Home > Function > Scanner on the screen to enter the Scanner Card function interface, as shown in the following figure:

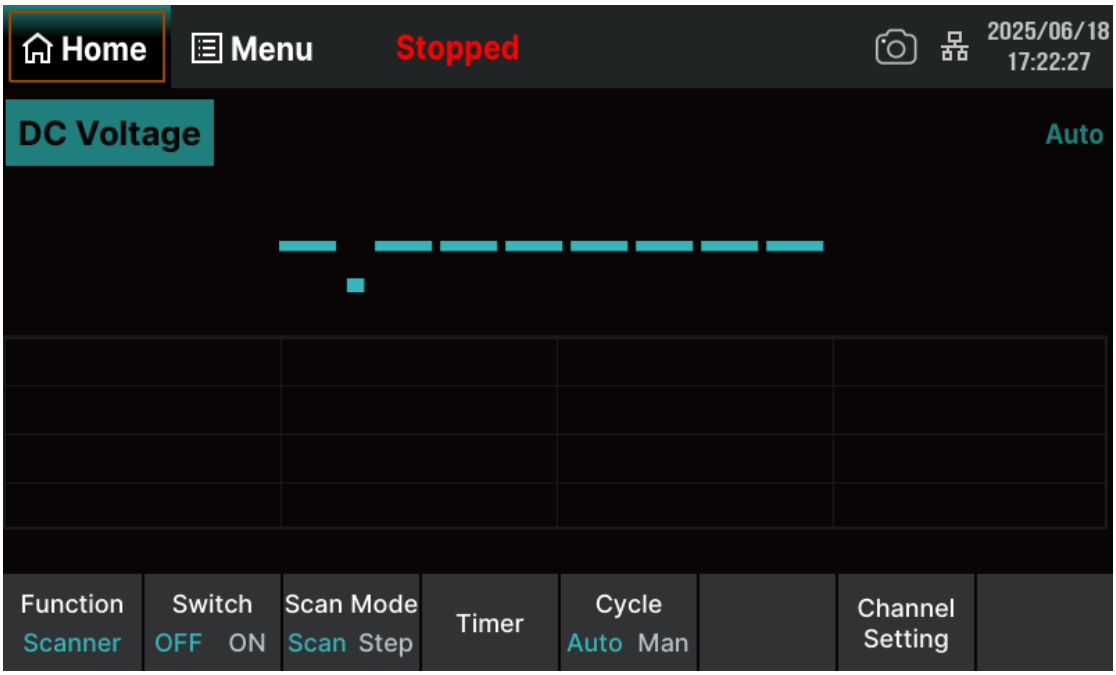


Figure 7-42 Scanner function interface

Table 7-7 Scanner function menu description

Function Menu	Setting	Description
Switch	OFF/ON	Switch on or off the scanner function.
Scan Mode	Scan/Step	Set scan mode to Scan or Step.
Timer		Set the time interval between each scan (scan mode) or between each channel (step mode).
Cycle	Auto/Man	Set the number of scan cycles automatically or manually.
Channel Setting		Set the measurement function, range, scan speed, and other parameters for the specified channel.

Operation Steps

1. **Set scan mode**

- **Scan:** Each time triggered, all specified channels will be measured, and after all channel measurements are completed, the timing function will be activated.

- **Step:** Each time triggered, measure a specified channel, and after the measurement is completed, the timing function will be activated.

2. Set Timer

Definition of Timer: In scan mode, the time interval between the end of one scan and the start of the next scan; In step mode, the time interval between the end of one channel measurement and the next channel measurement.

3. Set the cycle mode

- **Auto:** After starting the scanning operation, the multimeter will continuously cycle through the specified channels until the scanning operation is manually turned off.
- **Man:** By manually setting the number of scanning cycles. After starting the scanning operation, the universal expression will automatically stop scanning after reaching the specified number of scanning cycles.

4. Channel settings

Touch Channel Setting to enter the channel setting interface, as shown in the following figure:

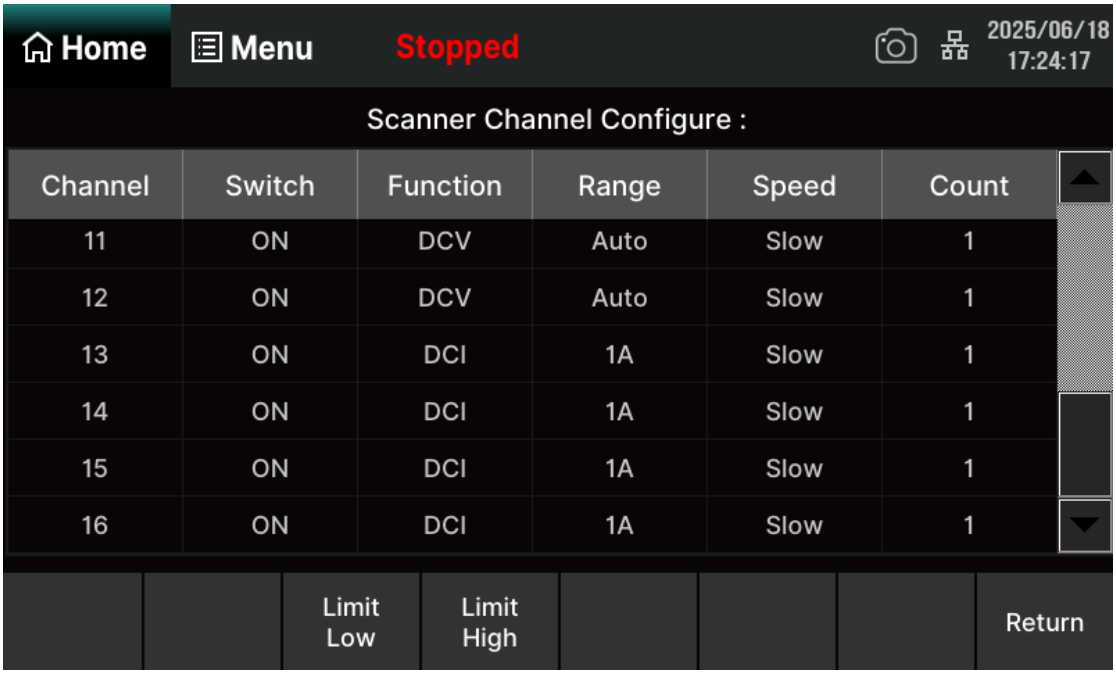


Figure 7-43 Channel setting interface

Table 7-8 Channel setting menu description

Function Menu	Description
Limit Low	Specify the lower numeber for scanning channels.
Limit High	Specify the higher number for scanning channels.
Return	Return to the higher-level menu.

By touching the Switch, Function, Range, Speed or Count area of the corresponding channel, the corresponding parameters can be selected and set. as shown in the following figure:

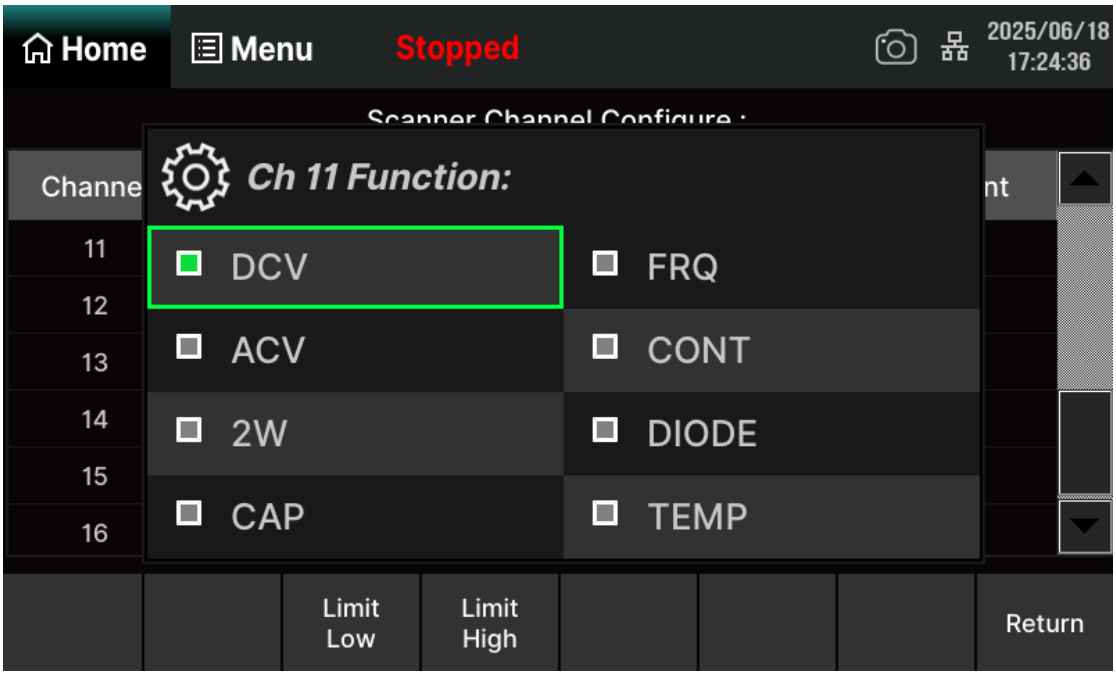


Figure 7-44 Channel configuration interface

Note: The 4-wire resistance (4W) function is available only on the first six channels (channels 1-6). When 4W is enabled on a channel (denoted as n), channel n+6 (within channels 7-12) is forcibly disabled and cannot be modified. For example, setting the measurement function of channel 2 to 4W automatically disables channel 8.

The measurement functions with adjustable range include: DCV/ACV, 2-wire/4-wire resistance (2W/4W), capacitance (Cap), frequency (FRQ), continuity (CONT), diode (DIODE), temperature (TEMP).

The speed can be set to either Fast or Slow. The measurement functions that can set the scanning speed include: DCV/ACV, DCI/ACI, 2-wire/4-wire resistance (2W/4W).

Operating instructions:

- By pressing the screen settings module to select settings, the background color of the cursor's position changes to gray.
- The background color of the selected settings changes to green.
- Set the selected parameters through the left/right directional buttons on the front panel or the virtual keyboard that pops up on the screen; Save this setting, and the background color of the parameter area will change from green to gray.
- Continue to repeat the above steps to set the next parameter.
- Touch Return to save the current configuration and return to the higher-level interface.

5. Set the number of scanning channels

Touch Limit Low and Limit High to enter a channel number.

Note: The specified high number should always be greater than or equal to the low number.

6. Switch on the scanner function

Touch Switch > ON to enable the scanner function, as shown in the following figure:

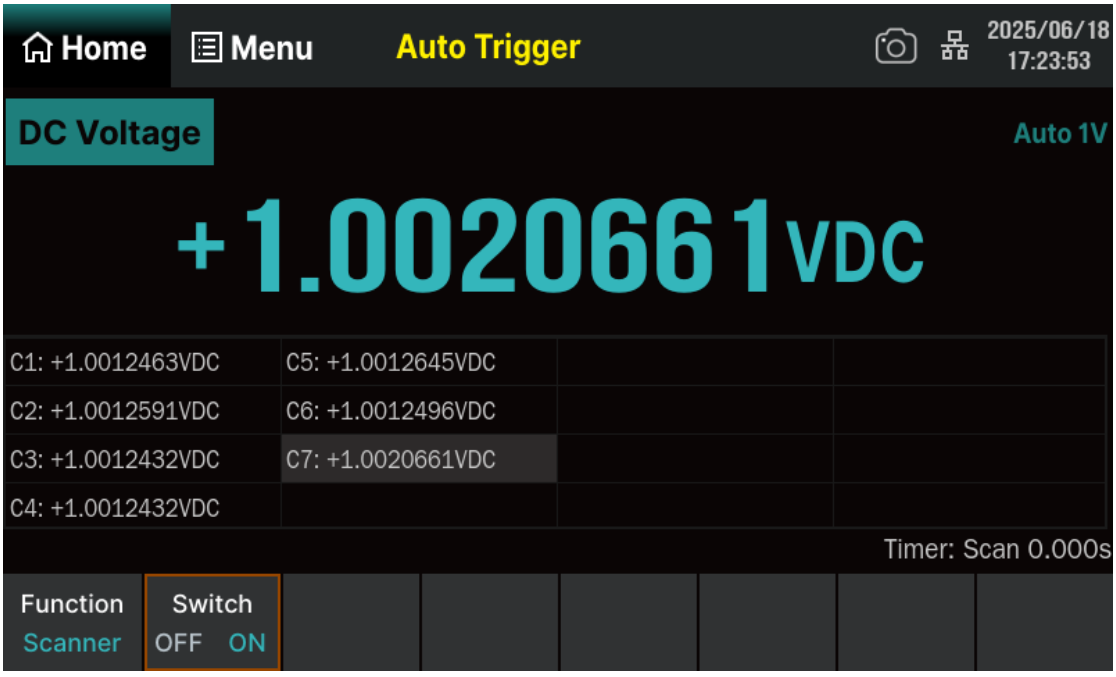


Figure 7-45 Scanner function ON interface

As shown in the above figure, the upper part of the interface displays the measurement function, range, and reading of the current scanning channel. The table below records the measurement results of each channel during this scan.

7. Set the display mode (option operation)

Touch Menu > Display to set the display. Taking the trend display mode as an example in the following figure.

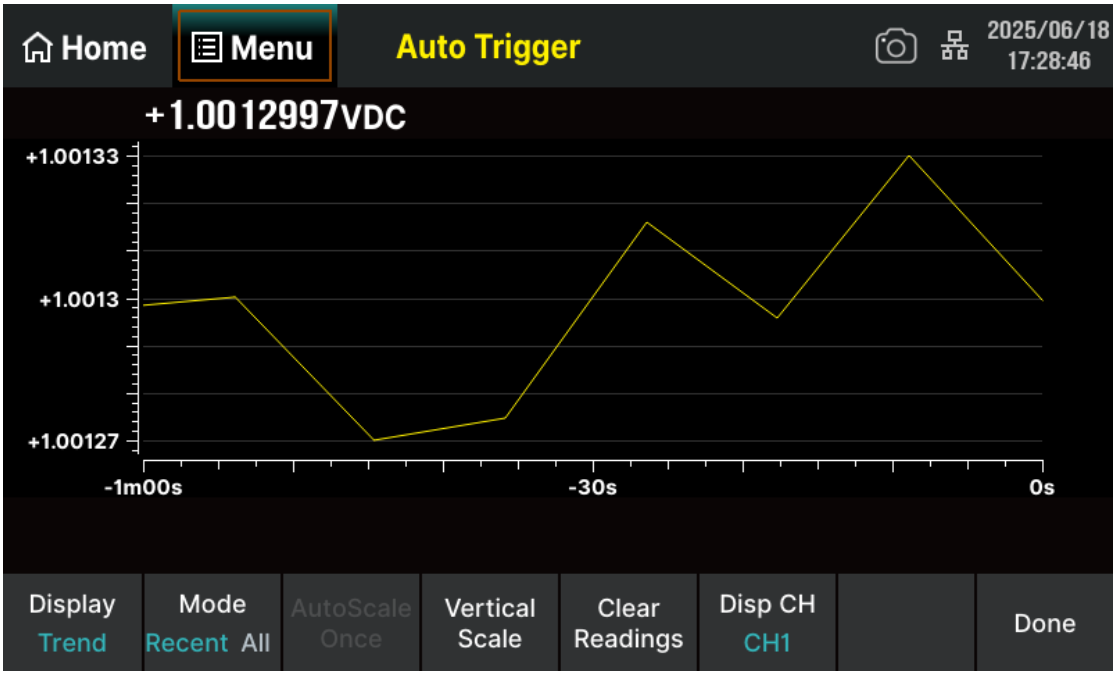


Figure 7-46 Trend display mode interface

For details about display mode, please refer to “7.7.3Trend” chapter.

You can also use mathematical statistics function in channel scanning. For more details, please refer to the relevant description in the "7.6 Math Function" chapter.

Touch Done to return to the higher-level interface.

8. Stop scanning

Touch Switch > Off to disable the scanner function. If Cycle is set to manual, the multimeter will automatically stop scanning after reaching the specified number of cycles.

7.3 Dual-display Function

The Dual-display function is used to turn on two basic measurement functions, and observe the two measurement results at the same time, thus improve the test and measurement functions. For available combinations of Dual-display, refer to the Table 7-9, blank space indicates that the combination is not available.

Table 7-9 Available combination of Dual-display (letters in brackets correspond to Figure 7-48 wiring example)

Correspond to Figure 7-48 wiring example		Main Display Function								
		DCV	DCI	ACV	ACI	Freq	Period	Ω2W	Ω4W	Cap
Secondary Display Function	DCV		(a)[1]	(b)	(a)					
	DCI	(a)[1]		(a)[1]	(c)					
	ACV	(b)	(a)[1]		(a)	(b)	(b)			
	ACI	(a)	(c)	(a)		(a)	(a)			
	Freq			(b)	(a)		(b)			
	Period			(b)	(a)	(b)				
	Ω2W								(d)	(e)
	Ω4W							(d)		
	Cap							(e)		

Remark:

(1). Because connection (a) reverses the polarity of current line, DCI measurement shows its negative value.

Operating Steps:

1. Enable temperature measurement

Touch Home > Function to set the main measurement function, touch Menu > Dual Function > Secondary to set the secondary measurement function. Then touch Switch menu and set the status to "ON" to enable secondary measurement function. When the second measurement function is enabled, touch the Swap Display on the screen to switch between the main/secondary display. As shown in the following figure.

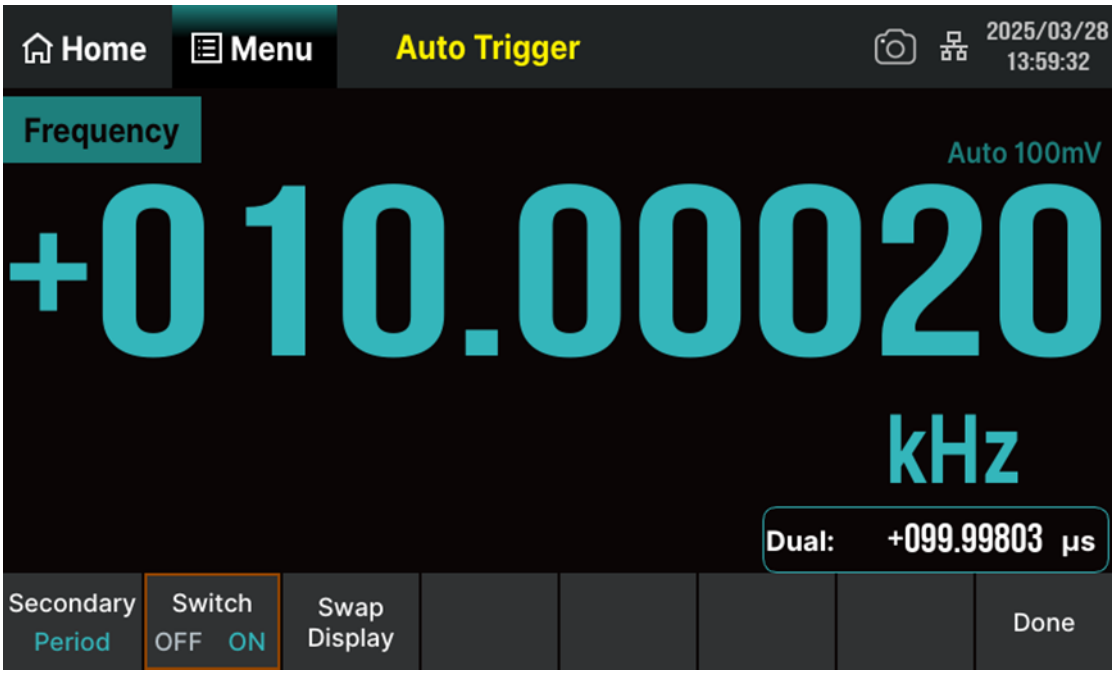


Figure 7-47 Dual-display interface (main display – Freq, secondary display – Period)

2. Make connection

Connect the test leads with the measured signal by referencing the wiring example shown in the following figure, where Power Source refers to connecting DC/AC power or not.

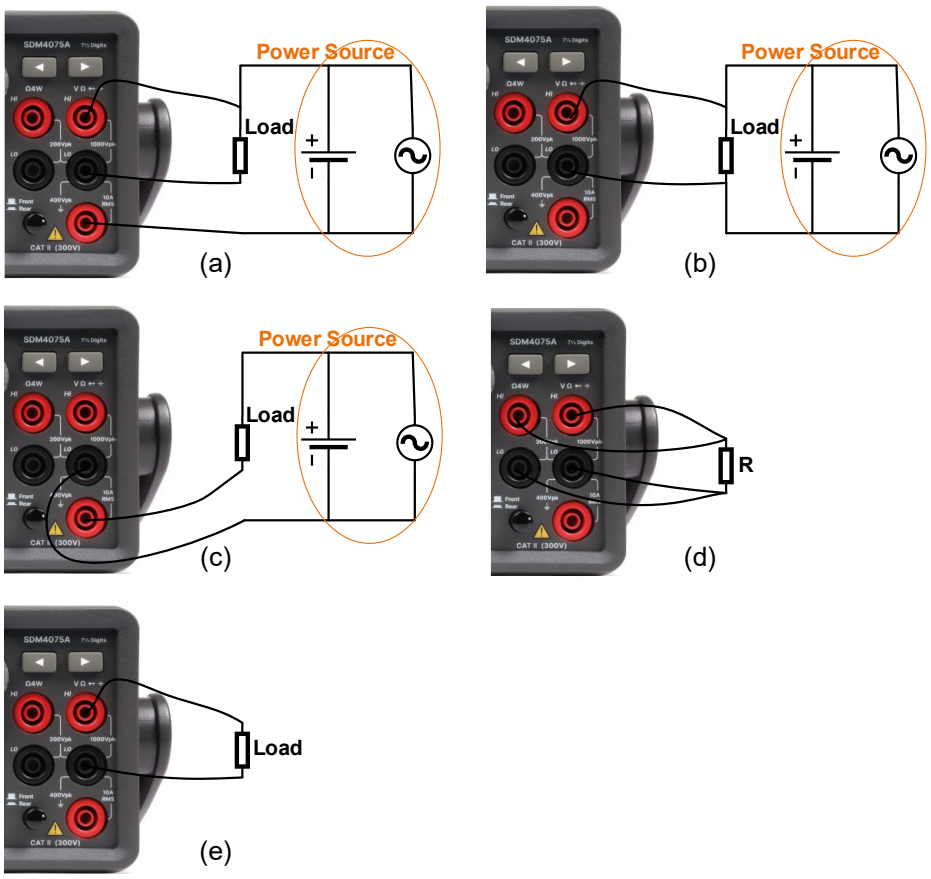


Figure 7-48 Dual-display wiring example

3. Instruction

1) The readings in both measurement functions will update alternately, and the relevant configuration information (such as auto zero switch, relative value, input impedance, etc.) is also updated synchronously.

2) If math function (Statistics, Limits, Relative, dB/dBm) is used in Main Display, when opening Secondary Display, the result will still be shown in Main Display and Secondary Display will show the second selected function normally.

3) Temp, Cont, and Diode do not support dual display function.

4) The configuration of the secondary display should be consistent with the configuration of the second test function before the dual display function is turned on.

5) Measured data in secondary display can be saved into “History”.

6) DCV ratio measurement function and dual display function can not be used at the same time.

7) In dual-display mode, only numeric, trend graph and histogram display are supported, bar graph is not supported. When the display in dual-display mode is a trend graph or histogram, the measurement data in the main display is displayed as a trend graph or histogram, and the measurement data in the secondary display is still displayed as numbers.

8) Data Log mode and digitize mode are not supported when the dual display function is running.

7.4 Utility

The Utility function enables users to set up system parameters, interface parameters of the multimeters.

Press Utility button on the front panel, or touch Menu > Utility on the screen to enter the operation menu for utility function, as shown in the following figure.

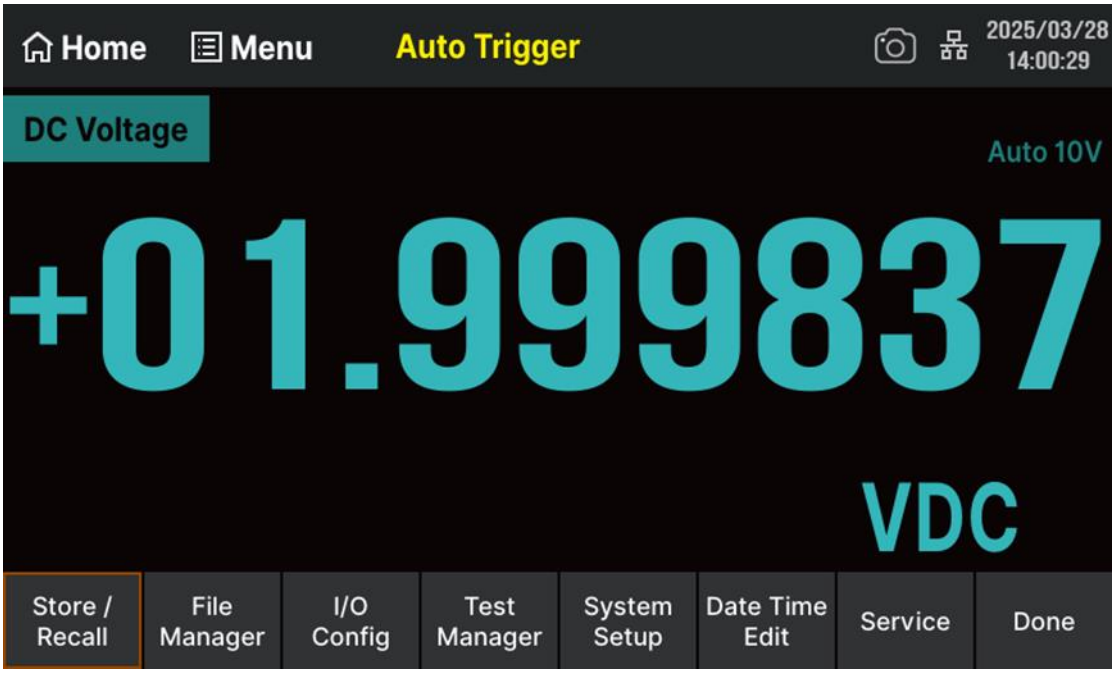


Figure 7-49 Utility configuration interface

Table 7-10 Utility function menu description

Function Menu	Description
Store/Recall	Store or recall state files.
File Manage	Create a new file, copy, rename or delete a file.
I/O Config	Configure USB, LAN and GPIB interface.
Test Manager	Provide board test function.
System Setup	Configure instrument's user settings.
DateTime Edit	Set the date and time.
Sevice	View LXI relevant standard information and set up SMB File Share.
Done	Save current settings and return to the higher-level menu.

7.4.1 Store/Recall

The Store/Recall function enables users to store and recall the instrument state and data files in the local storage as well as in USB storage. Touch Utility > Save/Recall on the screen to enter the following figure.

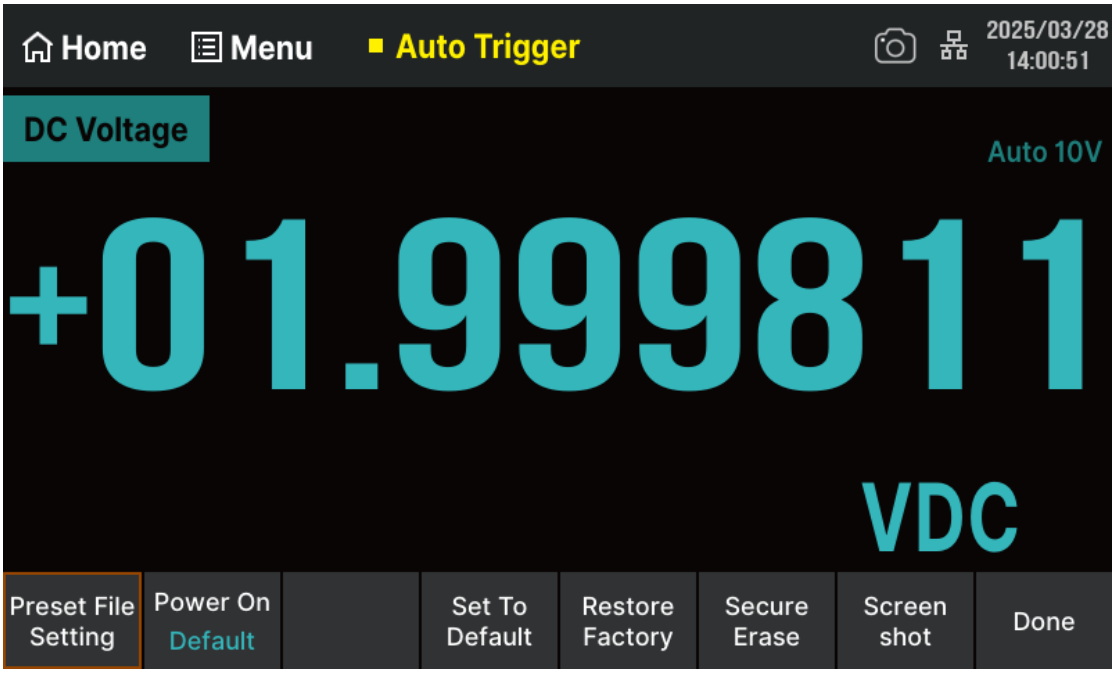


Figure 7-50 Save/Recall interface

Table 7-11 Save/Recall function menu description

Function Menu	Description
Preset File Setting	Save/Read saved files.
Power On	Select the power on mode: Default, Last, and User.
Set To Default	Restore the default configuration of the multimeter function.
Restore Factory	Restore the default settings of the multimeter function, and also restore the network port, language, power on mode, screen saver, calibration compensation, and screenshot settings.
Secure Erase	Restore factory configuration and deleting all user data.
Screen Shot	Set the path and file name for saving screenshots.
Done	Return to the higher-level menu.

7.4.1.1 Preset File Setting

You can store system configuration (in the form of .xml) in internal memory or an external USB storage device and recall it when required. After entering the Store/Recall operation menu, select the Preset File Setting to enter the settings interface as shown in the following figure.

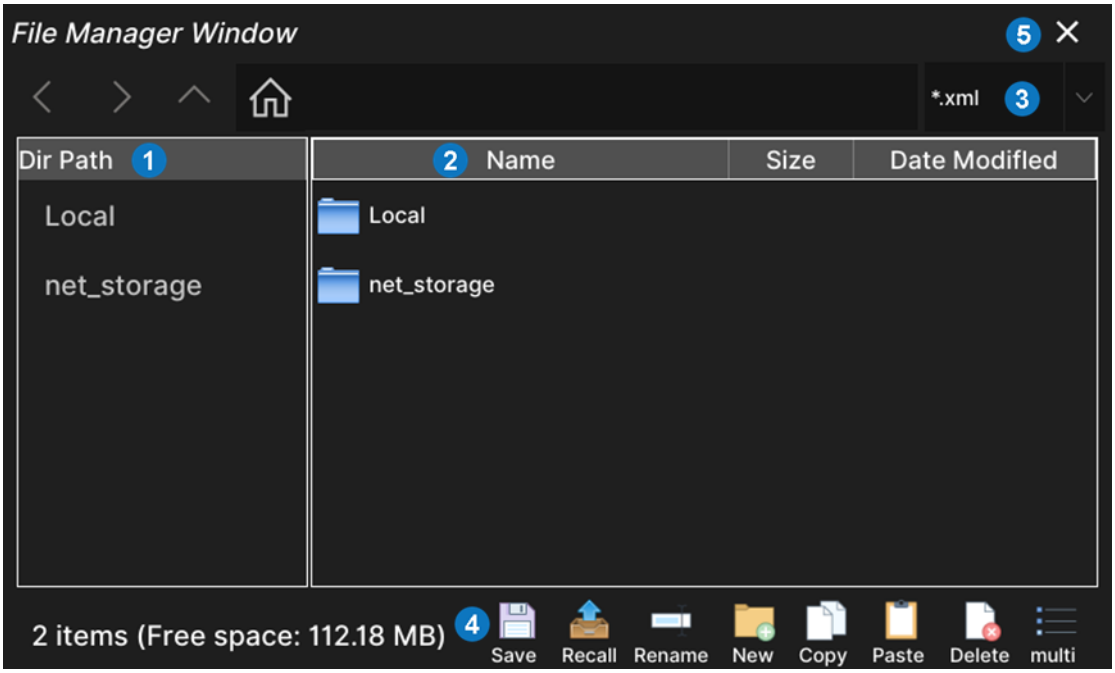


Figure 7-51 Preset file setting interface

Table 7-12 Preset file setting menu

No.	Item	Description
1	Dir Path	Select the path to save or recall.
2	Name	The file name.
3	File type	Choose the file type to .xml/.csv. .xml is used to save the current configuration of the multimeter; and. csv is used to save the measurement data of the current function of the multimeter.
4	Operation menu bar	Perform file operations such as Save , Recall , Rename , New , Copy , Paste and Delete files using the currently selected path, file type, and input file name.
5	Close window	Save all settings and close the window.

7.4.1.2 Power On

After entering the Store/Recall operation menu, touch the Power On to configure the status of the multimeter when powered on. The power on mode can be set to Default, Last, or User.

