DM858 Series

Digital Multimeter

User Guide

Oct. 2023

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Contact Us

If you have any problem or requirement when using our products or this manual, please contact RIGOL.

E-mail: service@rigol.com

Website: *http://www.rigol.com*

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1 Safety Requirement

1.1 General Safety Summary

Please review the following safety precautions carefully before putting the instrument into operation so as to avoid any personal injury or damage to the instrument and any product connected to it. To prevent potential hazards, please follow the instructions specified in this manual to use the instrument properly.

- **Use Proper Power Cord.**

  Only the exclusive power cord designed for the instrument and authorized for use within the local country could be used.

- **Ground the Instrument.**

  The instrument is grounded through the Protective Earth lead of the power cord. To avoid electric shock, it is essential to connect the earth terminal of the power cord to the Protective Earth terminal before connecting any inputs or outputs.

- **Observe All Terminal Ratings.**

  To avoid fire or shock hazard, observe all ratings and markers on the instrument and check your manual for more information about ratings before connecting the instrument.

- **Use Proper Overvoltage Protection.**

  Ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the operator might be exposed to the danger of an electric shock.

- **Do Not Operate Without Covers.**

  Do not operate the instrument with covers or panels removed.

- **Do Not Insert Objects Into the Air Outlet.**

  Do not insert anything into the holes of the fan to avoid damaging the instrument.

- **Use Proper Fuse.**

  Please use the specified fuses.

- **Avoid Circuit or Wire Exposure.**

  Do not touch exposed junctions and components when the unit is powered on.

- **Do Not Operate With Suspected Failures.**

  If you suspect damage occurs to the instrument, have it inspected by RIGOL authorized personnel before further operations. Any maintenance, adjustment or

replacement especially to circuits or accessories must be performed by RIGOL authorized personnel.

- **Provide Adequate Ventilation.**

  Inadequate ventilation may cause an increase of temperature in the instrument, which would cause damage to the instrument. So please keep the instrument well ventilated and inspect the air outlet and the fan regularly.

- **Do Not Operate in Wet Conditions.**

  To avoid short circuit inside the instrument or electric shock, never operate the instrument in a humid environment.

- **Do Not Operate in an Explosive Atmosphere.**

  To avoid personal injuries or damage to the instrument, never operate the instrument in an explosive atmosphere.

- **Keep instrument surfaces clean and dry.**

  To avoid dust or moisture from affecting the performance of the instrument, keep the surfaces of the instrument clean and dry.

- **Prevent Electrostatic Impact.**

  Operate the instrument in an electrostatic discharge protective environment to avoid damage induced by static discharges. Always ground both the internal and external conductors of cables to release static before making connections.

- **Handle with Caution.**

  Please handle with care during transportation to avoid damage to keys, knobs, interfaces, and other parts on the panels.

WARNING

Equipment meeting Class A requirements may not offer adequate protection to broadcast services within residential environment.

1.2 Safety Notices and Symbols

Safety Notices in this Manual:

WARNING

Indicates a potentially hazardous situation or practice which, if not avoided, will result in serious injury or death.

CAUTION

Indicates a potentially hazardous situation or practice which, if not avoided, could result in damage to the product or loss of important data.

Safety Notices on the Product:

- **DANGER**

  It calls attention to an operation, if not correctly performed, could result in injury or hazard immediately.

- **WARNING**

  It calls attention to an operation, if not correctly performed, could result in potential injury or hazard.

- **CAUTION**

  It calls attention to an operation, if not correctly performed, could result in damage to the product or other devices connected to the product.

Safety Symbols on the Product:

| Hazardous Voltage | Safety Warning | Protective Earth Terminal | Chassis Ground | Test Ground |
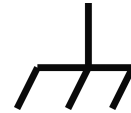
1.3   Input Terminal Protection Limits

Protection Limits are defined for the input terminals:

Main Input (HI and LO) Terminals

The HI and LO input terminals are used for voltage, resistance, capacitance, continuity, frequency (period), and diode test measurements. The following two Protection Limits are defined for these terminals:

1. HI to LO Protection Limit: 1000 VDC or 750 VAC, which is also the maximum voltage measurement. This limit can also be expressed as 1000 Vpk maximum.

2. LO to Ground Protection Limit. The LO input terminal can safely "float" a maximum of 500 Vpk relative to the ground.

The protection limit for HI terminal is a maximum of 1000 Vpk relative to the ground. Therefore, the sum of the "float" voltage and the measured voltage cannot exceed 1000 Vpk.

Sense (HI Sense and LO Sense) Terminal

HI Sense and LO Sense terminals are used only for four-wire resistance measurements. The following two Protection Limits are defined for these terminals:

1. HI Sense to LO Sense Protection Limit. HI Sense to LO Sense Protection Limit: 200 Vpk.

2. LO Sense to LO Protection Limit. LO Sense to LO Protection Limit: 2 Vpk.

Current Input (I) Terminal

The I and LO terminals are used for current measurements. The I terminal has a protection limit of 10 A(DM858)/3.15 A(DM858E) maximum current flowing through the terminal by the front-panel current input fuse.

CAUTION

The current input terminal will be at approximately the same voltage as the LO terminal unless the current input fuse is blown. To maintain protection, replace this fuse only with a fuse of the specified type and rating.

1.4 IEC Measurement Category II

To protect against the danger of electric shock, DM858/DM858E Digital Multimeter provides overvoltage protection for line-voltage mains connections meeting both of the following conditions:

1. The HI and LO input terminals are connected to the mains under Measurement Category II conditions, defined below.

2. The mains are limited to a maximum line voltage of 300 VAC.

WARNING

IEC Measurement Category II includes electrical devices connected to mains at an outlet on a branch circuit. Such devices include most small appliances, test equipment, and other devices that plug into a branch outlet or socket. DM858/DM858E may be used to make measurements with the HI and LO inputs connected to mains in such devices (up to 300 VAC), or to the branch outlet itself. However, DM858/DM858E may not be used with its HI and LO inputs connected to mains in permanently installed electrical devices such as the main circuit-breaker panel, sub-panel disconnect boxes, or permanently wired motors. Such devices and circuits are subject to overvoltages that may exceed the protection limits of the DM858/DM858E.

CAUTION

Voltages above 300 VAC may be measured only in circuits that are isolated from mains. However, transient overvoltages are also present on circuits that are isolated from mains. DM858/DM858E is designed to safely withstand occasional transient overvoltage up to 2500 Vpk. Do not use this equipment to measure circuits where transient overvoltage could exceed this level.

1.5 Ventilation Requirement

This instrument uses a fan to force cooling. Please make sure that the air inlet and outlet areas are free from obstructions and have free air. When using the instrument

in a bench-top or rack setting, provide at least 10 cm clearance beside, above and behind the instrument for adequate ventilation.

CAUTION

Inadequate ventilation may cause an increase of temperature in the instrument, which would cause damage to the instrument. So please keep the instrument well ventilated and inspect the air outlet and the fan regularly.

1.6   Working Environment

Temperature

Operating: 0℃ to +50℃

Non-operating: -20℃ to +70℃

Humidity

≤80% RH, 40℃, without condensation

WARNING

To avoid short circuit inside the instrument or electric shock, never operate the instrument in a humid environment.

Altitude

Below 3 km

Protection Level Against Electric Shock

ESD ±8kV

Installation (Overvoltage) Category

This product is powered by mains conforming to installation (overvoltage) category II.

WARNING

Ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the operator might be exposed to the danger of an electric shock.

Installation (Overvoltage) Category Definitions

Installation (overvoltage) category I refers to signal level which is applicable to equipment measurement terminals connected to the source circuit. Among these terminals, precautions are done to limit the transient voltage to a low level.

Installation (overvoltage) category II refers to the local power distribution level which is applicable to equipment connected to the AC line (AC power).

Pollution Degree

Pollution Degree 2

Pollution Degree Definition

- **Pollution Degree 1:** No pollution or only dry, nonconductive pollution occurs. The pollution has no effect. For example, a clean room or air-conditioned office environment.

- **Pollution Degree 2:** Normally only nonconductive pollution occurs. Temporary conductivity caused by condensation is to be expected. For example, indoor environment.

- **Pollution Degree 3:** Conductive pollution or dry nonconductive pollution that becomes conductive due to condensation occurs. For example, sheltered outdoor environment.

- **Pollution Degree 4:** The pollution generates persistent conductivity caused by conductive dust, rain, or snow. For example, outdoor areas.

Safety Class

Class 2

1.7 Care and Cleaning

Care

Do not store or leave the instrument where it may be exposed to direct sunlight for long periods of time.

Cleaning

Clean the instrument regularly according to its operating conditions.

1. Disconnect the instrument from all power sources.
2. Clean the external surfaces of the instrument with a soft cloth dampened with mild detergent or water. Avoid having any water or other objects into the chassis via the heat dissipation hole. When cleaning the LCD, take care to avoid scarifying it.

CAUTION

To avoid damage to the instrument, do not expose it to caustic liquids.

WARNING

To avoid short-circuit resulting from moisture or personal injuries, ensure that the instrument is completely dry before connecting it to the power supply.

1.8 Environmental Considerations

The following symbol indicates that this product complies with the WEEE Directive 2002/96/EC.

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The equipment may contain substances that could be harmful to the environment or human health. To avoid the release of such substances into the environment and avoid harm to human health, we recommend you to recycle this product appropriately to ensure that most materials are reused or recycled properly. Please contact your local authorities for disposal or recycling information.

You can click on the following link *https://int.rigol.com/services/services/declaration* to download the latest version of the RoHS&WEEE certification file.

2   Product Features

Product Features

- Max. reading rate: 125 readings/s
- Up to 500,000 points logging memory to record and analyze more data
- 5½-digit reading resolution
- True-RMS AC Voltage and AC Current measuring
- Built-in 10 groups of data storage and 10 groups of setup storage
- Strong Math functions, supporting various application protocols
- 7'' color touch screen, displaying dual-measurement results concurrently
- Type-C interface for power charge; compact in size, freeing up your bench space
- Standard USB and LAN interfaces, supporting Web Control

DM858 series benchtop digital multimeter provides a highly cost-effective test tool for engineers. It features 5.5-digit resolution, max. 125 readings/s, data logging memory of 500,000 points, and 0.03% DCV accuracy (1 year). It provides 11 measurement functions for input signals, 5 Math operations, and 3 graphical display types, satisfying what most experiments and tests require of a multimeter. The 7'' touch screen allows a clear view on measurement results. Its provides USB and LAN interfaces (standard) as well as the Web Control function for you to control the instrument directly, bringing smoother interaction. It is equipped with a Type-C interface for power charge. In addition, it has a compact size and supports the attachment to a bracket, saving valuable bench space for engineers.

3   Document Overview

This manual gives you a quick overview of the front and rear panel, user interface as well as basic operation methods of DM858 series digital multimeter.

TIP

For the latest version of this manual, download it from RIGOL official website (*http://www.rigol.com*).

Publication Number

UGC11100-1110

Software Version

Software upgrade might change or add product features. Please acquire the latest version of the manual from RIGOL website or contact RIGOL to upgrade the software.

Format Conventions in this Manual

1. Key

The front panel key is denoted by the menu key icon. For example, indicates the "Trig" key.

2. Menu

The menu item is denoted by the format of "Menu Name (Bold) + Character Shading" in the manual. For example, **Measure** indicates the "Measure" menu item. You can click or tap **Measure** to access the "Measure" menu.

3. Operation Procedures

The next step of the operation is denoted by "**>**" in the manual. For example,

> Storage indicates first clicking or tapping and then clicking or tapping **Storage**.

4. Connector

The front/rear panel connector is denoted by "Brackets + Connector Name (Bold)", for example, **[EXT TRIG]**.

Content Conventions in this Manual

DM858 series digital multimeter includes DM858 and DM858E models. The table below shows the main differences between the two models. Their operation methods are the same. Unless otherwise specified, this manual takes DM858 as an example to illustrate the basic operation methods of DM858 series.

Specifications for Different Models		
	DM858	DM858E
DCV Accuracy (1 year)	0.030%	0.060%
Max. Reading Rate	125 readings/s	80 readings/s
No. of Points in Data Logging Memory	500,000 data points	20,000 data points
Current Measurement Range	100 µA to 10 A	100 µA to 3 A
Capacitance Measurement Range	1 nF to 10 mF	1 nF to 1 mF

4 Quick Start

4.1 General Inspection

1. Inspect the packaging

If the packaging has been damaged, do not dispose the damaged packaging or cushioning materials until the shipment has been checked for completeness and has passed both electrical and mechanical tests.

The consigner or carrier shall be liable for the damage to the instrument resulting from shipment. RIGOL would not be responsible for free maintenance/rework or replacement of the instrument.

2. Inspect the instrument

In case of any mechanical damage, missing parts, or failure in passing the electrical and mechanical tests, contact your RIGOL sales representative.

3. Check the accessories

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

Recommended Calibration Interval

RIGOL suggests that the instrument should be calibrated every 12 months.

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4.2 Appearance and Dimensions
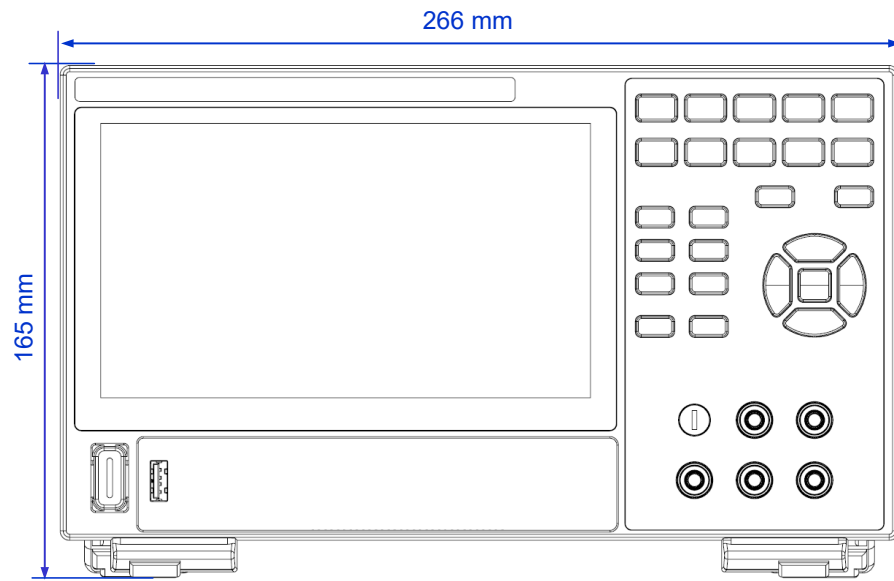
Figure 4.1 Front View
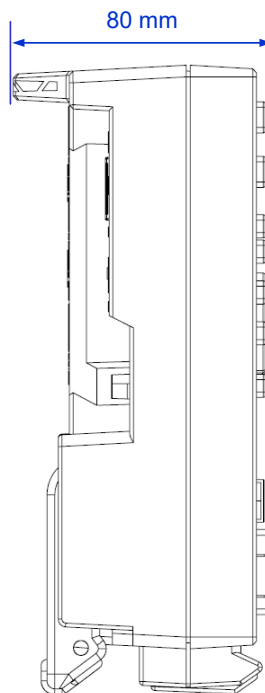
Figure 4.2 Side View

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4.3   To Prepare for Use

4.3.1   To Adjust the Supporting Legs

Adjust the supporting legs properly to use them as stands to tilt the multimeter upwards for stable placement of the multimeter as well as better operation and observation. You can also fold the supporting legs when the instrument is not in use for easier storage or shipment, as shown in the figure below.

(a) Unfold the supporting legs   (b) Fold the supporting legs
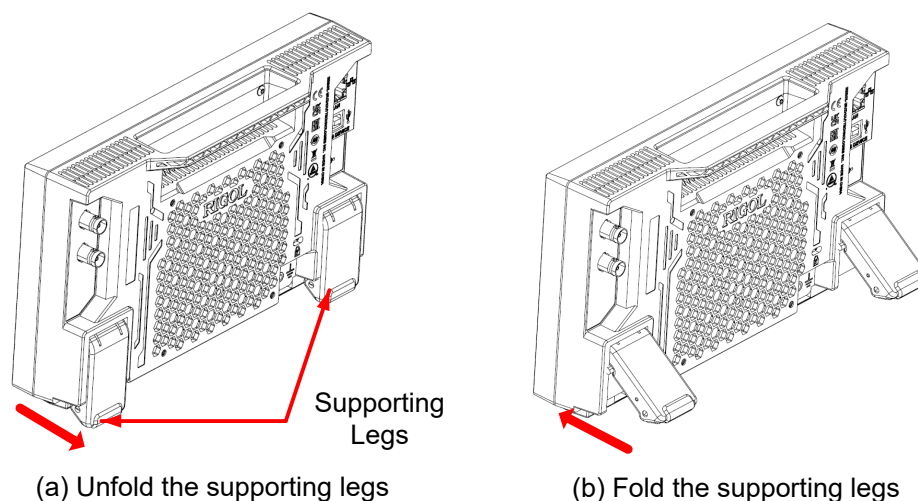
Supporting Legs

Figure 4.3 Adjusting the Supporting Legs

4.3.2   To Connect to Power

The power requirements of the multimeter are DC, 12 V, 3 A. Please use the power adaptor provided in the accessories to connect the multimeter to the AC power source (100 V to 240 V, 50 Hz to 60 Hz), as shown in the figure below.

Power Cord Connector
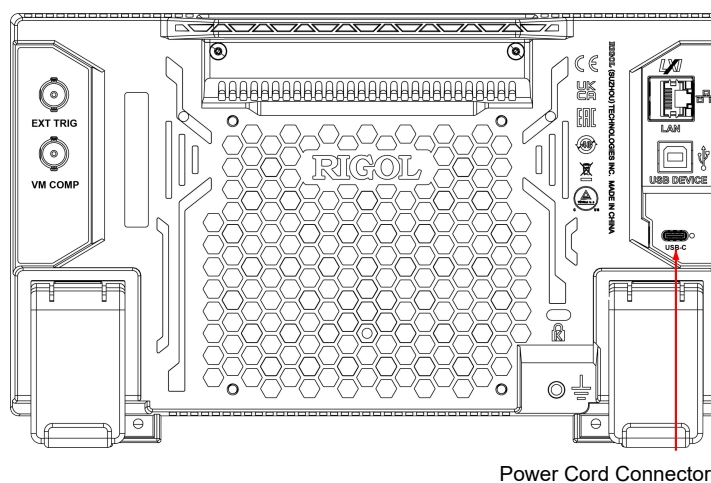
Figure 4.4 Connect to Power

Table 4.1 Power Adaptor Specifications

Model	Ratings
PA-1650-58LT (LITE-ON TECHNOLOGY, INC)	Input: AC, 100 V to 240 V, 50 Hz to 60 Hz, 1.6 A Output: 3 A@5 V/9 V/12 V/15 V, 3.25 A@20 V
ADP-65KE B (DELTA ELECTRONICS, INC)	Input: AC, 100 V to 240 V, 50 Hz to 60 Hz, 1.7 A Output: 3 A@5 V/9 V/12 V/15 V, 3.25 A@20 V

CAUTION

The power adaptor provided in accessories can only be used to power RIGOL instruments. Do not use it for mobile phone and other devices.

WARNING

To avoid electric shock, please ensure that the instrument is correctly grounded.

4.3.3   Turn-on Checkout

After the instrument is connected to the power source, press the power key ⏻ at the lower-left corner of the front panel to power on the instrument. During the start-up process, the instrument performs a series of self-tests. After the self-test, the splash screen is displayed.

- **Reboot:** Click or tap ⚙ > **Reboot**. Then a prompt message "Are you sure to reboot?" is displayed. Click or tap **OK** to restart the instrument.