- **Default**: Factory default settings. For details, please refer to "7.4.1.3 Set to Default".
- **Last**: Configuration at last power-off, including all system parameters and states, except for channel output switch states.
- **User**: System state previously saved by the user. After selecting "User" as the power-up mode, touch Power On File to recall the power on file that the user has stored in the local or external USB memory device.

7.4.1.3 Set to Default

After entering the Store/Recall operation menu, touch the Set To Default , select OK in the pop-up confirmation dialog box to restore the function settings to the default state of the instrument.

Table 7-13 Default settings

Parameter	Default Value
Function	
DCV	
Range	Auto
Speed	Medium
Aperture	10 PLC
Auto Zero	OFF
Rel	OFF
Input Z	10 MΩ
DCV Ratio	OFF
ACV	
Range	Auto
Speed	Medium
Filter	>20 Hz
Rel	OFF
DCI	

Parameter	Default Value
Range	Auto
Speed	Medium
Aperture	10 PLC
Auto Zero	OFF
Rel	OFF
Option	None
ACI	
Range	Auto
Speed	Medium
Aperture	>20 Hz
Rel	OFF
Option	None
Ω2W/Ω4W	
Range	Auto
Speed	Medium
Aperture	10 PLC
Auto Zero	OFF
Rel	OFF
Cap	
Range	Auto
Rel	OFF
Freq/Period	
Range	Auto
Gate Time	100 ms
Rel	OFF
Cont	
Buzz	ON
Threshold	10 Ω (SDM4075A series) 50 Ω (SDM4055A series / SDM4065A series)

Parameter		Default Value
Volume		Middle
Diode		
Buzz		ON
Threshold		2 V
Volume		Moddle
Temp		
Load		JITS90
Display		Temp Val
Ref Temp		Int
Units		℃
Rel		OFF
Sensor		
Edit	Sensor name	Sensor
	Current File	Local/Sensor.csv
	Current unit	V
	Current type	DCV
Display		Sensor Val
Rel		OFF
Scanner		
Switch		OFF
Scan Mode		Scan
Timer		0 ms
Cycle		Auto
Math		
Statistics		OFF
Limits		OFF
dB/dBm		OFF
Rel		OFF
Acquire		

Parameter		Default Value
Continue		
Trigger Setting	Trg Src	Auto
	Delay	Auto
	Samples/Trigger	1
	Sample	Imm
VMC Out		Neg
Save Readings	AddDate	OFF
	Metadata	OFF
	Separator	Comma
	Rel time	On
Data Log		
Duration		Rdg
Delay Time		0 s
Log to		Memory
DIgitize		
Trigger Setting	Trg Src	Auto
	Delay	Auto
Sample		Int
Duration		Rdg
Display		
Display		Number
Disp Prec		Auto
Bar		
Scale Mode		Default
Trend		
Mode		Recent
Vertical Scale		Default
Histogram		
Binning		Auto

Parameter	Default Value
Cursors	OFF
Cumulate	OFF
Dual Function	
Secondary	ACV
Switch	OFF
Probe Hold	
ProbeHold	OFF
Buzz	ON

7.4.1.4 Restore Factory

After entering the Store/Recall operation menu, touch the Restore Factory, select OK in the pop-up confirmation dialog box. After performing this operation, the multimeter will restore the default settings of the multimeter function, and also restore the I/O configuration, language, power on mode, screen settings, calibration settings, and screenshot settings.

This operation is irreversible, please be cautious.

Table 7-14 Restore factory settings

Parameter	Default Value
I/O Config	
LAN	ON
LAN Setting	Automatic IP address (DHCP) Automatic DNS address
GPIB Setting	18
Socket	Port 1
Port Number	0
System Setup	

Parameter	Default Value
Language	English
Cali	Factory
Scrn Svr	Off
Screen Brightness	80%
Power On	Default
Srcreen shot	File Path: *Local/* File Name: *ScreenShot*

7.4.1.5 Secure Erase

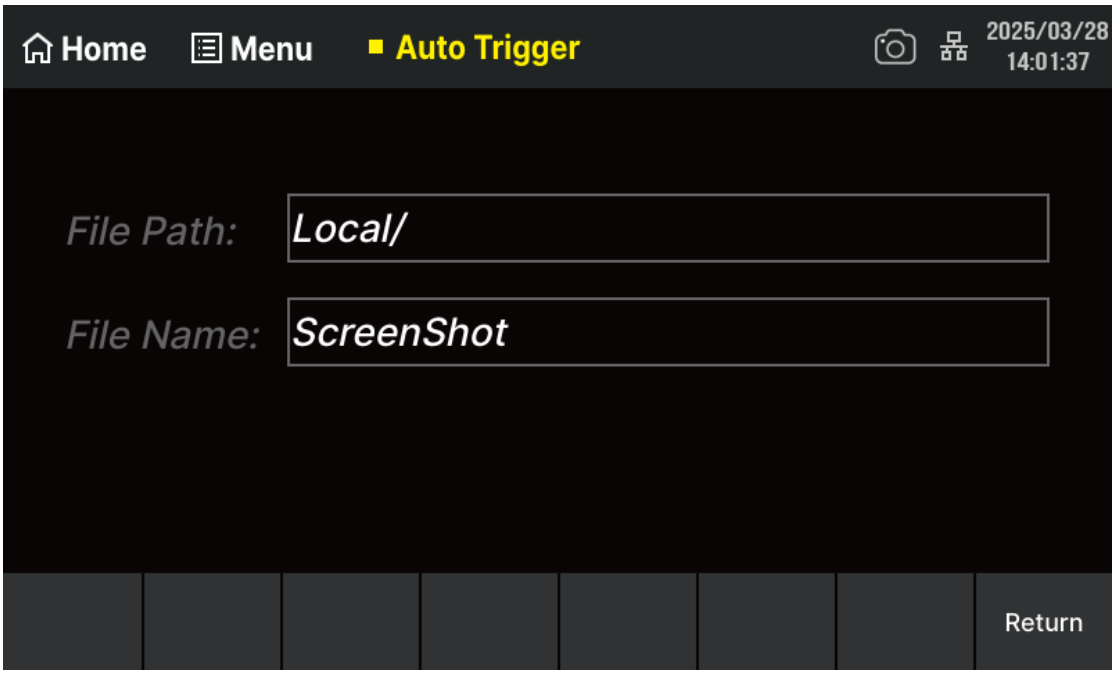
After entering the Store/Recall operation menu, touch the Secure Erase , select OK in the pop-up confirmation dialog box. After performing this operation, the multimeter will restore factory configuration and delete all user data.



This operation is irreversible, please be cautious.

7.4.1.6 Screen Shot

Entering the Store/Recall operation menu, touch the Screen shot to enter the interface as shown in the following figure. You can set the storage path and file name in the corresponding input area. The path can be selected from internal storage or external USB storage device. After the setting is completed, touch "1" at the upper right corner of the multimeter screen interface to take a screenshot of the current interface image and save it to the specified path with the set file name. If you do not change the save path and file name, when you take screenshots for several times, the default will automatically add "_N" after the file name (N is an integer incremented from 1), and save it to the last set path.



7.4.2 File Manager

The multimeter provides file management functionality for both the internal storage area and external USB storage devices. Supported operations include folder creation, saving, copying, renaming, and file deletion.

After entering into the function menu of Utility, touch Manage File to enter the manage file interface, as shown in the following figure.

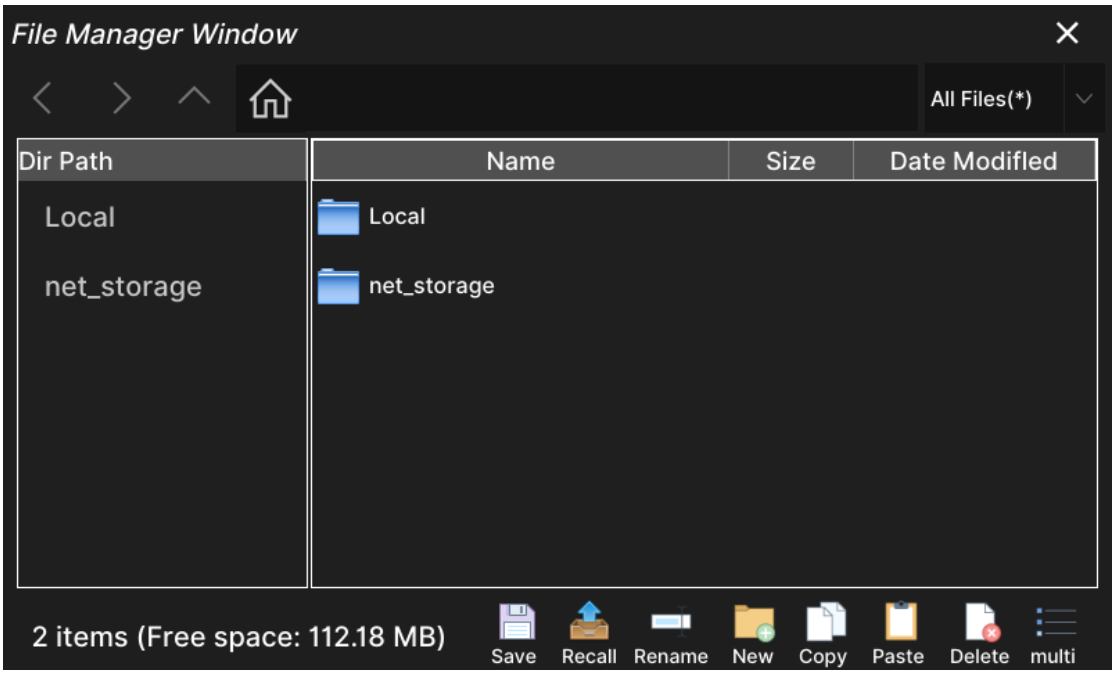


Figure 7-52 Manage file interface

Touch the file type in the upper right corner to bring up the file type drop-down box and select the file type you want to display. The file types and their descriptions are shown in the following table.

Table 7-15 File type

File Type	Description
All Files(*)	All types of files
*.ADS	System update file
*.CFG	Configuration update file
*.xml	System state file
*.cal	Calibration file
*.jpg	Screenshot file
*.csv	Readings file

Touch the Save , Recall , Rename , New , Copy , Paste , Delete or Multi to perform corresponding operations.

- Save: Save the current configuration file.
- Recall: Load the file saved.
- Rename: To rename a file or folder.
- New: Create a folder. After selecting the path to generate the folder, touch New , then enter

the folder name and generate the folder to the specified path.

- Copy: Copy a file or folder. After selecting the path of the file or folder to be copied, touch Copy to generate the copied file or folder to the specified path.
- Paste: Paste the file or folder to the specified path.
- Delete: Delete the file or folder selected.
- Multi: Select multiple files.

7.4.3 I/O Configuration

SDM4000A provides USB, LAN (VXI-11), and GPIB (optional) interfaces. You can set GPIB and LAN interface parameters as needed (USB parameters do not need to be configured). After touching Utility to enter the operation menu of utility functions, touch I/O Config to open the interface settings menu, as shown in the following figure.

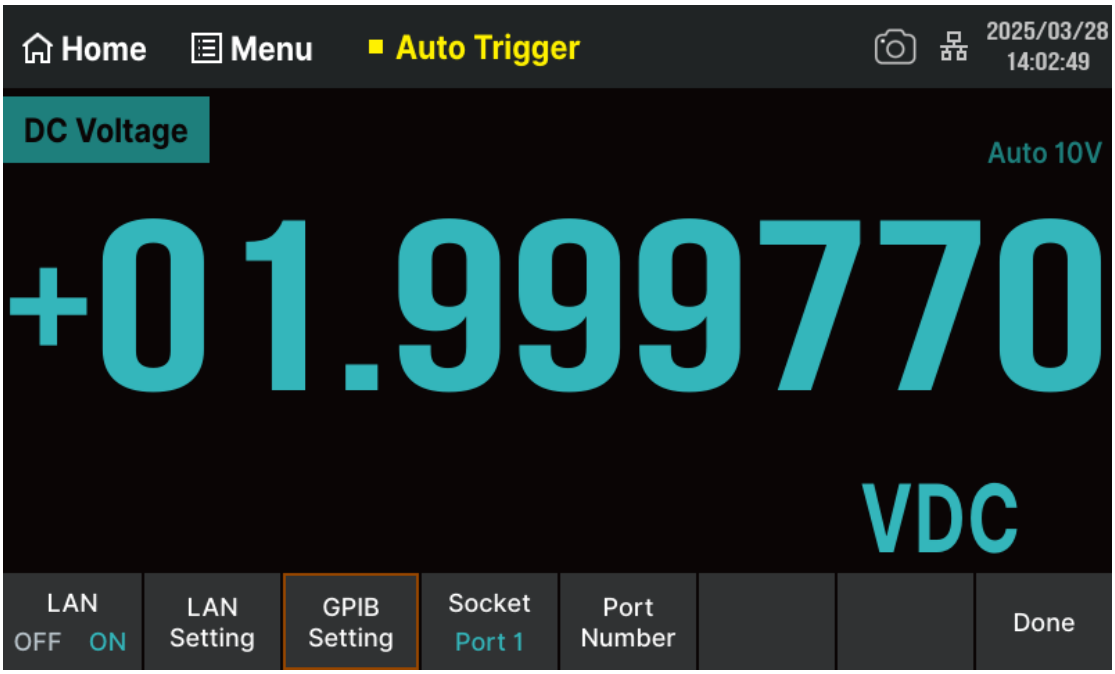


Figure 7-53 I/O configuration interface

7.4.3.1 LAN Setting

After entering the I/O configuration menu, set the LAN to ON and touch LAN Setting to enter the interface shown below. You can set the IP address, subnet mask, and gateway.

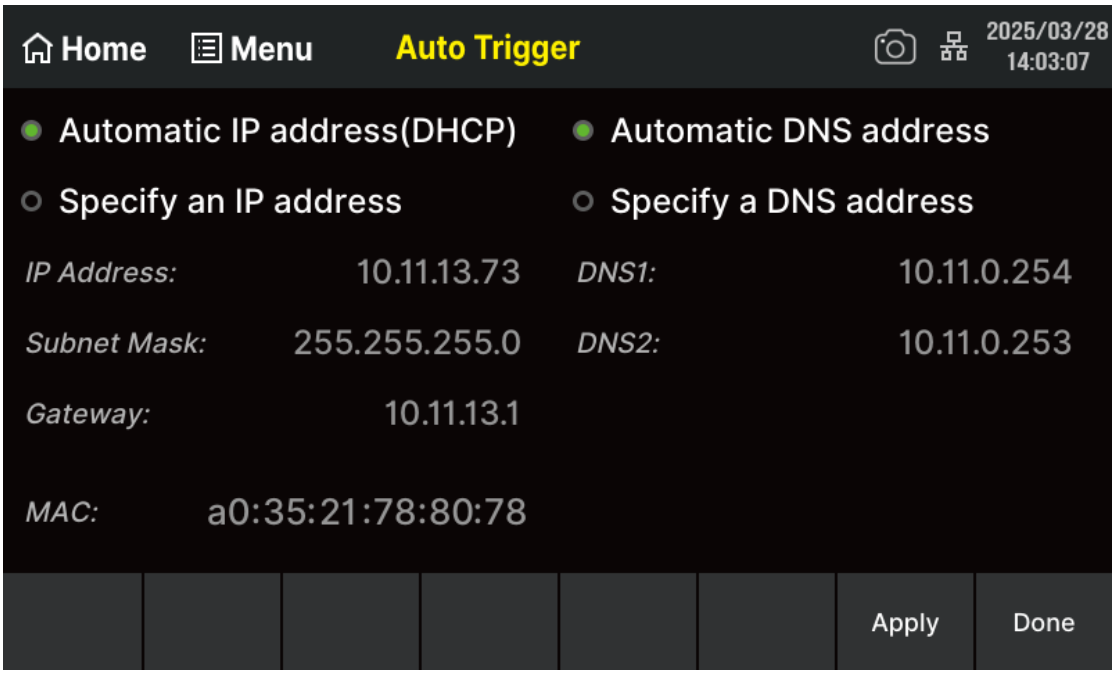


Figure 7-54 LAN setting interface

Table 7-16 LAN settings description

Item	Description
Automatic IP address (DHCP)	Select this option to enable automatic IP. The multimeter must be connected to a LAN with a DHCP server. Contact your network administrator to confirm this information.
Specify an IP address	Select this option, the multimeter uses a static IP. you need to set the address, subnet mask and gateway of the static IP.
IP Address	Set up IP address.
Subnet	Set up subnet mask.
Gateway	Set up gateway.
Apply	Apply current settings.
Done	Save all changes and return to the higher-level menu.

Explanation:

- If the instrument is directly connected to the computer, set the IP address, subnet mask, and default gateway for the instrument and computer separately. The subnet masks and default gateways of both must be the same, and their IP addresses must be within the same network segment.
- If the instrument is connected to the local area network where the computer is located, please

obtain available network parameters such as IP addresses from your network administrator. Please refer to the TCP/IP network protocol for relevant knowledge.

- The IP address, subnet mask, and gateway settings are saved in non-volatile memory. The instrument will automatically load the relevant settings on the next boot.

7.4.3.2 GPIB Setting

SDM4000A is available with an optional GPIB interface. The GPIB address can be set within the range of 1 to 30, and the selected address is stored in non-volatile memory.

1. Connect the instrument

Connect the multimeter to your computer using the USB-GPIB module (optional) and ensure that your computer has a GPIB card installed. Connect the USB end of the USB-GPIB module to the USB Host interface on the multimeter front panel, and connect the GPIB end of the USB-GPIB module to the GPIB card port on the computer.

2. Install GPIB card drivers on the computer

Please correctly install the GPIB card driver connected to the computer.

3. Set the GPIB address of the instrument

After entering the I/O configuration operation menu, select GPIB setting, and you can use the pop-up virtual keyboard to enter the desired values, as shown in the following figure. After entering, touch Enter to save the current settings.

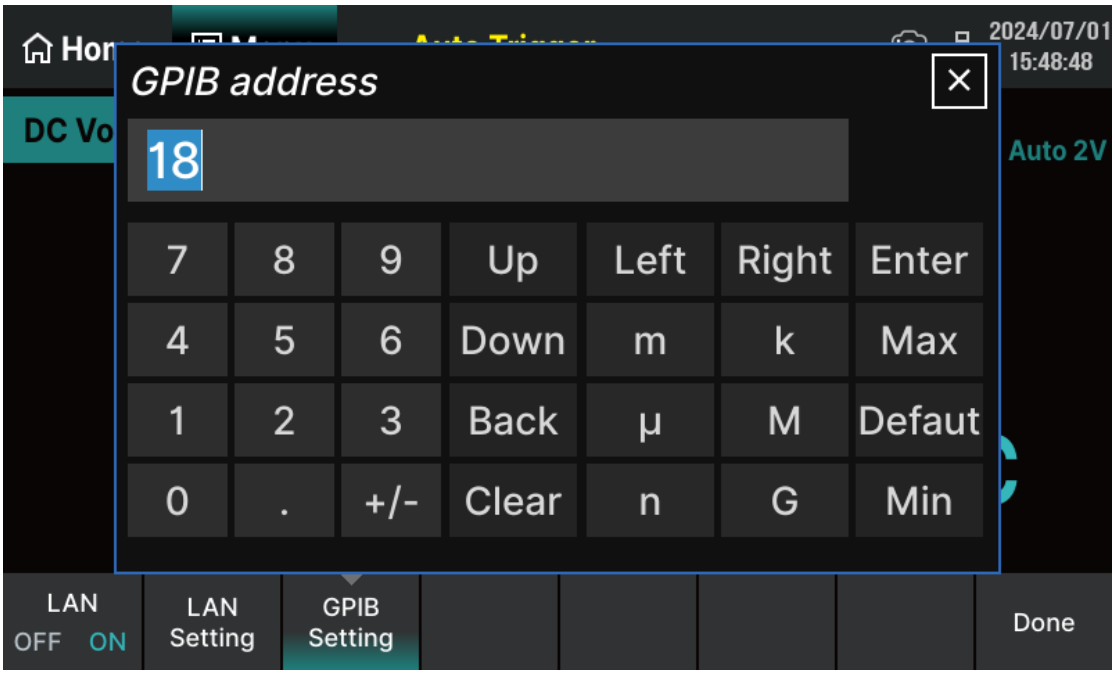


Figure 7-55 GPIB setting interface

4. Remote communication with computers

1) Open the Measurement & Automation Explorer software.
2) Add GPIB devices.
3) Open the remote command control panel, and you can send commands and read data through this panel.

7.4.3.3 Socket Settings (SDM4075A Series Only)

Sets the port for socket communication: Port 1 or Port 2.

7.4.3.4 Port Number (SDM4075A Series Only)

Sets the port number used for socket communication.

7.4.4 Test Manager

SDM4000A provides self-test functions, including Button Test, LCD Test and Buzz Test.

Perform Utility > Test Manager ,or touch Menu > Utility > Test Manager on the screen enter the test manager interface, as shown in the following figure.

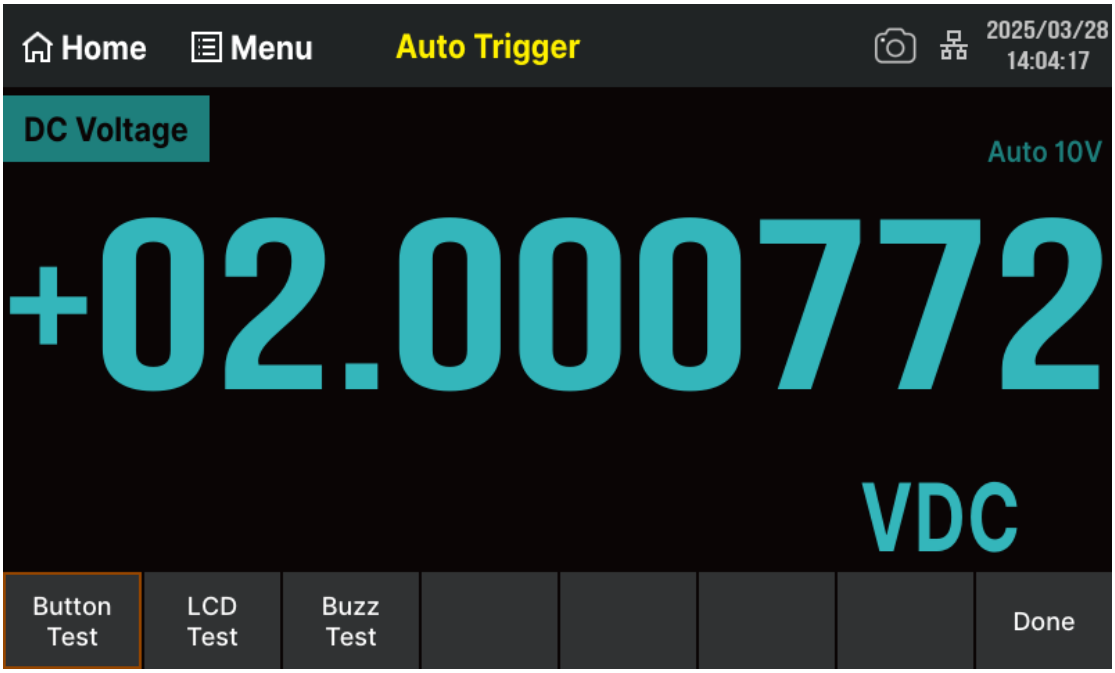


Figure 7-56 Test manager interface

Table 7-17 Test manager function description

Function Menu	Description
Button Test	Test all the buttons and knob of the multimeter to find out if the front panel buttons and knob are unresponsive or not responsive.
LCD Test	Test the screen display of the multimeter to find out whether the screen display has serious color deviation, bad dots or screen scratches, etc.
Buzz Test	Test the buzzer of the multimeter, used to detect problems such as the buzzer does not sound or responds poorly.
Done	Return to the higher-level menu.

7.4.4.1 Button Test

Touch Button Test to enter the button test interface, as shown in the following figure. The graphic area on this interface represents the corresponding buttons and knob on the panel. Test all buttons and knob separately to see if they react correctly.

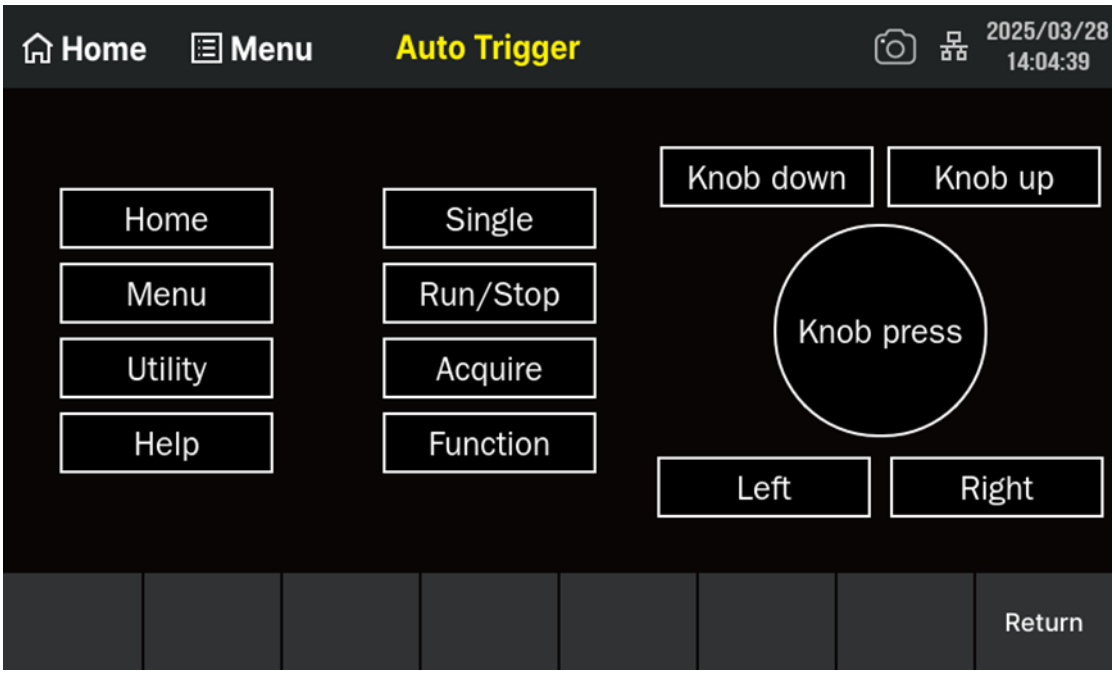


Figure 7-57 Button test interface

Operating instructions:

- **Button Test**

  Before pressing the button, the background color of the button on the screen is displayed as black; after pressing the button, the corresponding button background color is displayed in green. Press each button and observe whether the corresponding button on the display interface becomes bright in real time.

- **Knob Test**

  Turn the knob counterclockwise, the "Knob down" of the interface is shown in green; turn the knob clockwise, the "Knob up" of the interface is shown in green; press the knob, the "Knob press" of the interface is shown in green.

When the button or knob display is green, repeat the previous operation and the background color returns to black.

Press the Return on the screen to exit the test.

7.4.4.2 LCD Test

Touch LCD Test to enter the LCD test interface. Touch Start to start the test, and the entire screen will display in pure white first. Touch the screen and it will display in pure red, and prompt

messages "Press screen to LCD test." and "Double click to exit.". Follow the prompts and observe whether the screen has serious color deviation, stains, or screen scratches. As shown in the following figure:

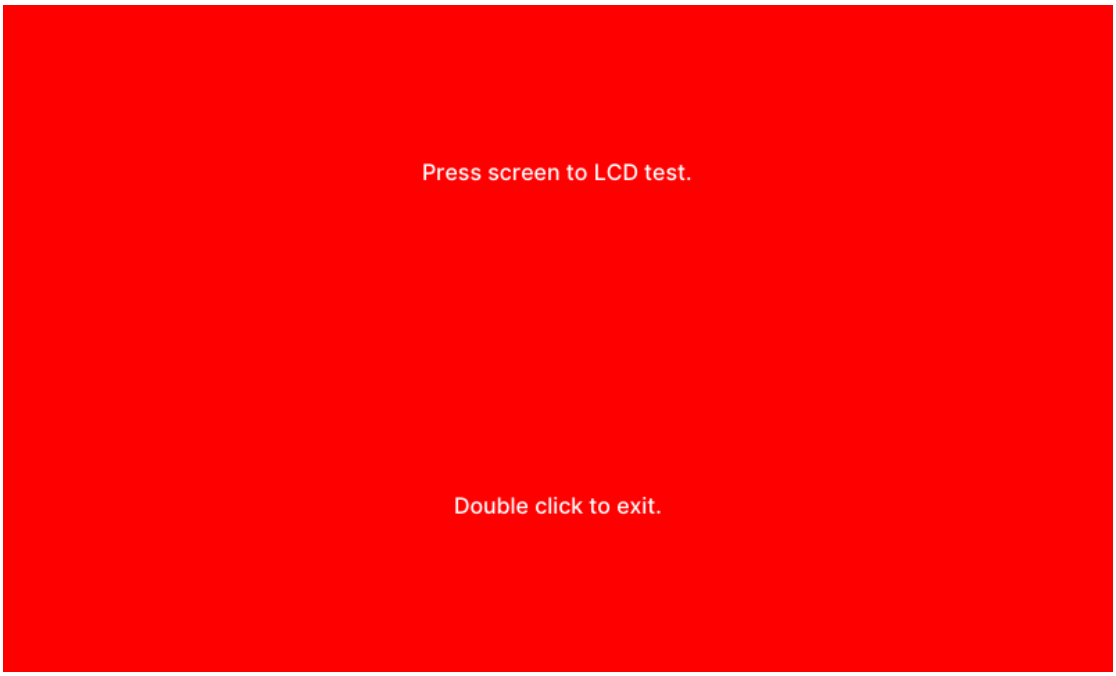


Figure 7-58 LCD test interface

Operating instructions:

- During testing, press the screen to change the screen color, which includes four colors: white, red, green, and blue;
- Double click on the screen to exit the test.

7.4.4.3 Buzz Test

Touch Buzz Test to perform the buzz test. Under regular circumstances, press Alarm Once once and the instrument will emit a buzz.

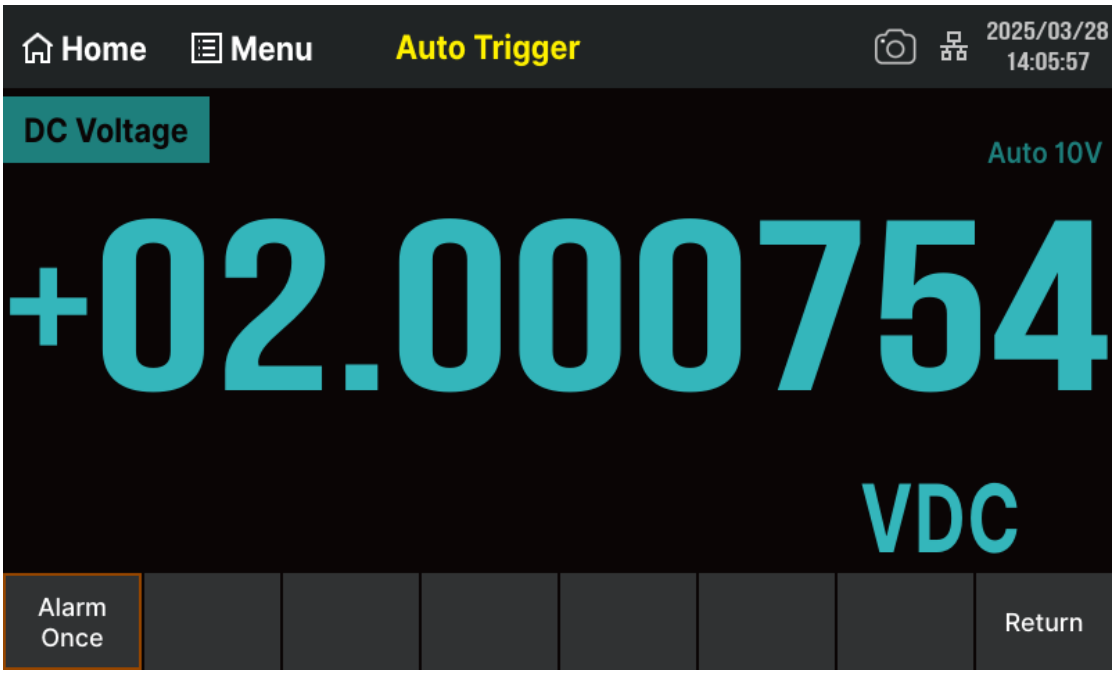


Figure 7-59 Buzz test interface

7.4.5 System Setup

After entering the Utility function menu, touch System Setup to enter the system settings menu interface, as shown in the following figure.