- **Shutdown:**

  - Click or tap ⚙ > **Shutdown**. Then a prompt message "Are you sure to shutdown?" is displayed. Click or tap **OK** to shut down the instrument.

  - Press ⏻ and a prompt message "Are you sure to shutdown?" is displayed. Click or tap **OK** to shut down the instrument.

  - Press ⏻ twice to shut down the instrument.

  - Press ⏻ for three seconds to shut down the instrument.

TIP

You can also click or tap ⚙ > **System** > **Settings** and set the "Power Status" to "ON". The instrument powers on once connected to power.

4.3.4 To Set the System Language

This product supports multiple languages. You can click or tap ⚙ > **System** > **Settings** > **Language** to select the system language.

4.4 Product Overview

Unless otherwise specified, this chapter takes DM858 as an example to introduce the appearance and dimensions, front and rear panels, and user interface of DM858 and DM858E.

4.4.1 Front Panel Overview
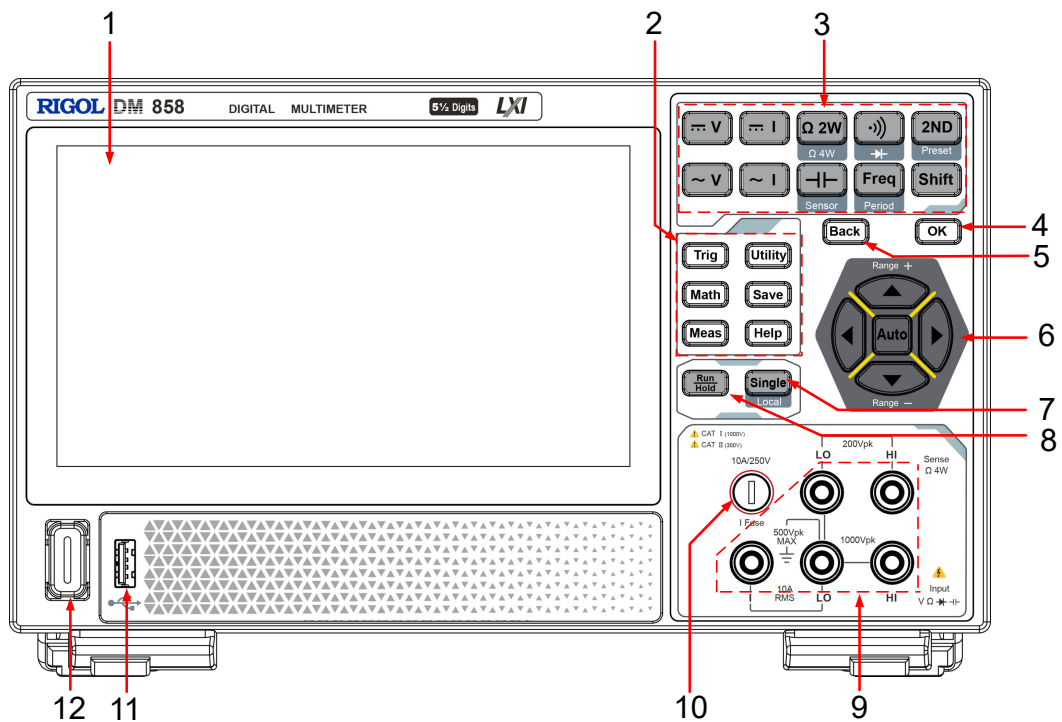
Figure 4.5 DM858 Front Panel

1. 7-inch Capacitive Touch Screen

Displays the menu and parameter settings of the currently enabled function, system state, prompt messages, and other information.

2. Auxiliary Function Keys

Trig : indicates the trigger setting key. Press this key to open the trigger setting menu. You can set the trigger mode (auto, single, and external), enable the reading hold function, set the number of samples per trigger, set the delay time prior to reading, the edge of the trigger input signal, and trigger output.

Utility : indicates the system utility function setting. Press this key to open the system utility setting menu. You can set the basic system settings and view the system information.

Math : indicates the math operation key. Press this key to open the math operation menu. You can perform the math operation (limit, statistics, dBm, and dB) on the measurement results.

Save : indicates the storage operation key. Press this key to open the storage setting key. You can save, load, upgrade the file; perform the disk management operation to copy, cut, or delete files.

Meas : indicates the measurement setting key. Press this key to open the measurement parameter setting menu. You can configure the parameters for the current measurement item.

Help : indicates the Help key. Press this key to enter the Help documentation. You can get its help information by clicking on the link for the introduction of the specified function.

3. Measurement Function Keys

⎓ V : Press this key to enable the DC voltage (DCV) measurement.

~ V : Press this key to enable the AC voltage (ACV) measurement.

⎓ I : Press this key to enable the DC current (DCI) measurement.

~ I : Press this key to enable the AC current (ACI) measurement.

Ω 2W : Press this key to enable the 2-wire resistance (Ω 2W) measurement. Press **Shift** > **Ω 2W** to enable the 4-wire resistance (Ω 4W) measurement.

⊣⊢ : Press this key to enable the capacitance measurement. Press **Shift** > **⊣⊢** to enable any sensor measurement.

·)) : Press this key to enable the continuity measurement. Press **Shift** > **·))** to enable the diode measurement.

`Freq` : Press this key to enable the frequency measurement. Press `Shift` > `Freq` to enable the period measurement.

`2ND` : Press this key and then press the specified secondary function to enable the secondary measurement function. Press `Shift` > `2ND` to preset the current instrument configuration, save it, and apply the configuration.

`Shift` Under some of the measurement function keys are printed with the specified alternative function names or labels. To enable the specified function displayed under the key, first press `Shift`, and then press the specified function key. For example, as shown on the front panel, 4-wire resistance measurement label is displayed under the 2-wire resistance measurement key. To enable the 4-wire impedance measurement, first press `Shift`, and then press `Ω 2W`.

4. Confirmation Key

`OK`: Press this key to confirm the current parameter settings.

5. Back Key

`Back`: Press this key to exit the current operation or close the current dialog box (if exists).

6. Range Selection and Arrow Keys

`Auto`: Press this key to enable the auto range.

: indicates the Up/Down arrow keys.

Press the Up/Down arrow keys to increase/decrease the range manually.

: indicates the Left/Right arrow keys.

In measuring DCV, DCI, ACV, ACI, Frequency or Period, you can use the Left/Right arrow keys to increase/decrease the measurement speed.

7. Single/Local Key

`Single`: Press Single to trigger one single acquisition and will not trigger again unless you press it once again. To make the instrument to switch to the local mode, press the Shift key first, and then press this key.

8. Auto Trigger/Reading Hold Key

Run
Hold : Press this key to switch between auto trigger and readings hold functions.

- Run: The key is always illuminated and remains the auto-trig state unchanged. In this state, the instrument continues acquiring data at the specified speed based on the current settings.

- Hold: The key is blinking constantly and the acquisition stops. The measurement data are displayed on the screen.

9. Signal Input Terminals

The signals (devices) under test are input to the instrument via these terminals. The measurement connection methods are different for different objects under test.

10. Current Input Fuse

The front-panel current input fuse allows a max. of 10 A(DM858)/3.15 A(DM858E) protection limit. Once the input current exceeds 13.5 A(DM858)/4.05 A(DM858E), the fuse blows out.

11. USB HOST Interface

Allows to connect the USB storage device (FAT32 or NTFS format) or the mouse.

- **USB storage device:** imports or exports data (e.g. software update, waveforms, setups, or screenshot files).

- **Mouse:** It can be connected to the instrument to realize remote control.

12. Power Key

Powers on or off the instrument.

4.4.2   Rear Panel Overview
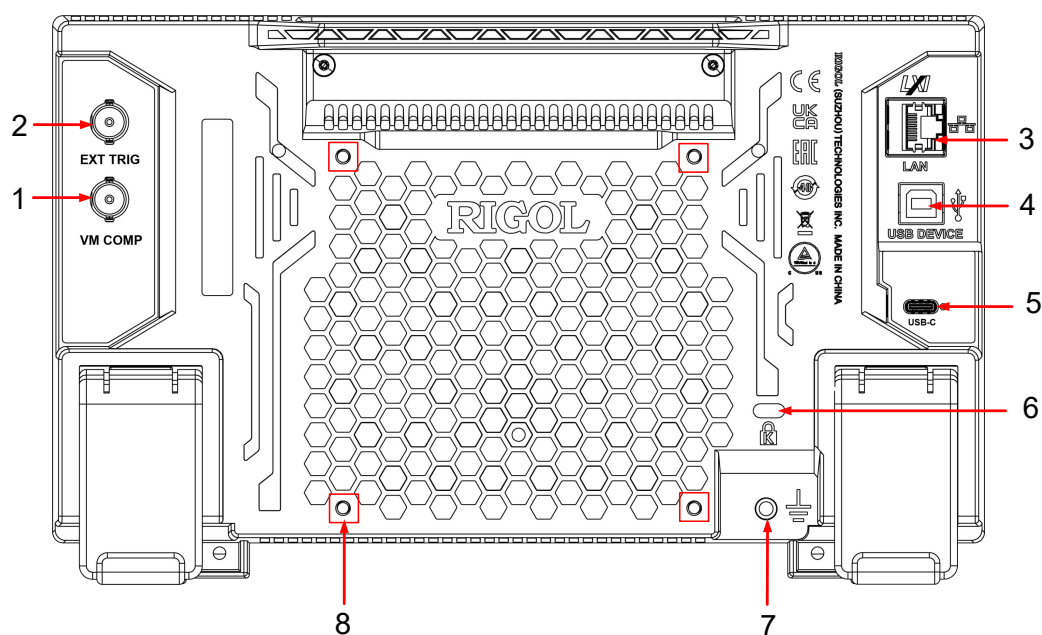
Figure 4.6 Rear Panel

1. VM COMP Output Interface

The multimeter outputs a pulse via **[VM Comp]** connector after each

measurement when VM output is enabled. To enable the VM output, press [Trig] on the front panel (you can also click or tap the **Trigger** label at the bottom of the screen to enter the trigger setting interface), then click or tap "ON" for the **Output** menu to enable the VMC output.

2. External Trigger Input Interface

Triggers the multimeter by connecting a pulse via the **[EXT TRIG]** connector after external trigger is selected. To enable the external trigger, click or tap to select **External**.

3. LAN Interface

Connects the instrument to network via this interface. The instrument is in compliance with the standards specified in *LXI Device Specification 2011*. It can be used to set up a test system with other standard devices. Then you can use the Web Control to send the SCPI commands to control the instrument.

4. USB DEVICE Interface

Connects the instrument to the PC via this interface. Then you can use the PC software to send the SCPI commands or use the user-defined programming to control the instrument.

5. USB Type-C Power Interface

The power requirements of the multimeter are DC, 12 V, 3 A. Please use the power adaptor provided in the accessories to connect the multimeter to the AC power source (100 V to 240 V, 50 Hz to 60 Hz).

6. Security Lock Hole

You can lock the instrument to a fixed location by using the security lock (please purchase it by yourself) via the lock hole.

7. Ground Terminal

Connects with the instrument chassis and ground lead (power cord ground terminal), which is in the grounded state.

8. Mounting Screw Holes (VESA 100 x 100)

Mounts the multimeter to the bracket with the screws.

4.4.3   User Interface Overview
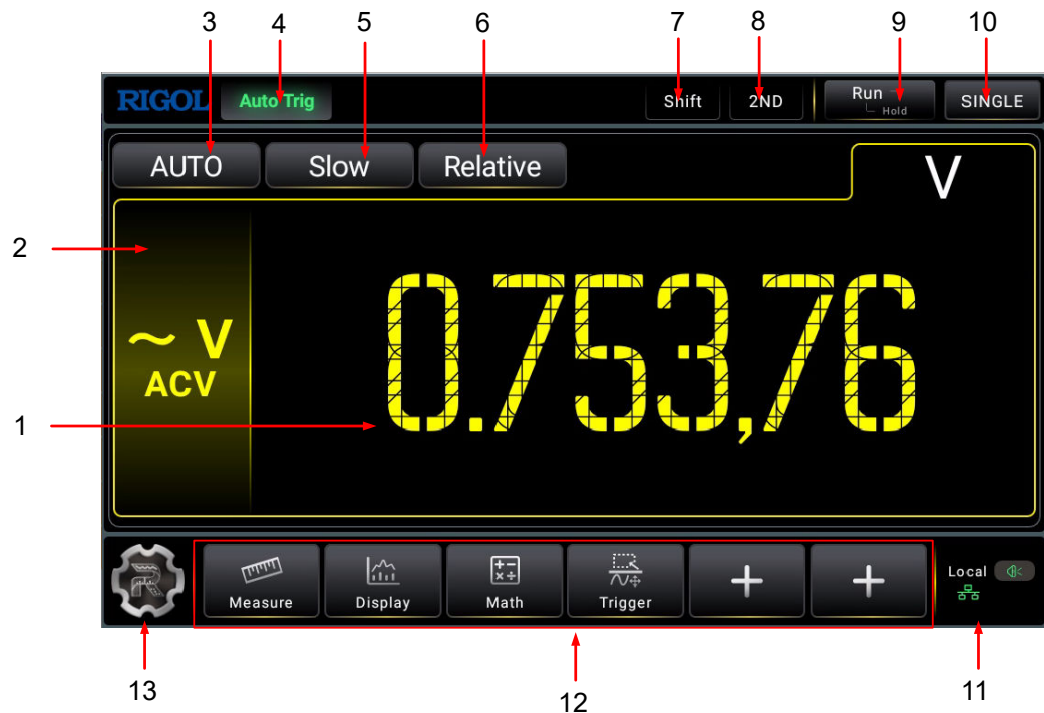
Figure 4.7 User Interface (Single Display)

Figure 4.8 User Interface (Dual Display)

1. Main Measurement Result Display

Displays the measurement result of the current main measurement item.

2. Main Measurement Item

Displays the main measurement item. Click or tap the label, the main measurement items are displayed. Click or tap to select the specified main measurement item to be displayed in the main display area.

3. Main Measurement Range Selection

Displays the measurement range for the specified main measurement item.

4. Operating Status

Displays the current operating status of the instrument. It can be Auto Trig, Single Trig, Ext Trig, Hold, or Stop.

5. Measurement Speed Selection

Displays the current measurement speed. Click or tap the label to select Slow, Medium, or Fast from the drop-down list.

6. "Relative" Tab

Click or tap the tab to enable or disable the relative operation.

7. "Shift" Tab

Press [Shift] on the front panel to enable the Shift key. The "Shift" tab is highlighted.

8. "2ND" Tab

When you press the 2ND key on the front panel, the "2ND" tab is highlighted.

9. "Run/Hold" Tab

Click or tap the "Run/Hold" tab to switch the status from Run to Hold. You can also press Run/Hold on the front panel to switch the status from Run to Hold.

10. "Single" Tab

Click or tap the "Single" tab to initiate one single trigger. You can also press Single on the front panel to initiate one single trigger.

11. Notification Area

Displays the USB storage device icon, LAN connection, sound icon, and remote control icon. Click or tap the area, the system setting menu is displayed.

- USB storage device icon: When a USB storage device is detected, ![USB icon] will be displayed.

- LAN connection icon: When the LAN interface is successfully connected, ![LAN icon] is displayed.

- Sound icon: In the "System" menu, click or tap **Settings** > **Beeper** to enable or disable the sound. When the sound is turned on, ![sound on icon] will be displayed; when off, ![sound off icon] will be displayed. Clicking or tapping the sound icon can also enable or disable the sound.

- Remote control icon: When you control the instrument remotely, ![Rmt icon] will be displayed.

- Time: When you enable to display the time information, the system time is displayed.

12. Shortcut Menus

Provides four fixed shortcut menus (**Measure**, **Display**, **Math**, and **Trigger**) and two customized menus. You can click or tap ![+ icon] to customize the shortcut menu that you want to add here.

13. Function Navigation Icon

Click or tap the icon to enter the function navigation menu. Click or tap the desired menu to enter the specified menu setting interface.

14. Main-Secondary Measurement Item Switchover Icon

When you enable the 2ND measurement, click or tap this icon to switch between the main measurement item and the secondary (2ND) measurement item.

15. Secondary (2ND) Measurement Range

Displays the measurement range of the 2ND measurement item when the 2ND measurement is enabled.

16. **Secondary (2ND) Measurement Result Display**

Displays the measurement result of the 2ND measurement item when the 2ND measurement is enabled.

17. **Secondary (2ND) Measurement Item**

Displays the secondary (2ND) measurement item. When you enable the 2ND measurement, click or tap the label, then the 2ND measurement menu is displayed.

4.5 Touch Screen Gestures

The instrument's capacitive touch screen makes operation and configuration easy and flexible. It features great convenience, high flexibility, and great sensitivity. The actions supported by the touch screen controls include dragging and tapping.

4.5.1 Drag

Use one finger to select the object, and then drag the object to a destination place, as shown in *Figure 4.9* . You can also drag the window controls to change the window position (e.g. numeric keypad).
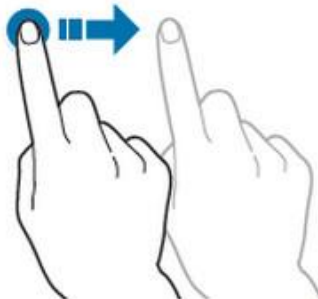
Figure 4.9 Drag Gesture

4.5.2 Tap

Use one finger to tap the symbol or characters on the screen slightly, as shown in *Figure 4.10* . With the Tap gesture, you can perform the following operations:

- Tap the menu displayed on the screen to operate on the menu.

- Tap the function navigation icon at the lower-left corner of the touch screen to enable the function navigation.

- Tap the displayed numeric keypad to set the parameters.

- Tap the virtual keypad to set the filename.

- Tap the close button at the upper-right corner of the message box to close the prompt window.

- Tap other windows on the touch screen and operate on the windows.

Figure 4.10 Tap Gesture

4.6 Parameter Setting Method

Tap the input field of the parameter, then a virtual keypad is displayed. Input the values to complete the parameter settings.

Input Chinese and English

You can use the Chinese/English input method to input a name.

- **Input English**
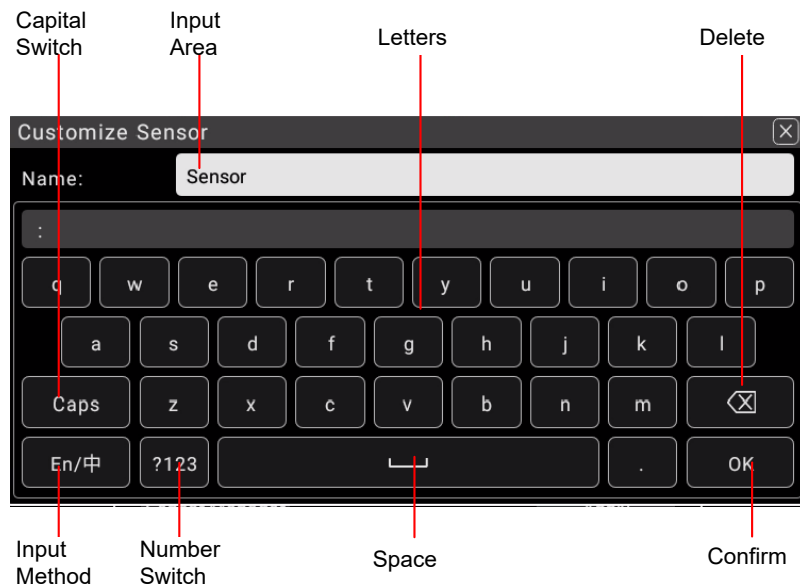
Figure 4.11 English Input Interface

1. **Select English input method**

   First check the input method type. If it shows "En/中", then go to Step 2; if it shows "中/En", click or tap the input method switchover key to switch to "En/中" (English input method).