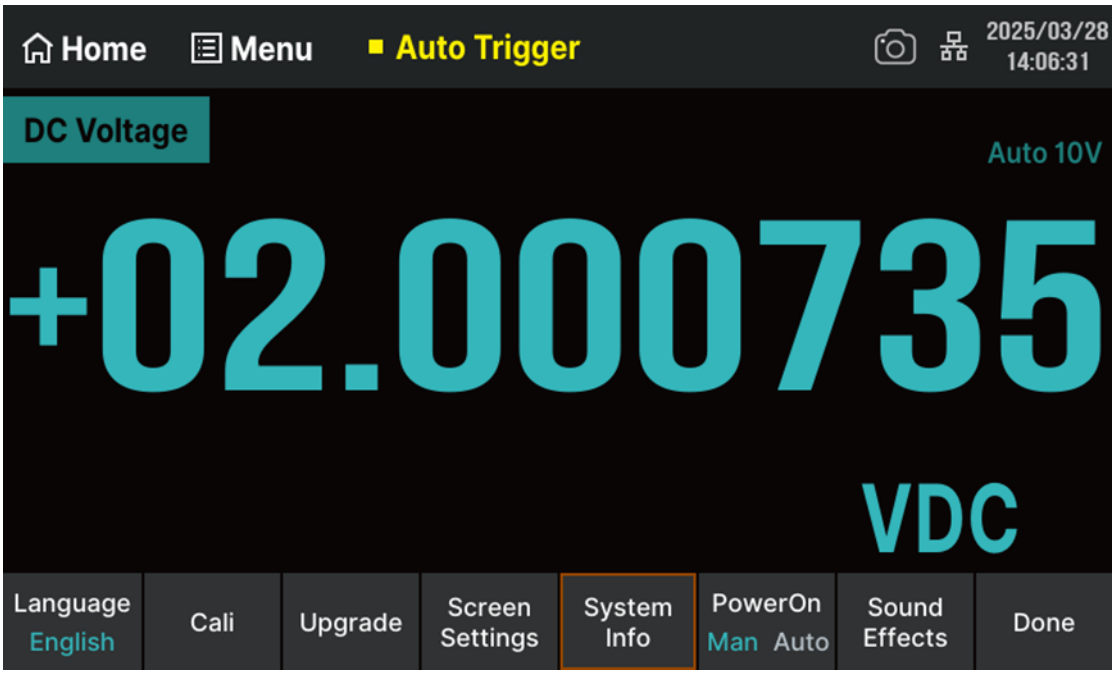


Figure 7-60 System setup interface

Table 7-18 System setup function description

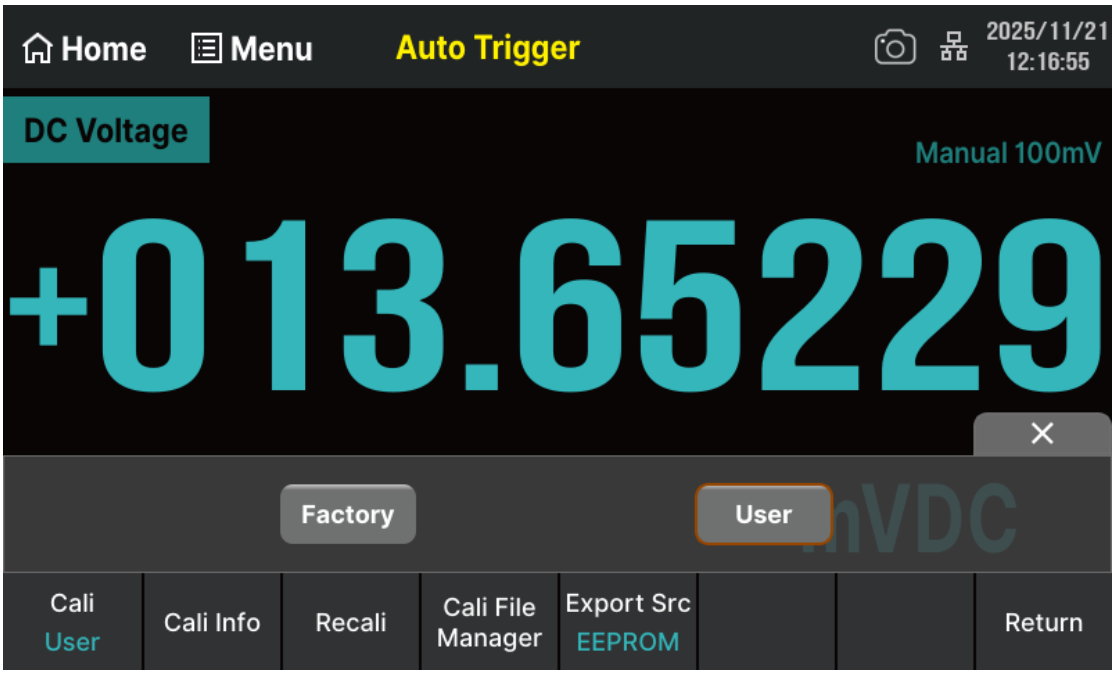
Function Menu	Description
Language	Set the display interface language: 中文 and English can be set.
Cali	Entrance for factory calibration and user-defined calibration.
Upgrade	Upgrade software version.
Screen Settings	Enable or disable screen saver function. Adjust the screen brightness, 10%~100% can be set, the default is 80%.
System Info	View system information about the multimeter.
PowerOn	Set power on mode: manual or automatic.
Sound Effects	Turn on or off the buzzer. Turn on or off the screen click sound. When on, the multimeter buzzes once when the screen is tapped.
Done	Return to the higher-level menu.

7.4.5.1 Language

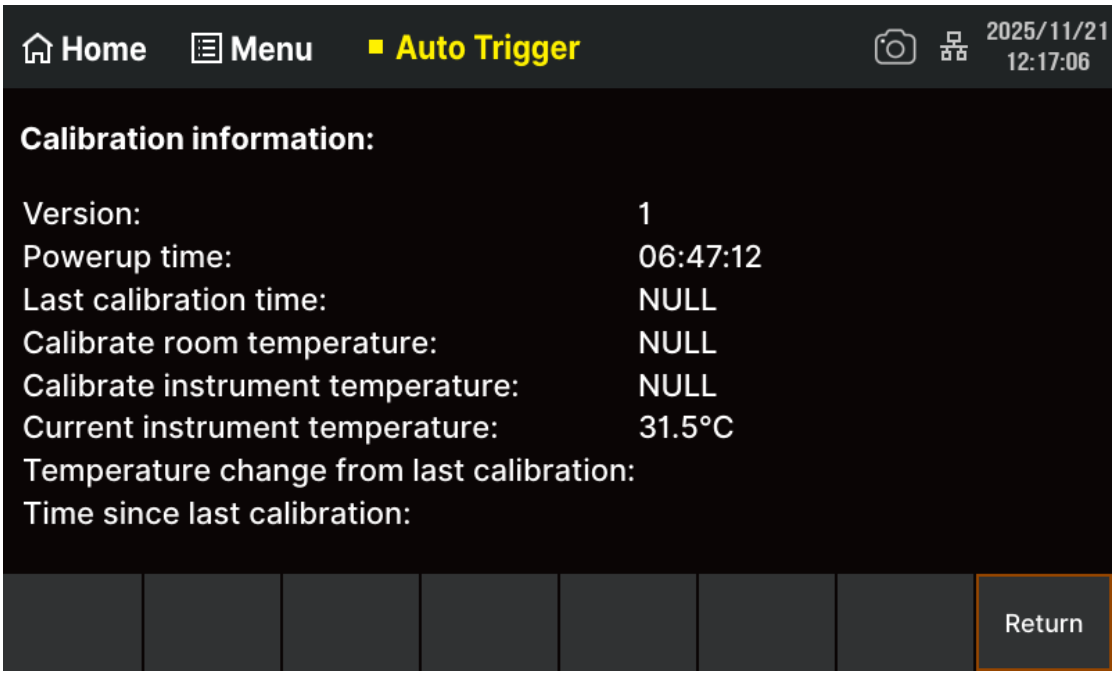
The multimeter supports two kinds of languages: English and 中文. Press Language to select the language. All operation menus and help information are displayed in the selected language.

7.4.5.2 Calibration

The calibration mode provides two states: Factory and User, which correspond to factory calibration selection and user-defined calibration, respectively.



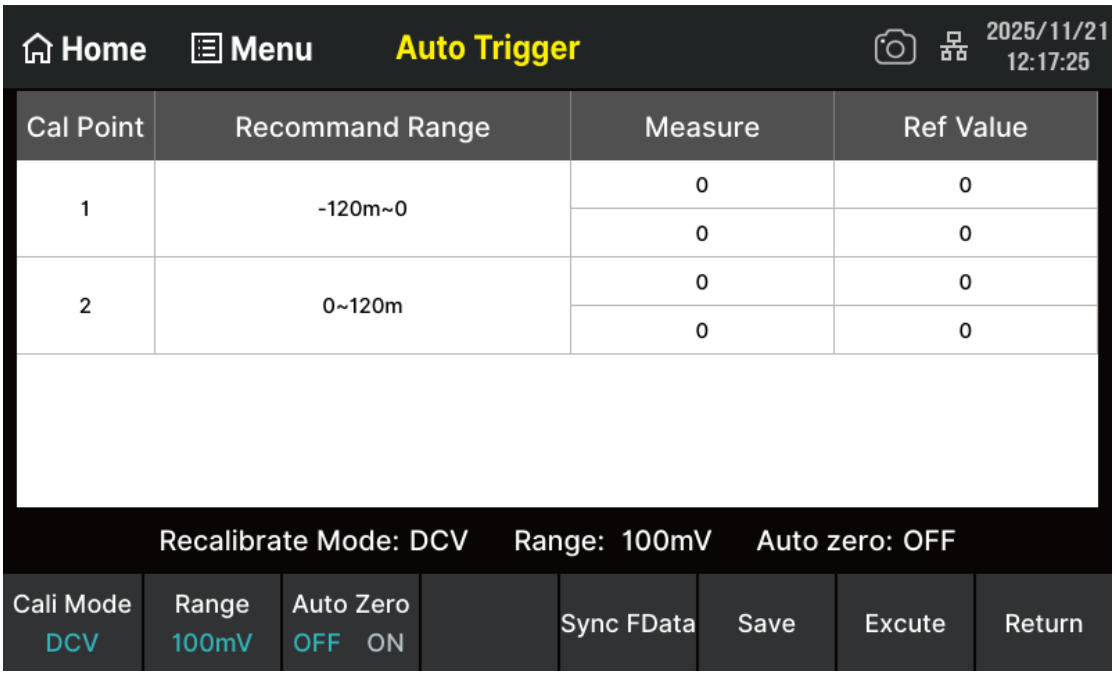
Touch Cali Info to view the powerup time, last calibration time, calibration room temperature, calibration instrument temperature, current instrument temperature, temperature change from last calibration, and the time since last calibration.



When the calibration mode is set to "User", touch Recall , enter the password "admin", and then touch Enter to access the user manual calibration interface, where measurement functions can be calibrated.

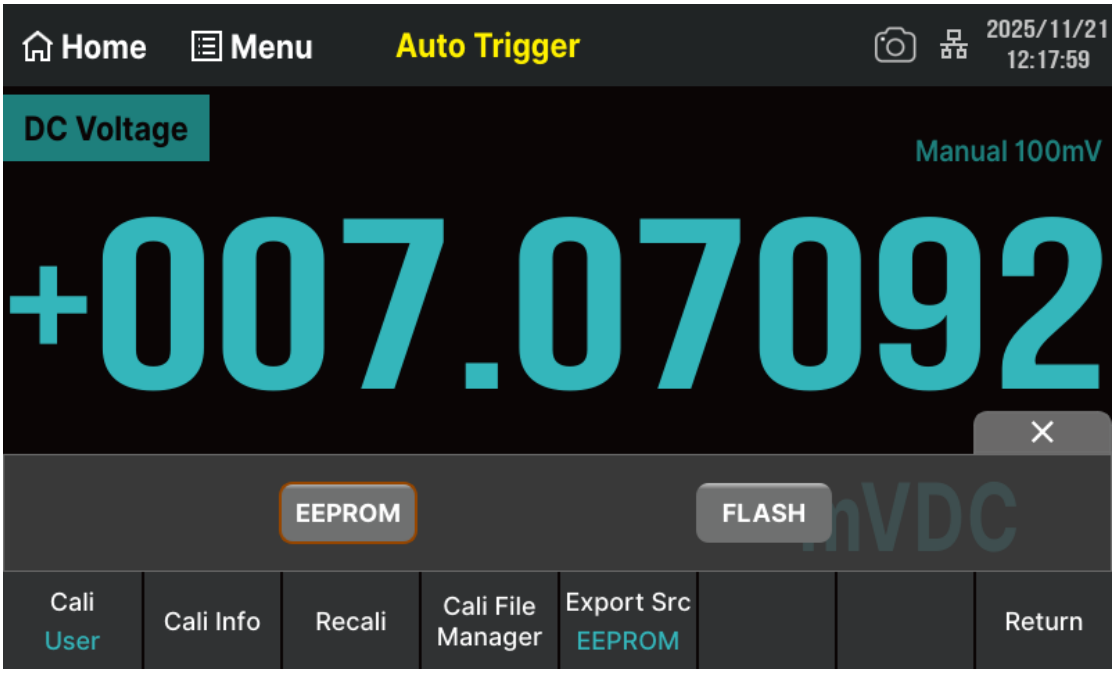
Taking DCV calibration as an example: first select the calibration mode as "DCV", set the range and auto-zero switch, then connect the source signal to the multimeter input. Next, touch the value

under the Ref Value column, enter the reference value using the on-screen numeric keypad, and touch Enter . Once the measured value under the corresponding Measure column stabilizes, touch Save > Execute in sequence.



Touch Cali File Manager , select a folder outside the root directory, and touch Save to save the current calibration data file or touch Load to load a calibration data file.

Touch Export Src to select EEPROM or FLASH, and set the source of the instrument's internal calibration data to the data in use in EEPROM or the data backed up in FLASH.



7.4.5.3 Upgrade

The software of the multimeter can be updated directly via USB flash drive, updating current software version to desired software version.

Operating Steps:

1. Copy the update file to the USB flash drive.
2. Insert USB flash drive to USB host interface on the front panel of the multimeter.
3. Perform Utility > System Setup > Upgrade , select the update file, then touch Upgrade > OK to start updating the system software.
4. After the upgrade is completed, the screen will prompt "Firmware Update Done!" and the multimeter will automatically reboot.
5. After the multimeter reboots, check the version information. Perform Utility > System Setup > System info to check if the upgraded version numbers match the target version. If not, the updating is failed and you need update once more as the above steps.
6. After checking, touch Done to exit the system information interface.

⚠ CAUTION

Don't cut off the power during the instrument is updating.

7.4.5.4 Screen Settings

Touch Utility > Screen Settings to enter screen setting interface to set the screen saver and screen brightness.

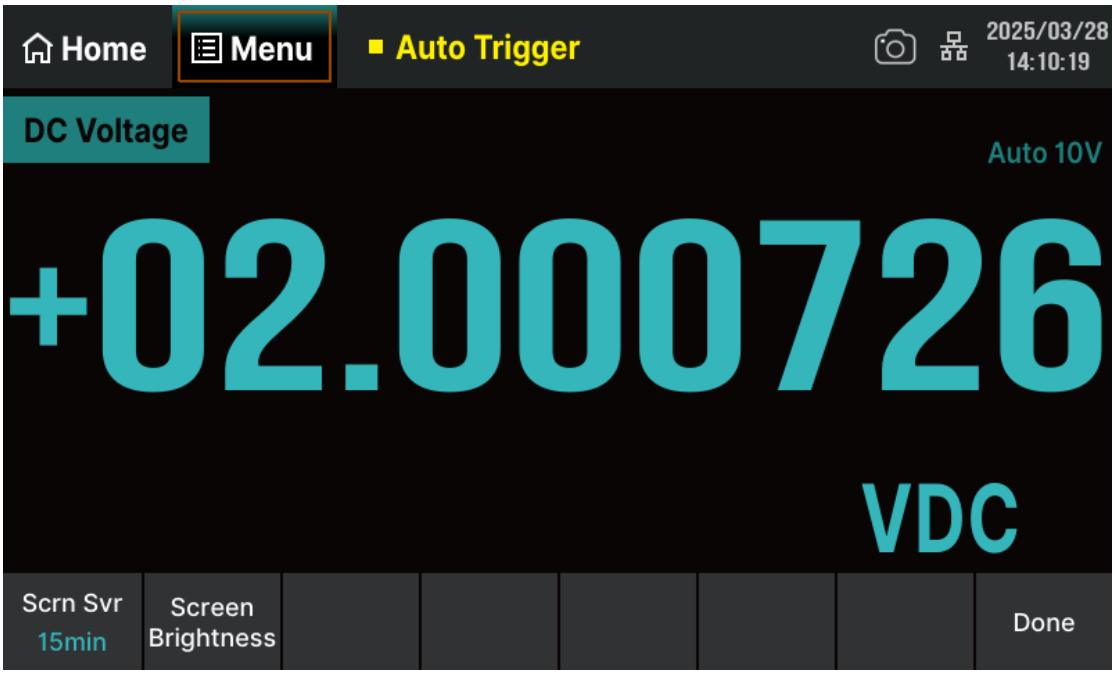


Figure 7-61 Screen setting interface

- **Scrn Svr**

Touch Scrn Svr to set the screen saver time to 1 min, 5 min, 15 min, 30 min, 1 hour, 2 hour, 5 hour, or turn off the screen saver function according to different needs. After enabling the screen saver function, if there is no operation during the set time, the instrument enters the screen saver state, touch any position on the screen or press any button on the panel to exit the screen saver. The screen saver is turned off by default.

- **Screen Brightness**

Adjust the screen brightness of the multimeter, 10%~100% can be set, default 80%.

7.4.5.5 System Information

Touch System Info to view system information, including product name, software version, serial number, FPGA version, scope ID, hardware version, BKF version and start-up times, as shown in the following figure. Touch Return to return to the higher-level interface.

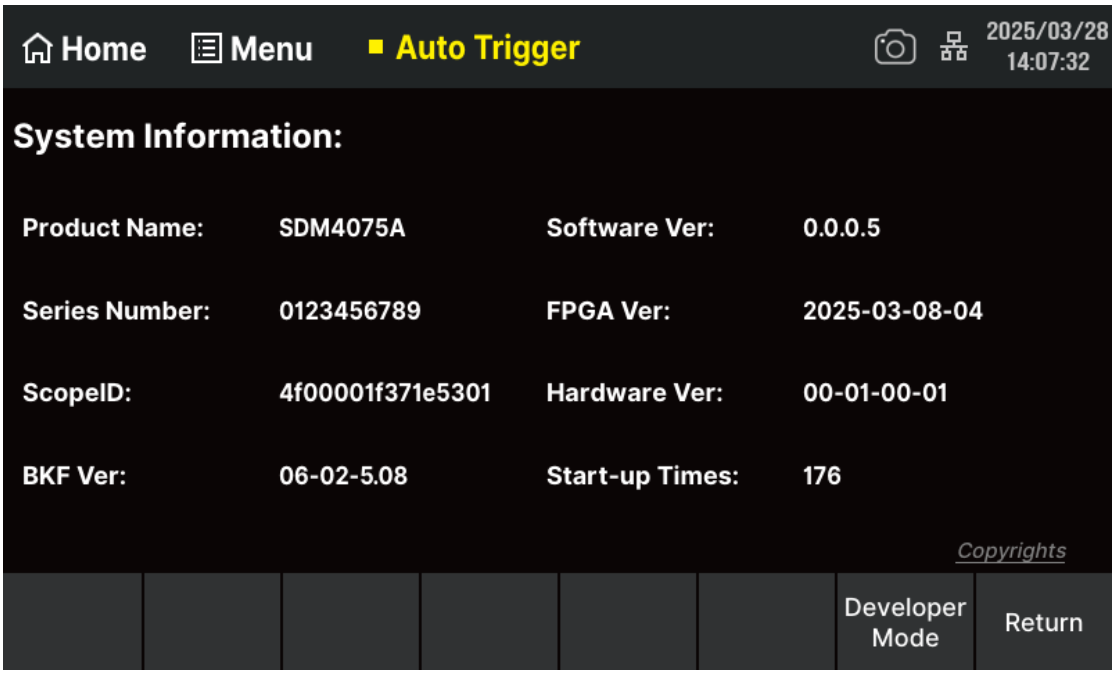


Figure 7-62 System information interface

Developer Mode: This option is for internal SIGLENT development use.

7.4.5.6 Power On

Perform PowerOn > Man/Auto to set the startup type to manual or automatic according to different needs.

Auto Power On

When the “Auto” option is selected, once the multimeter is connected to the AC power supply through the power cord, the multimeter boots automatically. This is useful in automated or remote applications where physical access to the instrument is difficult or impossible.

Power on by Manual

When the " Man” option is selected, the power button on the front panel is the only control for the power state of the multimeter. The multimeter can only be turned on by manually pressing down the power button.

7.4.5.7 Sound Effects

Touch Sound Effects to enter sound effects setting interface.

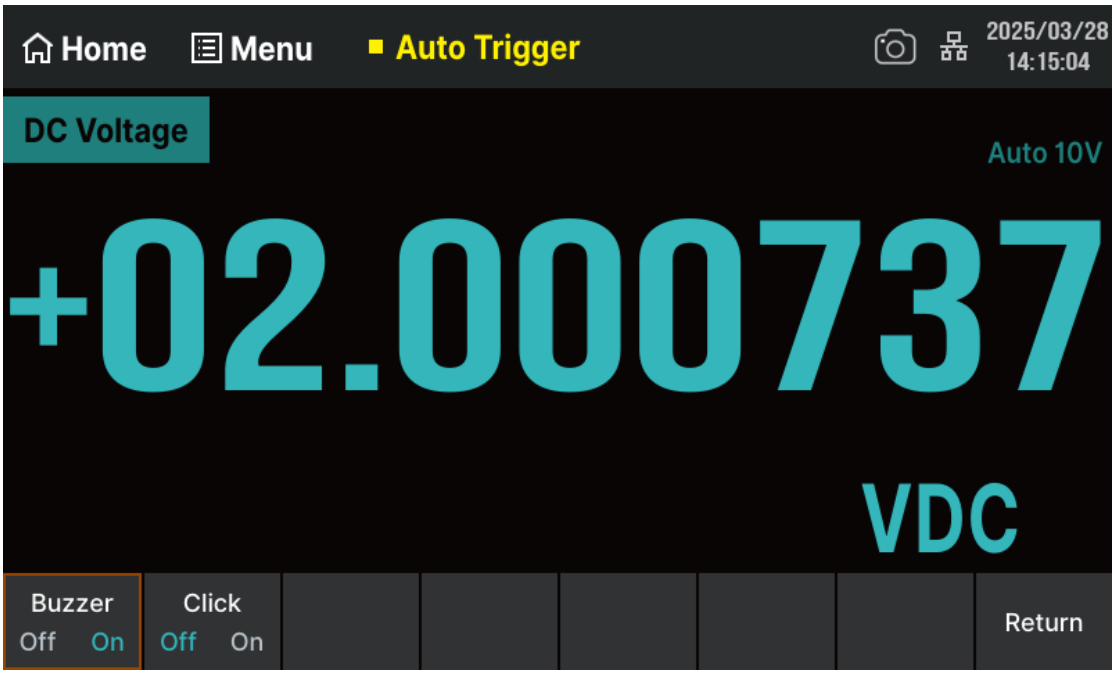


Figure 7-63 Sound effects setting interface

- Touch Buzzer > Off/On to turn on or turn off the buzzer.
- Touch Click > Off/On to turn on or turn off the click sound. When this function is turned on, click the screen once and the multimeter beeps once.

The buzzer settings are associated with the buzzer settings under the Function menu below:

- Limit: Exceeding a measurement limit (if limit is enabled), the buzzer emits a single beep.
- Probe Hold: The measured signal registers a stable reading and the buzzer emits a single beep.
- Diode: The multimeter continuously beeps when the on-state voltage value of the diode measured in the circuit under test falls below the set value.
- Connectivity: The multimeter beeps continuously when the resistance value of the resistor measured in the circuit under test is lower than the short-circuit resistance value.

Buzzer settings are displayed on several different menus on the screen. Turning a buzzer off or on in one menu affects all other menus and functions. For example, if the buzzer for Probe Hold is turned off, the buzzers for Limit, Diode, Continuity, etc. will also be turned off.

7.4.6 Date Time Edit

The clock can be synchronized via NTP protocol, or you can choose to set the time and date manually. Touch the Date Time Edit to bring up the time setting interface. You can also enter the setting interface by touching the time display area at the upper right corner of the screen.

Touch the ▲ or ▼ buttons on the screen or use the knob on the front panel to adjust the corresponding values. Touch OK to save the current time setting. You can also enter the IP address of the server in the "NTP Addr" area and touch Sync to synchronize the clock. In the "Timezone" area, you can select the time zone.

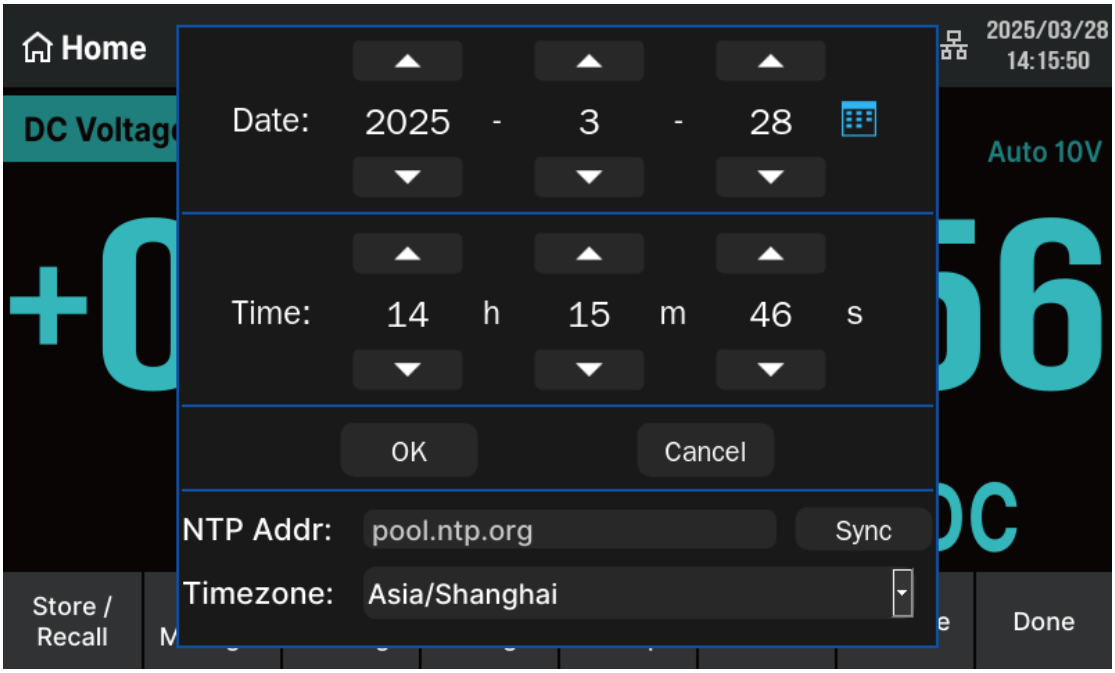


Figure 7-64 Data time editing interface

You can also quickly set the year, month, and day in the pop-up calendar menu interface by touching icon .

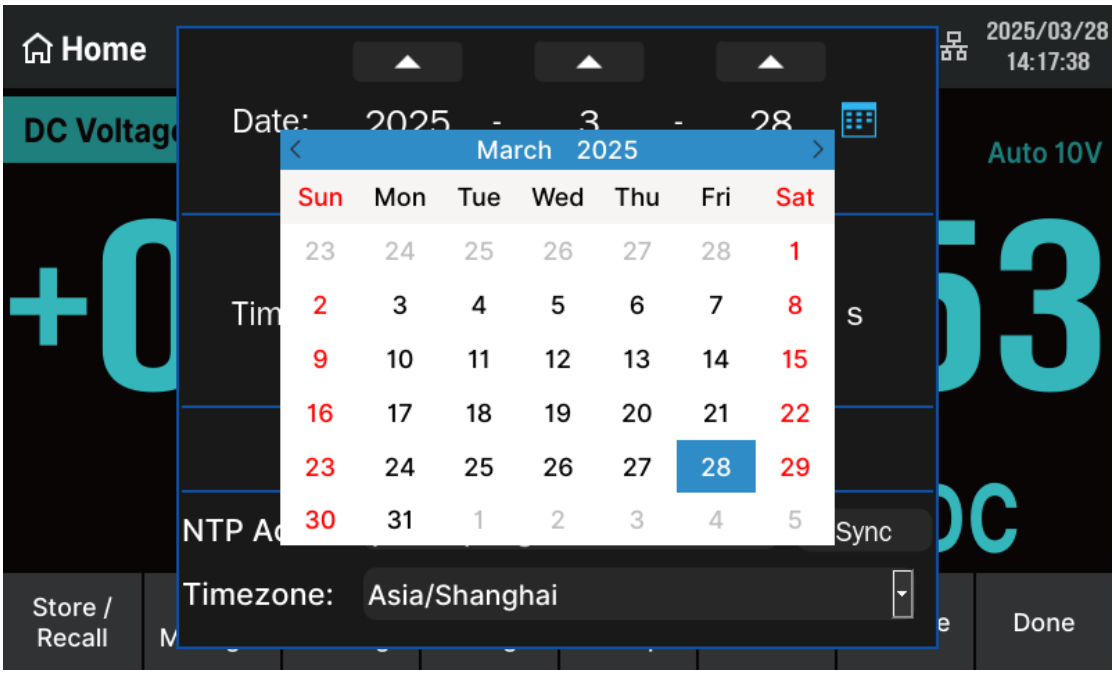


Figure 7-65 Quick set date

7.4.7 Service

Touch Service to enter service setting interface to make settings about LXI and SMB file share.

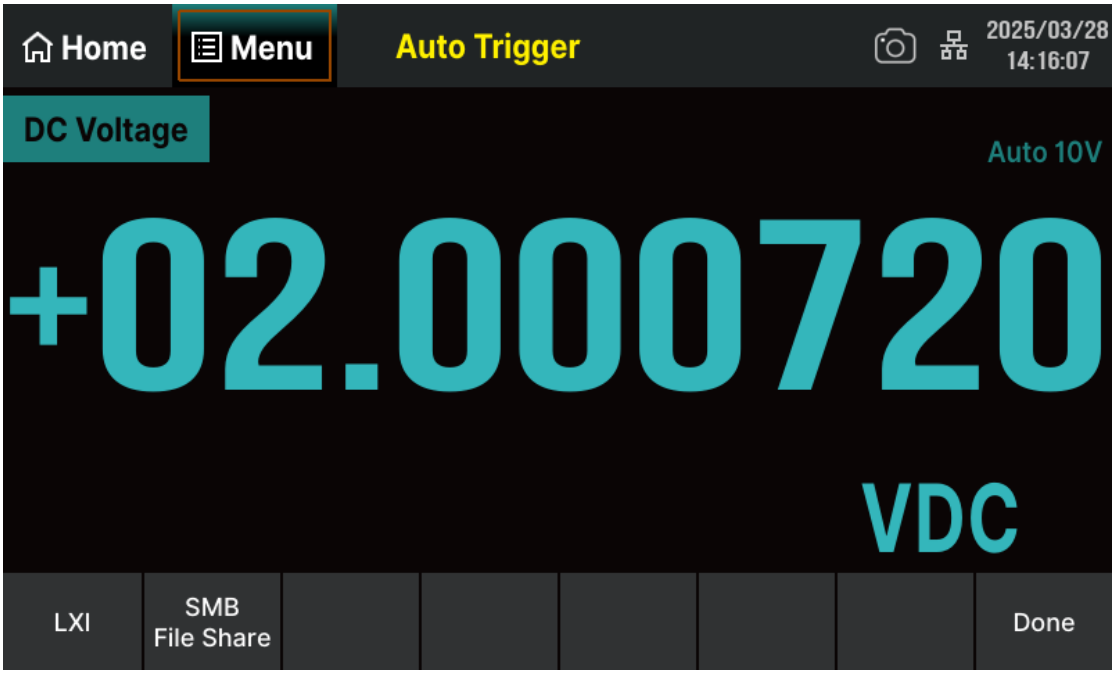


Figure 7-66 Service setting interface

7.4.7.1 LXI

LXI is a modular testing platform standard based on local area networks. LXI instrument is a new type of instrument strictly based on IEEE 802.3, TCP/IP, network bus, network browser, IVI-C0M driver, clock synchronization protocol (IEEE1588), and standard module size.

Touch LXI menu to view the information about LXI. Touch Lan Reset , and then touch OK in the pop-up window to reset the network configuration.