2. **Clear the name input area**

   If there is no character in the "Name Input Area", please go to the next step. If there are characters in the "Name Input Area", click or tap the Backspace key to delete all the characters from the "Name Input Area" in order.

3. **Input the upper-case letter**

   If you want to input an upper-case letter, first use the Caps key to switch between the upper-case and lower-case mode. If the Caps key is selected, input the upper-case letter with the virtual keypad. If not, first click or tap the Caps key to ensure it is selected, then input the upper-case letter. All the input letters will be displayed in the "Name Input Area".

4. **Input the lower-case letter**

   Refer to the operation specified in the previous step. If the Caps key is not selected, directly input the lower-case letter.

5. **Input numbers or symbols**

   If the letter keypad is displayed, you need to click or tap the numeric switchover key to switch to the numeric keypad, and input numbers or symbols with the numeric keypad. All the input letters will be displayed in the "Name Input Area".

6. **Modify or delete the unwanted characters that have been input**

   During the name input process, you can modify or delete the unwanted character if necessary. To delete the characters that have been input, click or tap the Backspace key in the virtual keypad to delete the characters. To modify the input characters, delete the unwanted characters and input the desired characters again.

   You can directly move the cursor to the character to be modified or deleted, delete the desired character or input the new characters after deleting the unwanted character.

7. **Confirm the input**

   After completing the input operation, click or tap OK.

- **Input Chinese Characters**

Figure 4.12 Chinese Input Interface

1. Select Chinese input method

First check the Chinese and English Characters type. If it shows "中/En", then go to Step 2; if it shows "En/中", click or tap the input method switchover key to switch to "中/En" (Chinese input method).

2. Clear the name input area

If there is no character in the "Name Input Area", please go to the next step. If there are characters in the "Name Input Area", click or tap the Backspace key to delete all the characters denoted "Name Input Area" in order.

3. Input Chinese characters

Click or tap the characters in the virtual keypad to input Pinyin into the input area, then the characters to be selected will be displayed in the Chinese character selection area. Slide to view more Chinese characters for you to choose. Select the desired Chinese character, and then the selected character will be displayed in the input area.

4. Modify or delete the unwanted characters that have been input

During the name input process, you can modify or delete the unwanted character if necessary. To delete the characters that have been input, click or tap the Backspace key in the virtual keypad to delete the characters. To modify the input characters, delete the unwanted characters and input the desired characters again.

5. Confirm the input

After completing the input operation, click or tap OK.

Input a Value

When setting or modifying a parameter, use the pop-up numeric keypad to input an appropriate value.

- Click or tap the value or unit in the virtual numeric keypad to complete the input.

Input Area

Delete

Clear

Enter

Decimal Point   Number Key   Plus or minus sign   Unit(Optional)
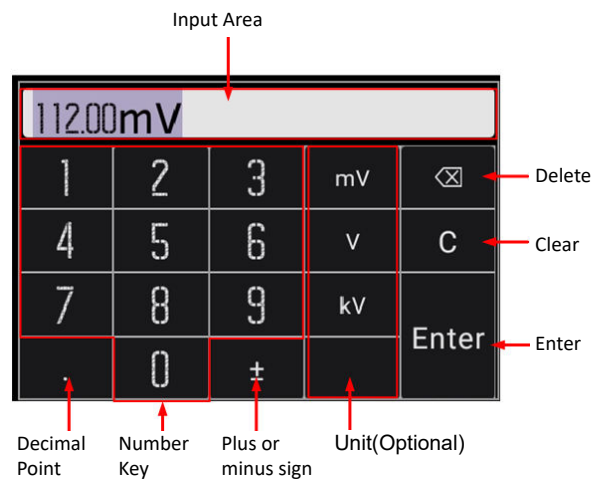
Figure 4.13 Numeric Keypad Input Interface

After you input all the values and select the desired units, the virtual numeric keypad is turned off automatically. This indicates that you have completed parameter setting. In virtual the numeric keypad, you can perform the following operation:

1. Input Area

Click or tap the desired number and the desired value is input in this area.

2. Number Key

There are 10 numbers in the numeric key area. Click or tap the number to input the desired value.

3. Decimal Point

- To input a decimal number less than 1, input the decimal point first and then add a number.

- To input a real number with decimals, input an real number first and then add a decimal point. The number of zero digits is automatically added after the decimal point according to the rules of the specified parameter.

- The dot can be added to the specified position when you input a value that is not an integer.

- It is not allowed to input several decimal points.

4. Plus or minus sign (±)

Your first click or tap of the sign will input a minus (-) sign, the second time of click or tap of it will input a plus sign, but the plus sign is always omitted for the number display.

5. Unit

Click or tap the desired unit.

6. Enter

After inputting the file or folder name, click or tap Enter directly to confirm the name input. Then it automatically goes to the previous page.

7. Clear (C)

Click or tap C to clear all the input.

8. Delete (x)

Click or tap this icon to clear the input. Move the cursor to the position of the number that needs to be deleted, then click or tap this icon to clear the digit ahead of the cursor.

4.7   To Use the Security Lock

If necessary, you can lock the instrument to a fixed location by using a standard laptop security lock (please purchase it by yourself), as shown in the figure below.

The method is as follows: align the lock with the lock hole and plug it into the lock hole vertically, turn the key clockwise to lock the instrument, and then pull the key out.
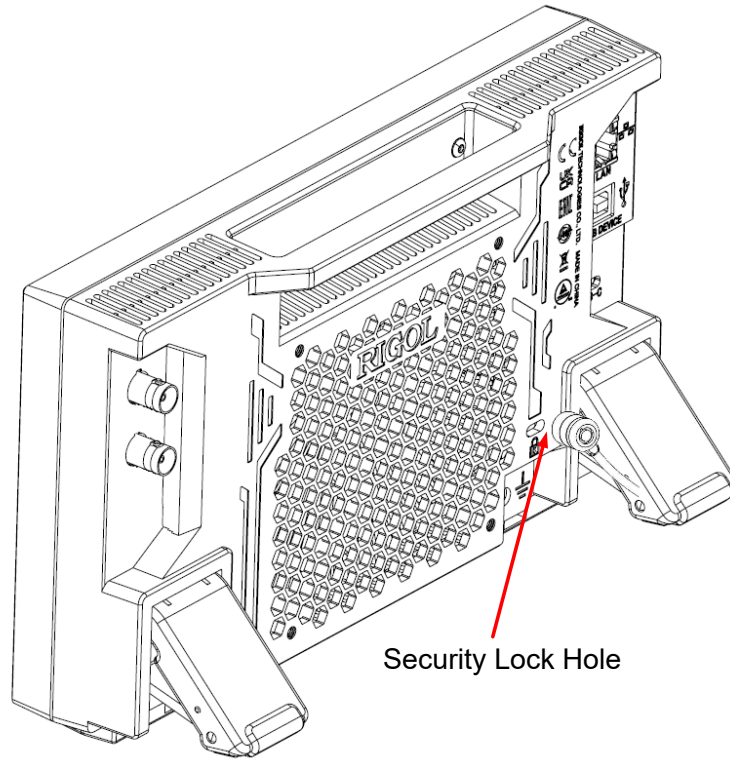
Security Lock Hole

Figure 4.14 To Use the Security Lock

⚠️ **CAUTION**

Please do not insert other objects into the security lock hole to avoid damaging the instrument.

5 Front Panel Operation

•	*To Set the Range*	Auto ▲ ▼
•	*To Set the Measurement Rate*	▲ ▼
•	*To Measure DC Voltage*	⎓ V
•	*To Measure AC Voltage*	~ V
•	*To Measure DC Current*	⎓ I
•	*To Measure AC Current*	~ I
•	*To Measure Resistance*	Ω 2W
•	*To Measure Capacitance*	⊣⊢
•	*To Test Continuity*	·))
•	*To Check Diode*	·))
•	*To Measure Frequency/ Period*	Freq
•	*Any Sensor Measurement*	⊣⊢
•	*Preset Mode*	2ND
•	*Trigger*	Trig Run Hold Single
•	*Math Operation*	Math
•	*To Store and Load*	Save
•	*System Utility Function Setting*	Utility

5.1 To Set the Range

For the specified measurement item, the range can be set to Auto or specified values. You can set the range to Auto, and then the proper range for the current measurement will be automatically selected. It is convenient for you to make measurements. You can also select a specified range manually to obtain higher reading precision.

The range selection keys are located at the right part of the front panel, as shown in the figure below.
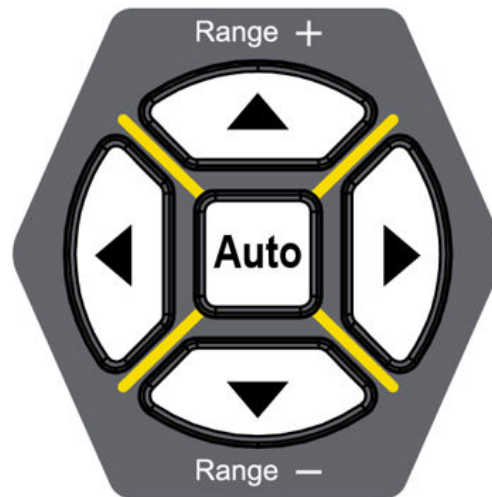
Figure 5.1 Range and Rate Selection Keys

Operation Method:

Auto: Press to set the range to Auto.

Specified range selection: Press or to select the available range.

You can also set the range for each measurement item in the specified measurement interface.

For each measurement item displayed on the screen, click or tap the Measure label at the bottom of the screen to enter the specified measurement item interface. Click or tap the drop-down list of **Range** to select AUTO or the specified range value.

Figure 5.2 Range Selection Menu

Remarks:

• When the input signal exceeds the current range (except the Frequency measurement), a message "OVERLOAD" is displayed on the screen.

- The range of the Frequency is from 20 Hz to 100 kHz. Once exceeding the range, the instrument does not display the Overload prompt message, but the accuracy of the measurement results cannot be guaranteed.

- The range is automatically set to AUTO after a reset.

- Auto range is recommended if you are not sure about the measurement range so as to protect the instrument and obtain accurate data.

- The ranges for continuity test and diode measurement are fixed. The fixed range for Continuity test is 1 kΩ; and the fixed range of DIODE measurement is 2.1 V.

5.2　To Set the Measurement Rate

The multimeter provides three measurement rates: Fast, Medium, and Slow.

The measurement rate can be adjusted by using the Left and Right arrow keys on the front panel. Press ◀ to increase the rate and press ▶ to decrease the rate.

Remarks:

1. Three measurement rates are available to choose for the DCV, DCI, ACV, ACI, 2WR, and 4WR measurements.

2. The reading resolution is correlated to the measurement rate.

- Slow corresponds to 5.5 reading resolution;

- Medium and Fast correspond to 4.5 reading resolution;

- Sensor has a fixed 5.5 reading resolution which corresponds to Slow;

- Continuity and Diode have a fixed 4.5 reading resolution which corresponds to Fast;

- Frequency/Period has a fixed 5.5 reading resolution which corresponds to Slow;

- Capacitance has a fixed 3.5 reading resolution which corresponds to Slow.

5.3　Basic Measurement Functions

The basic measurement functions of the instrument include:

- *To Measure DC Voltage*

EN

- *To Measure AC Voltage*

- *To Measure DC Current*

- *To Measure AC Current*

- *To Measure Resistance*

- *To Measure Capacitance*

- *To Test Continuity*

- *To Check Diode*

- *To Measure Frequency/Period*

- *Any Sensor Measurement*

5.3.1   To Measure DC Voltage

The instrument can measure up to 1,000 V DC voltage. The following section introduces the connection methods and measurement methods of DC voltage.

NOTE

DCV measurement is selected by default.

Operation Procedures:

1. To enter the DC voltage measurement interface, perform either one of the following two operations.

- Press [⎓ V] on the front panel;

- Click or tap the main measurement item shown at the left part of the main display area. The measurement items are displayed. Click or tap to select [⎓ V DCV] to enter the DC voltage interface.

Figure 5.3 DC Voltage Measurement Interface

2. Connect red lead to terminal Input-HI and black lead to terminal Input-LO, as

shown in the figure below.

Figure 5.4 DC Voltage Measurement Connection Diagram

3. Click or tap ![Measure] to set the measurement parameters of DC voltage: Range,
Impedance (available to set when the Range is not set to Auto), and Rate.

Table 5.2 DC Voltage Measurement Parameter Setting

Parameter	Description
Range*	Auto, 100 mV, 1 V, 10V, 100 V, 1000V
Impedance	Available to set when the Range is a specified value rather than Auto. 10 GΩ, 11.2 MΩ - When you select "11.2 MΩ", the input impedance for all the ranges is 11.2 MΩ. - When you select "10 GΩ", the input impedance for 100 mV and 1 V ranges is "10 GΩ", but the input impedance for the 10V, 100 V, 1000V ranges is "11.2 MΩ".
Rate	Fast, Medium, Slow

NOTE

- 20% over range on all ranges except 1000 V range.
- The range can be set to Auto or a specified value (available range options for Range menu).
- A 1000 V input protection is available in all ranges and a 20% overrange is available on all ranges except 1000 V.
- If the reading exceeds 1000 V in 1000 V range, "OVER LOAD" will be displayed.

4. Click or tap Relative to enable or disable the relative operation function. When enabled, the displayed reading value is the result obtained by subtracting the set relative value from the actual measurement value. For the relative value setting methods, refer to descriptions in "*Math Operation*".

5. Read the measured value

When reading the measurement results, you can use the arrow keys to switch the reading rate.

6. Hold the reading data

Press Run Hold to run and hold the reading data displayed on the screen.

5.3.2   To Measure DC Current

The instrument can measure up to 10 A(DM858)/3 A(DM858E) DC current. The following section introduces the connection methods and measurement methods of DC Current.

Operation Procedures:

1. To enter the DC current measurement interface, perform either one of the following two operations.

- **-** Press ⬚ on the front panel;

- **-** Click or tap the main measurement item shown at the left part of the main display area. The measurement items are displayed. Click or tap to select ⬚ to enter the DC current interface.

Figure 5.5 DC Current Measurement Interface

2. Connect red lead to terminal Input-I and black lead to terminal Input-LO, as shown in the figure below.
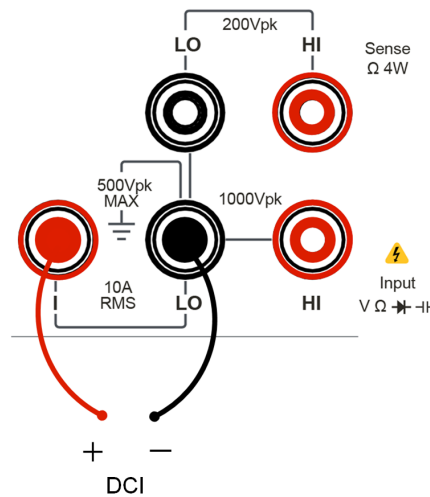
Figure 5.6 DC Current Measurement Connection Diagram

3. Click or tap ▦ to set the measurement parameters of DC current: Range and Rate.

Table 5.3 DC Current Measurement Parameter Setting

Parameter	Remarks
Range*	Auto, 100 μA, 1 mA, 10 mA, 100 mA, 1 A, 10 A (DM858)/3 A (DM858E)
Rate	Fast, Medium, Slow

NOTE

20% over range on all ranges except 10 A range. The range can be set to Auto or the given specified values.

4. Click or tap **Relative** to enable or disable the relative operation function. When enabled, the displayed reading value is the result obtained by subtracting the set relative value from the actual measurement value. For the relative value setting methods, refer to descriptions in "*Math Operation*".

5. Read the measured value

When reading the measurement results, you can use the arrow keys to switch the reading rate.

6. Hold the reading data

Press [Run Hold] to run and hold the reading data displayed on the screen.

5.3.3   To Measure AC Voltage

The instrument can measure up to 750 V AC voltage. The following section introduces the connection methods and measurement methods of AC voltage.

Operation Procedures:

1. To enter the AC voltage measurement interface, perform either one of the

   following two operations.

   - Press ⌊ ~ V ⌋ on the front panel;

   - Click or tap the main measurement item shown at the left part of the main

     display area. The measurement items are displayed. Click or tap to select

     ⌊ ~ V ACV ⌋ to enter the AC voltage interface.

Figure 5.7 AC Voltage Measurement Interface

2. Connect red lead to terminal Input-HI and black lead to terminal Input-LO, as

   shown in the figure below.
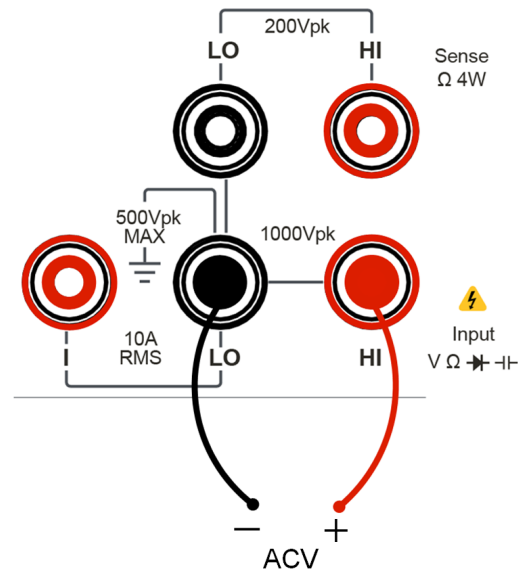
Figure 5.8 AC Voltage Measurement Connection Diagram

3. Click or tap to set the measurement parameters of AC voltage: Range and Rate

Table 5.4 AC Voltage Measurement Parameter Setting

Parameter	Description
Range*	Auto, 100 mV, 1 V, 10 V, 100 V, 750 V
Rate	Fast, Medium, Slow

NOTE

- 20% over range on all ranges except 750 V range.
- The range can be set to Auto or a specified value (available range options for Range menu).
- A 750 V input protection is available in all ranges and a 20% overrange is available on all ranges except 750 V.
- If the reading exceeds 750 V in 750 V range, "OVER LOAD" will be displayed.

4. Click or tap **Relative** to enable or disable the relative operation function. When enabled, the displayed reading value is the result obtained by subtracting the set relative value from the actual measurement value. For the relative value setting methods, refer to descriptions in "*Math Operation*".

5. Read the measured value

When reading the measurement results, you can use the arrow keys to switch the reading rate.

6. Hold the reading data

Press ⟨Run Hold⟩ to run and hold the reading data displayed on the screen.

5.3.4   To Measure AC Current

The instrument can measure up to 10 A(DM858)/3 A(DM858E) AC current . The following section introduces the connection methods and measurement methods of AC current.

Operation Procedures:

1. To enter the AC current measurement interface, perform either one of the following two operations.

- Press ⟨∼ I⟩ on the front panel;

- Click or tap the main measurement item shown at the left part of the main display area. The measurement items are displayed. Click or tap to select ⟨∼ I ACI⟩ to enter the AC current measurement interface.

Figure 5.9 AC Current Measurement Interface

2. Connect red lead to terminal Input-I and black lead to terminal Input-LO, as shown in the figure below.

EN
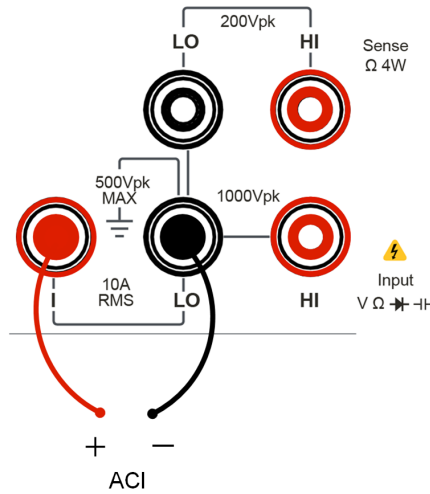
Figure 5.10 AC Current Measurement Connection Diagram

3. Click or tap [Measure] to set the measurement parameters of AC current: Range and Rate

Table 5.5 AC Current Measurement Parameter Setting

Parameter	Remarks
Range*	Auto, 100 μA, 1 mA, 10 mA, 100 mA, 1 A, 10 A(DM858)/3 A(DM858E)
Rate	Fast, Medium, Slow

NOTE

20% over range on all ranges except 10 A range. The range can be set to Auto or the given specified values.