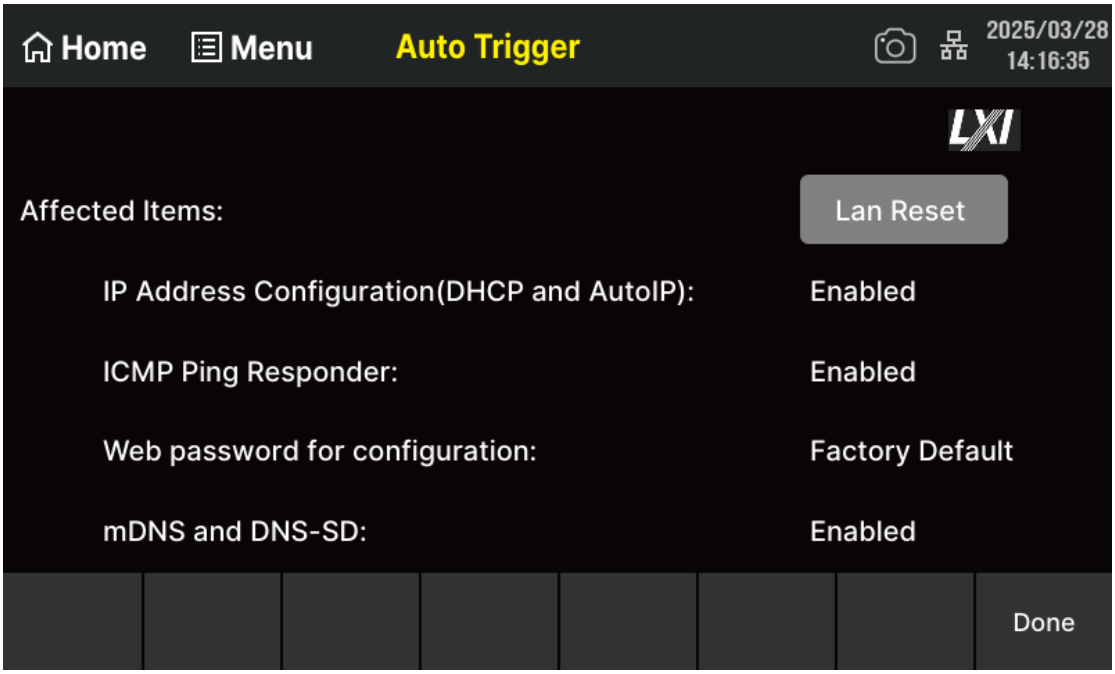
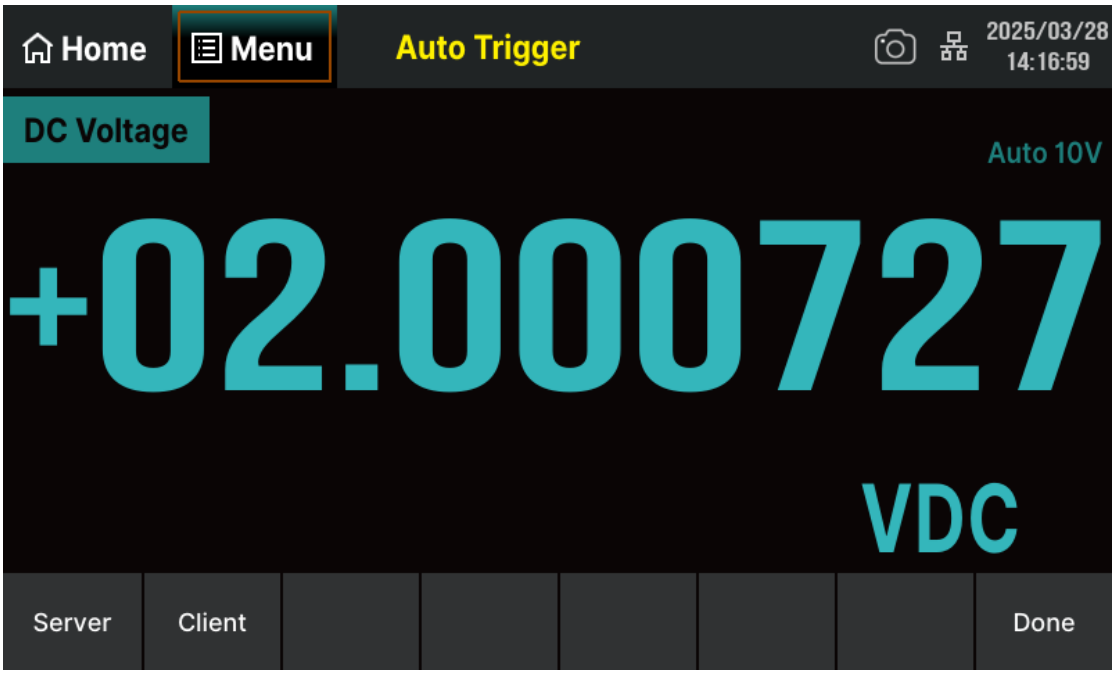


Figure 7-67 LXI information interface

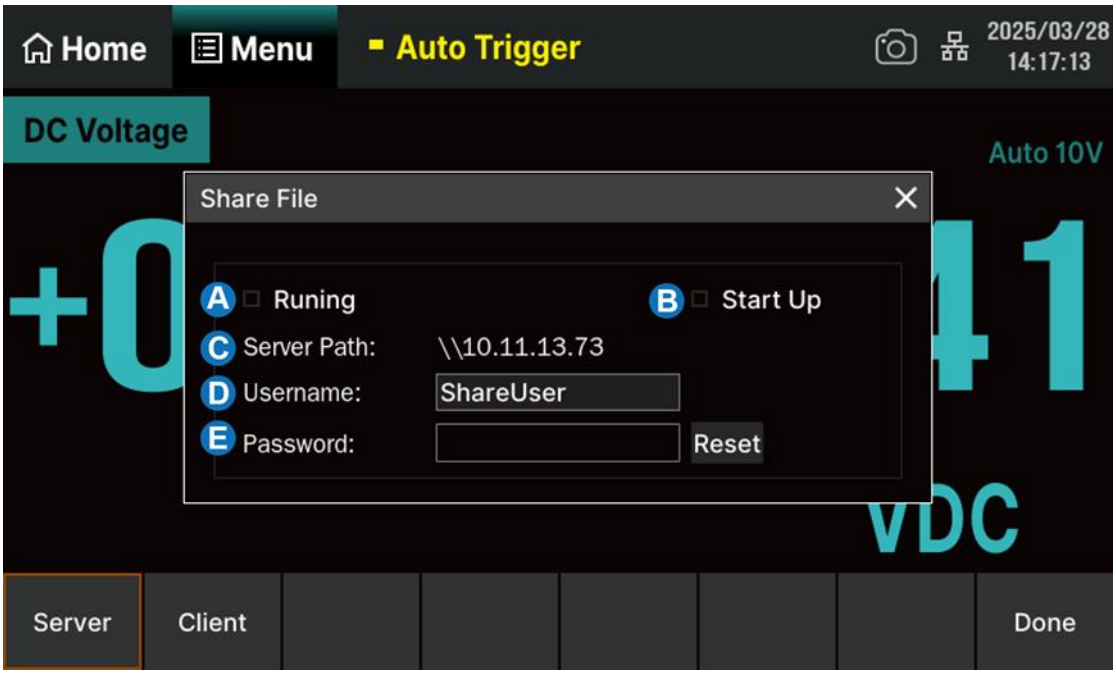
7.4.7.2 SMB File Share

Set up the SMB file sharing path and the content related to the access privileges, and then you can store or call the files on the specified path. This multimeter acts as the client and the accessed object acts as the server in network access. You need to set up the shared directory and access privileges on the server side before setting up the SMB file share on this device.

Touch SMB File Share to enter the following interface to set up the server and client.



Set up Server:



A. Check “Runing” to enable the SMB file sharing function.

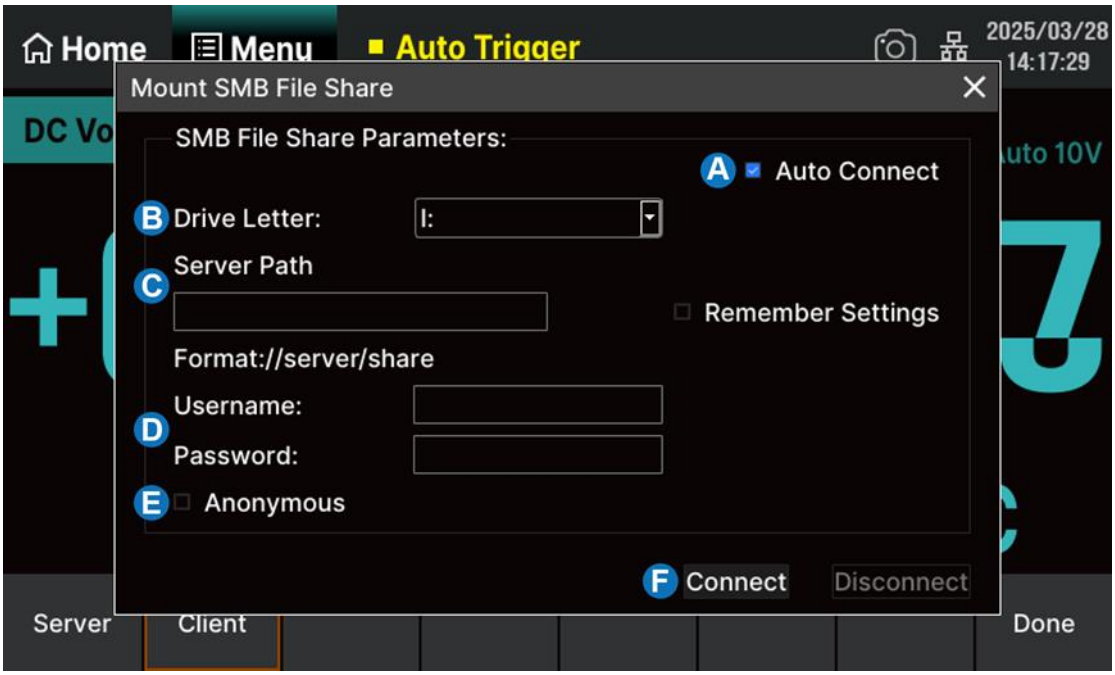
B. Check “Start Up” to enable SMB file sharing when the multimeter is turned on.

C. The current server path.

D. Server user name

E. Set the Server password as required (optional).

Set up Client:



A. Check "Auto Connect" to connect to the server automatically every time you turn on the computer.

B. Select the drive letter.

C. Set the path to the server. Touch the text box area and enter the path in the pop-up virtual keyboard. Check "Remember Settings" to save the path.

D. User name and password. Touch the corresponding text box and complete the input in the pop-up virtual keyboard.

E. Check "Anonymous" to access the specified path in the default guest mode (username: Guest, password: None).

F. Manually connect or disconnect.

7.5 Trigger and Acquire

SDM4000A provides multiple trigger source: Auto, Single, Ext, and Level. The multimeter can read one or a specified number of readings each time it receives a trigger signal, and the delay time between the trigger and the reading can be set.

Press Acquire button on the front panel to enter the operating menu of Acquire, as shown in the following figure.



Figure 7-68 Acquire and trigger setting interface

7.5.1 Sampling Rate

Sampling frequency, also known as sampling speed or sampling rate, defines the number of samples extracted from a continuous signal and composed of a discrete signal per unit time, expressed in Hertz (Hz). The reciprocal of the sampling frequency is the sampling period, also known as the sampling time, which is the time interval between samples. Simply put, sampling frequency refers to how many signal samples a computer can collect per unit of time.

Nyquist or sampling theorem states that if a continuous and bandwidth limited signal does not contain frequency components higher than F, the original signal can be restored without distortion (sawtooth) when sampled at a rate greater than 2F samples per second. The sampling rate of a multimeter must be greater than twice the frequency component of the measured signal.

7.5.2 Acquire Mode

SDM4075A series and SDM4065A series provide three acquire mode: Continue, Data Log, Digitize.

SDM4055A series provide two acquire mode: Continue, Data Log.

7.5.2.1 Continue Mode

Continue mode is the default mode applicable to all functions of a digital multimeter. When using the factory default settings, the digital multimeter can continuously measure DC voltage with automatic range adjustment and automatic zeroing enabled, and aperture set to 10 PLC.

Touch Acquire > Continue to enable continuous sampling mode

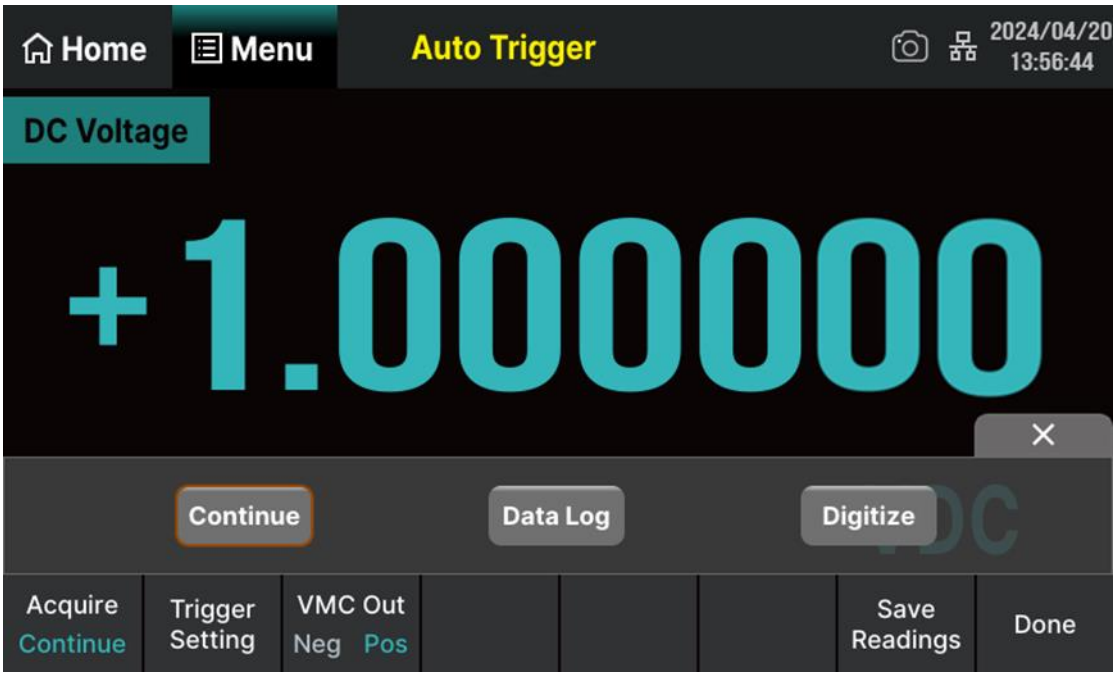


Figure 7-69 Continue mode setting interface

Table 7-19 Continue mode function menu description

Function Menu	Setting	Description
Acquire	Continue/Data Log/Digitize	Set the mode of acquire.
Trigger Setting	Trg src	Set the source of trigger to Auto/Single/Ext/Level.
	Delay	Set delay automatically or manually.
	Samples/Trigger	Set the number of sampling times.

Function Menu	Setting	Description
	Sample	Set the trigger mode for sampling delay: Immediate sampling orTimed sampling.
VMC Out	Positive/Negative	Set the polarity of output pulse signal when sampling signal is finished.
Save Readings		Save the current cached measurement readings to local or external devices.
Done		Return to the higher-level menu.

7.5.2.2 Data Log Mode

The Data Log mode supports recording a specified number of readings or readings collected during a specified time to the instrument's memory or internal/external data files without programming and without connecting to a computer. After collecting the data, you can view it on the front panel interface or transfer it to the computer.

The Data Log mode can be used for measurement functions such as DCV, DCI, ACV, ACI, Ω2W, Ω4W, frequency, period, capacitance, temperature, but not for continuity and diode measurements.

By default, data logging performs automatic triggering. Level and external trigger sources are not supported for data logging.

Operating Steps:

1. Enable Data Log function

Touch Acquire > Data Log to enable Data Log function, and "Data log Stopped" is displayed at the top of the screen.

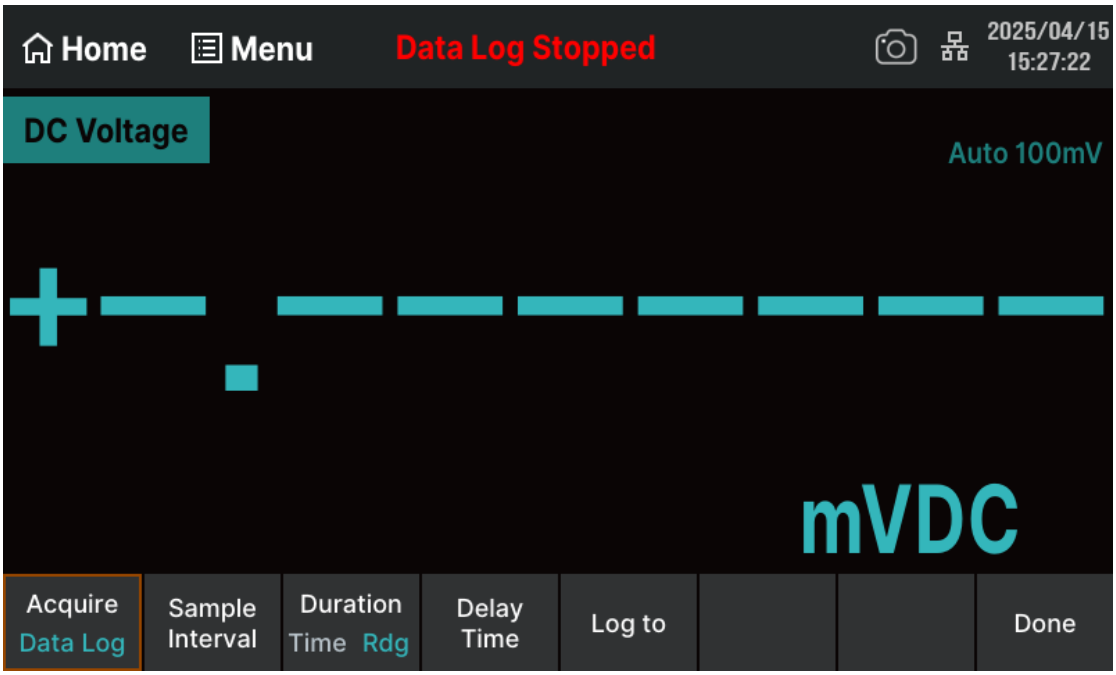


Figure 7-70 Data Log mode setting interface

Table 7-20 Data Log function menu description

Function Menu	Setting	Description
Acquire	Continue/Data Log/Digitize	Set the mode of acquire.
Sample Interval		Set the interval time for sampling.
Duration	Time/Rdg	Set the sampling duration or number of readings.
Delay Time		Set sampling delay time.
Log to	Memory/File	Set the storage address for recording data.
Done		Return to the higher-level menu.

2. Set interval time

Set the sampling interval time between two measurement data. Touch the Sample Interval and set the interval time on the pop-up virtual keyboard.

The sampling interval for data logging cannot be shorter than the measurement time. You can reduce the measurement time by selecting a shorter integration time, using a fixed range, etc.

3. Set duration

Touch Duration and set it to Time or Rdg mode.

- Time: Specifies the duration of data recording.
- Rdg: Specifies the total number of readings to be recorded.

4. Set delay time

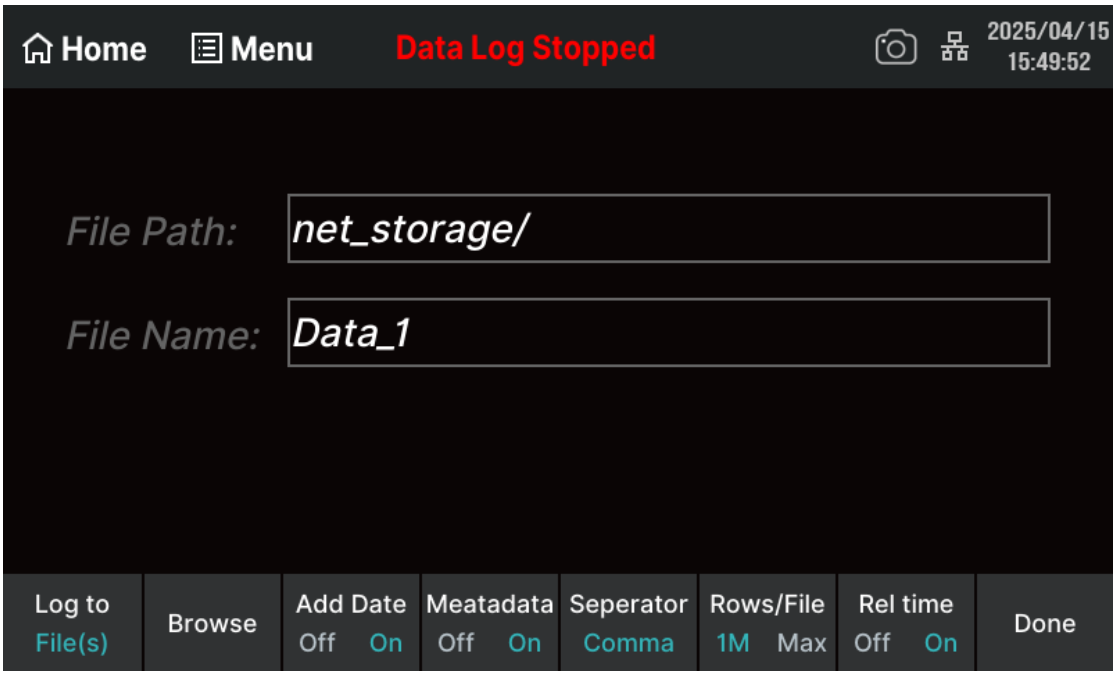
Set the waiting time for the first sampling point to start. Touch Delay Time to set the delay time on the pop-up virtual keyboard.

5. Set storage path

Touch Log to , and then select Memory or File to log the readings to internal storage space or external files.

When log readings to memory, the trend chart maps each reading to a point in a pixel column, connects multiple points in each column into a line, and then connects the last reading in the column with the first reading in the next column into a line. If there are too many readings to save to memory, the behavior of the trend chart is similar to that of continuous measurement mode. That is, the number of readings displayed in each pixel column depends on the reading rate and the selected time window.

When logging to file(s), set the path and file name to save the readings, and set whether to add date, metadata, separator and relative time to the saved readings. For detailed settings of saving readings, please refer to "7.5.5 Save Readings". After finishing the settings, touch Done to return to the previous interface, as shown in the following figure.



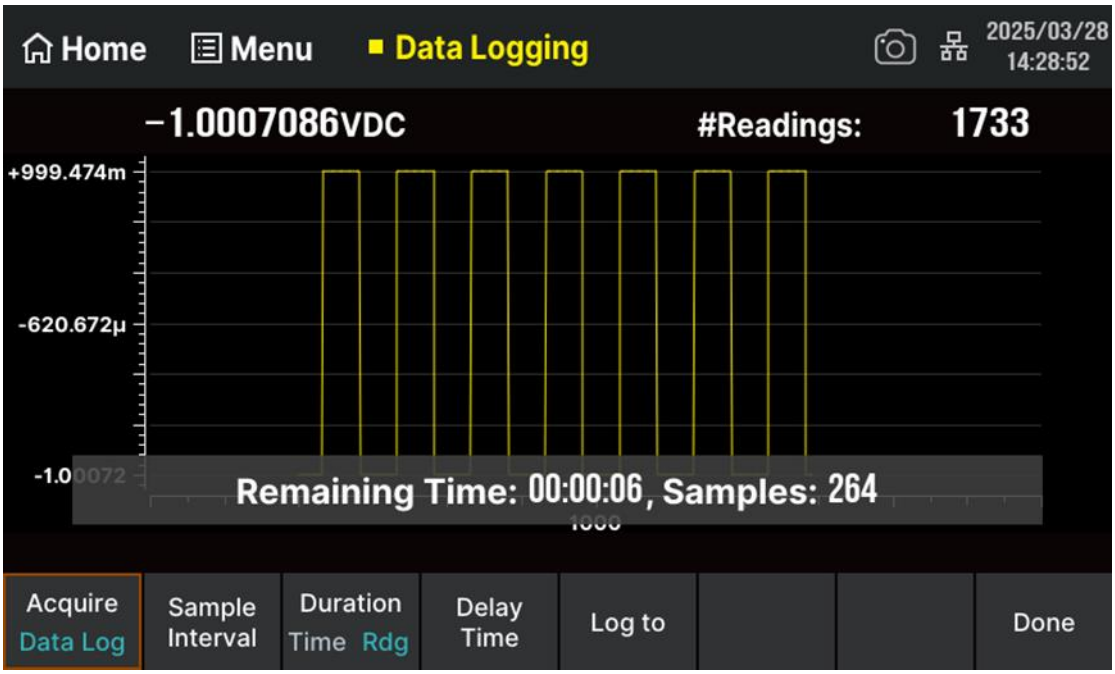
6. Set display mode

Touch Menu > Display to set the display mode for the measured readings of the data log to Number, Bar, Trend, Histogram. For details, refer to "7.7 Display".

7. Data logging

Press Single or Run/Stop on the front panel to start data logging. At this time, "Data Logging" will be displayed at the top of the screen, and the interface will display information such as the number of readings and remaining sampling times. When logging to file(s), the save path and file name are also displayed.

The following figure is an example of the display mode as a trend graph and data logging to memory.



At the end of data logging, a pop-up message "Data logging completed" appears on the screen, and you can view the file in the set save path.

Local and remote interaction of data logging and digitize

Attention:

Possible data loss -- During the process of data migration from local to remote, the instrument storage will be cleared: After data is recorded or digitized to storage, if the instrument is accessed remotely (sending SCPI command) and then returned to local, the reading in the storage will be cleared and the instrument will return to "Continue" mode.

For data logging only, you can avoid this situation by recording data to a file instead of memory (see Data Log Mode for more information). If it is for data recording or digitization, you can also avoid this

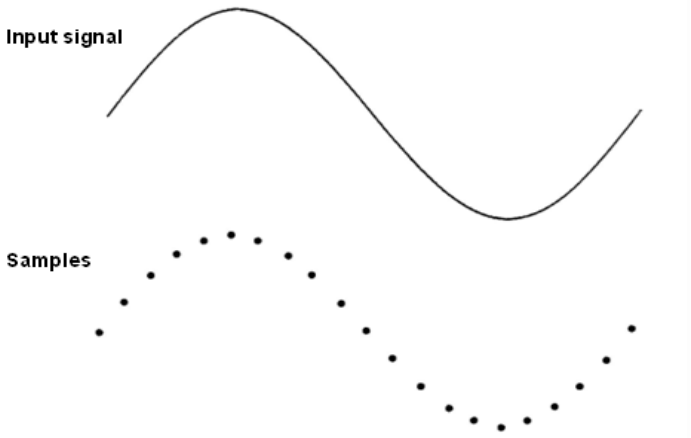
situation by performing operations that can prevent remote access to the instrument. To prevent remote access, you may need to disconnect the LAN, GPIB, and USB interface cables from the instrument before starting the measurement. To prevent remote access through LAN, you can connect to the instrument behind the router to minimize the possibility of remote access.

To view the status of remote data logging or digitize, please use the instrument's web user interface. The web user interface monitor cannot set the instrument to remote.

When accessing remotely, the instrument will continue to perform data logging or digitization until it is completed, and you can retrieve readings remotely.

7.5.2.3 Digitize Mode

Digitization refers to the process of converting continuous analog signals (such as sine waves) into a series of discrete samples (readings). The Digitize function can only be enabled from the menu bar on the display interface, and parameters can be quickly set on the Digitize function interface. This mode can only be used for DCV or DCI measurement functions.



Note: Auto range cannot be used under digitize mode, please manually select the appropriate range for measurement.

Operating Steps:

1. **Enable Digitize function**

Touch Acquire > Digitize to enable Digitize function, and " Digitize stopped " is displayed at the top of the screen.

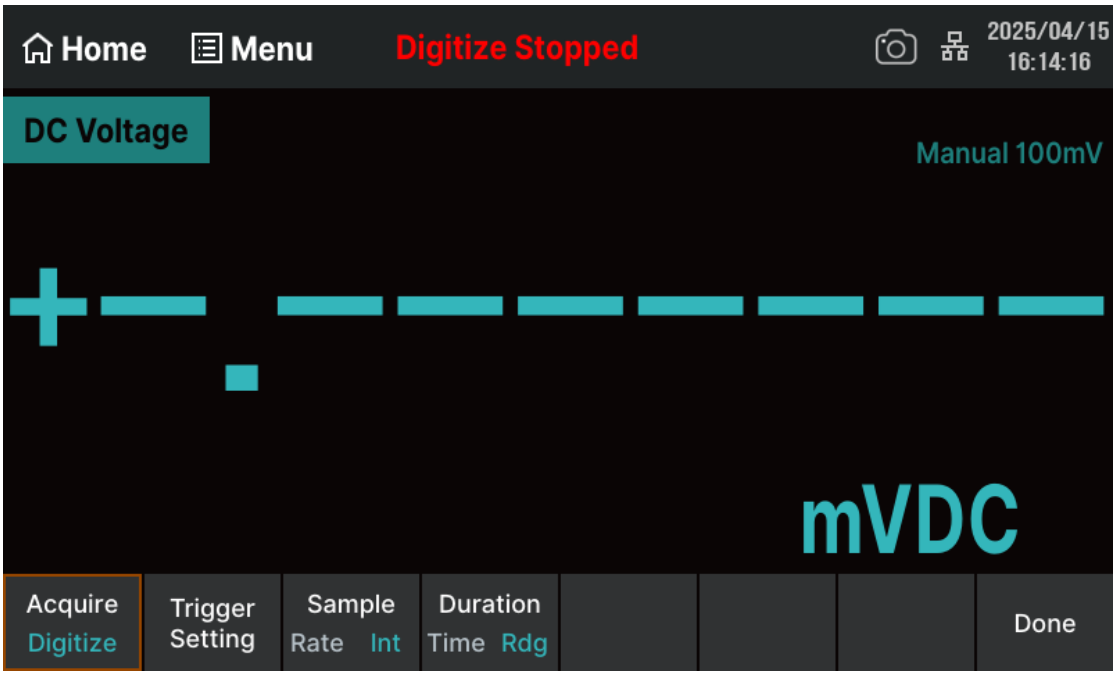


Figure 7-71 Digitize mode setting interface

Table 7-21 Digitize function menu description

Function Menu	Setting	Description
Acquire	Continue/Data Log/Digitize	Set the mode of acquire.
Trigger Setting	Trg Src	Set the source of trigger to Auto/Ext/Level.
	Delay	Set delay automatically or manually.
Sample	Rate/Int	Set the frequency and interval of sampling.
Duration	Time/Rdg	Set the sampling time or number of readings.
Done		Return to the higher-level menu.

2. Trigger source setting

Touch Trigger Setting > Trg Src to select the trigger source: Auto, Ext or Level.

- Auto: Enables automatic triggering and the multimeter will take readings at the fastest measurement speed allowed by the current settings.
- Ext: Enable external trigger signal for triggering. When the external trigger source is enabled, the multimeter will accept the trigger pulse input from the external trigger interface on the rear panel and will initiate the trigger and acquire the measurement reading at the specified rising or falling edge of the pulse signal.
- Level: Enable level trigger. After selecting “Level” as the trigger source, input the desired level value via the knob or virtual numeric keypad. The multimeter will start triggering and acquire

measurement parameters when the input signal's rising or falling edge and the input level crosses the set trigger level value.

Touch Trigger Setting > Delay to set the delay time automatically or manually.

- Auto: The delay time is determined by a combination of settings such as the current measurement function, range, integration time and resolution.
- Man: The delay time is set manually. After the delay mode is set to “Man”, input the desired delay time via the knob or the virtual numeric keypad.

3. Frequency and Interval Setting

You can sample the input signal by specifying either the sampling rate (in samples/s, Hz) or the sampling interval (the time between two consecutive samples).

4. Duration Setting

You can specify the duration as Time or Rdg.

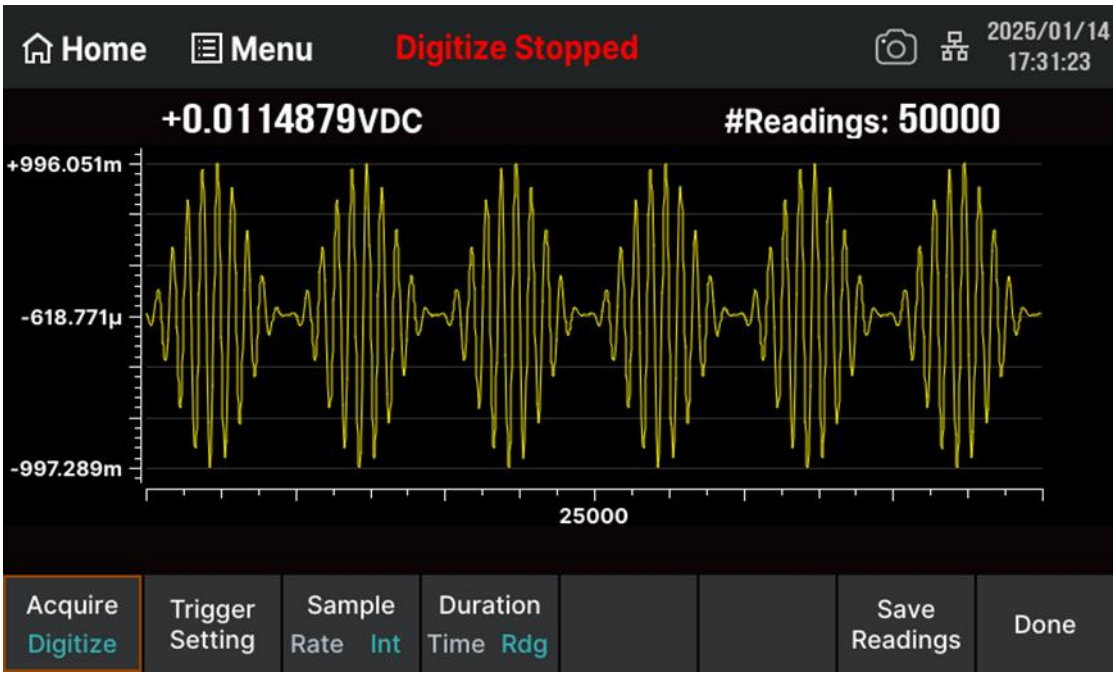
- Time: Specifies the length of time to digitize.
- Rdg: Specifies the number of sample points to digitize.