4. Click or tap [Relative] to enable or disable the relative operation function. When enabled, the displayed reading value is the result obtained by subtracting the set relative value from the actual measurement value. For the relative value setting methods, refer to descriptions in "*Math Operation*".

5. Read the measured value

When reading the measurement results, you can use the arrow keys to switch the reading rate.

6. Hold the reading data

Press [Run Hold] to run and hold the reading data displayed on the screen.

5.3.5 To Measure Resistance

The instrument provides 2-wire (2WR) and 4-wire (4WR) resistance measurements. The following section introduces the connection methods and measurement methods of 2WR and 4WR resistance measurements.

5.3.5.1 2WR Measurement

Operation Procedures:

1. To enter the 2WR measurement interface, perform either one of the following two operations.

- Press Ω 2W on the front panel;

- Click or tap the main measurement item shown at the left part of the main display area. The measurement items are displayed. Click or tap to select Ω 2W 2WR to enter the 2WR measurement interface.
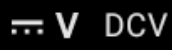

Figure 5.11 2WR Measurement Interface

2. Connect red lead to terminal Input-HI and black lead to terminal Input-LO, as shown in the figure below.
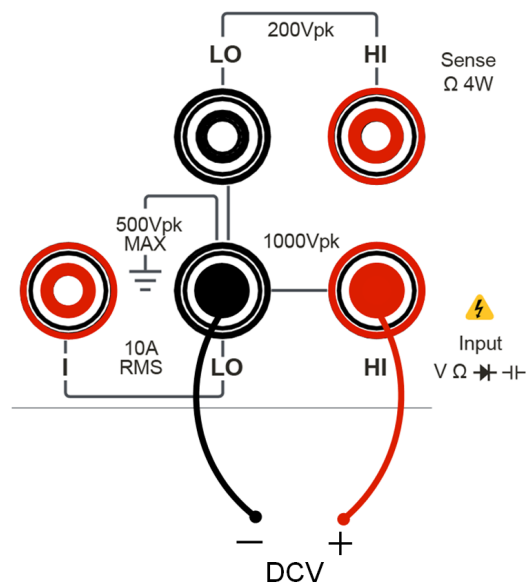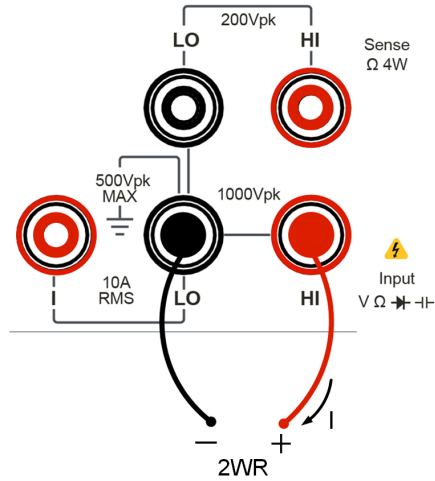
Figure 5.12 2WR Measurement Connection Diagram

3. Click or tap ▦ to set the measurement range, rate, and display digit (available when the range is set to 1 MΩ or above and when the measurement rate is Slow).

Table 5.6 2WR Measurement Parameter Setting

Parameter	Description
Range*	Auto, 100 Ω, 1 kΩ, 10 kΩ, 100 kΩ, 1 MΩ, 10 MΩ, and 50 MΩ
Rate	Slow, Medium, Fast
Digit (available when the range is set to 1 MΩ or above and when the measurement rate is Slow)	$4^{1/2}$, $5^{1/2}$

NOTE

20% overrange in all ranges. You can select Auto or a specified range value.

4. Click or tap **Relative** to enable or disable the relative operation function. When enabled, the displayed reading value is the result obtained by subtracting the set relative value from the actual measurement value. For the relative value setting methods, refer to descriptions in "*Math Operation*".

TIP

If the measured resistance is small, Relative operation is recommended to reduce the error caused by test lead. If no oRelative operation is used, an additional error of 0.2 Ω is added. To test the resistance above 1 MΩ, avoid external interference.

5. Read the measured value

When reading the measurement results, you can use the arrow keys to switch the reading rate.

6. Hold the reading data

Press [Run Hold] to run and hold the reading data displayed on the screen.

5.3.5.2　4WR Measurement

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 comparing with the measured resistance.

Operation Procedures:

1. To enter the 4WR measurement interface, perform either one of the following two operations.

- Press [Shift] > [Ω 2W] to enter the 4WR measurement interface.

- Click or tap the main measurement item shown at the left part of the main display area. The measurement items are displayed. Click or tap to select [Ω 4W 4WR] to enter the 4WR measurement interface.

-

Figure 5.13 4WR Measurement Interface

2. Connect red leads to terminal Input-HI and HI-Sense, black leads to terminal

Input-LO and Low Sense, as shown in the figure below.
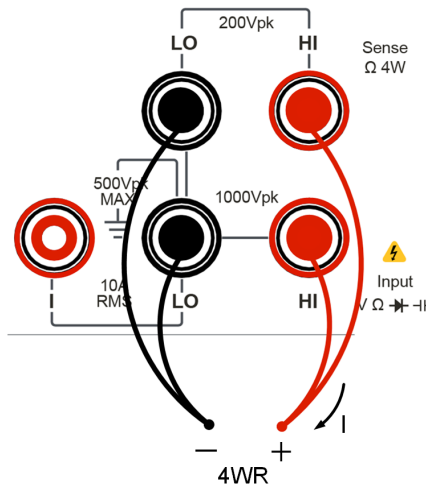
Figure 5.14 4WR Measurement Connection Diagram

3. Click or tap to set the measurement range, rate, and display digit (available when the range is set to 1 MΩ or above).

Table 5.7 4WR Measurement Parameter

Parameter	Description
Range*	Auto, 100 Ω, 1 kΩ, 10 kΩ, 100 kΩ, 1 MΩ, 10 MΩ, and 50 MΩ

Parameter	Description
Rate	Slow, Medium, Fast
Digit (available when the range is set to 1 MΩ or above)	$4^{1/2}$, $5^{1/2}$

NOTE

20% overrange in all ranges. You can select Auto or a specified range value.

4. Click or tap `Relative` to enable or disable the relative operation function. When enabled, the displayed reading value is the result obtained by subtracting the set relative value from the actual measurement value. For the relative value setting methods, refer to descriptions in "*Math Operation*".

5. Read the measured value

When reading the measurement results, you can use the arrow keys to switch the reading rate.

6. Hold the reading data

Press `Run Hold` to run and hold the reading data displayed on the screen.

NOTE

Please do not put the terminals of the resistance on the conductive plane or in your hand to avoid error. The larger the resistance, the more the impact on the measurement results.

5.3.6   To Measure Capacitance

The instrument can measure up to 1 mF/10 mF (only available for DM858) capacitance. The following section introduces the connection methods and measurement methods of capacitance.

Operation Procedures:

1. To enter the capacitance measurement interface, perform either one of the following two operations.

- Press `⊣⊢` on the front panel;

EN

- Click or tap the main measurement item shown at the left part of the main display area. The measurement items are displayed. Click or tap to select ⊣⊢ CAP to enter the capacitance measurement interface.

Figure 5.15 Capacitance Measurement Setting Interface

2. Connect red lead to terminal Input-HI and anode of the capacitance. Connect the black lead to both terminal Input-LO and cathode of the capacitance, as shown in the figure below.
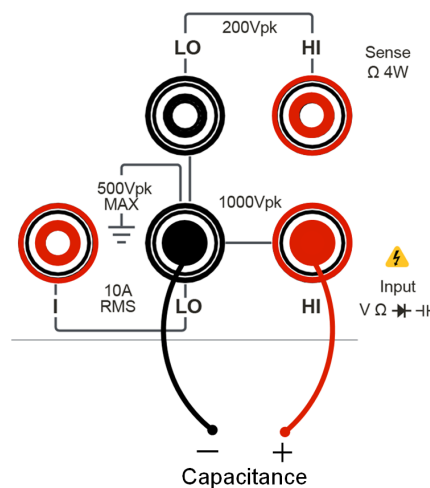
Figure 5.16 Capacitance Measurement Connection Diagram

3. Click or tap [Measure] to set the range of the capacitance measurement.

Table 5.8 Capacitance Measurement Parameter Settings

Parameter	Description
Range*	Auto, 1 nF, 10 nF, 100 nF, 1 µF, 10 µF, 100 µF, 1 mF, and 10 mF (only available for DM858)

NOTE

20% overrange on all ranges.

4. Click or tap **Relative** to enable or disable the relative operation function. When enabled, the displayed reading value is the result obtained by subtracting the set relative value from the actual measurement value. For the relative value setting methods, refer to descriptions in "*Math Operation*".

5. Read the measured value

   The capacitance measurement is measured at a fixed "slow" rate with a 3.5-digit display. Therefore, the reading rate cannot be adjusted during measurement results reading.

6. Hold the reading data

   Press **Run Hold** to run and hold the reading data displayed on the screen.

TIP

Before measuring the electrolytic capacitor, you should first short-circuit the two pins of the electrolytic capacitor to discharge it.

5.3.7 To Test Continuity

The continuity test checks that the resistance in the DUT is low enough to be considered continuous. In this case, the beeper sounds, if enabled, to inform you of the continuity situation.

Operation Procedures:

1. To enter the continuity measurement interface, perform either one of the following two operations.

   - Press ⏺ on the front panel;

EN

- Click or tap the main measurement item shown at the left part of the main

display area. The measurement items are displayed. Click or tap to select

CONT to enter the continuity measurement interface.

Figure 5.17 Continuity Test Interface

2. Connect red lead to terminal Input-HI and black lead to terminal Input-LO, as

shown in the figure below.
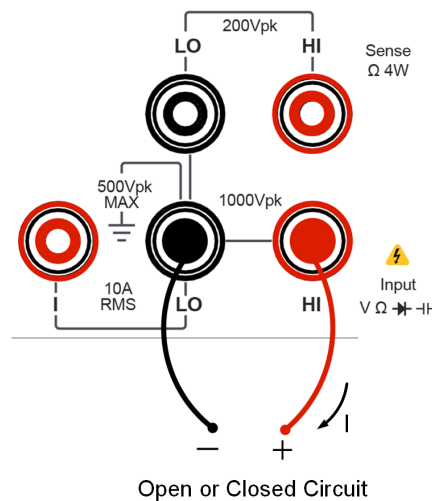

Figure 5.18 Continuity Test Connection Diagram

3. Click or tap Measure to set the short-circuit resistance. By default, the short-circuit
resistance is 10 Ω. The value is set before leaving factory and you can directly

perform the continuity test. If you do not need to modify the parameter, go to the next step.

Table 5.9 Continuity Test Parameter Settings

Parameter	Description
Short Circuit Resistance	10 Ω (default); from 1 Ω to 1,000 Ω
Beeper	Enables or disables the beeper. If the beeper is enabled, beeper sounds when the circuit is considered to be continuous.

NOTE

The short-circuit resistance value is stored in the non-volatile memory and will remain unchanged at power-off.

4. Measurement Display Results

For the open circuit or measured value exceeds 1.2 kΩ, OPEN is displayed on the screen; When the measured value is smaller than the set short-circuit resistance, the actual resistance value is displayed on the screen. At this time, if the beeper is enabled, the beeper sounds. When the measured value is greater than the set short-circuit resistance and less than 1.2 kΩ, the beeper does not sound whether it is enabled or not, and the actual resistance value is displayed on the screen.

5.3.8 To Check Diode

Operation Procedures:

1. To enter the diode measurement interface, perform either one of the following two operations.

- Press $\boxed{\text{Shift}}$ > $\boxed{\cdot)))}$ on the front panel to enter the diode measurement Interface.

- Click or tap the main measurement item shown at the left part of the main display area. The measurement items are displayed. Click or tap to select $\boxed{\text{→|— DIDO}}$ to enter the diode measurement interface.

Figure 5.19 Diode Measurement Interface

2. Connect red lead to both terminal Input-HI and anode of the Diode and black lead to both terminal Input-LO and cathode of the Diode, as shown in the figure below.
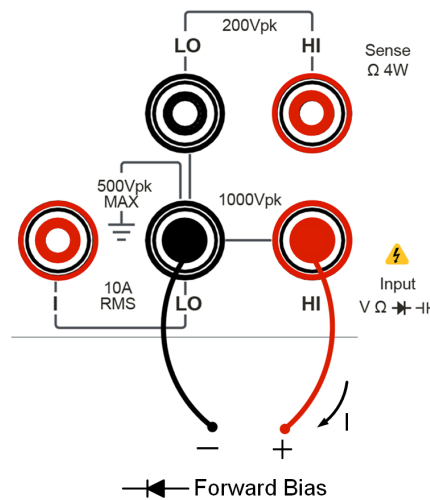
Figure 5.20 Diode Measurement Connection Diagram

3. Press ⌊Run Hold⌉ on the front panel, and the secondary display area is displayed. Click or tap the ON/OFF tab for **Beeper** to enable or disable the beeper. When the diode is properly connected, the instrument beeps for one time (If beeper is enabled).

4. Different conditions for Measurement Result:

- OPEN: when OPEN is displayed on the screen, it indicates that the diode is open-circuit or the measured forward voltage drop is less than 0.1 V or greater than 2.1 V.

- Measured Value: when the measured forward voltage drop is within the range of 0.1 V and 2.1 V.

- Measured Value and with Beeper On: when the measured values are displayed on the screen, with beeper on, the measured forward voltage drop is within the range of 0.1 V and 2.1 V.

5.3.9 To Measure Frequency/Period

The frequency/period of a signal could be measured with the frequency/period measurement function. The following section introduces how to perform Frequency and Period measurement with the instrument.

5.3.9.1 Measure Frequency

Operation Procedures:

1. To enter the frequency measurement interface, perform either one of the following two operations.

- Press **Freq** on the front panel;

- Click or tap the main measurement item shown at the left part of the main display area. The measurement items are displayed. Click or tap to select

  Hz FREQ to enter the frequency measurement interface.

Figure 5.21 Frequency Measurement Interface

**2.** Connect red lead to terminal Input-HI and black lead to terminal Input-LO, as shown in the figure below.
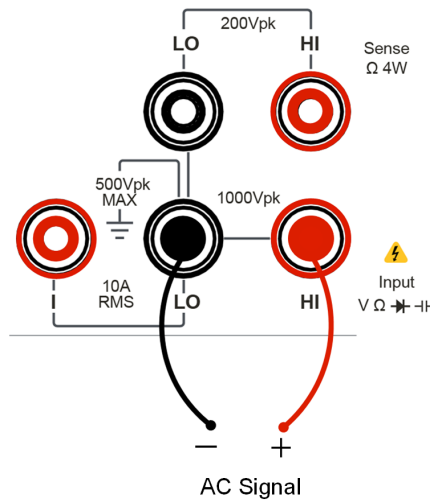
Figure 5.22 Frequency Measurement Connection Diagram

3. Click or tap [Measure] to set the range of the frequency measurement.

Table 5.10 Frequency Measurement Settings

Parameter	Description
Range	Auto, 100 mV, 1 V, 10V, 100 V, 750 V

4. Click or tap Relative to enable or disable the relative operation function. When enabled, the displayed reading value is the result obtained by subtracting the set relative value from the actual measurement value. For the relative value setting methods, refer to descriptions in "*Math Operation*".

5. Read the measured value

The frequency measurement is measured at a fixed "slow" rate with a 5.5-digit display. Therefore, the reading rate cannot be adjusted during measurement results reading.

6. Hold the reading data

Press Run Hold to run and hold the reading data displayed on the screen.

5.3.9.2 **Measure Period**

Operation Procedures:

1. To enter the period measurement interface, perform either one of the following two operations.

- Press Shift > Freq on the front panel;

- Click or tap the main measurement item shown at the left part of the main display area. The measurement items are displayed. Click or tap to select

T PERIOD to enter the period measurement interface.

Figure 5.23 Period Measurement Interface

**2.** Connect red lead to terminal Input HI and black lead to terminal Input LO, as shown in the figure below.
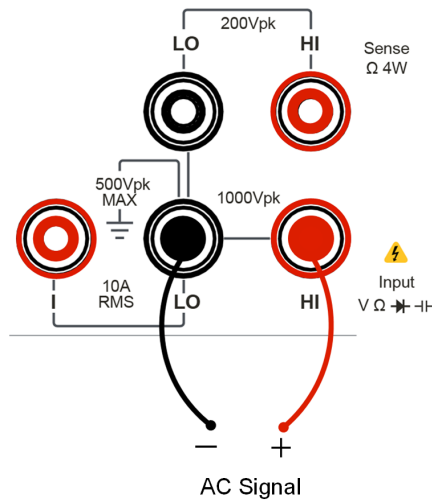
Figure 5.24 Period Measurement Connection Diagram

3. Click or tap ![Measure icon] to set the range of the period measurement.

Table 5.11 Period Measurement Parameter Setting

Parameter	Description
Range	Auto, 100 mV, 1 V, 10V, 100 V, 750V

4. Click or tap Relative to enable or disable the relative operation function. When enabled, the displayed reading value is the result obtained by subtracting the set relative value from the actual measurement value. For the relative value setting methods, refer to descriptions in "*Math Operation*".

5. Read the measured value

The period measurement is measured at a fixed "slow" rate with a 5.5-digit display. Therefore, the reading rate cannot be adjusted during measurement results reading.

6. Hold the reading data

Press [Run Hold] to run and hold the reading data displayed on the screen.

5.3.10   Any Sensor Measurement

By using any sensor measurement, you can connect Pressure Sensor, Flux Sensor or Temperature Sensor easily. This function enables you to easily convert a measured physical quantity (such as pressure, flow rate and temperature) into a quantity that can be easily measured (such as voltage, current or resistance). By pre-inputting a response curve, the multimeter converts and amends the data according to the internal arithmetic and displays the physical quantity measured on the screen. Users can edit and modify the display unit of the measured physical quantity at will.

The multimeter supports DCV, DCI, Freq, 2WR, 4WR, and temperature sensor measurement (TC, RTD, Therm). Meanwhile, there are 10 groups of basic Sensor preset within the instrument.

Connection

Different sensors have different connection methods. For the Voltage Sensor, Resistance Sensor, Thermocouple Sensor and Frequency Sensor, please connect the red lead to terminal Input-HI and black lead to terminal Input-LO, as shown in the figure below.
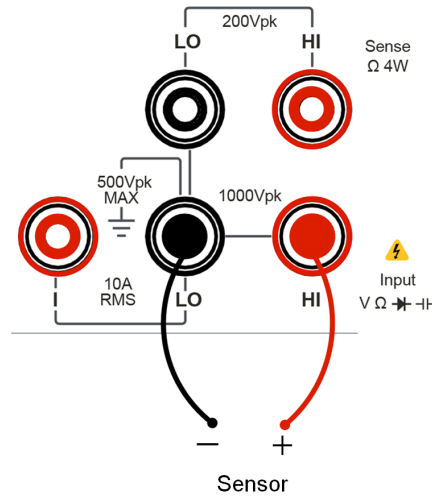
Figure 5.25 Voltage, Resistance, TC, Frequency Sensor Connection Method

For the Current Sensor, please connect the red lead to terminal Input-HI and black lead to terminal Input-LO, as shown in the figure below.
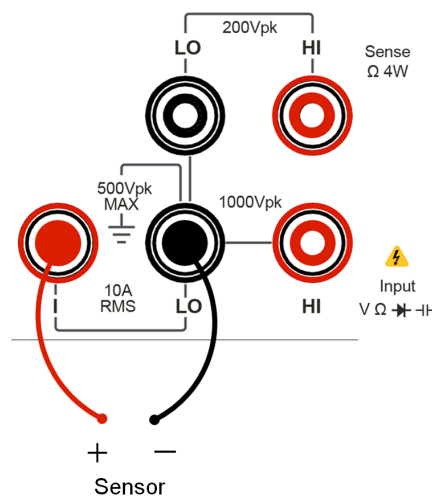
Figure 5.26 Current Sensor Connection Method

1. To enter the sensor measurement interface, perform either one of the following

two operations.