5. Set display mode

Touch Menu > Display to set the display mode for the measured readings of the data log to Number, Bar, Trend, Histogram. For details, refer to “7.7 Display”.

6. Digitizing sampling

After configuring the parameters, press Single or Run/Stop on the front panel, and digitizing will start when the specified trigger event occurs. The screen displays “Digitizing” and information such as the number of readings, the remaining time, and the remaining number of samples. At the end of sampling, the screen displays “Digitize Stopped”, as shown in the following screen (as an example of a trend graph display).



7. Save readings

When the digitizing sampling is finished, touch Save Readings to save the readings to the local or external device. Please refer to "7.5.5 Save Readings" for detailed settings of saving readings.

Local and remote interaction of data logging and digitize

Attention:

Possible data loss -- During the process of data migration from local to remote, the instrument storage will be cleared: After data is recorded or digitized to storage, if the instrument is accessed remotely (sending SCPI command) and then returned to local, the reading in the storage will be cleared and the instrument will return to "Continue" mode.

For data logging only, you can avoid this situation by recording data to a file instead of memory (see Data Log Mode for more information). If it is for data recording or digitization, you can also avoid this situation by performing operations that can prevent remote access to the instrument. To prevent remote access, you may need to disconnect the LAN, GPIB, and USB interface cables from the instrument before starting the measurement. To prevent remote access through LAN, you can connect to the instrument behind the router to minimize the possibility of remote access.

To view the status of remote data logging or digitize, please use the instrument's web user interface. The web user interface monitor cannot set the instrument to remote.

When accessing remotely, the instrument will continue to perform data logging or digitization until it is completed, and you can retrieve readings remotely.

7.5.3 Trigger Settings

Touch Trigger Settings to set the trigger source, delay, sampling trigger times, sampling delay, and so on.

7.5.3.1 Trigger Source

The trigger sources supported by different acquire modes are shown in the table below.

Table 7-22 Acquire mode and trigger source

Acquire Mode	Trigger Sources
Continue	Auto, Single, Ext, Level
Data Log	Auto
Digitize	Auto, Ext, Level

Touch Trg Src to set the trigger source. The following figure shows an example of setting the trigger source for continue mode.

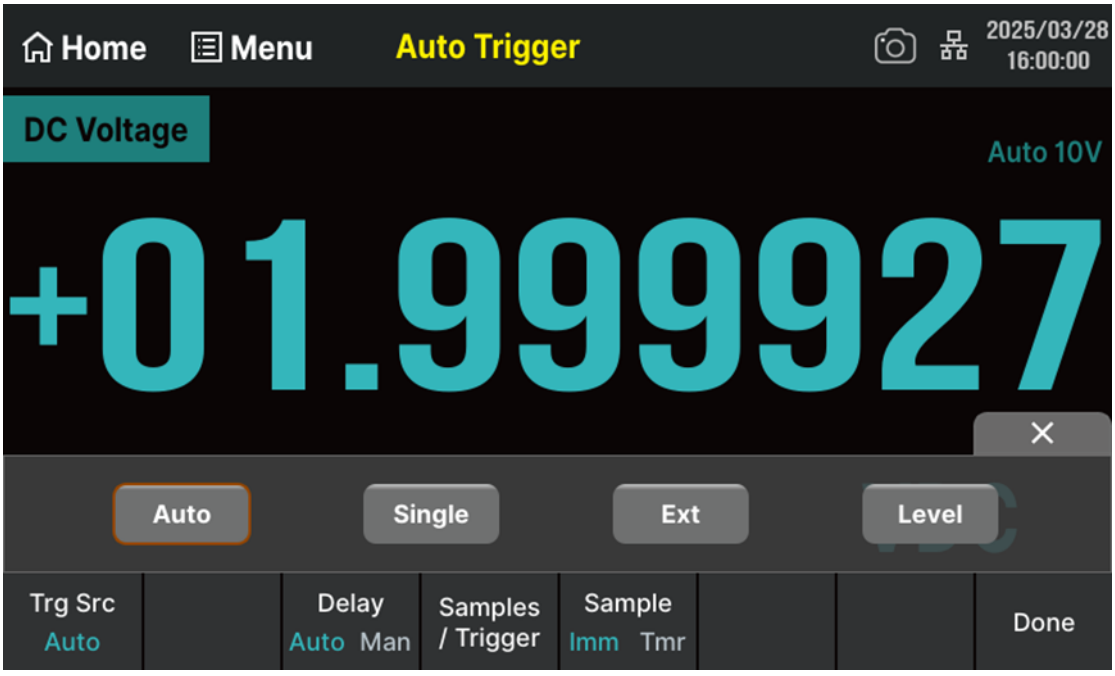


Figure 7-72 Trigger source setting interface

Auto Trigger

The instrument continuously measures, and once a measurement is completed, a new trigger will be automatically triggered, and the multimeter will obtain continuous readings. In Auto trigger mode,

"Auto Trigger" is displayed in the upper area of the multimeter display interface. Press Run/Stop button to stop triggering, and the interface will display "Stopped" and the last measured value. Press Run/Stop button again to resume automatic triggering.

Single Trigger

The instrument will trigger once every time the Single button is touched. After reaching the specified number of samples, the multimeter stops measuring. In Single trigger mode, "Single Stopped " is displayed in the upper area of the multimeter display interface.

External Trigger

The multimeter receives the trigger pulse from the Ext Trig interface on the rear panel and triggers at the specified edge of the pulse signal and acquires measured data.

Table 7-23 External trigger input signal specifications

Input level	5 V TTL compatible (High level when left input terminal is hanging in the air)
Trigger condition	Rising and falling selectable
Input impedance	≥ 30 kΩ//500 pF
Delay	< 50 μs
Max rate	300/s
Min pulse	2 μs

Level Trigger

This mode applies to DCV/DCI/ACI/ACV/Ω2W/Ω4W measurement functions. Touch Level Setting and enter a desired level using the pop-up virtual keyboard, then touch Enter to enable the level. The multimeter will trigger on the positive or negative edge of the input signal when the input level passes through the specified trigger level and acquire measured data. Level trigger mode can specify the time at which sampling begins (based on voltage and slope) trigger.

7.5.3.2 Delay and Sample

Delay represents the waiting time before sampling begins after receiving the trigger signal.

Touch Delay to set the delay setting method to Auto or Man. When selecting manual mode, enter the desired number of digits using the pop-up virtual keyboard.

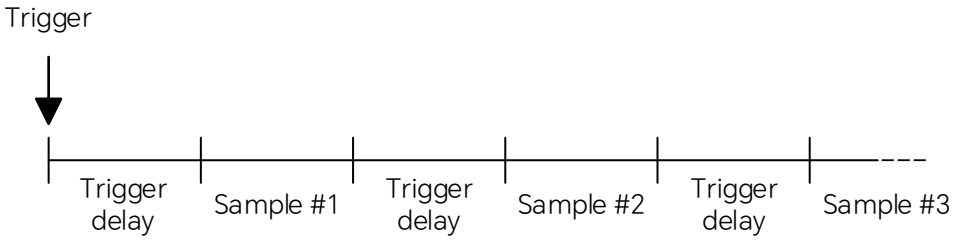
- **Auto**: The multimeter automatically sets the delay time according to the current measurement, range and integration time

- **Man**: User manually sets the delay time.

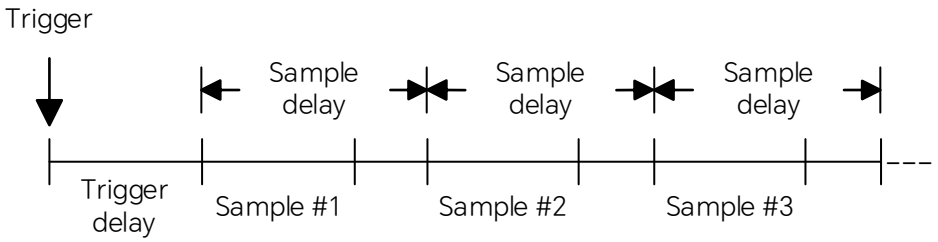
When sampling multiple times per trigger, after triggering, the first sample will be taken after a trigger delay. In addition to the sampling time being related to the set trigger delay, the sample delay mode also affects the sampling time.

Touch Sample to set the sample delay mode to Imm or Tmr. When set to "Tmr", you need to set the delay time value.

- **Imm**: When triggered, the first sample will be taken after a trigger delay time, and then a trigger delay time will be inserted between successive samples.



- **Tmr**: After triggering, the first sample will be taken after a trigger delay time. After the first sample, the second sample will start after a sample delay time.



7.5.3.3 Samples/Trigger

The multimeter will read a specified number of readings each time it receives a trigger signal. Touch Samples/Trigger and use the numeric keypad to set the desired number of readings. The default value is 1.

7.5.3.4 Slope

When the trigger source is set to Ext, the Slope will appear in the menu. Select Neg or Pos to set the external triggering mode to either negative or positive edge triggering.

7.5.3.5 Level Setting

When the trigger source is set to Level, the Level Setting will appear in the menu. You can use the numeric keypad to set the desired trigger level value.

7.5.4 VMC Out

After data collection is completed, the instrument will output a pulse signal through the VM COMP interface on the rear panel. By touching the VMC Out , the polarity of the pulse signal can be set to positive or negative.



Figure 7-73 VMC Out setting

Table 7-24 VMC output characteristics

Level	5 V TTL compatible
Output polarity	Positive and negative optional
Output impendence	100 Ω, typical
Pulse width	About 2 μs

7.5.5 Save Readings

Touch Save Readings to enter the save readings setting interface.

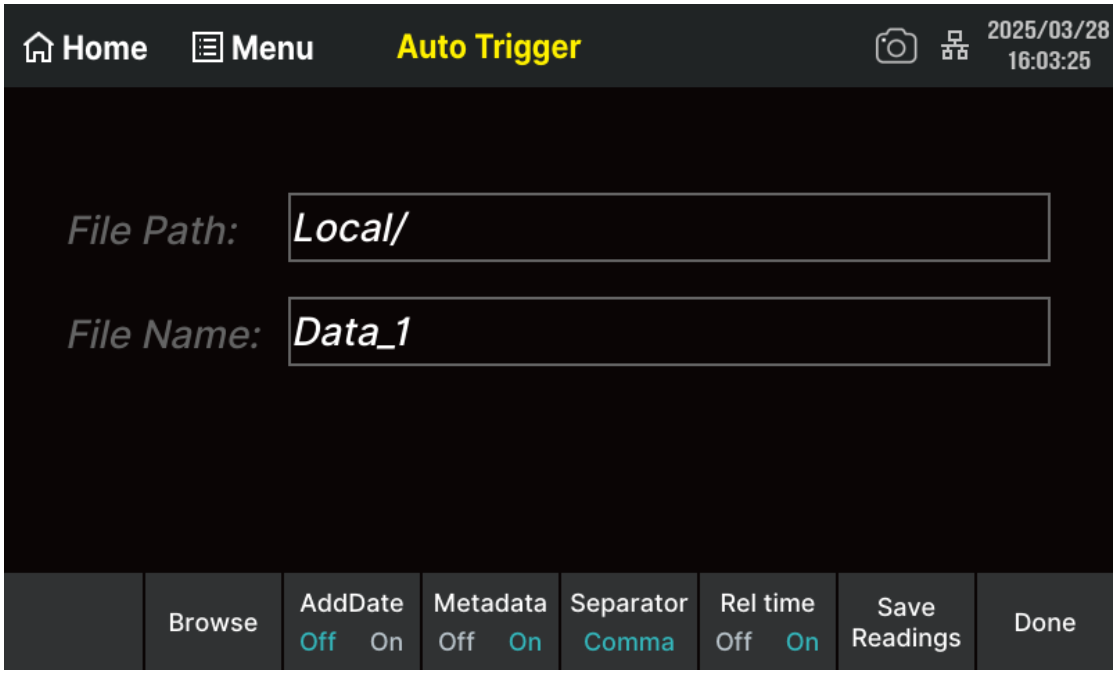
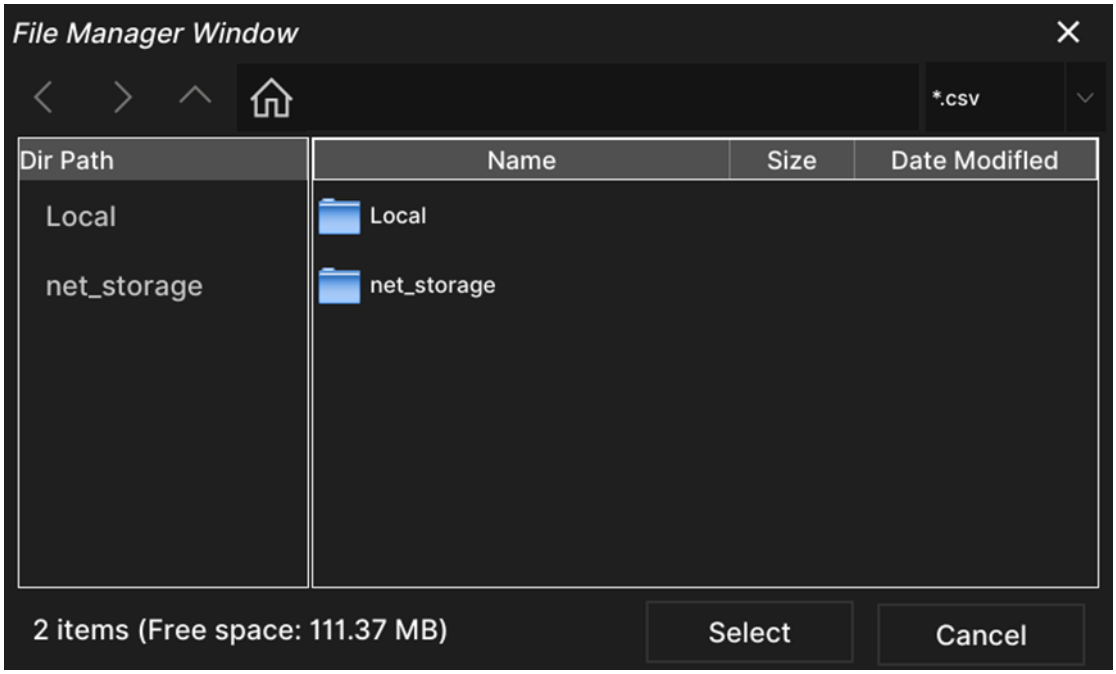


Figure 7-74 Save readimgs setting interface

Operating Steps:

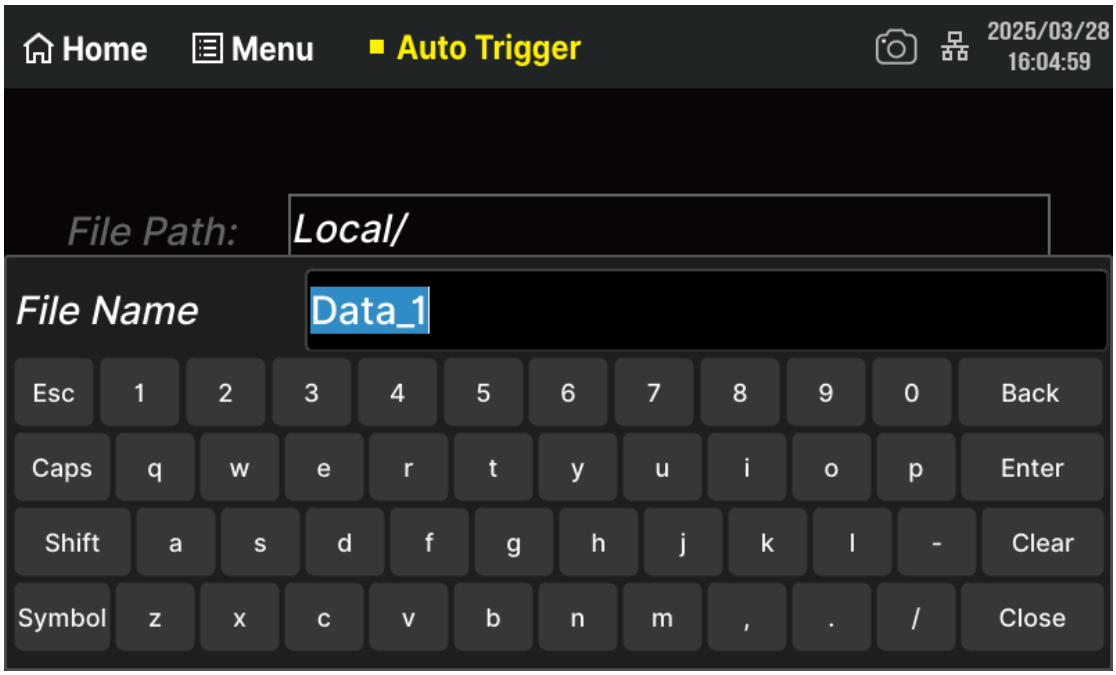
1. **Select storage path**

Touch Browse to enter the file manager interface shown in the figure below. You can select the path on the screen, then touch the Select button to set the current selected path as the location for file storage and return to the higher-level interface. The "File Path:" column on the interface displays the selected path.



2. Set file name

Touch the "File Name" column on the interface, and you can set the file name in the pop-up virtual keyboard. After entering, touch the Enter key to close the virtual keyboard.



3. Add date

Touch AddDate and then select Off or On . When On is selected, the saved file name displays the date the file was saved. When Off is selected, the saved file name does not display the date the file was saved.

4. Set metadata

Touch Metadata , when set to the On state, the saved readings contain the number of readings, the time stamp of the first reading, and the sampling interval (if available).

5. Set Separator

Three types of separators are available: Comma, Tab, and Semicolon.

6. Set relative time

Touch Rel Time and then select Off or On to disable or enable the relative time function.

7. Save Readings

Touch Save Readings to save the current reading to the specified path.

7.6 Math Function

The Multimeter provides multiple math functions: Statistics, Limits, dB/dBm and Rel Value. Choose different math functions to meet different measurement demands. Different measurement functions can perform different mathematical operations, please refer to the table below:

Table 7-25 Math function menu description

Measurement Function	Available Math Functions
DCV	Statistics, Limits, dB/dBm, Rel Value
ACV	Statistics, Limits, dB/dBm, Rel Value
DCI	Statistics, Limits, Rel Value
ACI	Statistics, Limits, Rel Value
Ω2W/Ω4W	Statistics, Limits, Rel Value
Cap	Statistics, Limits, Rel Value
Cont	Statistics, Limits
Diode	Statistics, Limits
Freq/Preiod	Statistics, Limits, Rel Value
Sensor	Statistics, Limits, Rel Value

Take the DCV for instance. Touch Menu > Math to enter the following interface.

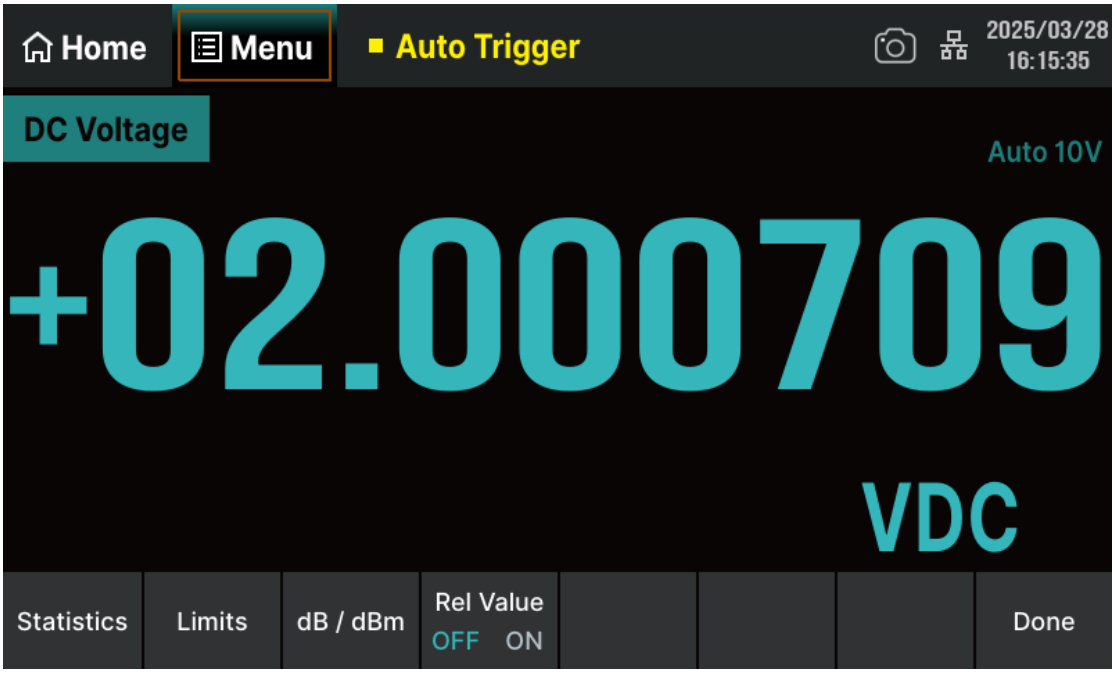


Figure 7-75 Math function menu interface

Table 7-26 Math function menu description

Function Menu	Description
Statistics	Reading statistic functions, including: Max, Min, Average, Span, Std Dev and Samples.
Limits	Execute Pass/Fail tests based on the set upper and lower limit parameters.
dB/dBm	The dB measurement is the difference between the input signal and a stored relative value. The dBm is based on a calculation of power delivered to a reference resistance, 0 dBm = 1 mW.
Rel Value	Turn on the relative value function and set up the value, or turn off the function.

If measurement function is changed, all math functions will be closed except Statistics.

7.6.1 Statistics

There are many kinds of reading statistic functions, including: Max, Min, Average, Span, Std Dev and Samples. Touch Menu > Math > Statistics > ON to enter the interface shown below:

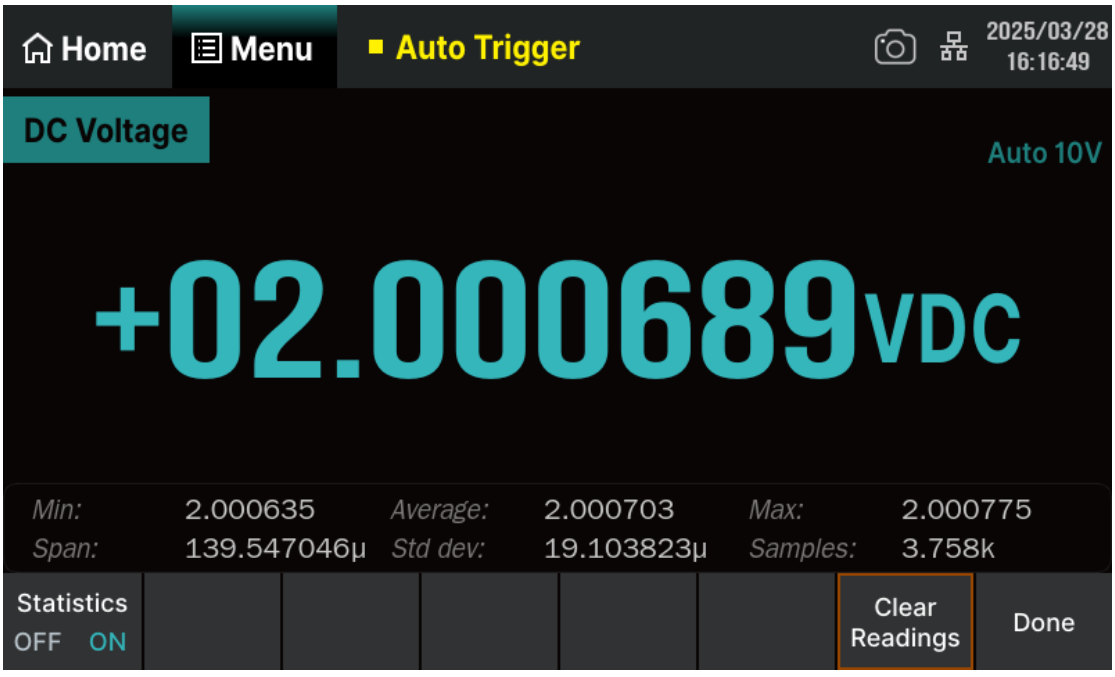


Figure 7-76 Statistics function menu interface

Table 7-27 Statistics function menu description

Function Menu	Setting	Description
Statistics	OFF/ON	Enable or disable the satistics function.
Clear Readings		Clear all current readings and restart statistics.
Done		Save current settings and return to the higher-level menu.

Table 7-28 Statistics parameters description

Parameters	Description
Min	Show the minimum value of current measurement.
Average	Show the average value of current measurement.
Max	Show the maximum value of current measurement.
Span	Show the span of current measurement.
Std dev	Show the standard deviation value of current measurement.
Samples	Show the maximum value of current measurement.

Statistics Function:

- In statistic function, the first reading is usually set to the maximum or minimum value. When getting more readings, current displaying value is always the maximum/minimum reading among all the measured values.
- The maximum, minimum, average and samples values are stored in volatile memory and automatically cleared upon power failure.

7.6.2 Limits

7.6.2.1 Limits Settings

The limits function provides statistics and prompts for out-of-range signals according to the set upper and lower limit parameters.

Touch Menu > Math > Limits > ON to enter the interface shown below:

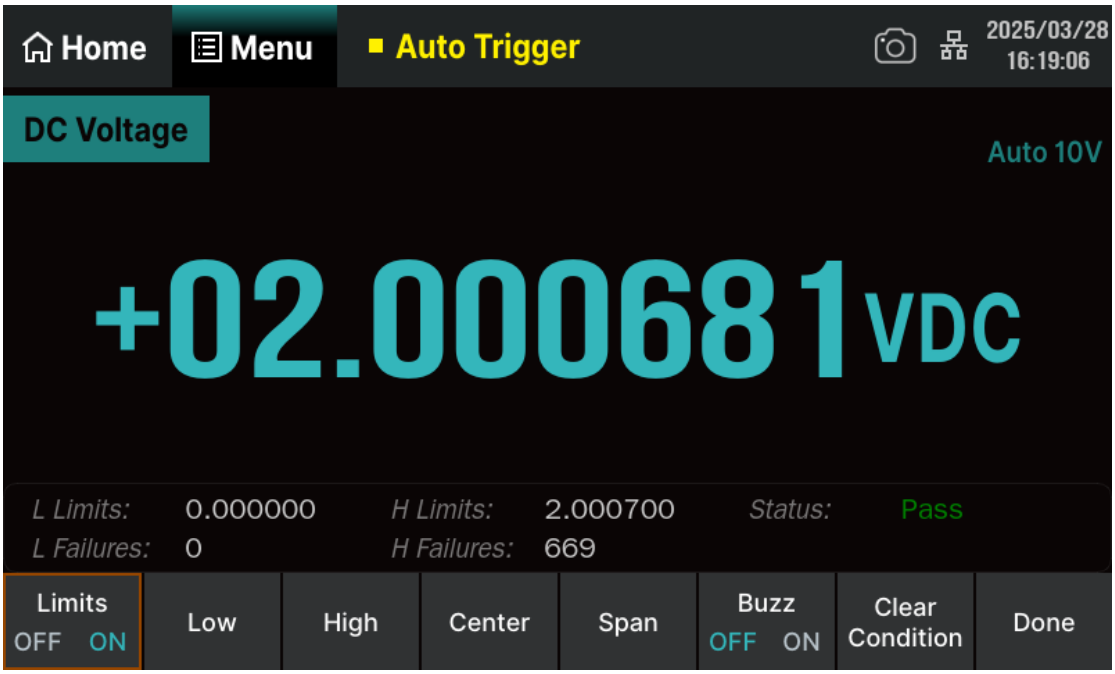


Figure 7-77 Limits function menu interface

Table 7-29 Limits function menu description

Function Menu	Setting	Description
Limits	OFF/ON	Turn on or turn off the Limits function.
Low		Set the desired lower limit.
High		Set the desired upper limit.
Center		Set the desired center value.
Span		Set the desired span.
Buzz	OFF/ON	When the buzzer is on, if the reading is lower or higher than limits, the instrument will beep once.
Clear Condition		Clear all current readings and restart to test.
Done		Save all changes and return to the higher-level menu.

Table 7-30 Limits parameters description

Parameters	Description
L Limits	Set lower limit value.
H Limits	Set upper limit value.
Status	Status of the limit operation for the reading (Pass or Failure) • Pass: Reading is within limits • Failure: Reading is outside limits
L Failures	Show the times that reading is lower than the lower limit.
H Failures	Show the times that reading is higher than the upper limit.

1. Set limits

Select Lower , High , Center or Span and enter the value through the pop-up virtual keyboard.

2. Unit

The unit of Limits is decided by the current measurement function.

3. Over limit alert

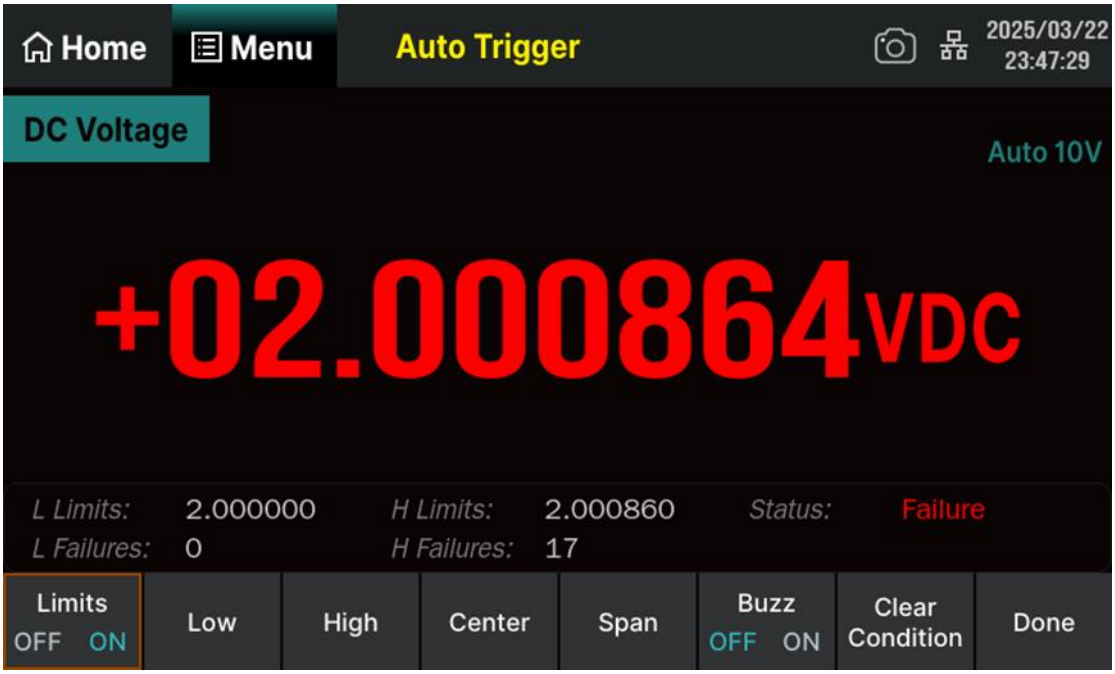
- When the reading exceeds the upper or lower limit, the current reading is displayed in red and the status shows "Fail". When within the limits, it is displayed in cyan and the status shows "Pass".
- When the reading exceeds the upper or lower limit, the buzzer will emit an audible alarm (if the buzzer is enabled).

The range of Limits function:

- The upper limit value should be always bigger than the lower limit value.
- The upper and lower values are stored in volatile memory. They will be set to default values 0 when the power is on.

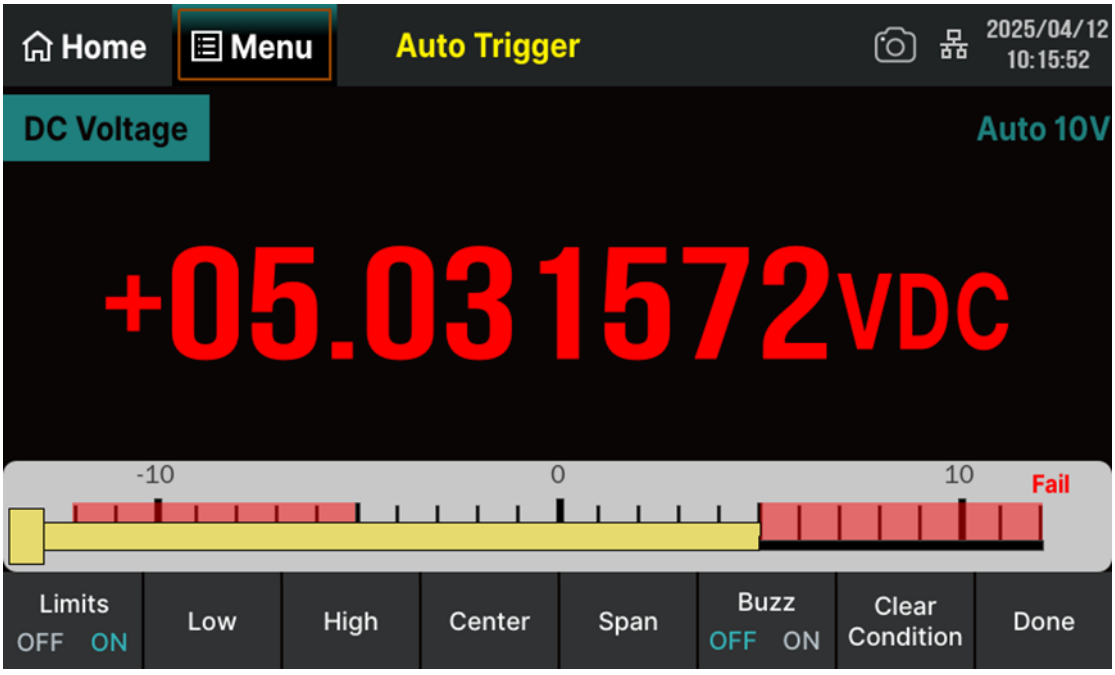
7.6.2.2 Limits in Different Display Modes

1. Limits in number display



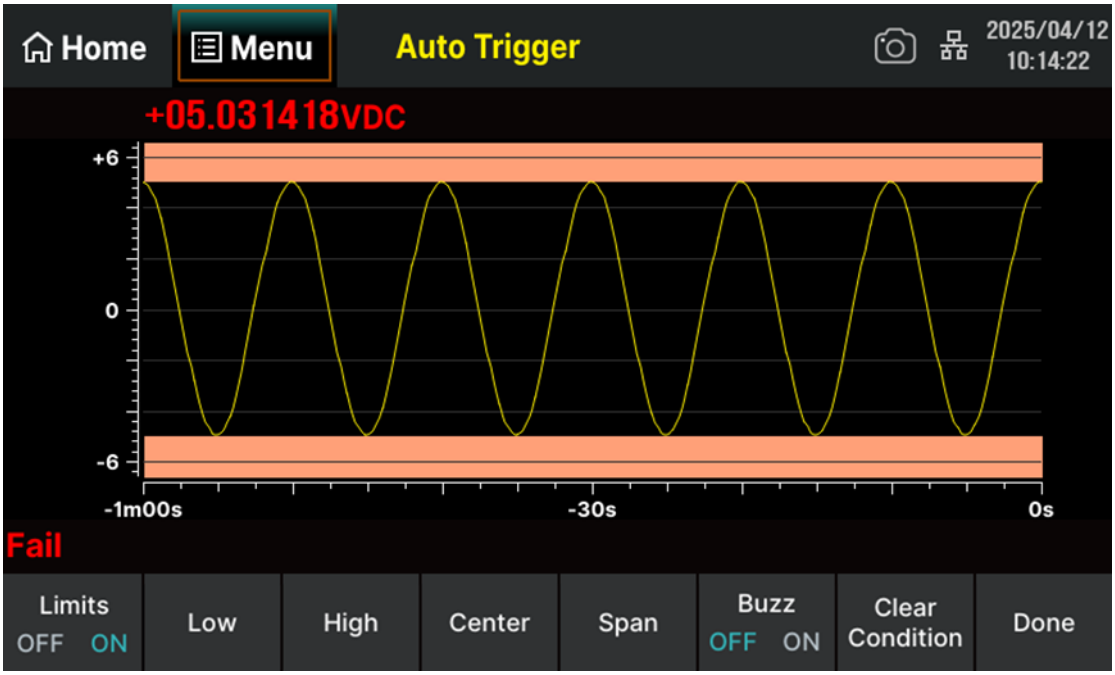
- The bottom of the screen displays the set lower (L Limits) and upper (H Limits) limits, the number of readings that exceed the lower (L Failures) and upper (H Failures) limits, and the limit status (Pass/Failure) of the current reading.
- When the reading exceeds the upper or lower limit value, the screen displays the reading in red.

2. Limits in bar display



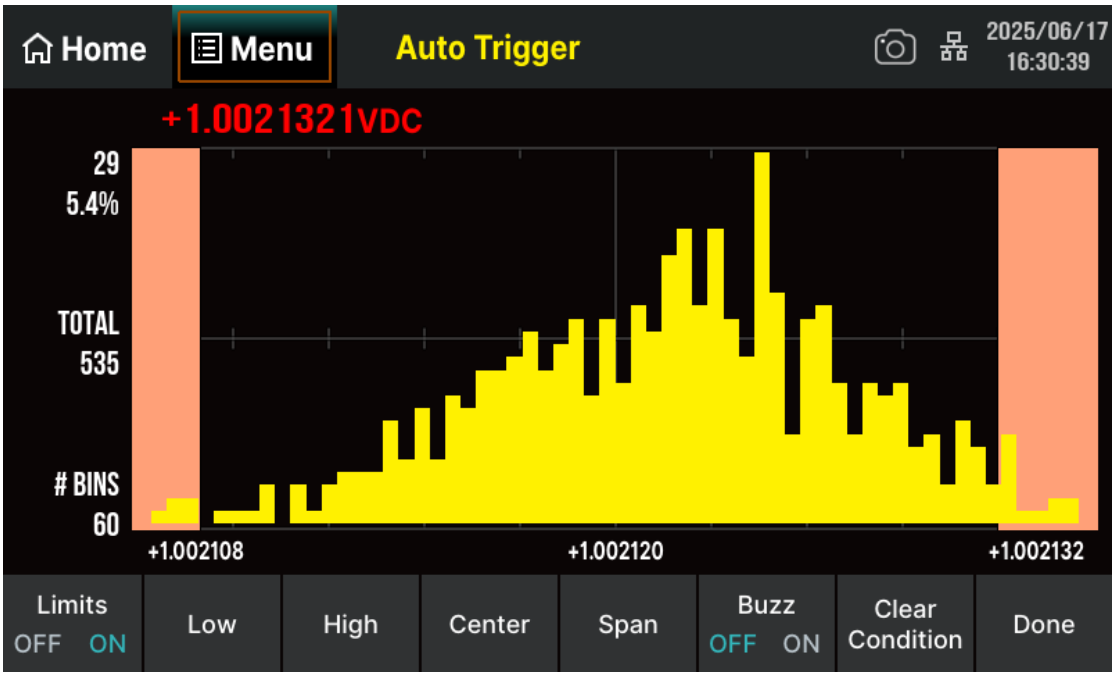
- Limit areas are shown in light red on the graph.
- When the limit is not exceeded, “Pass” is shown on the right side of the bar graph and the reading is displayed in blue-green; when the limit is exceeded, “Fail” is shown on the right side of the bar graph and the reading is displayed in red.

3. Limits in trend display



- Limit areas are shown on the graph in orange.
- When the limit value is not exceeded, the measured value in the upper left corner of the screen is displayed in green and “Pass” is displayed in the lower left corner of the screen; when the limit value is exceeded, the measured value in the upper left corner of the screen is displayed in red and “Fail” is displayed in the lower left corner of the screen.

4. Limits in histogram display



- Limit areas are shown on the graph in orange.
- When the limit value is not exceeded, the measured value in the upper left corner of the screen is displayed in green; when the limit value is exceeded, the measured value in the upper left corner of the screen is displayed in red.

7.6.3 dBm

dBm represents the absolute value of the power. The dBm operation calculates the power of the reference resistance according to the measured voltage.

$$\mathrm{dBm} = 10 \times \mathrm{Log10}[(\mathrm{Reading}^2/R_{REF})/0.001\mathrm{W}]$$

Where, Reading is the voltage measurement value, and R_{REF} is the reference resistance.

Touch Menu > Math > dB/dBm > ON and select the Mode as dBm, as shown in the following figure.

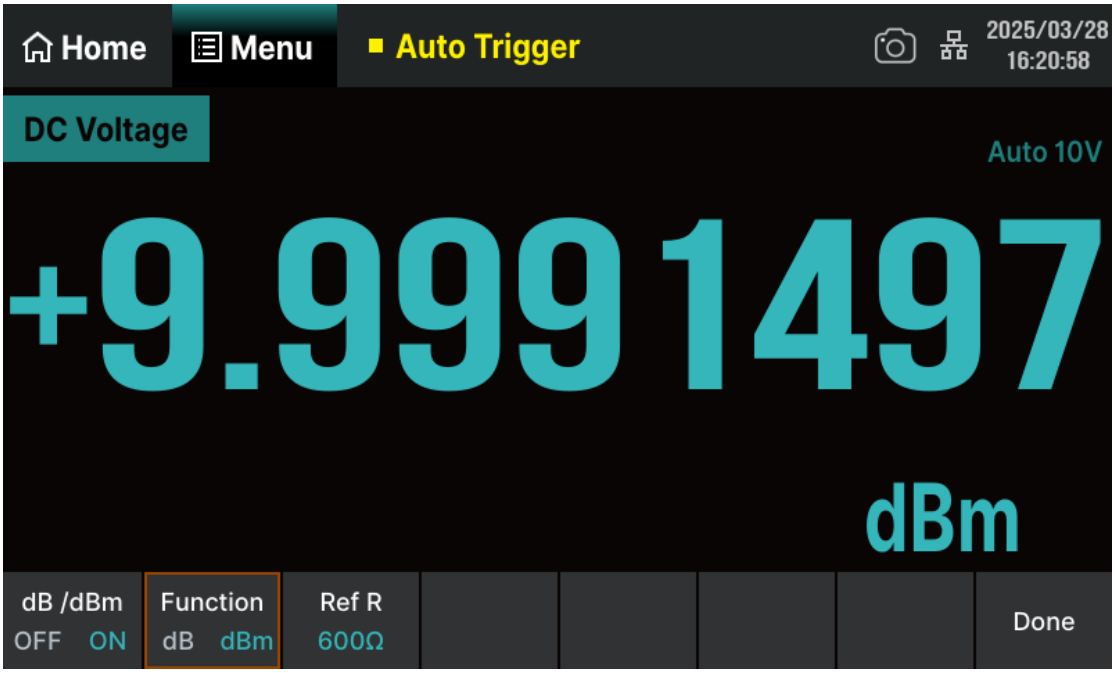


Figure 7-78 dBm function menu interface

Table 7-31 dBm function menu description

Function Menu	Setting	Description
dB/dBm	OFF/ON	Turn on or turn off dB/dBm function.
Function	dB/dBm	Turn on dB or dBm operation, and the selected operation mode will be displayed in the lower right corner of the main display screen.
Ref R		Set the relative resistance value.
Done		Save all settings and return to the higher-level menu.

7.6.4 dB

dB represents the relative value which is used in the relative operation of dBm value. When enabled, the multimeter calculates the dBm value of the next reading and subtracts the preset dB from this value and then displays the result.

$$\mathrm{dB} = 10 \times \mathrm{Log10}\left[\frac{\frac{\mathrm{Reading}^2}{R_{REF}}}{0.001\mathrm{W}}\right] - \mathrm{dB\ Ref\ Value}$$

Where, Reading is the voltage measurement value, and R_{REF} is the reference resistance.

Touch Menu > Math > dB/dBm > ON and select the Mode as dB , as shown in the following figure.

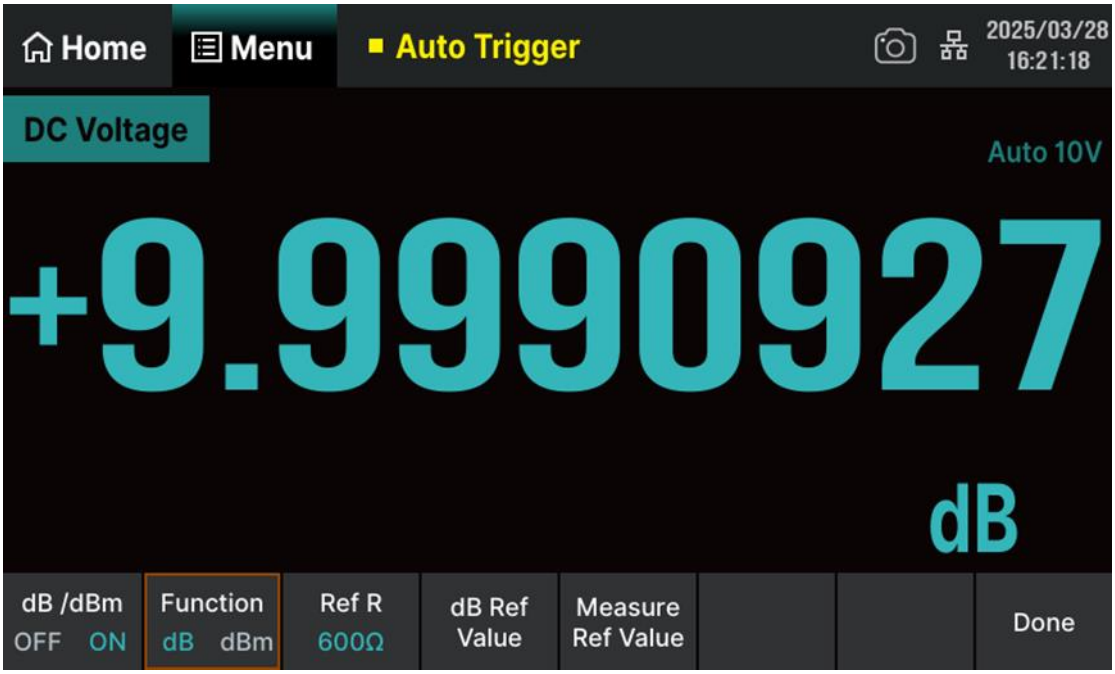


Figure 7-79 dB function menu interface

Table 7-32 dB function menu description

Function Menu	Setting	Description
dB/dBm	OFF/ON	Turn on or turn off dB/dBm function.
Function	dB/dBm	Turn on dB or dBm operation, and the selected operation mode will be displayed in the lower right corner of the main display screen.
Ref R		Set the relative resistance value.
dB Ref Value		Manually set relative value in dBm.
Measure Ref		Use the dBm value obtained from the current measurement as the

Function Menu	Setting	Description
Value		dB reference value.
Done		Save all settings and return to the higher-level menu.

- The dB Ref Value can be manually entered as a specified value, or the current measured dBm value can be used as the relative value by touching Measure Ref Value.
- The range for setting the dB Ref Value is -200 dBm ~ +200 dBm, and the default value is 0 dBm.

7.6.5 Relative Value

When relative value function is enabled, the displayed reading on the screen is the difference between the actual measured value and the relative value.

Reading = Measured value - Relative value

There are two ways to configure relative values:

- In the basic function measurement interface, touch Rel > ON , and the multimeter will automatically take the current measurement result as the "relative value".
- Touch Menu > Math > Rel Value > ON . then touch Ref Value Edit , you can manually input relative values through the pop-up virtual keyboard, and the units are determined by the current measurement function. As shown in the following figure (taking DCV measurement as an example, the current actual measured value is 02.000709 VDC, the relative value is 1 V).

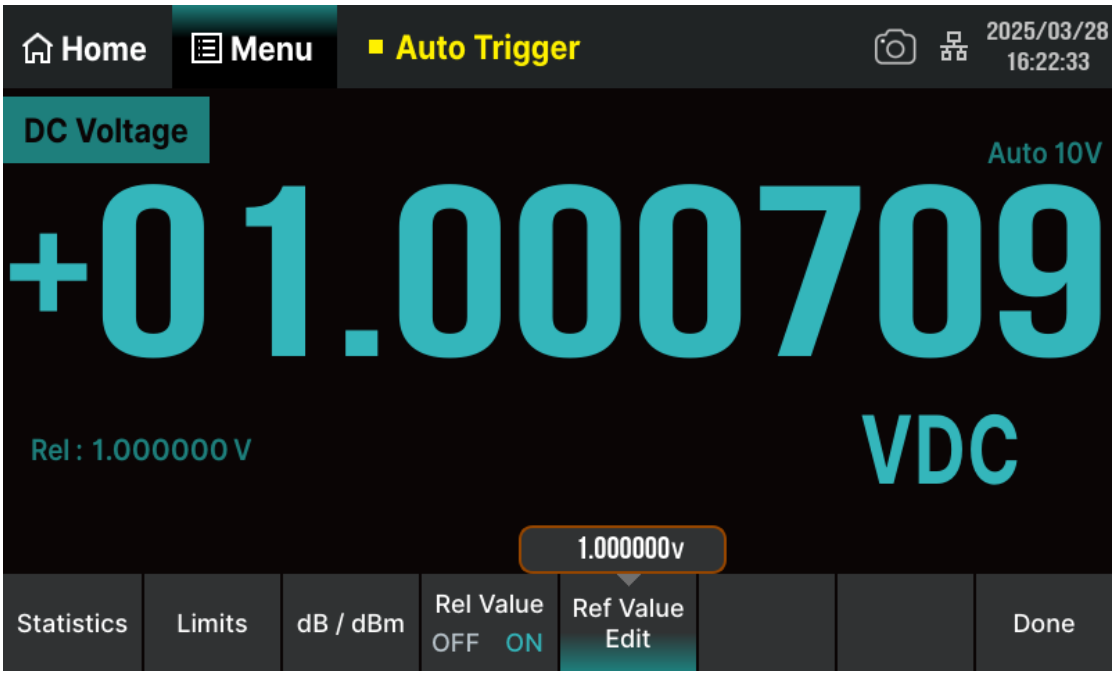


Figure 7-80 Relative value setting interface

7.7 Display

SDM4000A supports four display modes, number, bar, trend and histogram, for viewing measurement data. It also supports a probe hold function, which automatically records the measurement results and saves them on the screen when a series of stable readings (up to 8 readings can be saved) have been taken.

7.7.1 Number

When the multimeter is powered on, the number display mode is enabled by default.

Touch Menu > Display > Number to set the display to number, as shown in the following figure.

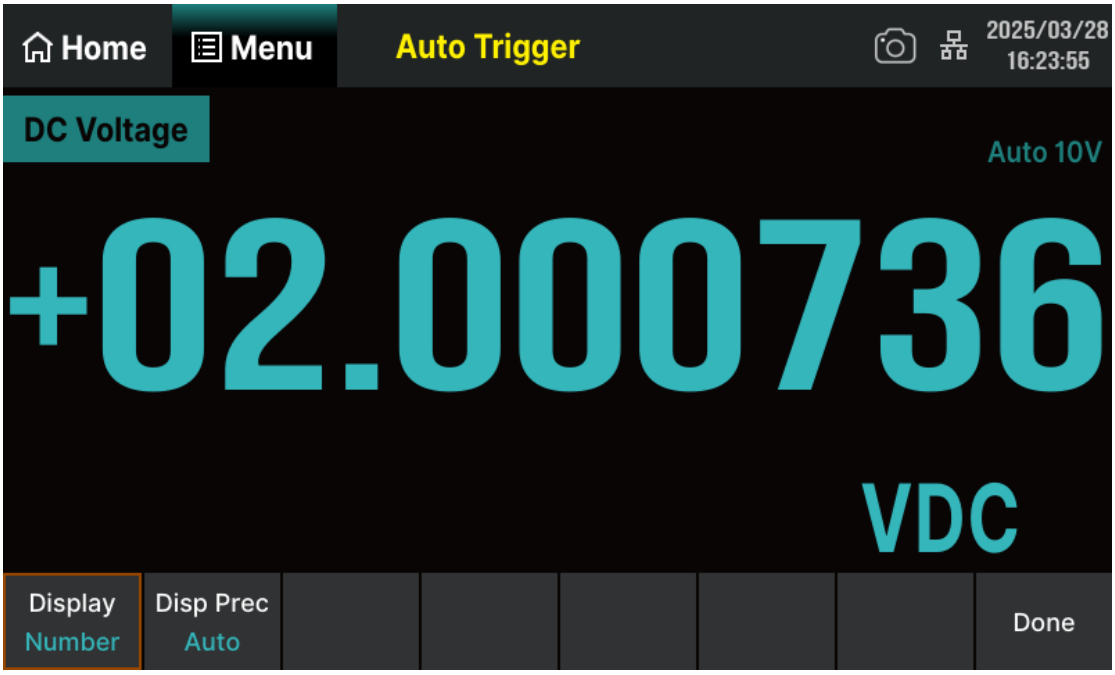


Figure 7-81 Number display interface

Touch Disp Prec to set different display digits according to the requirement. The default setting is Auto.

7.7.2 Bar

Touch Menu > Display > Bar to set the display to bar. At this point a moving bar is added below the standard numeric display as shown in the following figure.

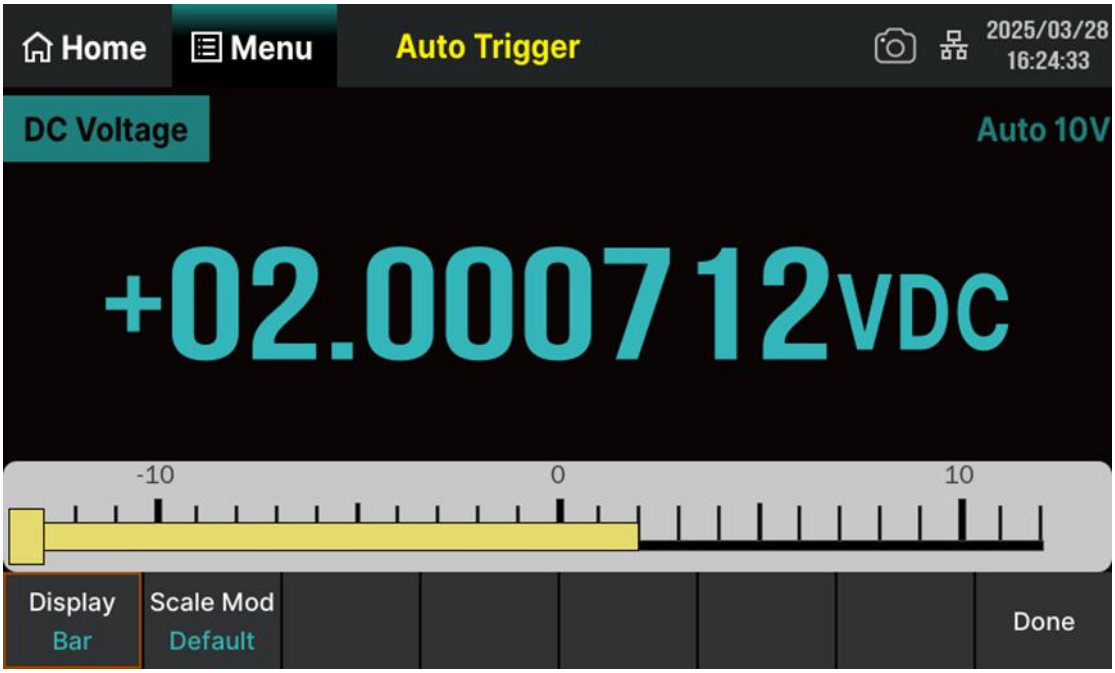


Figure 7-82 Bar display interface

Scale Mod

You can use the default scale or set the scale manually.

- Default: Use the measurement range of the current range as the scale of the bar chart.
- Manual: Enter the scale range of the bar chart manually.

The scale can be set either by default or manually.

- **Default**: The current measurement range is directly used as the scale range of the bar chart.
- **Manual**: The scale range of the bar chart is entered manually. Two methods are supported:

  Method 1: Set the Scale High and Scale Low of the range separately.

  Method 2: Set the center value of the range and the span around the center value.

In Method 1, Scale High value must always be greater than Scale Low value.

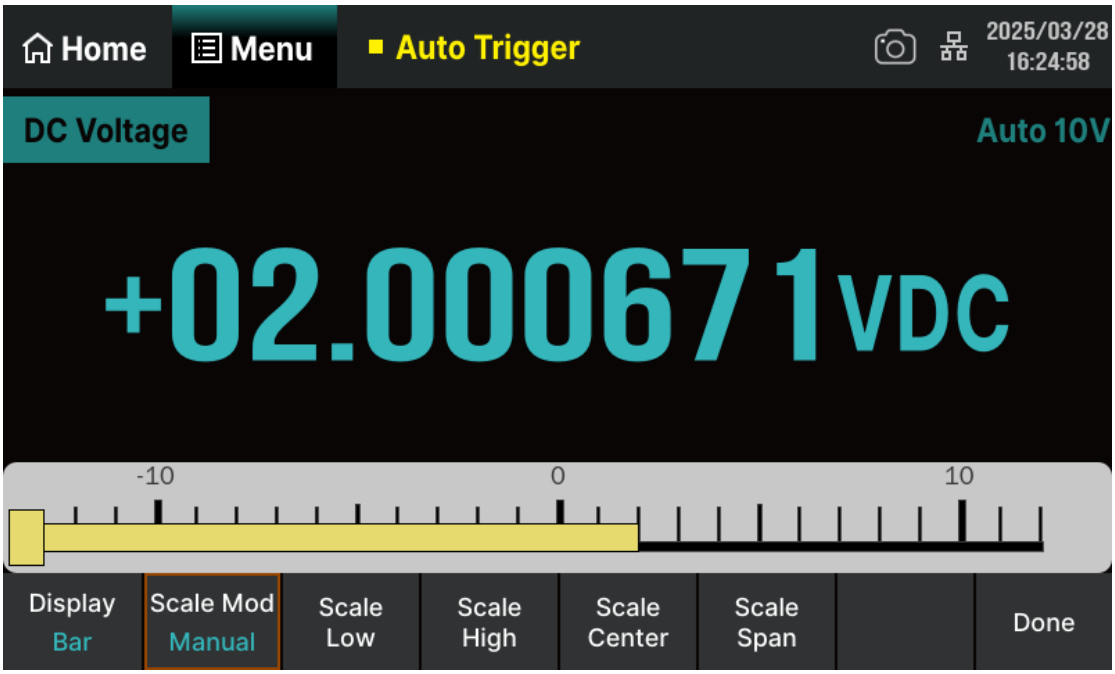


Figure 7-83 Set the scale range of the bar chart manually

Table 7-33 Set the scale range of bar chart manually

Function Menu	Description
Scale Mod	Select the mode for setting the scale range: default or manual.
Scale Low	Set the low value of the scale.
Scale High	Set the high value of the scale.
Scale Center	Set the center value of the scale.
Scale Span	Set the span of the scale.
Done	Save all settings and return to the higher-level menu.

7.7.3 Trend

7.7.3.1 Trend (Continue)

Set the acquire mode to Continue, and touch Menu > Display > Trend to set the display to trend, as shown in the following figure. In continuous measurement mode, the trend chart will display the data trend over a period of time. As shown in the following figure.

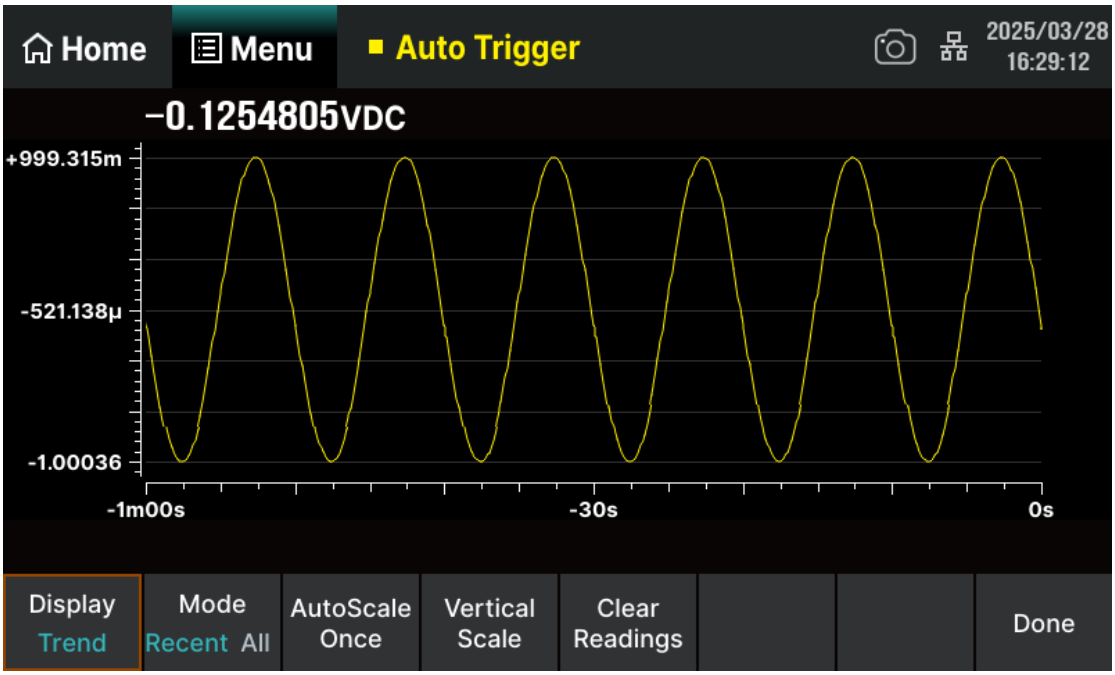


Figure 7-84 Trend display interface

Table 7-34 Trend display interface menu description

Function Menu	Setting	Description
Display	Trend	Currently selected display mode is Trend.
Mode	Recent/All	Recent: Display the readings acquired within the specified time, 1~60 min can be set, default 1 min. Changing this setting clears the trend chart, but does not clear the readings memory, statistics, or histogram data. All: Display all readings acquired and arranged from left to right. After filling the display, the data on the display will be compressed as new data is added to the right side of the display. Neither mode clears the reading memory.
Autoscale Once		Automatically set the vertical scale once based on existing measurement data.
Vertical Scale		Select the mode for setting the vertical scale, default, Auto, Manual, Limit (if Limits function is enabled).

Function Menu	Setting	Description
Clear Readings		Clear all current readings and restart statistics.
Done		Save all settings and return to the higher-level menu.

Vertical range:

The vertical scale supports the following four setting methods: Default, Automatic, Manual, or Limit (the limit function must be enabled).

- **Default**: The current measurement range is directly used as the vertical scale range.
- **Automatic**: The vertical scale is continuously and automatically adjusted based on the range of acquired measurement data.
- **Manual**: The vertical scale range is entered manually, with two supported methods:

  Method 1: Set the Scale High and Scale Low of the range separately.

  Method 2: Set the center value of the range and the span around the center value.
- **Limit**: When the limit function is enabled, the Scale High and Scale Low resulting from limit calculations are used as the upper and lower bounds of the vertical scale, respectively.



In Method 1 of the Manual mode, Scale High value must always be greater than Scale Low value.

Table 7-35 Set the vertical scale of trend chart manually

Function Menu	Description
Low	Set the low value of vertical scale.
High	Set the high value of vertical scale.
Center	Set the center value of vertical scale.
Span	Set the span of vertical scale.
Done	Save all changes and return to the higher-level menu.

7.7.3.2 Trend (Data Log and Digitize)

In Data Log or Digitize mode, the trend chart display supports zoom, pan and cursor control. The following is an example of the trend cart settings in logger mode.

While logging data, touch Menu > Display > Trend to select the trend chart display, as shown below.

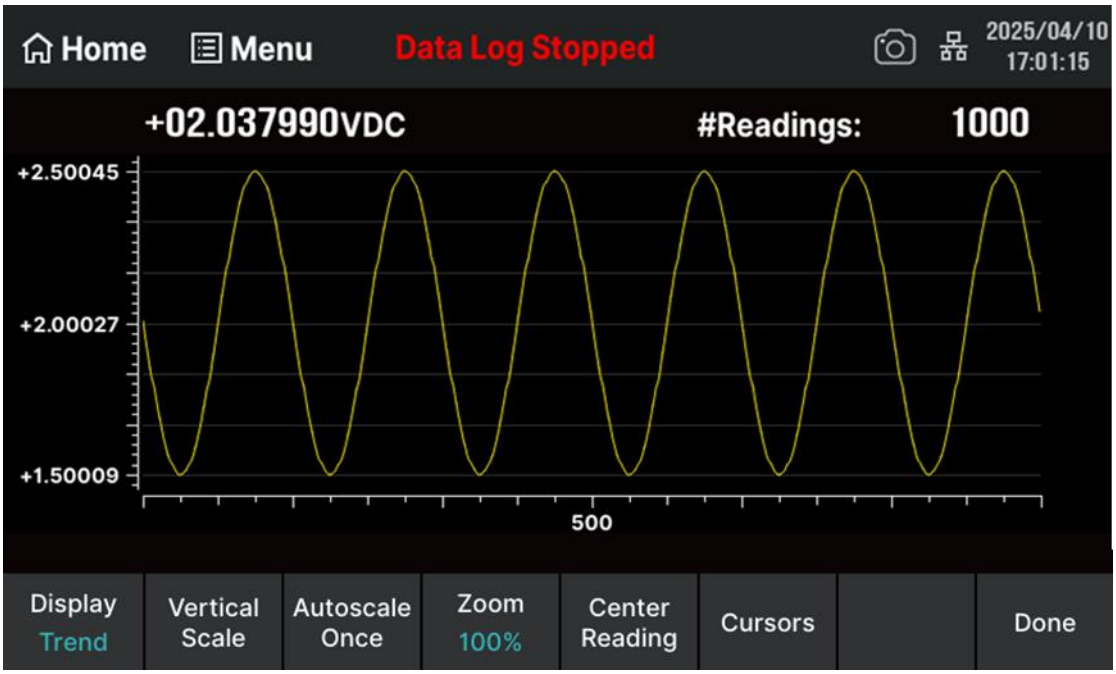


Figure 7-85 Trend display interface in data log mode

Table 7-36 Trend display interface menu in data log mode

Function Menu	Setting	Description
Display	Trend	Set the display mode to trend.
Vertical Scale	Vertical	Select the mode for setting the vertical scale. For more description, please refer to “7.7.3.1 Trend (Continue)”.
Autoscale Once		Automatically set the vertical scale once based on existing measurement data.
Zoom		Set the horizontal axis zoom ratio.
Center Reading		Set the reading displayed in the center of the screen enables graphical data panning.
Cursors		Display and control X1, X2, Y1, Y2.
Done		Save all settings and return to the higher-level menu.