- Press **Shift** > **2ND** on the front panel to enter the sensor measurement

interface.

- Click or tap the main measurement item shown at the left part of the main

display area. The measurement items are displayed. Click or tap to select

![SEN icon] to enter the sensor measurement interface.

Figure 5.27 Sensor Measurement Interface

5.3.10.1 To Measure the Temperature Sensor

In *Figure 5.27* , click or tap ![Measure icon] to enter the any sensor measurement setting
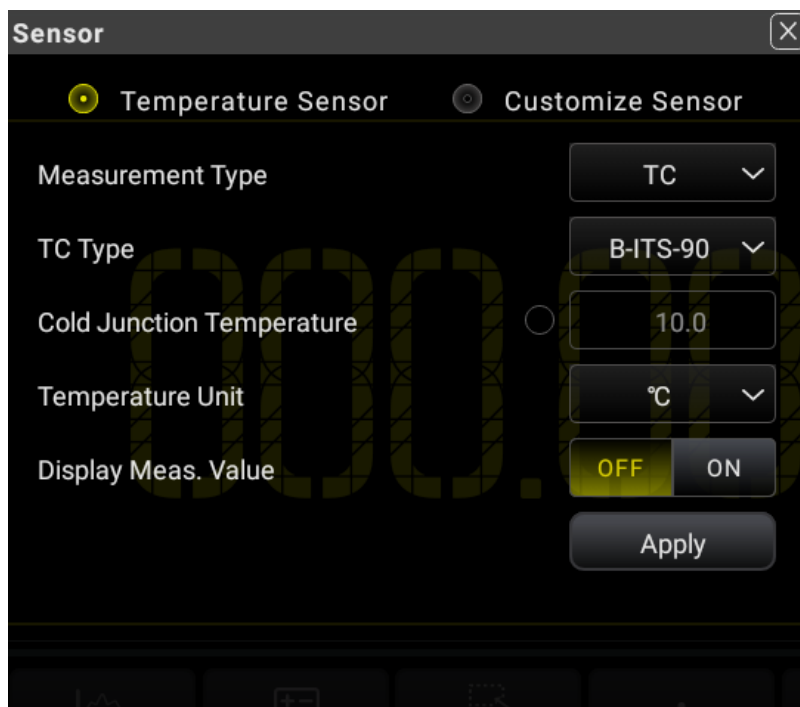
interface.

Figure 5.28 Temperature Sensor Setting Interface

In *Figure 5.28*, click or tap **Temperature Sensor** to enter the temperature sensor setting interface.

Select the temperature sensor type. As shown in *Figure 5.28*, click or tap the drop-down list of **Measurement Type** to select "TC", "RTD", or "Therm". By default, TC is selected.

- **TC**

    - The TC (thermocouple) is one of the most commonly used industrial temperature detection device. It converts the temperature value into voltage reading, and has a very large temperature measurement range. The common thermocouples are B (Pt Rh 30- Pt Rh6), E (NI CR-WRCK), J (Fe-WRCK), K (NI CR-NiSi), N (NiCrNi-NiSi), R (Pt Rh13 -Pt), S (Pt Rh10-Pt) and T (Cu-WRCK). Among them, B, R and S are precious metal thermocouple, while E, J, K, N and T are cheap metal thermocouples. For the reference table about each thermocouple, please see the ITS-90 standards. By default, B-ITS-90 is selected.

      Click or tap the drop-down list of **Measurement Type** to select "TC".

    - **User-defined Cold Junction Temperature**

        - Enables or disables the user-defined cold junction temperature. If the

          option box before the input field of **Cold Junction Temperature** is

not checked, the input field is grayed out and disabled. You can only

use the built-in cold junction temperature.

- If checked, click or tap the input field of **Cold Junction Temperature**,

then input the user-defined value with the pop-up numeric keypad.

NOTE

Theoretically, TC is measured at 0°C at the cold side. However, the instrument is usually at room temperature during measurement rather than 0°C.

This has caused the thermopotential difference to decrease, resulting in measurement inaccuracy or error.

Therefore, it is necessary to make the cold-junction compensation to reduce the error.

- **Temperature Unit**: sets the temperature unit. The available units are °C, °F,

and K. By default, the unit is °C.

- **Display Meas. Value**:

enables or disables the display of the measurement value on the screen.

- **ON**: enables the display of the measurement value on the screen.

- **OFF**: disables the display of the measurement value on the screen.

- **Apply**

Click or tap **Apply** to apply the current setting.

- **RTD**

- RTD is a temperature detector commonly used in medium-low temperature range. It features in high measurement accuracy and stable performance.

It measures the temperature depending on the changing resistance of the measured substance with the temperature. The multimeter will display the temperature corresponding to the resistance when the resistance changes.

This kind of sensor has good linearity.

The multimeter adopts the approximate arithmetic of IEC751 standards and converts the resistance signal from the temperature sensor into the related temperature for displaying.

For the reference table about each RTD, please refer to the related standards.

Click or tap the drop-down list of **Measurement Type** to select "RTD".
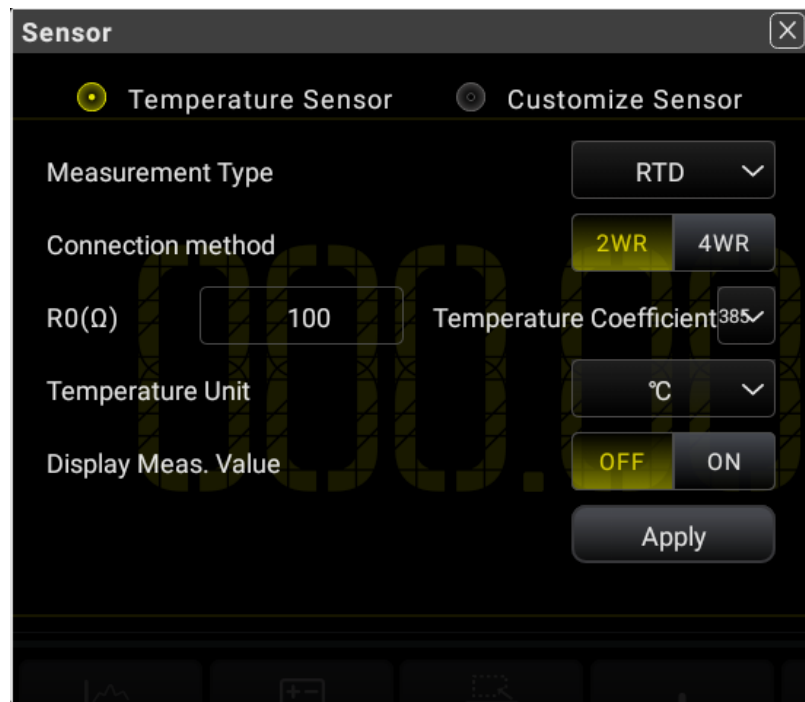
Figure 5.29 RTD Temperature Sensor Setting Interface

- **Connection Method**: sets the connection method of the thermal resistance. You can click or tap 2WR or 4WR to select the connection method. By default, it is 2WR.

- **R0(Ω)**: sets the nominal resistance at the reference temperature T0. The settable range is from 49 Ω to 2,100 Ω. By default, it is 100 Ω.

- **Temperature Unit**: sets the temperature unit. The available units are ℃, ℉, and K. By default, the unit is ℃.

- **Temperature Coefficient**: sets the temperature coefficient used for the RTD. Calculate it according to the formula: (R100 - R0)/R0. Wherein, R100 indicates the resistance at temperature 100℃. The available temperature coefficient values are 385, 389, 391, and 392. By default, it is 385.

- **Display Meas. Value**:

  enables or disables the display of the measurement value on the screen.

- **ON**: enables the display of the measurement value on the screen.

- **OFF**: disables the display of the measurement value on the screen.

- **Apply**

  Click or tap **Apply** to apply the current setting.

• **Therm**

- The THERM (thermistor) converts the temperature variation information into resistance variation information. It is especially sensitive to temperature.

  In this measurement, the multimeter adopts Steinhart-Hart approximate arithmetic and converts the resistance signal from the temperature sensor into the related temperature for displaying.

  To use the THERM sensor, you need to set the resistance parameter of the multimeter and select the connection mode.

  Click or tap the drop-down list of **Measurement Type** to select "Therm".
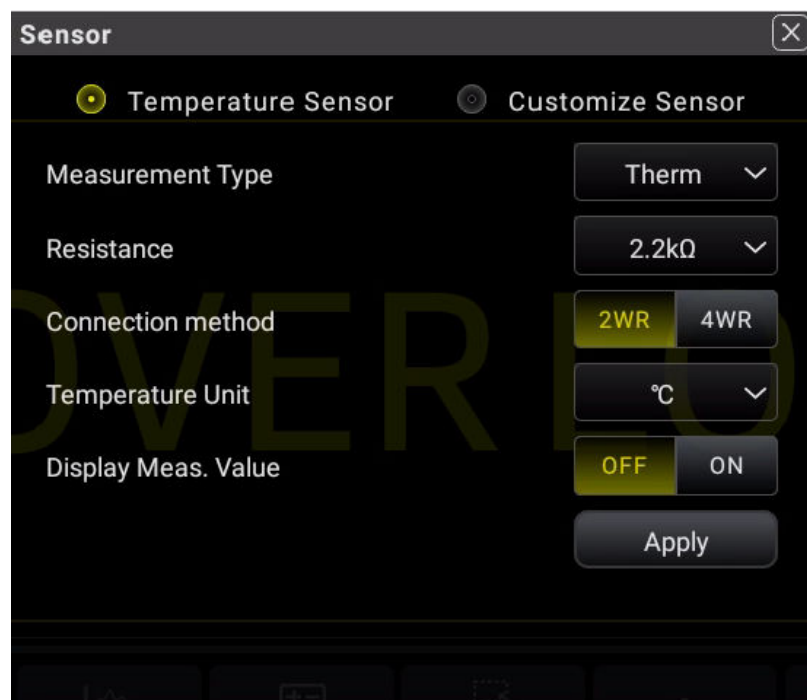
Figure 5.30 Therm Temperature Sensor Setting Interface

- **Resistance**: sets the resistance at temperature 25℃. The available

  choices are 2.2 kΩ, 3 kΩ, 5 kΩ, 10 kΩ, and 30 kΩ. By default, it is 2.2

  kΩ.

- **Connection Method**: sets the connection method of the thermal resistance. You can click or tap 2WR or 4WR to select the connection method. By default, it is 2WR.

- **Temperature Unit**: sets the temperature unit. The available units are ℃, ℉, and K. By default, the unit is ℃.

- **Display Meas. Value**:

  enables or disables the display of the measurement value on the screen.

  - **ON**: enables the display of the measurement value on the screen.
  - **OFF**: disables the display of the measurement value on the screen.

- **Apply**

  Click or tap **Apply** to apply the current setting.

5.3.10.2   To Measure User-defined Sensor

Set the User-Defined Sensor

In *Figure 5.28* , click or tap **Customize Sensor** to enter the user-defined sensor setting interface.
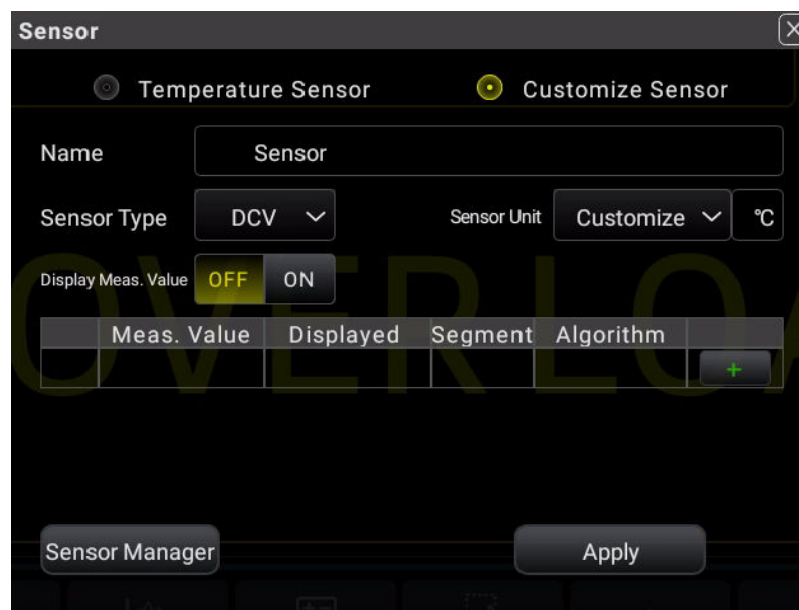
Figure 5.31 User-defined Sensor Setting Interface

1. Name

Sets the name of the sensor. Click or tap the input field of <mark>Name</mark> to enter the name setting interface.
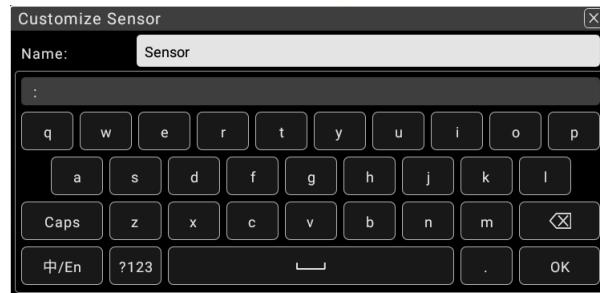
Figure 5.32 User-defined Sensor Name Setting

a. Input the sensor name. The length of the name shall not exceed 15 characters

and cannot be the same as the existing sensor name.

b. Click or tap <mark>OK</mark> to confirm input.

2. Sensor Type

Sets the sensor type. The available sensors are DCV, DCI, 2WR, 4WR, FREQ, and TC. By default, it is DCV.

3. Sensor Unit

Sets the sensor unit. The available units are ℃ (degree Celsius), ℉(degree Fahrenheit), K, %, °(degree), and Customize. By default, it is °. When you select "Customize", click or tap the edit field next to the Customize field, then a virtual keypad is displayed. Input the user-defined unit with the virtual keypad.

4. Display Meas. Value

Enables or disables the display of the measurement value on the screen.

- ON: enables the display of the measurement value on the screen.

- OFF: disables the display of the measurement value on the screen.

5. Reference Value

Sets the reference value. Click or tap to enter the reference value setting interface.

Click or tap to delete the specified line of the reference values.

EN
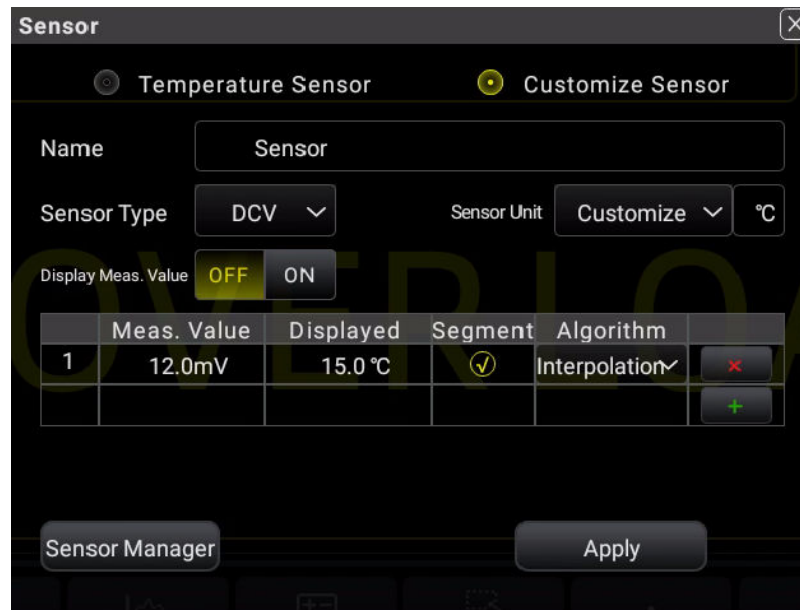
Figure 5.33 Reference Value Setting Table

NOTE

Algorithm: The reference value calculation supports **interpolation** and **fitting** algorithms. The interpolation algorithm applies to the sensor that has a strong linear relationship, and the number of data groups to be calculated shall not be less than two. The fitting algorithm applies to the sensor that has no distinctive linear relationship, and the number of data groups to be calculated shall not be less than 5 groups of measured values and displayed values.

Segment: sets the segment status of the data group. You can enable or disable the segment display. By default, segment is enabled for the first group of reference value and cannot be disabled. If you add another group of reference value, you can select whether to enable or disable the segment. Only when you enabled the segment, can you set the algorithm method for the current data group.

- **Meas. Value**: indicates the actually measured value. Its range is determined by the sensor type. For details, refer to the following table.

Table 5.12 Meas. Value Setting Range

Sensor Type	Setting Range
DCV	-1000 V to +1000 V
DCI	-10 A to +10 A (DM858)
	-3 A to +3 A (DM858E)
2WR	0 Ω to +100 MΩ
4WR	0 Ω to +100 MΩ
Freq	20 Hz to 100 kHz

- **Displayed Value**: indicates the displayed value of the sensor. The settable range is from -999999 to +999999.
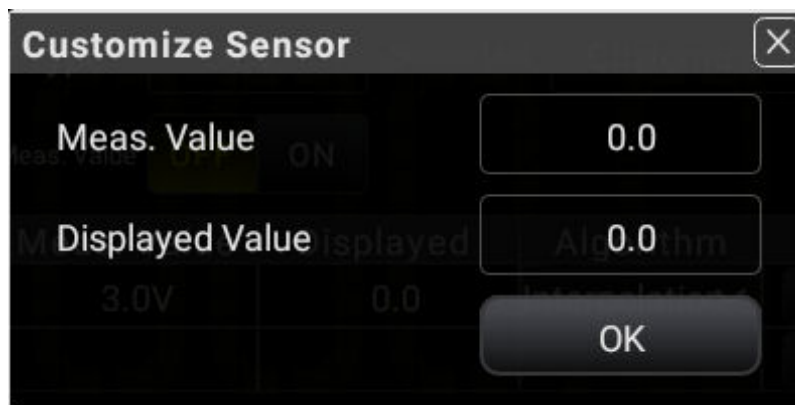
Figure 5.34 Reference Value Setting

After setting the measured value and displayed value, click or tap **OK** to confirm the reference value setting, as shown in the figure below.

6. Apply the setting

Click or tap **Apply** to apply the current setting.

7. Sensor management

Click or tap **Sensor Manager** to enter the user-defined sensor setting interface. The instrument supports at most 10 user-defined sensors. Each time only one sensor can be selected.