Center Reading:

Select the reading from memory that is displayed in the center of the screen. Increasing the center reading serial number value shifts the graphic data to the left; decreasing the center reading value shifts the graphic data to the right.

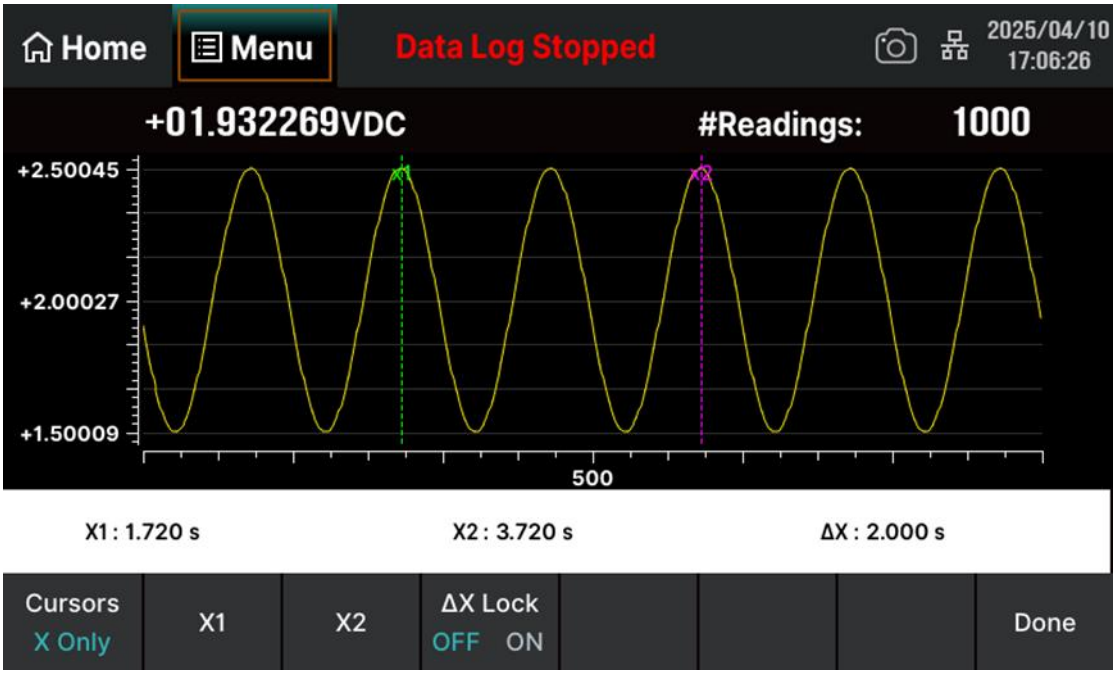
Zoom:

Set the zoom ratio to scale the horizontal axis of the trend chart.

Cursors:

Displays and controls X1, X2, Y1, Y2, and tracks the cursor on the trend chart (shown as lines). Settings are available for Off, X only, Y only, X and Y, and Track on X. The different setup options are described below:

- **Off**: Turn off the cursors function.
- **X Only**: Only the X1 and X2 cursors are displayed, along with the corresponding X values (time) and ΔX. As shown below:

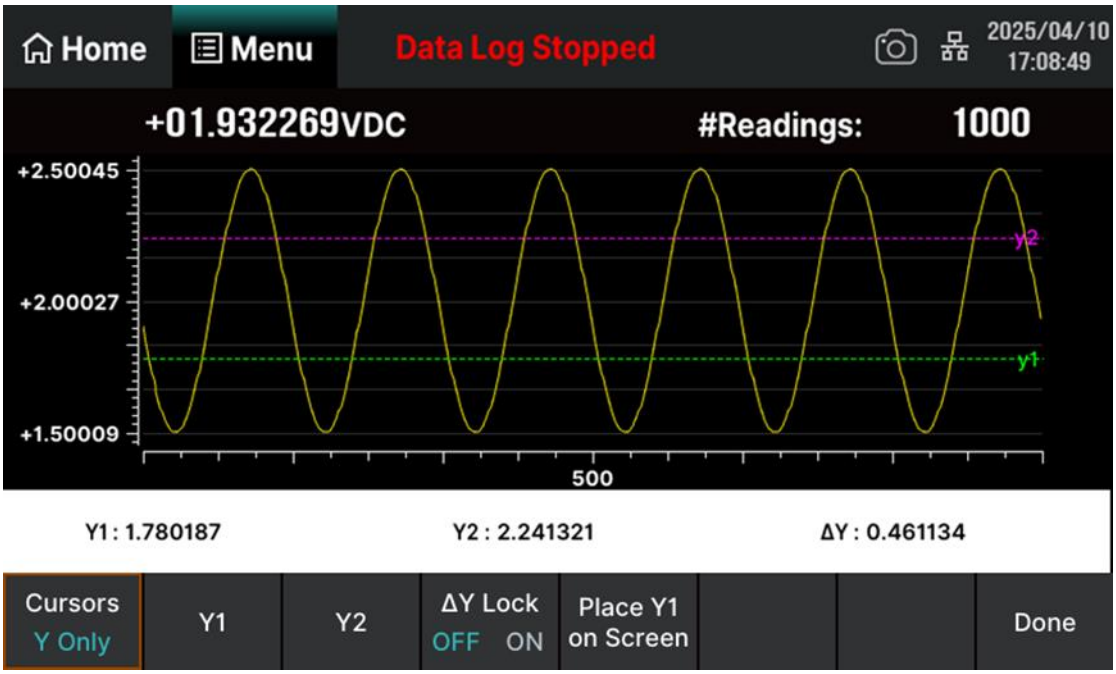


X1: Set the reading number of the X1 cursor.

X2: Set the reading number of the X2 cursor.

ΔX Lock: Turn on or off ΔX lock function. When ΔX Lock is enabled, X1 cursor and X2 cursor will always remain at a fixed distance between them after either moves.

- **Y Only**: Only the Y1 and Y2 cursors are displayed, along with the corresponding Y values (amplitude) and ΔY. As shown below:



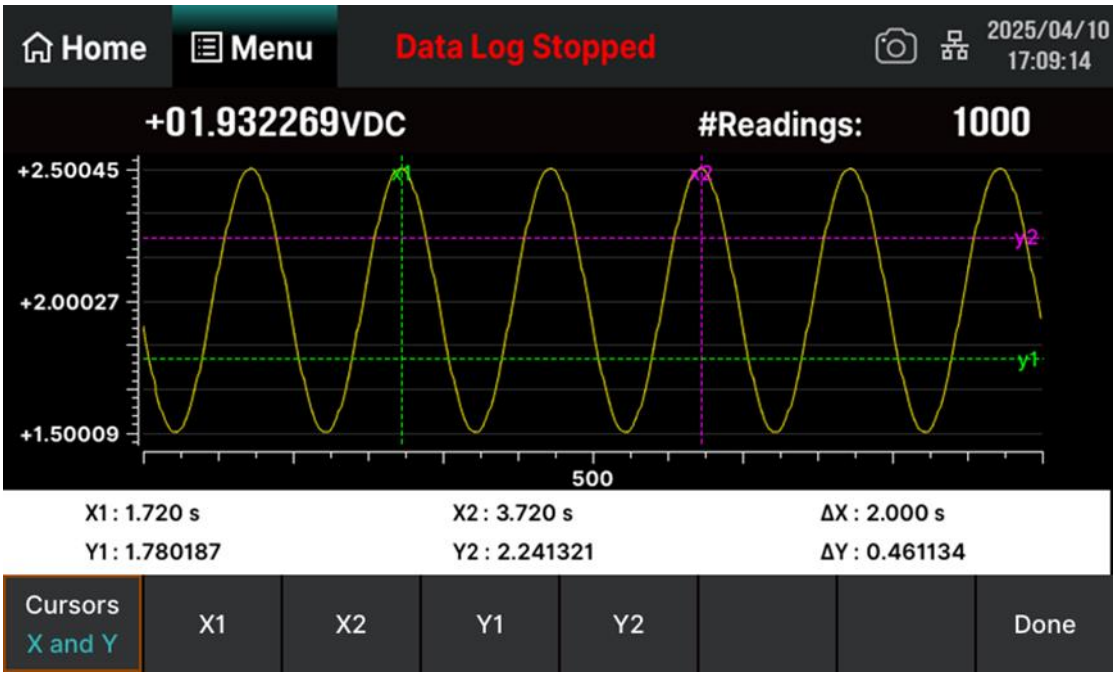
Y1: Set the reading number of the Y1 cursor.

Y2: Set the reading number of the Y2 cursor.

ΔY Lock: Turn on or off ΔY lock function. When ΔY Lock is enabled, Y1 cursor and Y2 cursor will always remain at a fixed distance between them after either moves.

Place Y1 on Screen: Display the set Y value as a cursor on the trend graph.

- **X and Y**: X1, X2, Y1, Y2 cursors are displayed, along with the corresponding X value (time), ΔX, Y value (amplitude), and ΔY. As shown below:



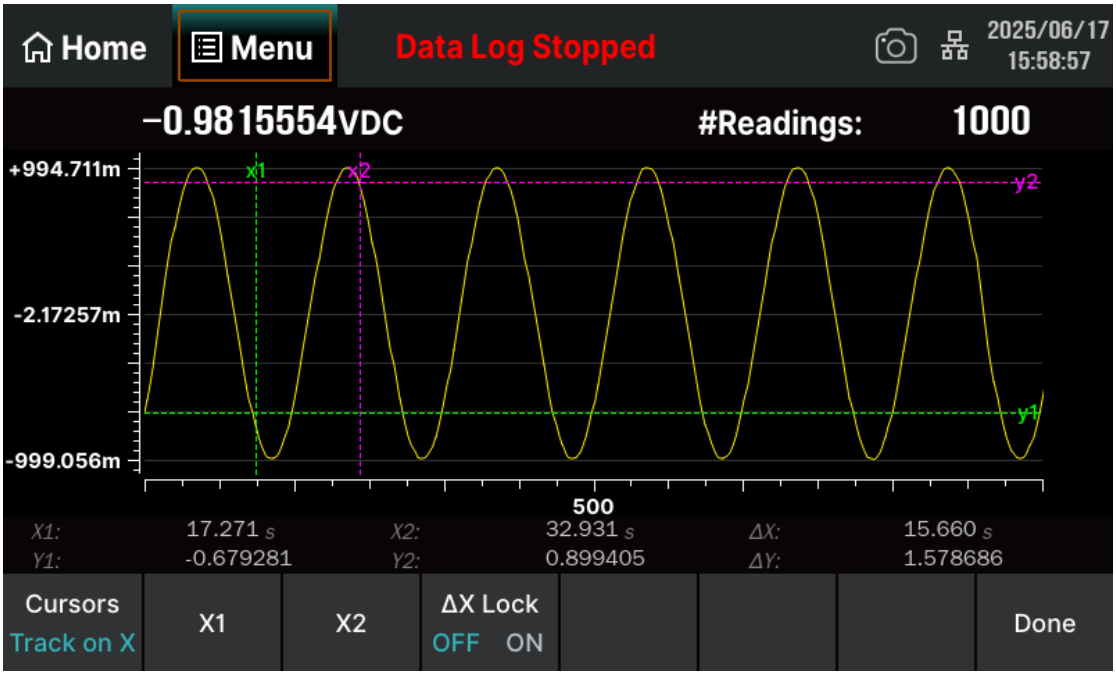
X1: Set the reading number of the X1 cursor.

X2: Set the reading number of the X2 cursor.

Y1: Set the reading number of the Y1 cursor.

Y2: Set the reading number of the Y2 cursor.

- **Track on X**: Select two readings at X1 and X2 of the menu to display the X value (time) and Y value (amplitude) corresponding to each reading, as well as ΔX and ΔY. As shown below:



X1: Set the reading number of the X1 cursor.

X2: Set the reading number of the X2 cursor.

ΔX Lock: Turn on or off ΔX lock function. When ΔX Lock is enabled, X1 cursor and X2 cursor will always remain at a fixed distance between them after either moves.

7.7.4 Histogram

Touch Menu > Display > Histogram to enable the histogram display function as shown in the following figure. Histogram displays the distribution situation of the measurement data.

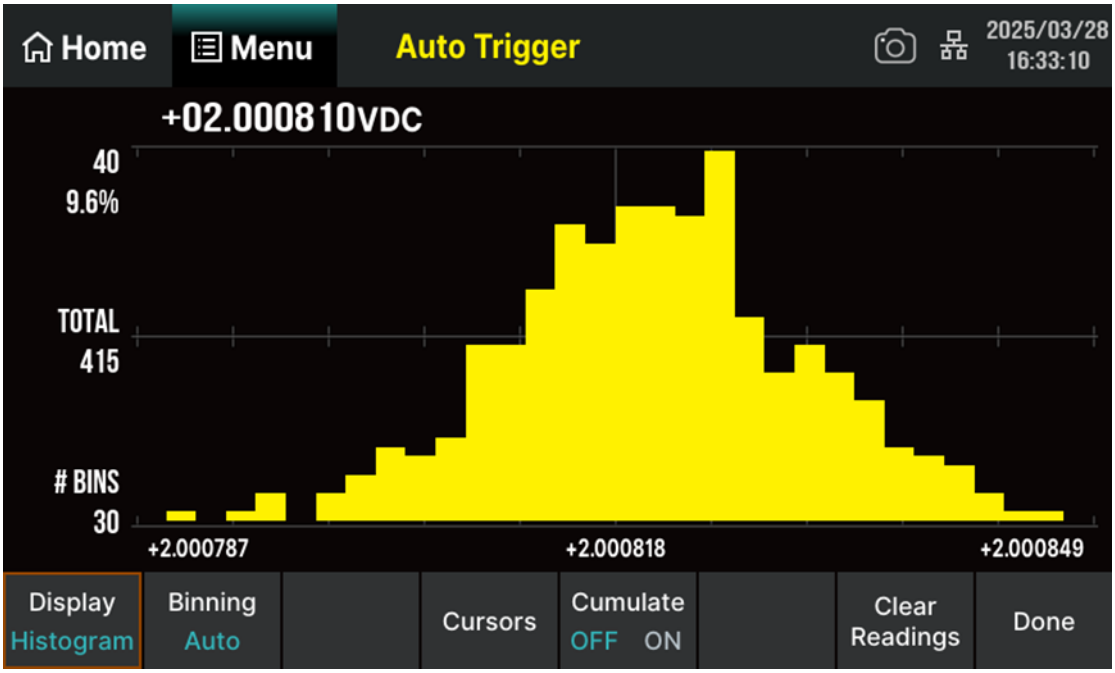


Figure 7-86 Histogram display interface

Description of parameters displayed in the histogram:

Taking the DC voltage measurement in the above figure as an example, describe the various parameters displayed on the interface.

- **+02.000810VDC** -- Current measured value.
- **40** -- Number of samples with the highest bar shape, i.e. the maximum number of samples.
- **9.6%** -- Percentage of maximum number of samples to total number of samples.
- **Total 415** -- Total number of samples.
- **#BINS 30** -- Total number of columns.
- **+2.000787**, **+2.000818**, **+2.000849** -- The horizontal scale representing the measured value.

Table 7-37 Histogram display function menu description

Function Menu	Setting	Description
Display	Histogram	Currently selected display mode is Hitogram.
Binninng	Auto/Manual	Set the binning mode to auto or manual.
Coursors		Turn the cursor display on or off to set and view the measured values of Cursor 1 and Cursor 2 as a percentage of the total number of samples.
Cumulate	OFF/ON	Show or hide the cumulative distribution function curve.
Clear Readings		Clear all current readings and restart statistics.
Done		Save all settings and return to the higher-level menu.

Binning Mode

Auto: Based on the readings, continuously readjust the histogram span, and when the new value exceeds the current span, perform a new columnar processing on the data. The relationship between the number of displayed columns and the number of readings:

Number of Readings	Number of Binnings
0~100	15
101~500	30
501~1000	60
1001~5000	150
5001~10000	300
>10000	600

Manual: Manually set parameters such as the number of columns and horizontal scale range for column processing. After setting the Binning to manual, select Binning Setting to enter the interface shown in the following figure:

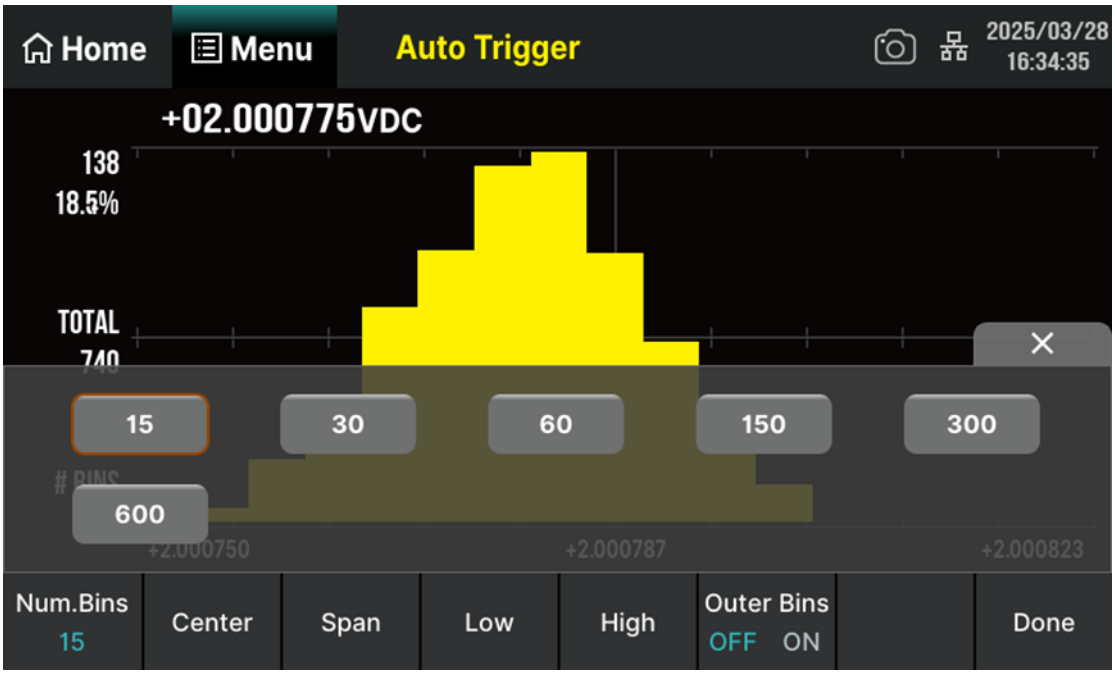


Figure 7-87 Histogram manual binning mode

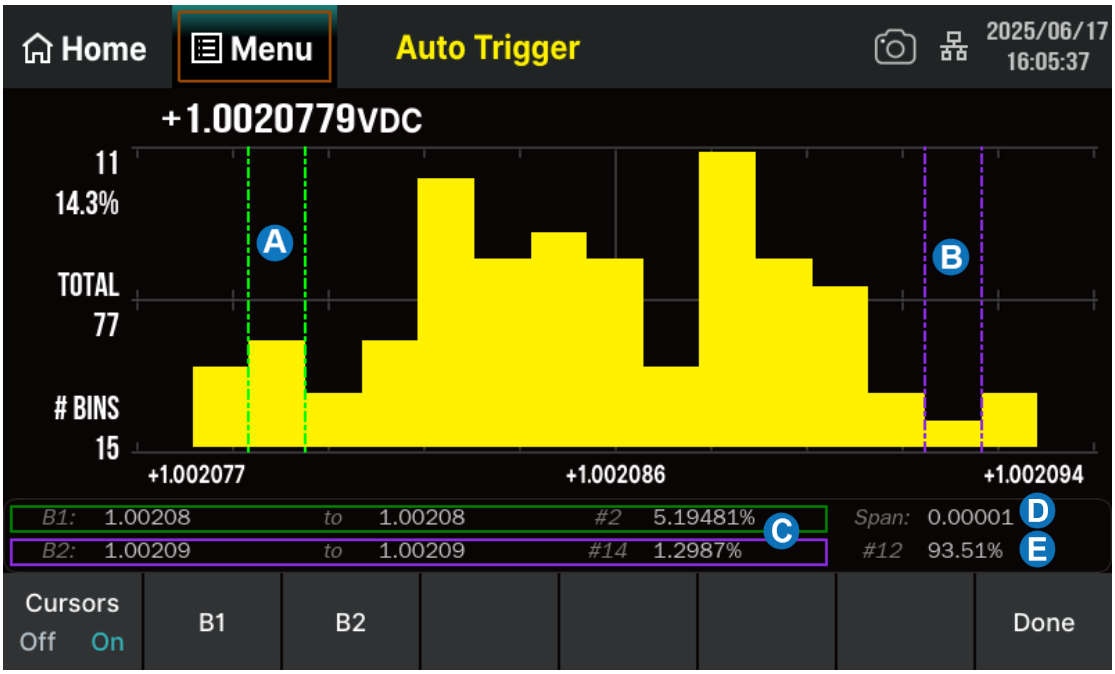
Table 7-38 Histogram manual binning mode menu description

Function Menu	Setting	Description
Num. Bins		Set the number of binnings.
Center		Set the center value of horizontal scale.
Span		Set the span of horizontal scale.
Low		Set the low value of horizontal scale.
High		Set the high value of horizontal scale.
Outer Bins	OFF/ON	Show or hide two additional bars indicating readings above or below the scale range.
Done		Save all settings and return to the higher-level menu.

Changing any bar processing parameter, or switching between automatic and manual binning modes, automatically clears the readings to form a histogram of new data.

Cursors

The cursor in the histogram is designated as the number of bars and displays the range of values, counts, and percent of total covered by those bars. It also displays the total counts, percent total, and the range of measurements covered between the cursor bars.



A. Bar specified by Cursor 1.

B. Bar specified by Cursor 2.

C. Reading information for the bar specified by Cursor 1 and Cursor 2. The information corresponding to cursor 1 is displayed in the green box where B1 is located, and the information corresponding to cursor 2 is displayed in the violet box where B2 is located.

   Using B1 as an example:

   - 1.00208 to 1.00208 -- Measurement range for this bar (VDC measurements currently being made).
   - #2 -- The bar number specified by cursor 1.
   - 5.19481% -- Number of samples in this bar as a percentage of the total number of samples.

D. Span: Range of measurements from B1 to B2.

E. #12: Number of bars from B1 to B2.

   93.51%: number of samples from B1 to B2 as a percentage of the total number of samples.

Table 7-39 Cursors setting menu description

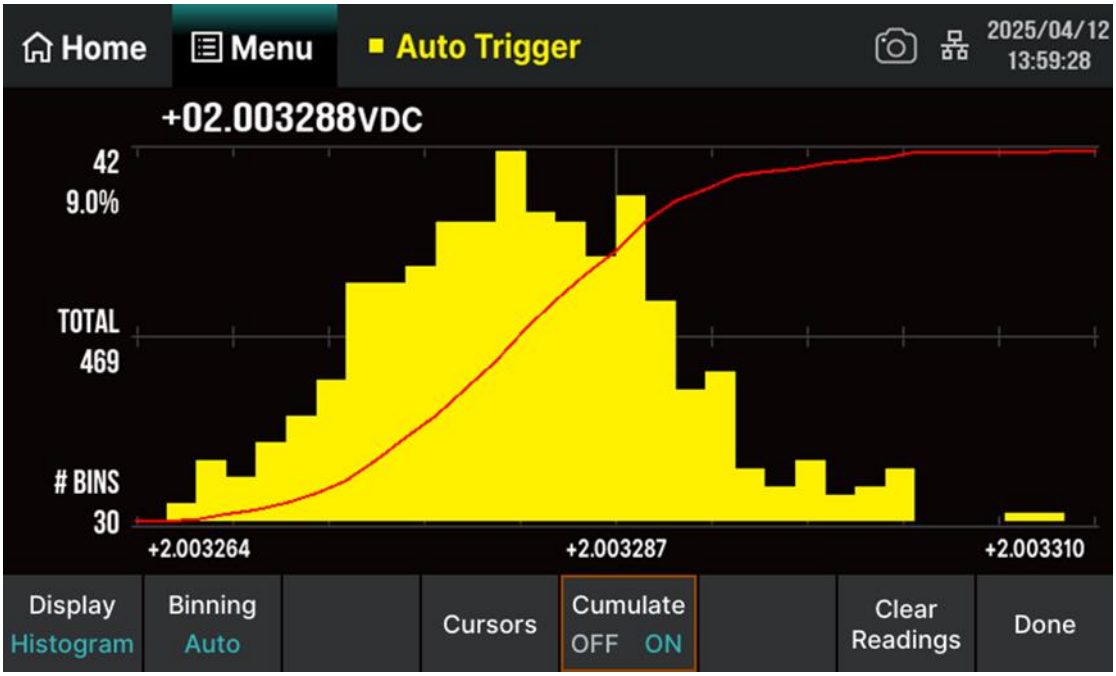
Function Menu	Setting	Description
Cursors	Off/On	Turn on or off cursors display.
B1		Set the number of bar where the cursor B1 (shown in green) is located.
B2		Set the number of bar where the cursor B2 (shown in violet) is located.

Notes:

- The multimeter is labeled according to the current number of bins in the histogram, using increasing integers in order from left to right, with ordinal numbers ranging from 1 to the number of bins.
- If an external bar is displayed (when using manual bar processing), the zero cursor value indicates the outlier count below the histogram range, and the sum of 1 and the number of bins indicates the outlier count above the histogram range.

Cumulate

The cumulative curve is a line representing the cumulative distribution of the histogram data. When this function is turned on, the screen displays as shown below.



Notes:

- The accumulation curve represents all data only when the external bar is displayed; if the external bar is not displayed, this accumulation curve represents only the displayed bar data, not the external bar data.
- Regardless of the value set for the horizontal coordinate, the cumulative curve is always 0 to 100% in the vertical coordinate.
- When a clear reading operation is performed, the accumulation curve is also recounted.



Changing any bar processing parameter, or switching between automatic and manual binning modes, automatically clears the readings to form a cumulative curve of new data.

7.7.5 Probe Hold

After enabling the probe hold function, when the multimeter measures a series of stable readings, the buzzer emits a beep (the buzzer is turned on) and records the measured values on the front panel display. The display can hold up to 8 of the latest measured readings. These readings can be of different measurement types, and you can view or clear the displayed readings.

When probe hold function is turned on, the on-screen Probe Hold display cannot be merged with other display modes such as bar display, trend display, histograms, and math operations and dual display functions cannot be used.

Touch Menu > ProbeHold > ON to enable the function. As shown in the following figure.

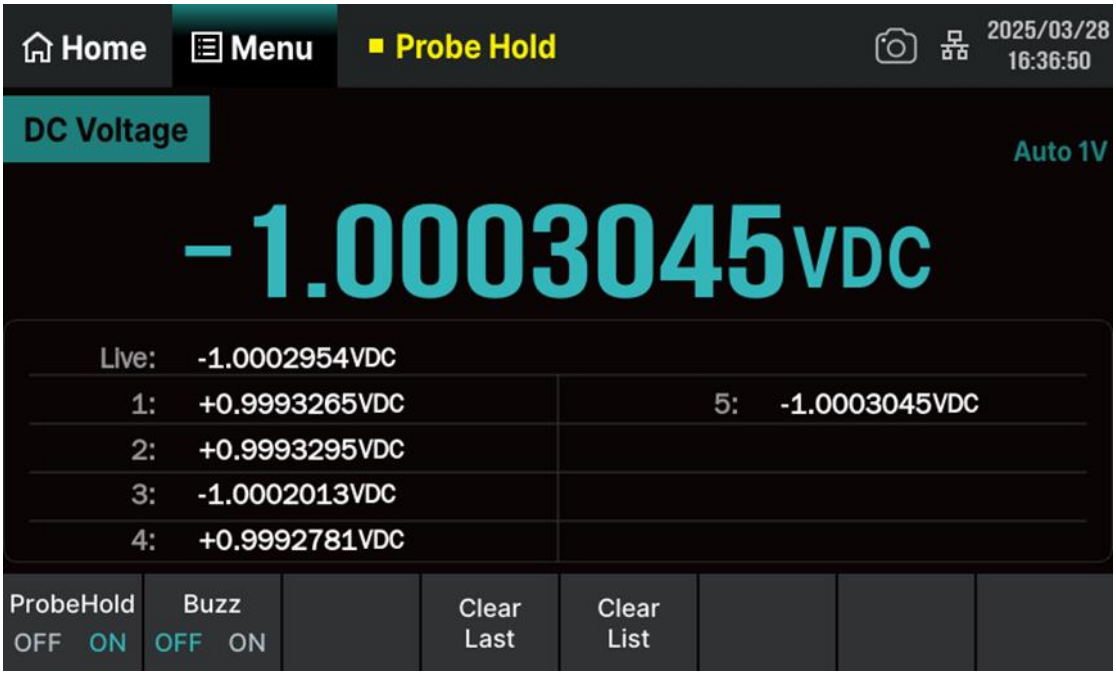


Figure 7-88 Probe hold function interface

Table 7-40 Probe Hold function menu description

Function Menu	Setting	Description
ProbeHold	OFF/ON	Turn on or off the Probe Hold function.
Buzz	OFF/ON	Turn on or off the buzzer.
Clear Last		Clear the latest stored data in the list.
Clear List		Clear all measured historical data in the list.
Done		Save all settings and return to the higher-level menu.

7.8 Help System

SDM4000A is equipped with a built-in help system. You can get help for every button on the front panel or menu by using the built-in help system, or you can get help about familiar operations in the help system interface.

Touch Menu > Help to enter help system interface as shown in the following figure.

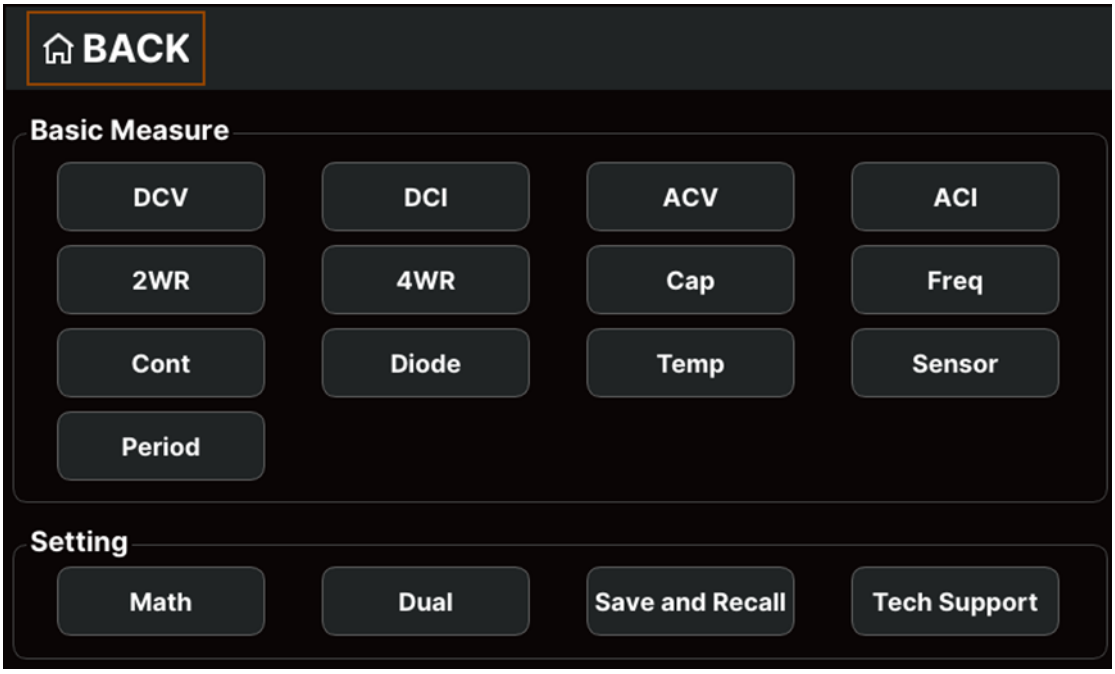


Figure 7-89 Help system interface

Basic Measure: Get basic measurement types and methods to connect the leads in different measurements.