- **Save the Sensor**

  Click or tap **Save** to save the selected sensor. After being saved, "saved" in bracket is added following the saved sensor name.
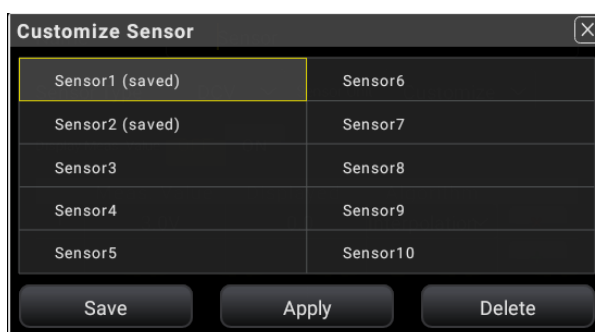
Figure 5.35 Customize the Sensor

- **Apply the Sensor**

  1. Click or tap **Apply** to apply the user-defined sensor setting.

EN

2. This operation is only available for the saved user-defined sensor.

- **Delete the Sensor**

1. Click or tap **Delete** to delete the user-defined sensor.

2. Then a dialog box is displayed, prompting you to confirm whether to delete the selected sensor. Click **OK** to confirm deleting the selected sensor; click **Cancel** to cancel the deletion operation. The deletion operation is only available for the saved user-defined sensor.

5.4   2ND Measurement

Click or tap the function navigation icon ⚙ at the lower-left corner of the screen, and then select **2ND** to enter the secondary measurement setting menu.
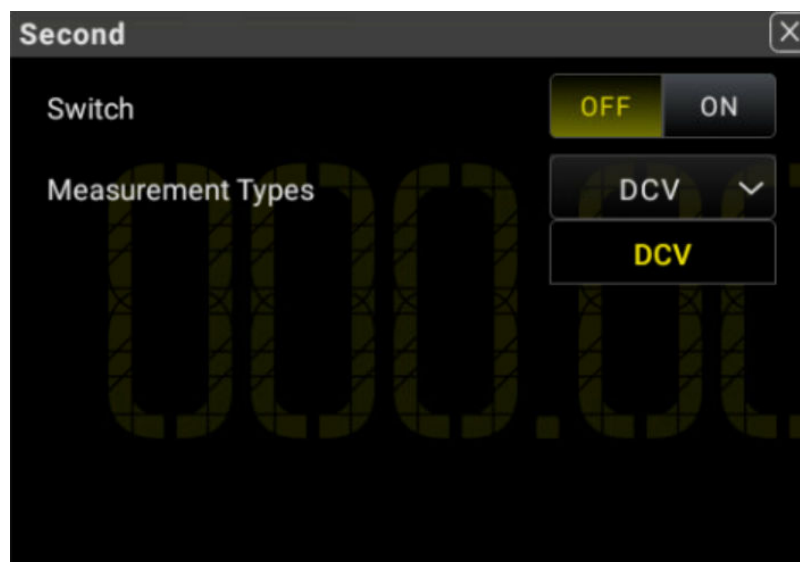
Figure 5.36 2ND Measurement Setting Interface

Table 5.13 2ND Measurement Parameter Setting

Parameter	Description
Switch	Enables or disables the 2ND measurement function.
Measurement Types	Selects the type of 2ND measurement.

When you enable the 2ND measurement, press <kbd>Run Hold</kbd>, the results of the 2ND measurement is displayed in the secondary display area of the screen, as shown in the following figure.

Figure 5.37 Main and Secondary Display Areas

As shown in the figure above, the section where the measured item and values are displayed in yellow is considered as the main display area, and the section below the main display area is considered as the secondary display area.

Click or tap in the secondary display area to switch the position of the basic measurement item and the secondary measurement item. For details, refer to *User Interface Overview*.

The basic measurement types displayed in the main display area are all supported by the 2ND measurement. In some specific conditions, some of the basic measurement types are disabled for 2ND measurement. For details, see the table below.

Table 5.14 Basic Measurement Types and 2ND Measurement Types

		Basic Measurement Function								
		DCV	DCI	ACV	ACI	FREQ	PERIOD	2WR	4WR	Cap
2ND Meas. Types	DCV	Available								
	DCI		Available							
	ACV			Available		Available	Available			

	Basic Measurement Function								
	DCV	DCI	ACV	ACI	FREQ	PERIOD	2WR	4WR	Cap
ACI				Available					
FREQ			Available	Available	Available				
PERIOD			Available	Available		Available			
2WR							Available		
4WR								Available	
Cap									Available

Remarks:

1. If the measurement type for the basic measurement and 2ND measurement is the same:

- The measurement data are updated synchronously in both the main display area and the secondary display area.
- If the math operations are adopted for the basic measurement types, then the operation results are displayed in the main display area and the measurement values before the operation are displayed in the secondary display area. For details, refer to *User Interface Overview*.

2. If the measurement type for the basic measurement and 2ND measurement is different:

- The two types of measurements are carried out alternatively. The measurement data in the main display area and the secondary display area are updated respectively.
- If math operations such as Stat, Limit, dBm, and dB are adopted and Relative operation is disabled for the basic measurement types, then the measurement values for the main measurement types are displayed in the main display area and the measurement values for the secondary measurement types are displayed in the secondary display area.
- If the math operations such as Stat, Limit, dBm, and dB are adopted and Relative operation is enabled for the basic measurement types, then the Relative operation results are displayed in the main display area and the

measurement values for the secondary measurement types are displayed in the secondary display area.

3. When the basic measurement type is Sensor, after setting the sensor parameters, the operation results (Relative Value) of the sensor is displayed in the main display area, and the current measurement value is displayed in the secondary display area. For details, refer to *To Measure User-defined Sensor*.

4. When the basic measurement type is ACV and the secondary measurement type is FREQ/PERIOD; or when the basic measurement type is FREQ/PERIOD and the secondary measurement type is ACV, the measurement values are mainly displayed for the basic measurement types.

5. By default, the secondary measurement types adopts Auto range. If the main and secondary measurement types are the same, then the secondary measurement type use the same range as the basic meaurement type.

6. The measurement data of the secondary measurement types do not support Holding operation.

5.5　Preset Mode

The instrument provides the preset setting. Preset mode applies to production lines to avoid misoperations.

Press $\boxed{\text{Shift}}$ > $\boxed{\text{2ND}}$ to enter the preset interface.
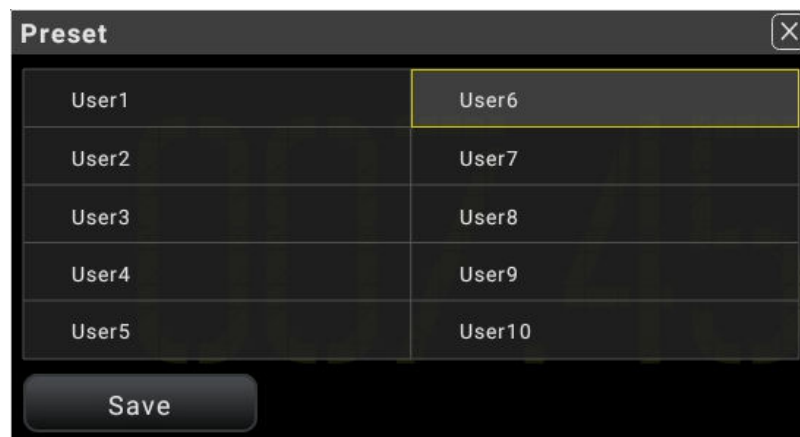
Figure 5.38 Preset Interface

The preset mode allows you to preset 10 user-defined settings.

Preset Settings

If User1 is defined to preset DCV measurement configurations and User2 is defined to preset ACV measurement configurations:

After configuring the DCV measurement parameters, click or tap **User1** > **Save**, "saved" in brackets is added following User1, which indicates that the DCV configurations are saved as User1(saved) preset file. At this time, **Apply** and **Delete** menu are added to the interface. To load the DCV configurations that you set, click or tap **Apply** to load the DCV measurement configurations. Click or tap **Delete** to delete the user-defined DCV presetting.

After configuring the ACV measurement parameters, click or tap **User2** > **Save**, "saved" in brackets is added following User2, which indicates that the ACV configurations are saved as User2(saved) preset file.

At this time, **Apply** and **Delete** menu are added to the interface. To load the ACV configurations that you set, click or tap **Apply** to load the ACV measurement configurations. Click or tap **Delete** to delete the user-defined ACV presetting.

Figure 5.39 Preset Setting Interface

5.6   Math Operation

The multimeter provides five math functions: Statistics (Max, Min, Avg, standard deviation, and count), Limit, dBm, dB, and Relative operation. You can select different math functions for different measurement items.

The math operations are applicable to the voltage, current, resistance, capacitance, frequency/period, and sensor measurements. However, dB and dBm operations are only applicable to the voltage measurement.

NOTE
The math operation is diabled when the range is AUTO.

Press [Math] or click/tap [Math icon] on the screen, then the math operation interface is displayed, as shown in *Figure 5.40* .
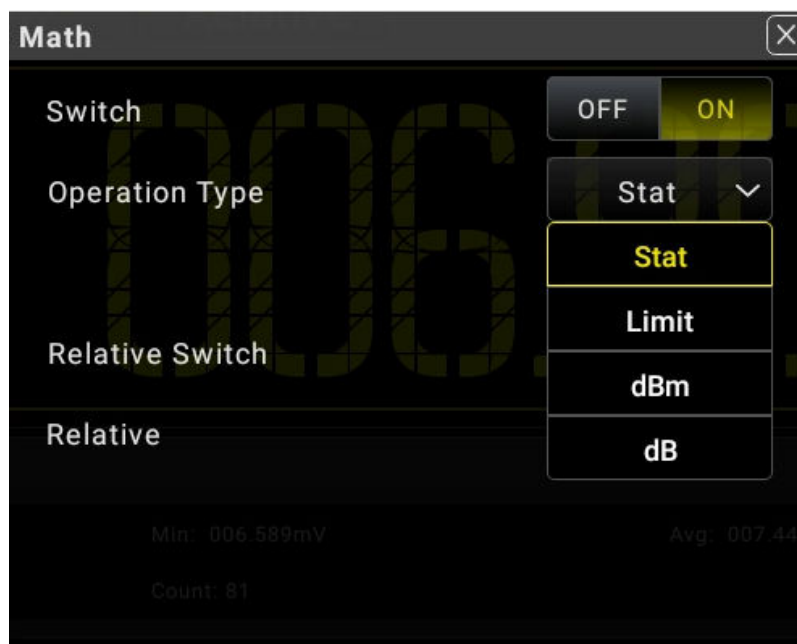
Figure 5.40 Math Operation Setting

Table 5.15 Description of Math Operations

Parameter	Remarks
Statistics	Makes statistics of the current measurement, including maximum value, minimum value, average value, standard deviation, and count (current count of the samples).
Limit	Sets the upper and lower limits and makes limit operation to identify those signals that are beyond the limits by sounding an alarm. It is applicable to DCV, ACV, DCI, ACI, Resistance, Frequency, Capacitance, and temperature measurements.
dBm	The dBm function is logarithmic, comparing power delivered to a reference resistance, relative to 1 milliwatt:
dB	Each dB measurement is the difference between the input signal and a stored reference value, with both values converted to dBm.
Relative	Enables or disables the Relative operation.

EN

5.6.1   Statistics

The Statistics operation calculates the min. value, max. value, average value, standard deviation, and reading count during the measurement.

The multimeter can perform Statistics operation on the following measurement items: DCV, ACV, DCI, ACI, Resistance, Frequency, Period, Capacitance, and any sensors.

Press [Math] to enter the math operation interface. You can also click or tap [Math] to enter the math operation interface. Then, select Stat from the drop-down list of Operation Type.
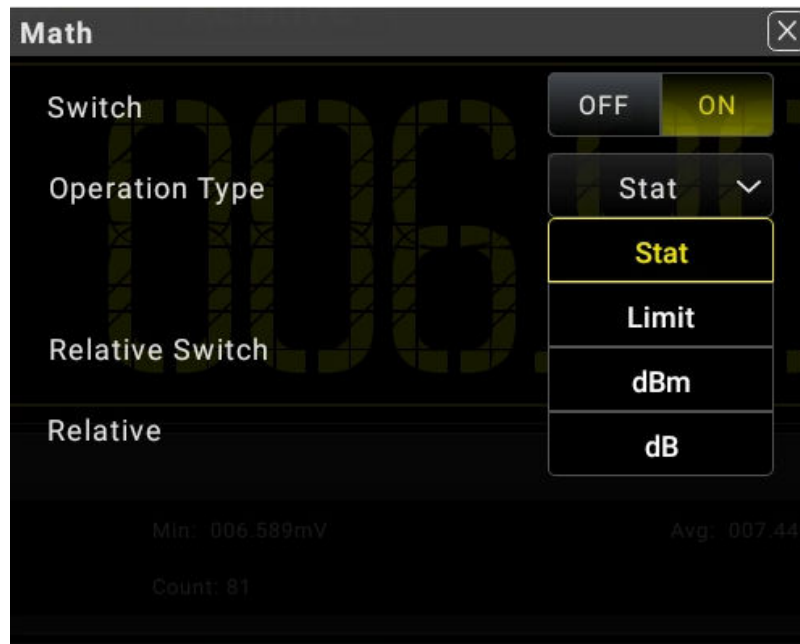
Figure 5.41 Statistic Parameter Setting

Table 5.16 Statistic Parameter Setting

Parameter	Remarks
Switch	Enables or disables the Statistical operation.
Operation Type	Selects Stat.

The operation results are displayed in the secondary display area, as shown in the following figure.
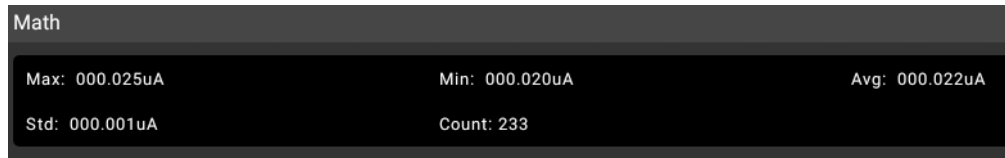
Figure 5.42 Statistics Operation Result

- Max: indicates the max. reading.

- Min: indicates the min. reading.

- Avg: indicates the average value of the reading.

- Std: indicates the standard deviation of the reading.

- Count: indicates the reading count.

NOTE

- When statistics operation is selected, the multimeter takes the first reading as the maximum (or minimum) for displaying. The reading shown on the screen is always the maximum (or minimum) within the current readings when measuring multiple consecutive readings.
- The max. value, min. value, average value, and sample count are all stored in the volatile memory. They will be cleared at power-off.

5.6.2 Limit

The limit operation allows you to set the specified upper limit and lower limit. Once the signal beyond the set limits appears, the beeper sounds. The multimeter can perform limit operation on the following measurement items: DCV, ACV, DCI, ACI, Resistance, Frequency, Period, Capacitance, and temperature sensor.

Press **Math** to enter the math operation interface. You can also click or tap 🔲 to enter the math operation interface. Then, select Limit from the drop-down list of Operation Type.

EN
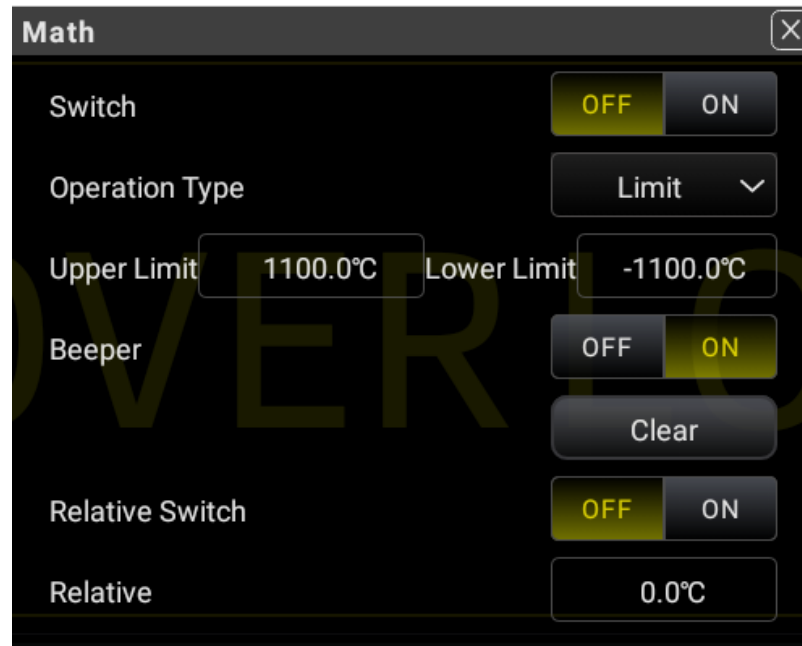
Figure 5.43 Limit Parameter Setting

Table 5.17 Limit Parameter Setting

Parameter	Remarks
Switch	Enables or disables the Limit operation.
Operation Type	Selects Limit operation.
Upper Limit	Indicates the specified upper limit.
Lower Limit	Indicates the specified lower limit.
Beeper	Enables or disables the beeper. When enabled, the beeper sounds once the reading exceeds the set limits.
Clear	Clears the current status and starts to make statistics again.
Relative Switch	Enables or disables the Relative operation.
Relative	Input the Relative value.

NOTE

- The ranges of the upper and lower limits shall be within -120%-120% of the current measurement range.
- The specified upper limit shall be greater than the lower limit.
- The upper and lower limits are stored in the volatile memory. They will be reset to the default values at power-on.

1. Set the limits

Click/tap the input field of **Upper Limit** or **Lower Limit** to input the desired value with the pop-up numeric keypad.

When inputting a positive or negative value, click or tap the "±" sign to switch between the positive and negative value sign.

The limit value unit is determined by the currently selected measurement item.

When the limit value you set exceeds the specified one, the beeper sounds (if enabled), and an error message "-222 Data out of range" is displayed.

2. Math operation result display

When you perform the math operation, the math operation results are displayed in the secondary display area, as shown in the figure below.
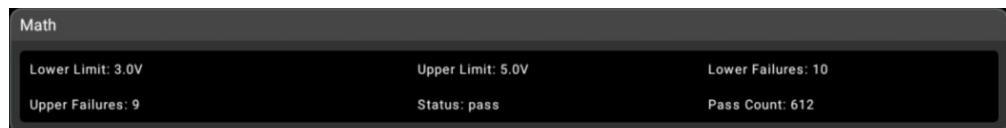
Figure 5.44 Limit Operation

Lower Failures: indicates the counts of below the defined lower limit.

Upper Failures: indicates the counts of above the defined upper limit.

Status: indicates the status of the limit operation.

Pass count: indicates the counts of values that are within the defined upper limit and lower limit.

When the count exceeds the upper limit, the secondary display area displays "high fail"; when the count exceeds the lower limit, the secondary display area displays "low fail"; when the count does not exceed the upper limit or lower limit, it shows "pass". If the beeper is enabled, when the count exceeds the upper limit or is below the lower limit, the beeper sounds an alarm.

5.6.3   dBm

dBm represents the absolute value of the power. The dBm operation calculates the power of the reference resistance according to the measured voltage. The dBm function applies to AC voltage and DC voltage measurements only.

Press Math to enter the math operation interface. You can also click or tap 🔲 to enter the math operation interface. Then, select dBm from the drop-down list of **Operation Type**.
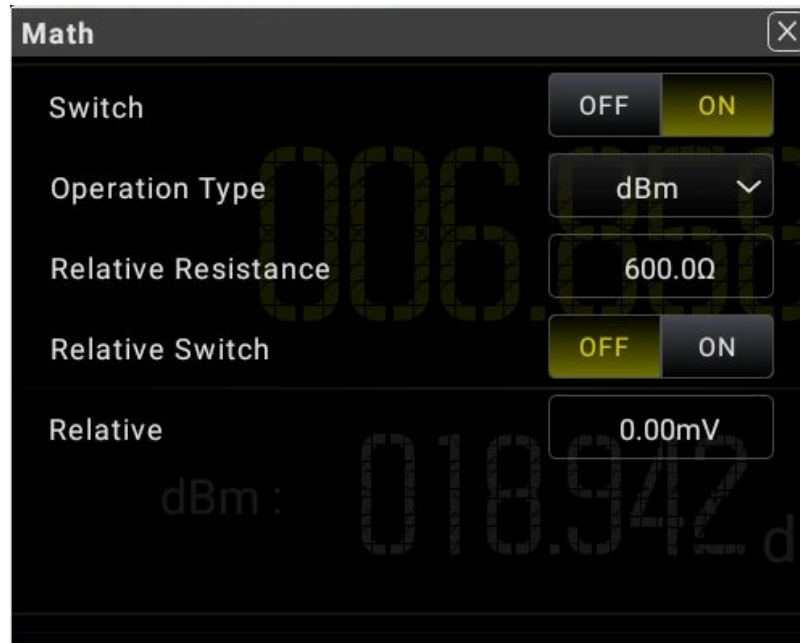
Figure 5.45 dBm Parameter Setting Interface

Table 5.18 dBm Parameter Setting

Parameter	Description
Switch	Enables or disables dBm operation.
Operation Type	Selects **dBm**.
Relative Resistance	The settable range is from 50 Ω to 8000 Ω.

dBm Operation Method

The dBm operation calculates the power of the reference resistance according to the measured voltage. The formula is as follows:

dBm = 10 x Log_{10} [(Reading^2 /R_{REF})/0.001W]

Wherein, Reading denotes the measured voltage and R_{REF} denotes the reference

resistance.

Take DCV measurement as an example, the calculation results are displayed in the secondary display area, as shown in the following figure.

Figure 5.46 dBm Operation Results

5.6.4 dB

dB represents the relative value which is used in the Relative operation of dBm value. The dB function applies to AC voltage and DC voltage measurements only.

Press $\boxed{\text{Math}}$ to enter the math operation interface. You can also click or tap $\boxed{\text{Math}}$ to enter the math operation interface. Then, select dB from the drop-down list of Operation Type.
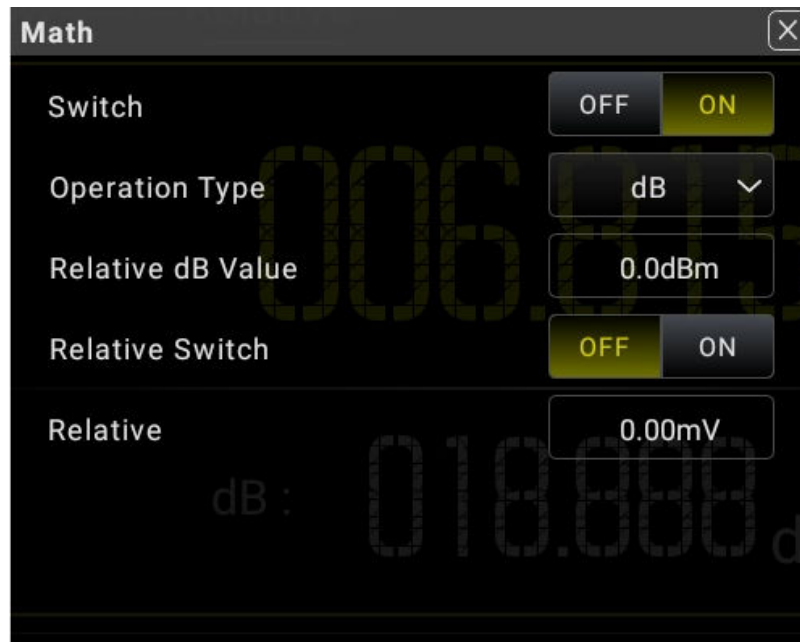
Figure 5.47 dB Operation Parameter Setting

Table 5.19 dB Parameter Setting

Parameter	Description
Switch	Enables or disables dB operation.
Operation Type	Selects **dB**.
Relative dB Value	The range of the relative dB value is from -120.00 dBm to 120.00 dBm. By default, it is 0 dBm.

dB Operation Method

When enabled, the multimeter calculates the dBm value of the next reading and subtracts the relative dB value from this value and then displays the result.

dB = 10 x Log_{10} [(Reading^2 /R_{REF})/0.001W] - dB relative value

Wherein, Reading denotes the measured voltage and R_{REF} denotes the reference resistance.

Take DCV measurement as an example, the calculation results are displayed in the secondary display area, as shown in the following figure.

Figure 5.48 dB Operation Results

NOTE

Relative dB Value

- Input a relative dB value with a pop-up numeric keypad, and save it as a relative dB value.
- The relative dB value is stored in the volatile memory and will be cleared at power-off. The range of the relative dB value is from -120 dBm to 120 dBm. By default, it is 0 dB.

5.6.5   Relative

The reading displayed on the screen in Relative operation is the difference between measured and relative values.

Enable the relative operation To enable the relative operation, perform the following operations:

- Click or tap ![Relative] to enable the relative operation. The Relative menu label is highlighted in yellow box.
- In the math operation menu, click or tap **ON** for the **Relative Switch** menu.

Displayed Value = Measured Value - Relative Value

Figure 5.49 Relative operation

The multimeter can perform relative operation on the following measurement items: DCV, ACV, DCI, ACI, Resistance, Frequency, Period, Capacitance, and temperature sensor.

The ranges of the relative values in Relative operation are shown in the table below:

Table 5.20 Relative Value Setting Range

Measurement Item	Setting Range
DCV	(-120% of the current range) to (120% of the current range)
ACV	(-120% of the current range) to (120% of the current range)
DCI/ACI	(-120% of the current range) to (120% of the current range)
2WR/4WR	(-120% of the current range) to (120% of the current range)

Measurement Item	Setting Range
Capacitance	(-120% of the current range) to (120% of the current range)
Frequency	-120 kHz to 120 kHz
Period	-60 ms to 60 ms

5.7　Graph Display

The measurement results can be displayed in Trend, Histogram, and Bar Chart.

NOTE
The graph display is disabled in Continuity and Diode tests.

5.7.1　Trend Graph

Click or tap ![Display] to enter the graph display interface.

Figure 5.50 Graph Display

1. Enable the graph

Click or tap the ON/OFF tab for the **Switch** menu to enable or disable the graph display.

2. Select the graph type

Click or tap the drop-down list of Chart Type to select "Trend". Then the following interface is displayed.

3. Record the data

Record: selects the reading data to be displayed in the trend graph. You can select RECENT or ALL data.

- RECENT: displays the most recent reading data.

- ALL: displays all of the reading data.

4. Set the vertical scale

Vertical Scale: sets the vertical scale of the trend graph. It supports Auto and Manual setting modes.

- Manual: You can set the vertical scale manually with two modes: Start-End and

  Center-Span.
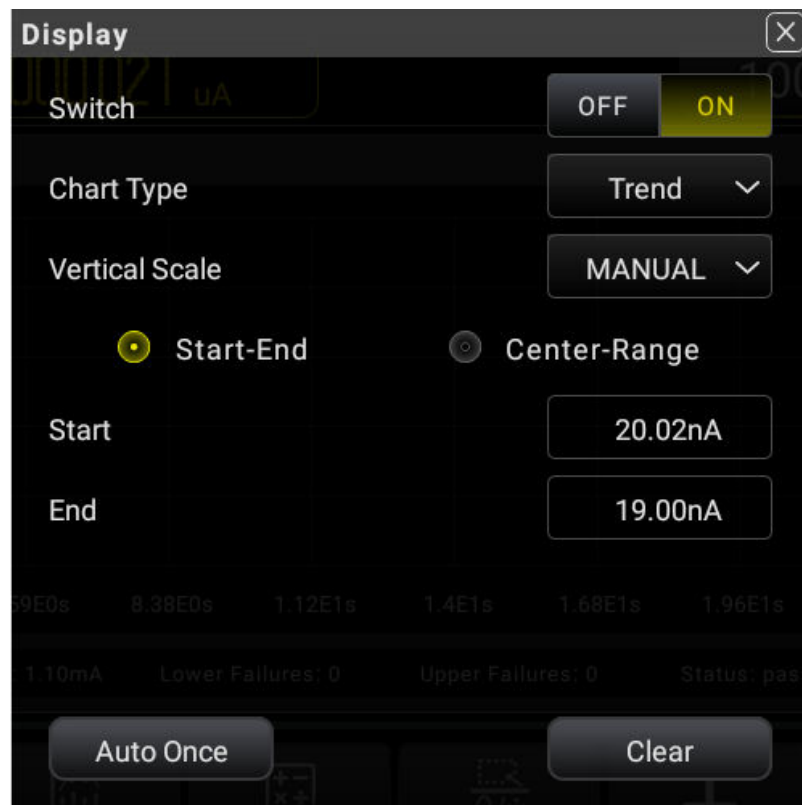
Figure 5.51 Manual Setting Menu

- Start: sets the start value of the horizontal scale.

- End: sets the end value of the vertical scale.

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- Center: sets the middle value of the vertical scale.

- Range: sets the span of the vertical scale.

- Auto: takes the current measurement range as the span of the vertical scale and adjusts the span of the vertical scale automatically based on the range of the measured data.

5. Auto Once

Click or tap Auto Once, the instrument auto adjusts the span of the vertical scale based on the range of the measured data.

6. Clear

Click or tap Clear to clear the existing reading memory and the data in the trend graph, and start to acquire new readings to make a new trend.

The following figure shows the trend display for the DCV measurement.
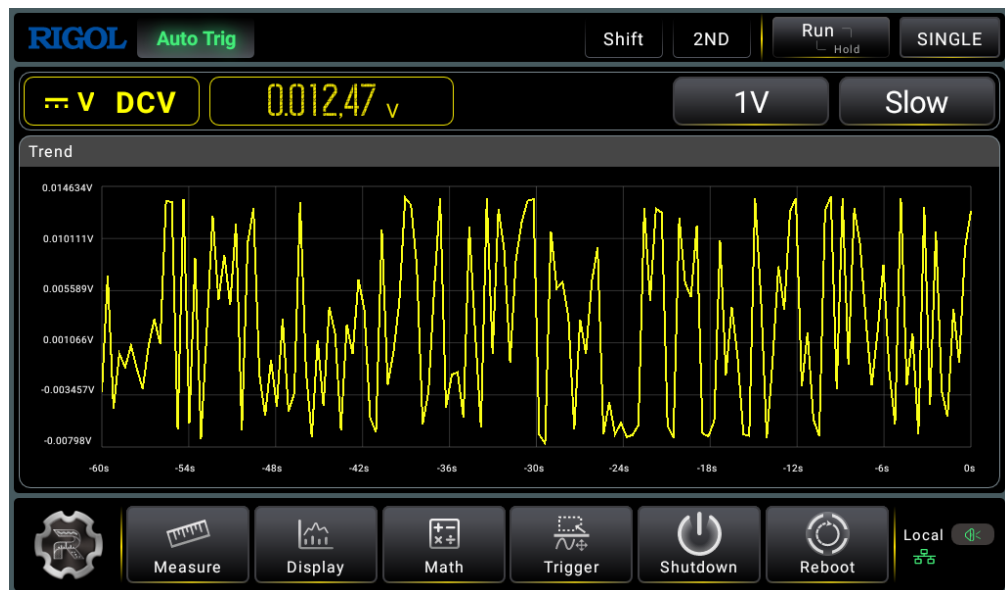
Figure 5.52 Trend Graph of DCV Measurement

The measurement rate for Capacitance, Period, and Frequecny is fixed to be Slow.

In Slow and Medium speed, the Trend graph only displays the samples within 60 s; in Fast speed, the Trend graph only displays samples within 10 s.

5.7.2   Histogram

Click or tap to enter the display interface.

Figure 5.53 Graph Display Interface

1. Click or tap the ON/OFF tab for the <mark>Switch</mark> menu to enable or disable the graph

display.

2. Click or tap the drop-down list of <mark>Chart Type</mark> to select "Histogram". Then the

following interface is displayed.
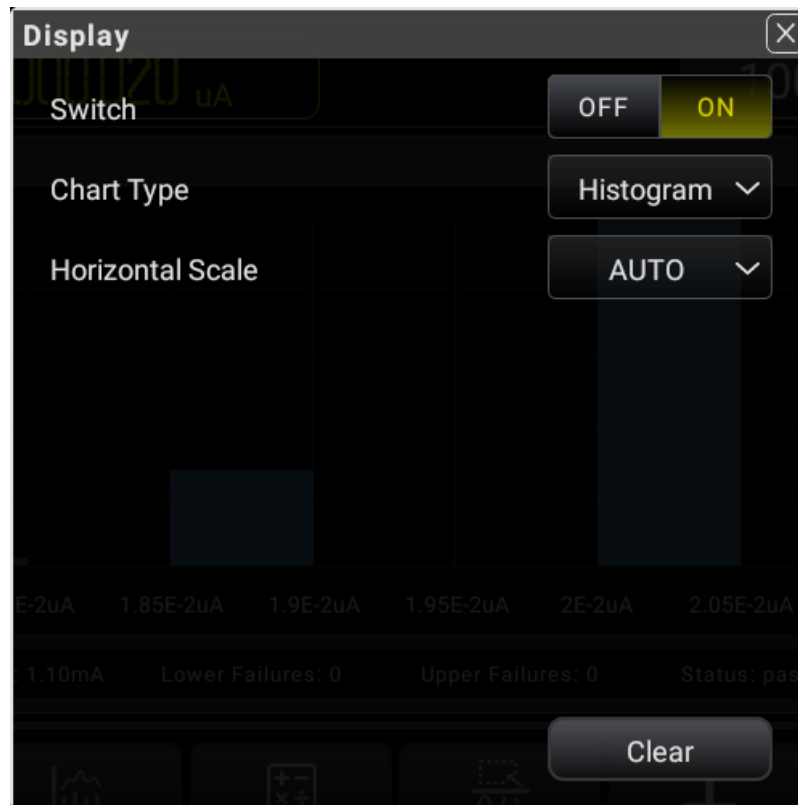
Figure 5.54 Histogram Setting Interface

3. The X-axis setting of the histogram supports Auto and Manual.

- Auto: the number of bins is a fixed number 10. The outer bin is disabled. The readouts outside of the upper and lower limits will not be displayed on the histogram. Its upper and lower limits are automatically set based on the current range.

- Manual: sets the parameters of the histogram display manually, including the range type (start-end/center-range) displayed in the horizontal scale of the histogram, the number of bins, whether enabling or disabling the outer bin.
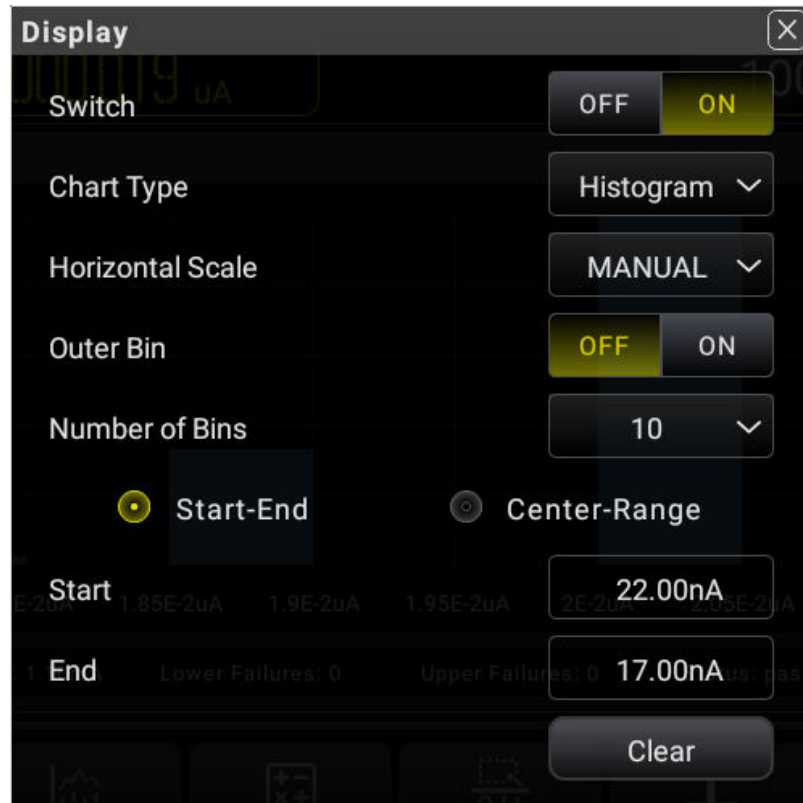
Figure 5.55 Histogram Manual Setting

- Outer Bin: sets to enable or disable the display of the additional bins at both
  left and right ends of the horizontal scale of the histogram, which can make
  statistics on the data that are above or below the horizontal scale range.

- Number of Bins: sets the number of bins. The available settings are 10, 20,
  40, 100, 200, and 400.

- End: sets the end value of the horizontal scale.

- Start: sets the start value of the horizontal scale.

- Center: sets the middle value of the horizontal scale.

- Range: sets the range value of the horizontal scale.

4. Click or tap **Clear** to clear the existing reading memory and the data in the trend
graph, and start to acquire new readings to make a new trend.

5. The following figure shows the histogram display for the DCV measurement.

EN
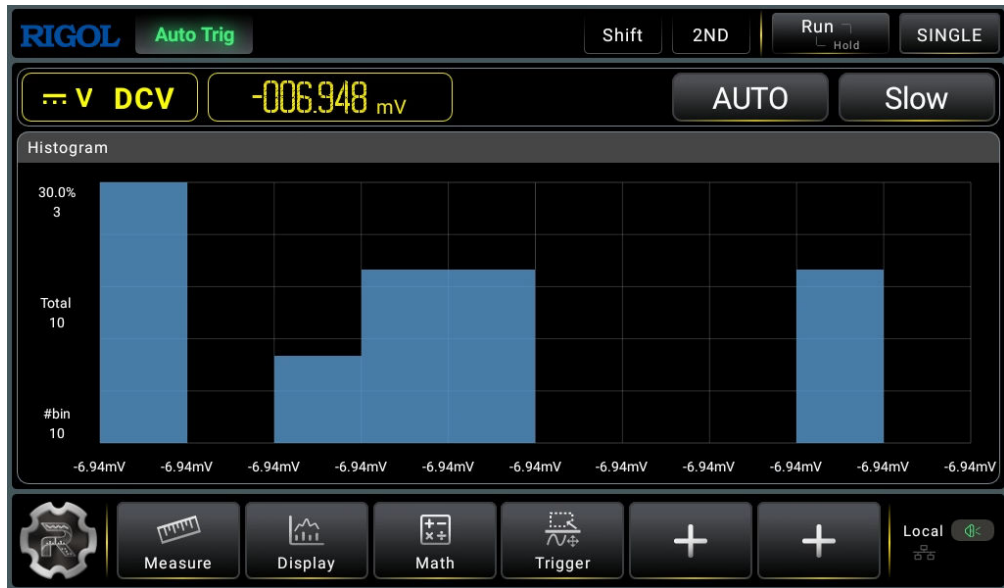
Figure 5.56 Histogram of DCV Measurement

As shown in the figure above, data are grouped in bins represented by vertical bars in the histogram display. The data are displayed on the left side of the histogram. Read the data from left downward.

- 82.6%: indicates the percentage of samples in the largest bin.
- 419: indicates the number of samples in the largest bin.
- Total 507: indicates the total number of samples.
- #bin 10: indicates the total number of bins.

For different measurement modes, the max. number of samples supported by the histogram is different. See the following table for details.

Table 5.21 Max. Number of Samples Displayed in the Histogram

Measurement Rate	Max. Number of Samples		
	Capacitance Measurement	Frequency/Period Measurement	Other Measurements
Slow	61	45	150
Medium	N/A	N/A	1050
Fast	N/A	N/A	DM858: 1000 DM858E: 700

The measurement rate for Capacitance, Period, and Frequency measurements is Slow.