Math Function: Introduce how to use the math function while you are measuring.

Dual-display Function: The operation steps to use the dual-display function.

Save and Recall: Introduce how to store and recall the data/parameter/ sensors files.

Teach support: The way to obtain technical support.

In the help system interface, touch the corresponding menu button to view the help information.

8 Remote Control

SDM4000A can be remotely controlled through the following two methods:

- **User defined programming**

Users can program and control instruments through the Standard commands for Programmable Instruments (SCPI) command. For detailed instructions on commands and programming, please refer to the programming manual of this product.

- **Using PC software**

Users can use NI (National Instruments Corporation)'s "Measurement & Automation Explorer" software to control the instruments.

SDM4000A supports communication with PC via USB, LAN and GPIB interfaces:

- USB Device interface: supports USB-TMC protocol. It can communicate with PC to control the multimeter through the upper computer software.
- LAN interface: supports VXI-11 protocol. The multimeter can be connected to the LAN through this interface for remote control.
- GPIG (optional).



Press any button on the front panel or touch the screen in remote mode, and you can choose to switch the multimeter into local mode in the pop-up prompt box.

8.1 Remote Control via USB

SDM4000A supports communication with computers using the USBTMC protocol. You need to complete the following steps to establish a connection.

1. Connect the instrument

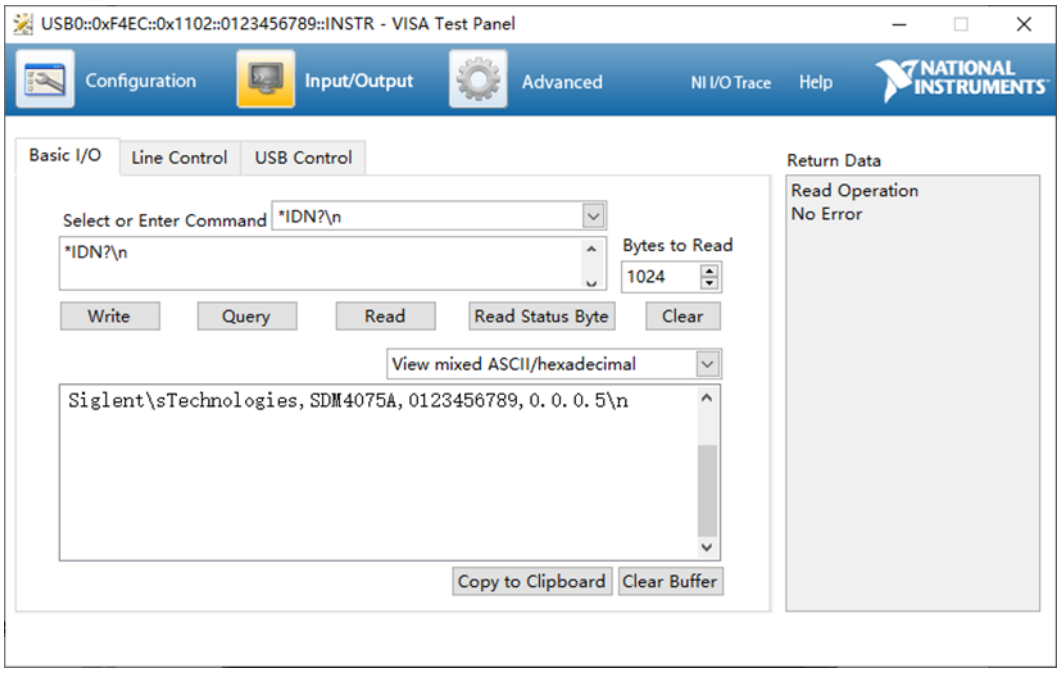
Connect SDM4000A (via the USB Device interface on the instrument's rear panel) to the computer using a USB data cable.

2. Install USBTMC driver on the computer

Recommend using NI Visa.

3. Remote communication with computers

Open the "Measurement & Automation Explorer" software, select the resource name corresponding to the instrument, and then select "Open VISA Test Panel" to open the remote command control panel, which you can send commands and read data through this panel.



8.2 Remote Control via LAN

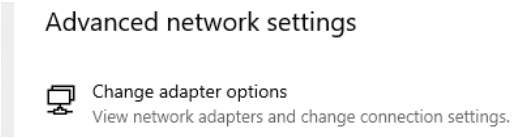
8.2.1 LAN Connection

LAN remote control can be realized by the following two connection methods.

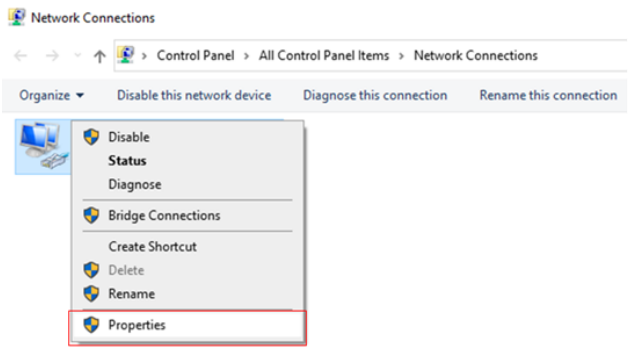
The first connection method: The computer is not connected to the network, and the multimeter and the PC computer are directly connected through a network cable (cross-over cable).

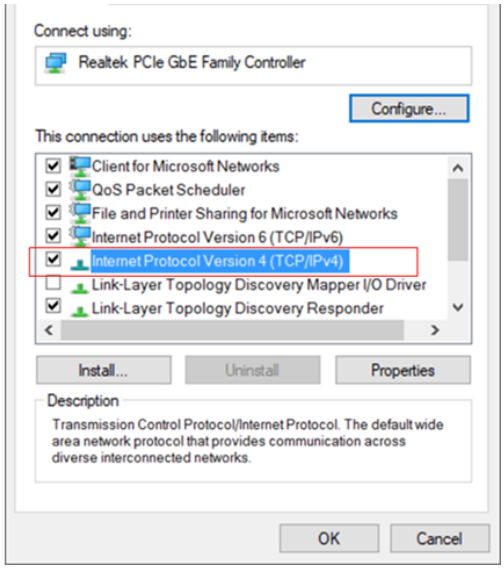
First, set up the computer. The following uses Windows 10 system as an example:

1. Select "Network and Internet" in Windows settings and click "Change adapter options" in "Advanced network settings".

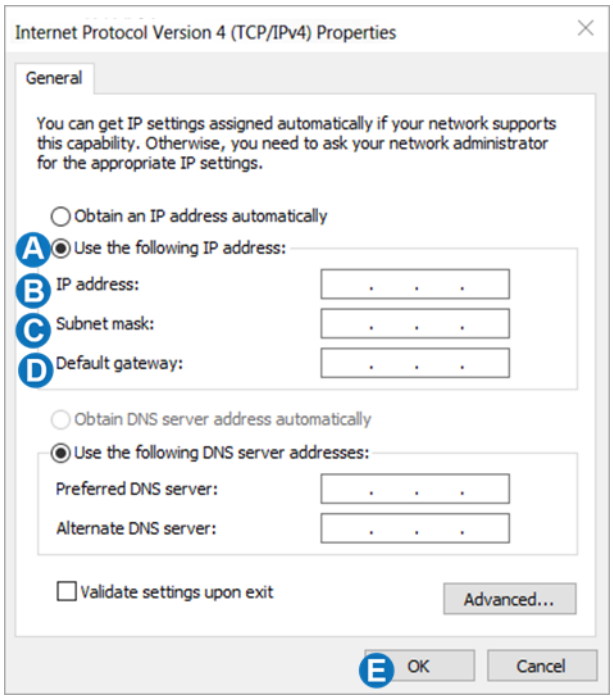


2. Right-click "Ethernet" and select "Properties", and double-click "Internet Protocol Version 4 (TCP/IPv4)" in the pop-up window.





3. Select "Use the following IP address:" to set the IP address, subnet mask and default gateway, and click "OK" after setting.



A. Select “Use the following IP address:”

B. Set an IP address different from SDM4000A

C. Set the same subnet mask as SDM4000A

D. Set the same gateway as SDM4000A

E. Click “OK” finish settings

4. The PC computer setting is completed.

Set the multimeter:

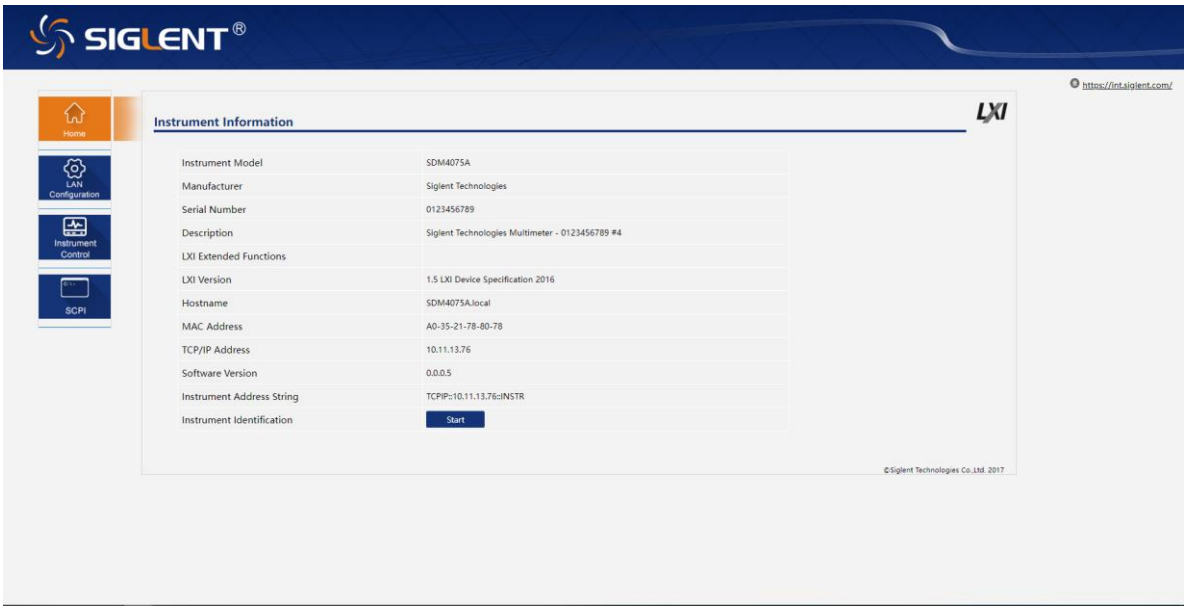
Touch I/O Config > LAN > ON to enable LAN setting, then touch LAN Setting to enter LAN setting interface and select “Specify an IP address”. Manually set multimeter to be the same as the PC computer subnet mask and default gateway, and set a different IP address. At this point, the PC and multimeter settings are completed, you can open a web page and enter the IP address for remote control.

The second connection method: multimeter and PC are connected to the same network. In the LAN setting interface, select “Automatic IP address (DHCP)”, and then touch Apply , the multimeter can automatically obtain IP. You can open a web page and enter the IP address for remote control.

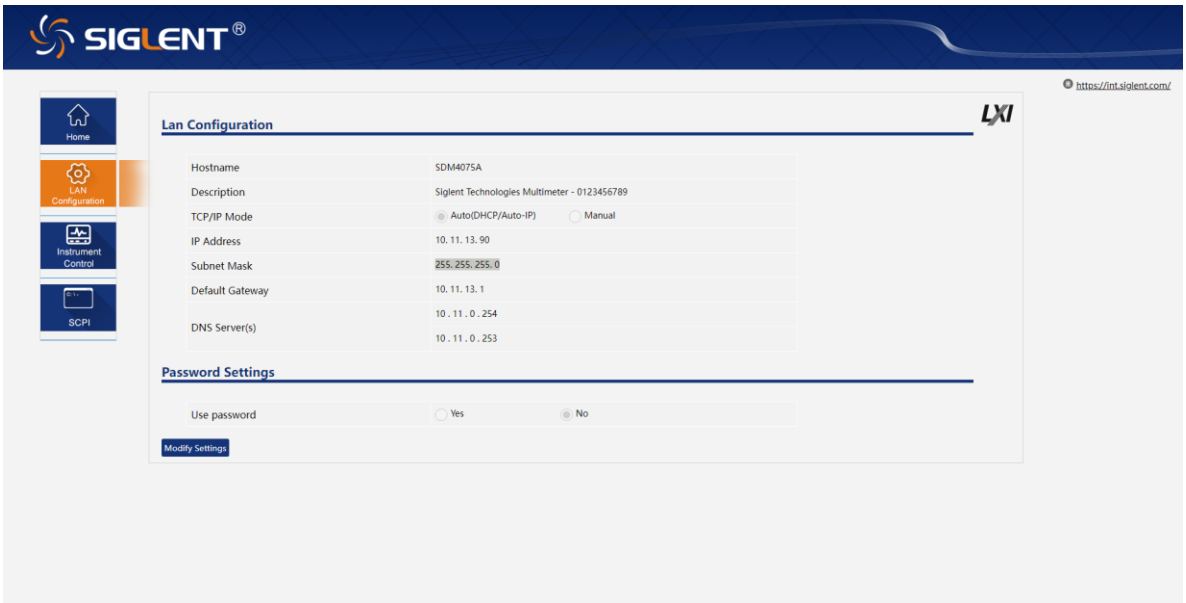
8.2.2 Web Control

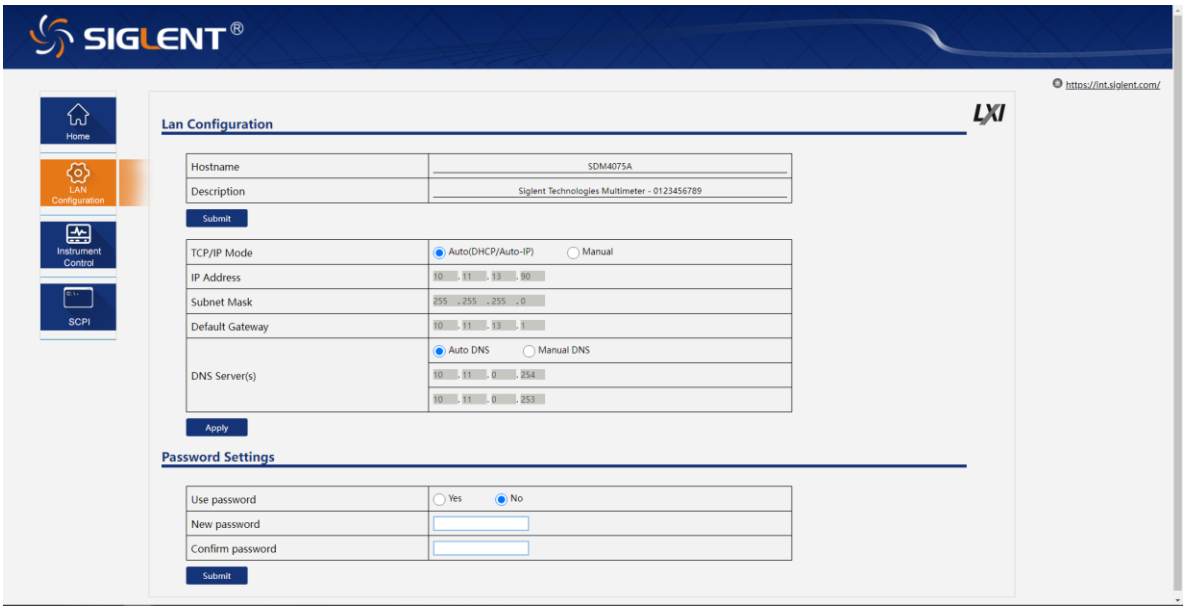
SDM4000A includes a built-in web interface for monitoring and controlling the instrument via a web browser. After obtaining the IP address of the multimeter by any of the methods described in “8.2.1 LAN Connection”, open Google Chrome on your PC and enter the IP address directly into the input field to access the Web remote control interface.

1. Click "Home" in the left column to view instrument information, including instrument model, manufacturer, serial number, instrument description, LXI version, hostname, MAC address, TCP/IP address, software version and instrument address string.

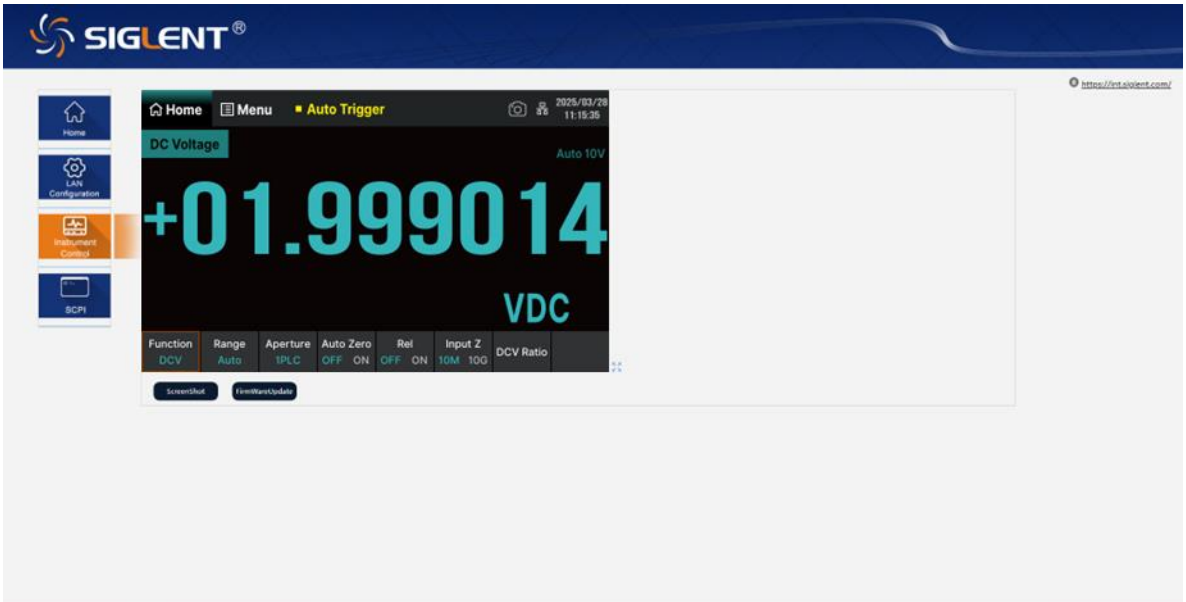


2. Click “LAN Configuration” in the left column to switch to the LAN configuration interface, click “Modify Settings” to configure the LAN and set the password, and then click “Apply”/“Submit” to apply the settings.





3. Click "Instrument Control" on the left column to synchronize the screen interface of the multimeter, which can be directly controlled and operated by computer mouse click. There are ScreenShot and FirmWareUpdate functions at the bottom of the screen, you can take a screenshot of the current interface of the multimeter or save the current screenshot to the specified storage path on your computer, or remotely upgrade the multimeter on your computer.



Web Remote Upgrade Steps:

1) Download the correct upgrade file (.ads) from the official website and save it to your computer.

2) Click the "FirmWaveUpdate" button at the bottom of "Instrument Control" interface, select the upgrade file saved in step 1), and then click "Open". The multimeter will

automatically download the file to the local computer and execute the upgrade.

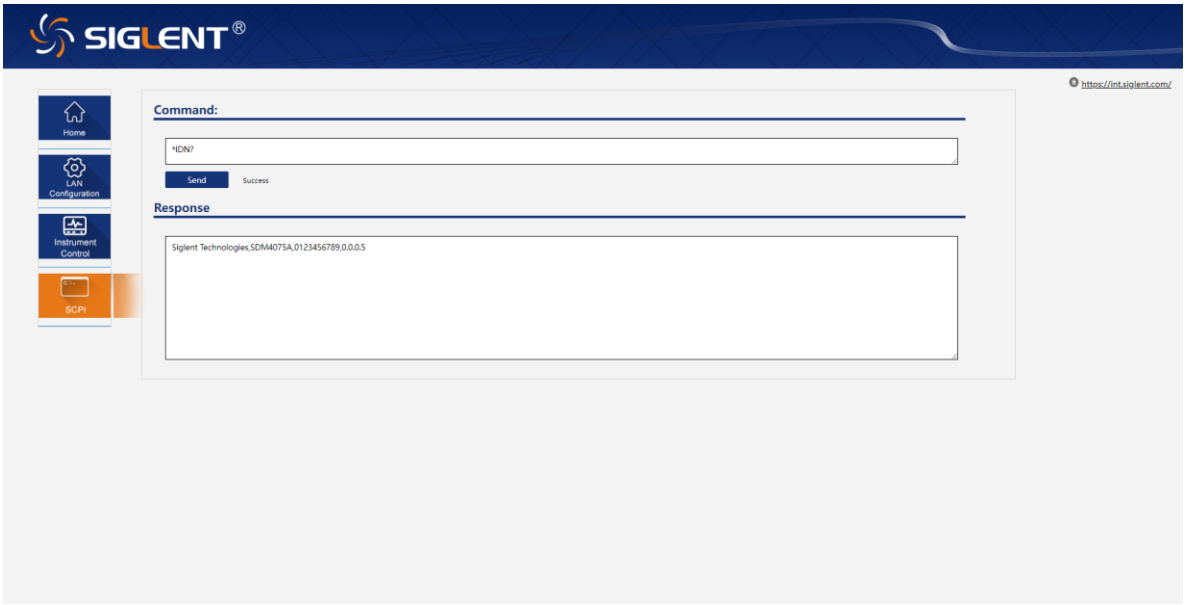
3) After the upgrade is completed, the screen prompts "Firmware Update Done!" and the multimeter will restart automatically.

4) After the multimeter restarts, check the upgrade version information.

You can click "Home" on the left to view the upgraded version information.

Don't cut off the power during the instrument is updating.

4. Click "SCPI" in the left column to enter the SCPI command control interface, and you can send SCPI commands.



8.3 Remote Control via GPIB

SDM4000A can be equipped with optional GPIB interface. The setting range is 1~30, and the selected address is saved in the non-volatile memory. Refer to the following procedure to set up remote control of the multimeter via GPIB.

1. Connect the instrument

Connect the multimeter to your computer using the USB-GPIB module (optional) and ensure that your computer has a GPIB card installed. Connect the USB end of the USB-GPIB module to the USB Host interface on the multimeter front panel, and connect the GPIB end of the USB-GPIB module to the GPIB card port on the computer.

2. Install GPIB card drivers on the computer

Please correctly install the GPIB card driver connected to the computer.

3. Set the GPIB address of the instrument

After entering the I/O configuration operation menu, select GPIB setting, and you can use the pop-up virtual keyboard to enter the desired values, as shown in the following figure. After entering, press Enter to save the current settings.

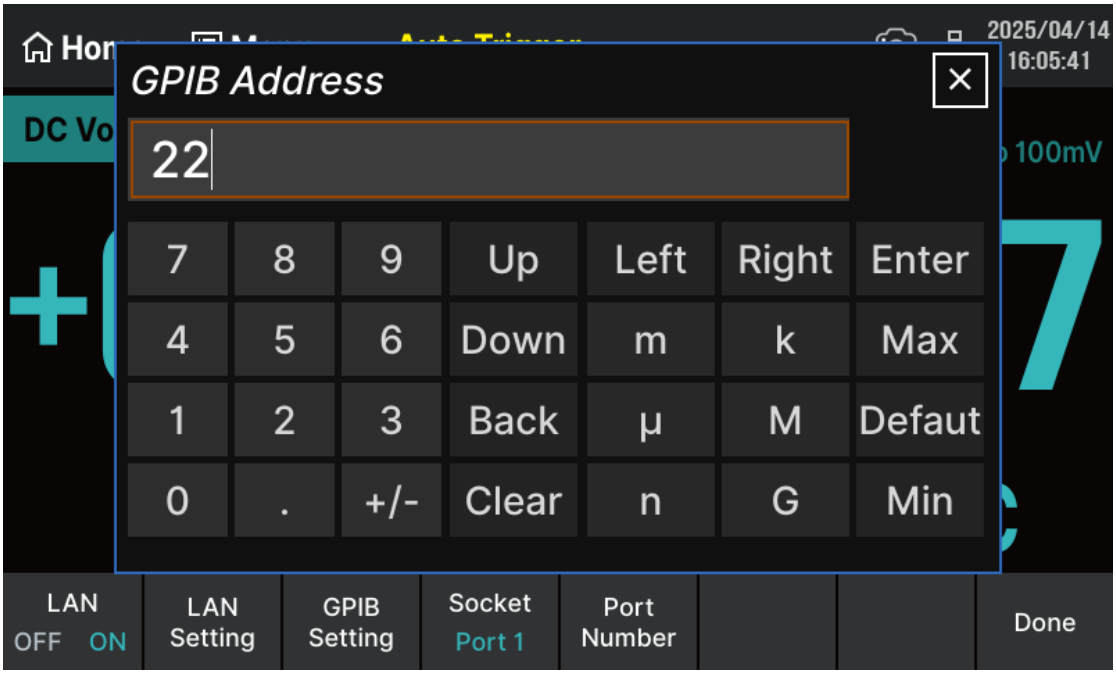


Figure 8-1 GPIB setting interface

4. Remote communication with computers

Open the "Measurement & Automation Explorer" software, and after successfully adding a GPIB device, open the Remote Command Control Panel, through which you can send commands and read data.

9 Measurement Tutorial

9.1 Loading Errors (DC Voltage)

When the resistance of the Device Under Test (DUT) accounts for a significant proportion of the input resistance of the multimeter itself, measurement load errors will occur. The following figure shows the load error source.

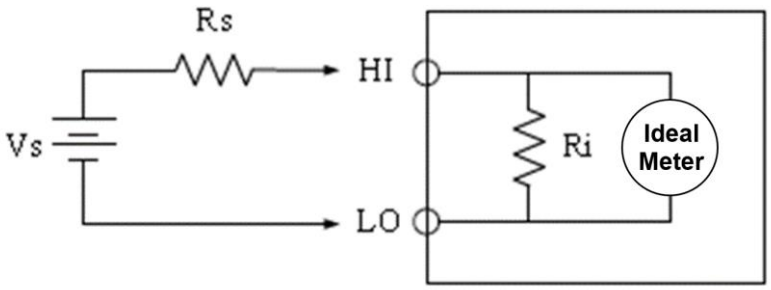


Figure 9-1 Schematic diagram of load error source (DC voltage)

Vs = ideal DUT voltage

Rs = DUT source resistance

Ri = input resistance of the multimeter (10 MΩ or 10 GΩ)

Error (%) = (100×Rs) / (Rs + Ri)

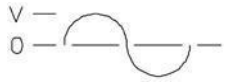
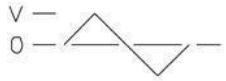
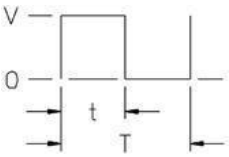
To reduce the effect of load error and noise interference, the input resistance can be set to "10 GΩ". For more details, please refer to “7.1.5 DC Impedance”.

9.2 True RMS AC Measurement

The AC measurement of multimeter has a true RMS response. The average thermal power of a resistor over a period of time is directly proportional to the square of the true RMS of the voltage applied to the resistor during this period, regardless of the waveform. When the energy contained in the voltage or current waveform outside the effective bandwidth of the multimeter can be ignored, multimeter can accurately measure the true RMS voltage or current.

The AC voltage and AC current functions measure the "AC coupled" true RMS value, which is to measure the RMS value of the AC component (DC component is rejected) of the input signal. For sine waves, triangle waves, and square waves, the AC and AC+DC values are equal since these waveforms do not contain a DC offset. See the following Table 9-1.

Table 9-1 True RMS AC measurement of sine, triangle and square waves

Waveform	Crest Factor (C.F.)	AC RMS	AC+DC RMS
	$\sqrt{2}$	$\frac{V}{\sqrt{2}}$	$\frac{V}{\sqrt{2}}$
	$\sqrt{3}$	$\frac{V}{\sqrt{3}}$	$\frac{V}{\sqrt{3}}$
	$\sqrt{\frac{T}{t}}$	$\frac{V}{C.F.}\times\sqrt{1-\left(\frac{1}{C.F.}\right)^2}$	$\frac{V}{C.F.}$

Non-symmetrical waveforms, such as pulse trains, contain DC voltages which are rejected by AC coupled true RMS measurements.

An AC coupled true RMS measurement is desirable in situations where you are measuring small AC signals in the presence of DC offsets. For instance, measuring AC ripple present on DC power supplies. There are situations, however, where you might want to know the AC+DC true RMS value. You can determine this value by combining results from DC and AC measurements as the following shows.

$$RMS_{(AC+DC)} = \sqrt{AC^2 + DC^2}$$

9.3 Crest Factor Errors (Non-sinusoidal Input)

A common misconception is that "since a Multimeter can measure the true RMS of signal, its sine wave accuracy specifications apply to all waveforms.". Actually, the shape of the input signal can dramatically affect measurement accuracy. A common way to describe signal wave shapes is “crest factor”. Crest factor is the ratio of the peak value to RMS value of a waveform.

Generally speaking, the greater the crest factor, the greater the energy contained in high frequency harmonics. All Multimeters have errors that are crest factor dependent.

You can estimate the measurement error due to signal crest factor as shown below:

Total Error = Error (Sine wave) + Error (Crest factor) + Error (Bandwidth)

Error (Sine wave): error for sine wave

Error (Crest factor): crest factor additional error

Error (Bandwidth): estimated bandwidth error as shown below:

$$\text{Bandwidth Error} = \frac{-C.F.\times F}{4\pi \times BW} \times 100\%$$

C.F.: signal crest factor

F: fundamental frequency of pulse

BW: effective bandwidth of the Multimeter

Example:

Calculate the approximate measurement error for a pulse train input with a crest factor of 2 and a fundamental frequency of 20 kHz. For this example, assume 1-year accuracy specifications of the Multimeter: ± (0.05%× reading + 0.03%×range).

Total Error = (0.05%× reading+0.03%× range) + (0.05%× range) + (0.8%× reading)

= 0.85%× reading + 0.08%× range

9.4 Loading Errors (AC Voltage)

In the AC Voltage function, the input of the multimeter appears as a 1 MΩ resistance in parallel with 100 pF of capacitance. The test lead that you use to connect signals to the multimeter will also add additional capacitance and loading. The approximate input resistances of the Multimeter at different frequencies are listed in the following table.

Table 9-2 Approximate input resistances at different frequencies

Input Frequency	Input Resistance
100 Hz	1 MΩ
1 kHz	850 kΩ
10 kHz	160 kΩ
100 kHz	16 kΩ

For low frequencies:

$$\text{Error}\ (\%) = \frac{-R_S}{R_S + 1M\Omega} \times 100\%$$

For high frequencies:

$$\text{Error}\ (\%) = \left[\frac{1}{\sqrt{1+(2\pi \times F \times R_s \times C_m)}} - 1\right] \times 100\%$$

F: input frequency

R_s: source resistance

C_m: input capacitance (100pF) plus test lead capacitance

10 Troubleshooting

The commonly encountered failures and their solutions are listed below. When you encounter those problems, please solve them following the corresponding steps. If the problem remains still, please contact **SIGLENT** and provide your device information.

1. **If the screen is still dark with nothing displayed after pressing the power key.**
   1) Check whether the power cord is well connected.
   2) Check if the power switch on the front panel is pressed firmly.
   3) Check whether the power fuse is burned out. If the fuse needs to be changed, please use the specified fuse.
   4) Restart the instrument after finishing the above inspections.
   5) If the instrument still can't start up properly, please contact **SIGLENT**.

2. **The reading doesn't change when a current signal is input.**
   1) Check whether the test lead is correctly inserted into the HI and LO terminals of current measurement.
   2) Check whether the DCI or ACI measurement function is enabled.
   3) Check whether the DCI measurement function is used to measure AC current.

3. **The USB storage device cannot be identified.**
   1) Check whether the USB storage device is in good condition.
   2) Make sure the USB storage device you used is a flash storage device. This instrument does not support hardware storage type.
   3) Restart the instrument and then insert the USB storage device.
   4) If the problem persists, please contact **SIGLENT**.

11 Ordering Information

Standard Configuration	Quantity
Power cord	1
Test lead	2
Alligator clip	2
USB cable	1
Quick start	1
Warranty card	1
Upper computer software	Free download from official website

Optional Configuration	Applicable Model
USB-GPIB adapter	USB-GPIB
30 A splitter	SCD30A

We suggest that the length of USB data wire and LAN cable connected to the instrument should be less than 3m to avoid affecting the product performance.
All the accessories are available by contacting your local **SIGLENT** office.

About SIGLENT

SIGLENT is an international high-tech company, concentrating on R&D, sales, production and services of electronic test & measurement instruments.

SIGLENT first began developing digital oscilloscopes independently in 2002. After more than a decade of continuous development, SIGLENT has extended its product line to include digital oscilloscopes, isolated handheld oscilloscopes, spectrum analyzers, function/arbitrary waveform generators, RF/MW signal generators, vector network analyzers, digital multimeters, DC power supplies, electronic loads and other general purpose test instrumentation. Since its first oscilloscope was launched in 2005, SIGLENT has become the fastest growing manufacturer of digital oscilloscopes. We firmly believe that today SIGLENT is the best value in electronic test & measurement.

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