5.7.3　Bar Chart

Click or tap [Display] to enter the display interface.

Figure 5.57 Display Interface

1. Enable the graph

Click or tap the ON/OFF tab for the Switch menu to enable or disable the graph display.

2. Select the graph type

Click or tap the drop-down list of Chart Type to select "BarChart". Then the following interface is displayed.
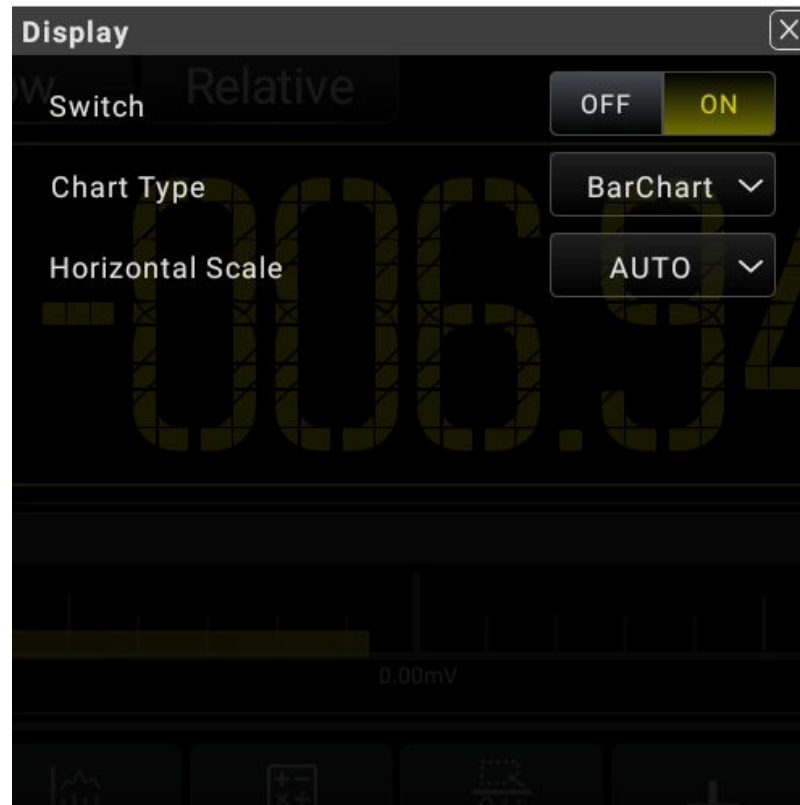
Figure 5.58 BarChart Setting Interface

3. Set the horizontal scale

The Horizontal Scale supports **Auto** and **Manual** setting modes.

- Auto: takes the currently set range as the horizontal scale.

- Manual: You can set the horizontal scale manually with two modes: Upper-

   Lower and Center-Range.

Figure 5.59 Manual Setting of Bar Chart

- Start: sets the start range of the horizontal scale.

- End: sets the end range of the horizontal scale.

- Center: sets the middle value of the horizontal scale.

- Range: sets the range value of the horizontal scale.

The following figure shows the bar chart display form for the DCV measurement.
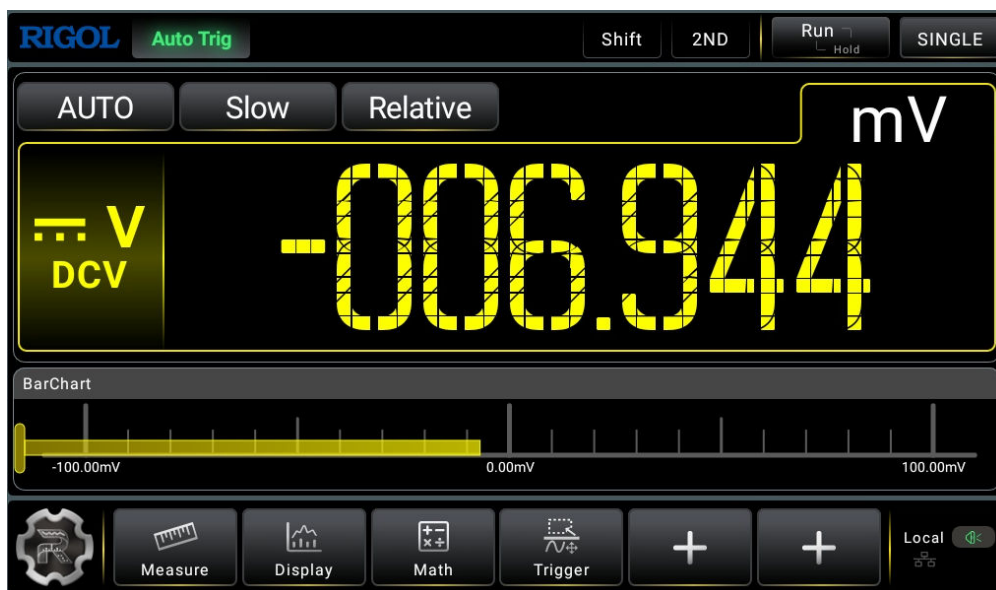
Figure 5.60 Bar Chart of DCV Measurement

5.8   Trigger

The optional trigger methods of the multimeter include Auto Trigger, Single Trigger and External Trigger. The default trigger mode is Auto trigger at power-on.

Run Hold: Press this key to enable Auto trigger, and then the instrument starts to acquire data and obtain the reading continuously. Press this key again, the reading holds and is displayed stably on the screen.

The multimeter reads a specified number of readings each time a trigger signal is

received and allows users to set the interval between the data acquisition and the

reading. Click or tap the Trigger label at the bottom of the screen to enter the trigger

setting menu.

Click or tap to select Auto, Single, or External trigger. By default, Auto is selected.

Auto: the instrument continuously takes measurements, automatically initiating a new trigger as soon as a measurement is completed.

Single: the instrument initiates a trigger each time you press the front-panel Single key.

External: the instrument initiates one trigger each time an edge of the appropriate slope arrives on the rear-panel EXT TRIG connector.
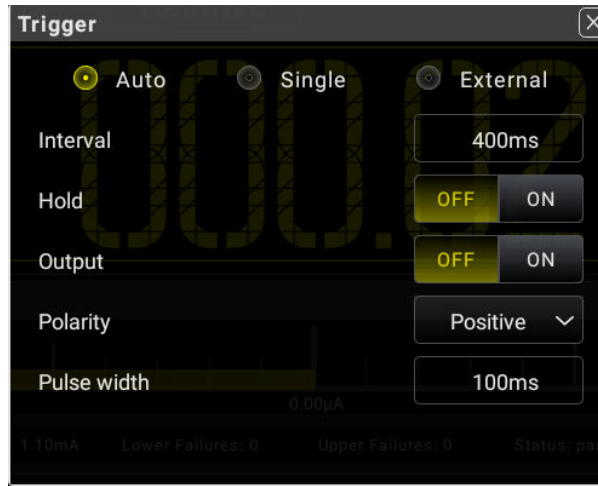
Figure 5.61 Trigger Parameter Setting

Table 5.22 Trigger Setting Menu

Parameter	Description
Auto	The multimeter performs measurement continuously. Each time it completes one measurement, new trigger will be initiated automatically. The multimeter obtains consecutive reading data. You can press Run/Hold to suspend or stop trigger.
Single	Each time you press the Single key, a single trigger is initiated.
External	The multimeter initiates a trigger when an external signal is received via the rear-panel **EXT TRIG** connector and triggers on the specified edge of the pulse signal, and acquire the reading data.

5.8.1 Auto Trig

Auto Trig

In Auto trig, you need to set the parameter "Interval". Press [Run Hold] on the front panel to enable the auto trigger and the instrument starts to make continuous measurements. The measurement data are acquired continuously. By default, the trigger mode is auto trig when the instrument is powered on.

Press [Trig] > **Auto** to enter the auto trigger setting menu.
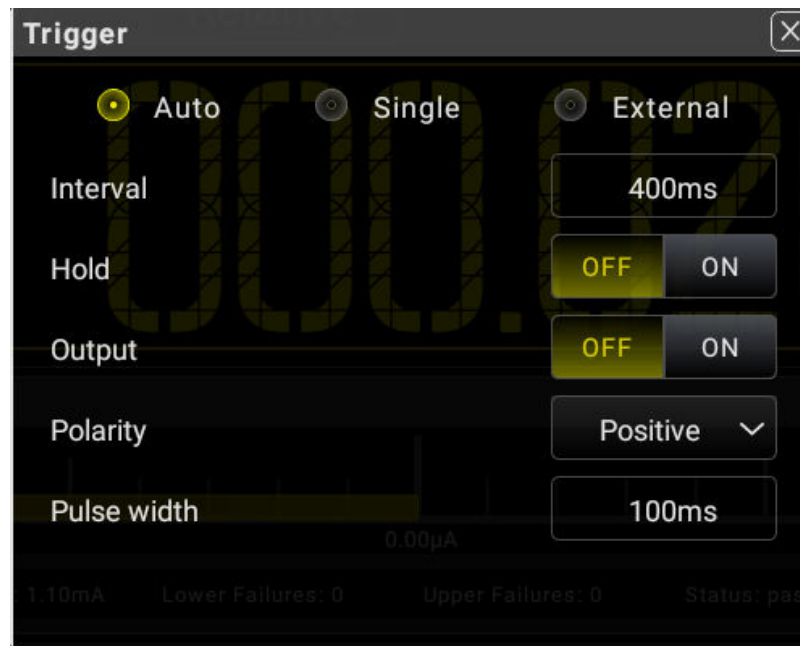
Figure 5.62 Auto Trigger Setting Interface

Table 5.23 Auto Trigger Menu

Parameter	Remarks
Interval	Sets the interval of the auto trigger. • It indicates the waiting time before acquisition when the trigger signal is sent. The intervals are different for different measurement speeds. Fast: The default interval is 8 ms. For DM858, its range is from 8 ms to 2,000 ms. For DM858E, its range is from12 ms to 2,000 ms. Medium: The default interval is 50 ms. Its range is from 50 ms to 2,000 ms. Slow: The default interval for Frequency and Period measurement is 1,600 ms. Its range is from 1,600 ms to 2,000 ms. The default interval for other measurement is 400 ms. Its range is from 400 ms to 2,000 ms. The default measurement rate is Slow, and the default interval is 400 ms. • The interval is stored in volatile memory.

Parameter	Remarks
Hold	Enables or disables the reading hold. In Auto trigger state, when you press [Run Hold], the [Run Hold] key blinks and the reading hold function is enabled, a stable readout is captured and is shown on the screen.
Sensitivity	When reading hold is enabled, you can set the sensitivity. For detailed operations, refer to *Hold*.
Output	Sets whether to output the pulse signal after sampling. By default, it is OFF. When enabled, the pulse signal is output via the rear-panel **VM COMP** interface. You can set the polarity and width of the pulse signal.
Pulse Polarity	Sets the polarity of the output pulse signal after sampling.
Pulse Width	Sets the pulse width of the output pulse signal. The range of the pulse width is different under different measurement speed. Fast: The default pulse width in fast speed is 2 ms. For DM858, its range is from 1 ms to 7 ms. For DM858E, its range is from 1 ms to 11 ms. Medium: The defalut pulse width in medium speed is 10 ms. Its range is from 1 ms to 49 ms. Slow: The default pulse width in slow speed is 100 ms. The range of the pulse width for the Frequency/Period measurement is from 1 ms to 1,599ms. The range of the pulse width for other measurements is from 1 ms to 399 ms.

Hold

You can enable the readout hold function via the following two methods:

- In Auto trigger state, press [Run Hold].

- In the Auto trigger setting interface, click or tap to select **ON** for the **Hold** menu.

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Figure 5.63 Enable the Hold function

When you enable the readout hold function, you can set the sensitivity. Adjust the range of the sensitivity to ensure that the readout is stable and properly displayed. It is expressed in %. If the readout is outside of the range of the selected sensitivity, the multimeter will capture the new readout and display it. The available sensitivity value can be set to 0.01%, 0.1%, 1%, or 10%. By default, it is 0.01%. For example, set the sensitivity to 0.01% and input a 5V signal, if the readout is beyond the range of 4.99975V-5.00025V, a new readout is displayed.

As shown in the figure above, the value shown in the main display area is the current measurement hold value. The table below the main display area records the latest nine updated readouts. Click or tap **Remove All** to remove all the readouts from the table. Click or tap **Remove Last** to remove the last displayed readout.

When the Hold function is enabled, you can set the beeper. When the beeper is enabled, if the readout is outside of the set sensitivity range, the instrument sounds an alarm and records the data in the table.

5.8.2   Single

In Single trigger, you need to set the parameter "Sample".
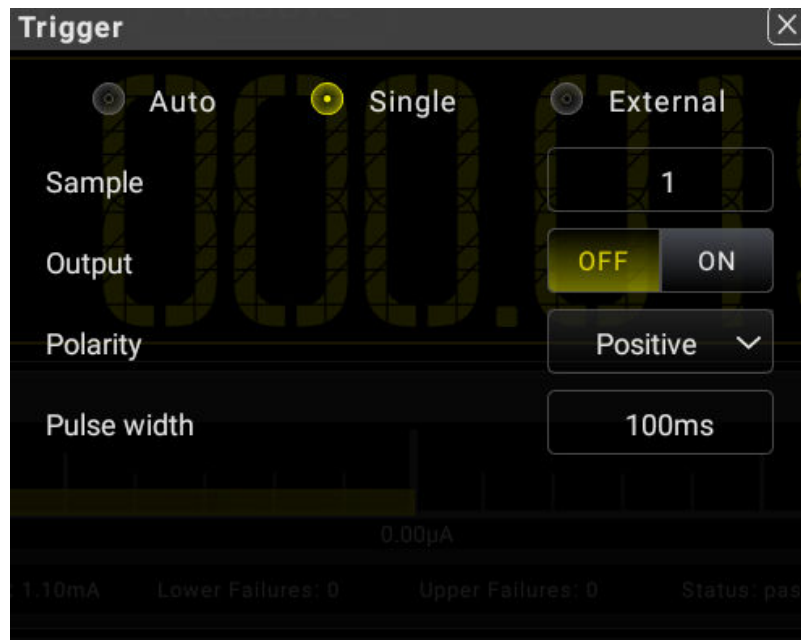
Figure 5.64 Single Trigger Parameter Setting

Table 5.24 Single Trigger Parameter Setting

Parameter	Remarks
Sample Count	Sets the number of samples acquired for each single trigger. The range is from 1 to 2,000. By default, it is 1.
Output	Sets whether to output the pulse signal. By default, it is OFF. When enabled, the pulse signal is output via the rear-panel **VM COMP** interface. You can set the polarity and width of the pulse signal.
Pulse Polarity	Sets the polarity of the output pulse signal after sampling.
Pulse Width	Sets the pulse width of the output pulse signal. The range of the pulse width is different under different measurement speed. Fast: The default pulse width in fast speed is 2 ms. For DM858, its range is

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Parameter	Remarks
	from 1 ms to 7 ms. For DM858E, its range is from 1 ms to 11 ms.
	Medium: The defalut pulse width in medium speed is 10 ms. Its range is from 1 ms to 49 ms.
	Slow: The default pulse width in slow speed is 100 ms. The range of the pulse width for the Frequency/Period measurement is from 1 ms to 1,599ms. The range of the pulse width for other measurements is from 1 ms to 399 ms.

5.8.3   External Trigger

The external trigger signal is input via the rear-panel **EXT TRIG** connector. You can set the parameters such as Edge, Output, Polarity, and Pulse Width.

Press Trig > **External** to enter the External trigger setting menu.
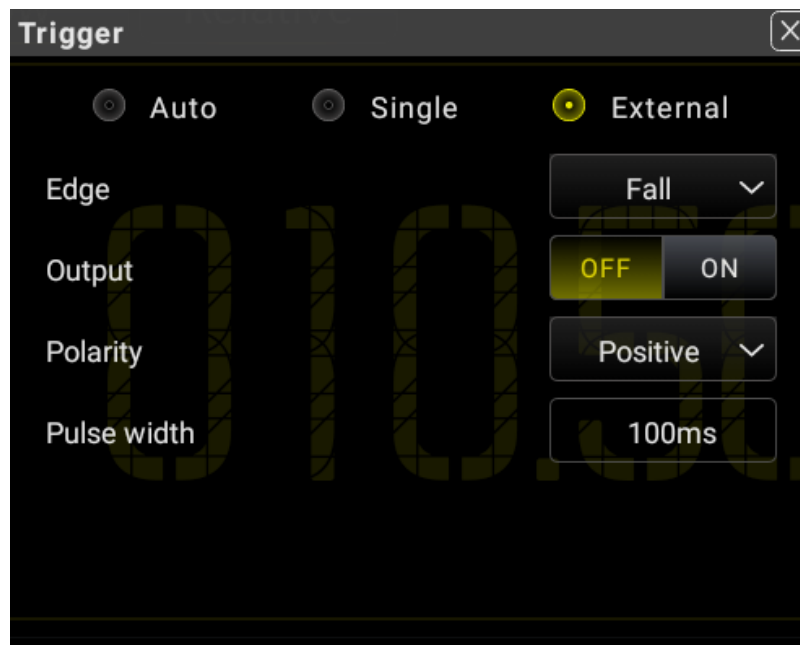
Figure 5.65 External Trigger Parameter Setting

Table 5.25 External Trigger Parameter Setting

Parameter	Description
Edge	Sets the trigger edge type. The available edges are Rise, Fall, HighLevel, and LowLevel. By default, it is Rise. When no external signal is available, it triggers only when HighLevel is selected. When an external signal is available, use the external trigger with a specified edge to make a measurement.
Output	Sets whether to output the pulse signal after sampling. By default, it is OFF. When enabled, the pulse signal is output via the rear-panel **VM COMP** interface. You can set the polarity and width of the pulse signal.
Pulse Polarity	Sets the polarity of the output pulse signal after sampling.
Pulse Width	Sets the pulse width of the output pulse signal. The range of the pulse width is different under different measurement speed. Fast: The default pulse width in fast speed is 2 ms. For DM858, its range is from 1 ms to 7 ms. For DM858E, its range is from 1 ms to 11 ms. Medium: The defalut pulse width in medium speed is 10 ms. Its range is from 1 ms to 49 ms. Slow: The default pulse width in slow speed is 100 ms. The range of the pulse width for the Frequency/Period measurement is from 1 ms to 1,599ms. The range of the pulse width for other measurements is from 1 ms to 399 ms.

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NOTE

- To ensure the external trigger works normally, ensure that the period of the input trigger signal is greater than the measurement period (1.6 s) when using external trigger in measuring Frequency/Period.

- For other measurements, to ensure the effectiveness of the external trigger, ensure that the period of the input trigger signal is greater than the measurement period (0.4 s).

- For Continuity, Diode, and Capacitance measurements, Auto trigger is fixed and cannot be modified to other trigger types.

- In external trigger, when no external trigger is input, the instrument will stay Auto trigger state when the trigger edge is high level until an external trigger signal is input.

5.9 Screen Image

To capture the screen image, perform either one of the following two operations.

Quick Save of Screen Image

Click or tap > **PrintScreen**.

The system auto captures and saves the screen image of the current interface. The image is saved in "*.png" format and cannot be modified to other formats. After performing the operation, "C:/ScreenShot-hh-mm-ss.png" is displayed, indicating the location of the saved image and its name. "hh-mm-ss" shows the time for capturing the screen image. To set the information about the saved image, including its color, header, storage path, refer to *To Save a File* for details.

Save the Screen Image with Storage Operation

Press Save on the front panel to enter the storage interface. You can also click or tap > **Storage** to enter the storage interface.
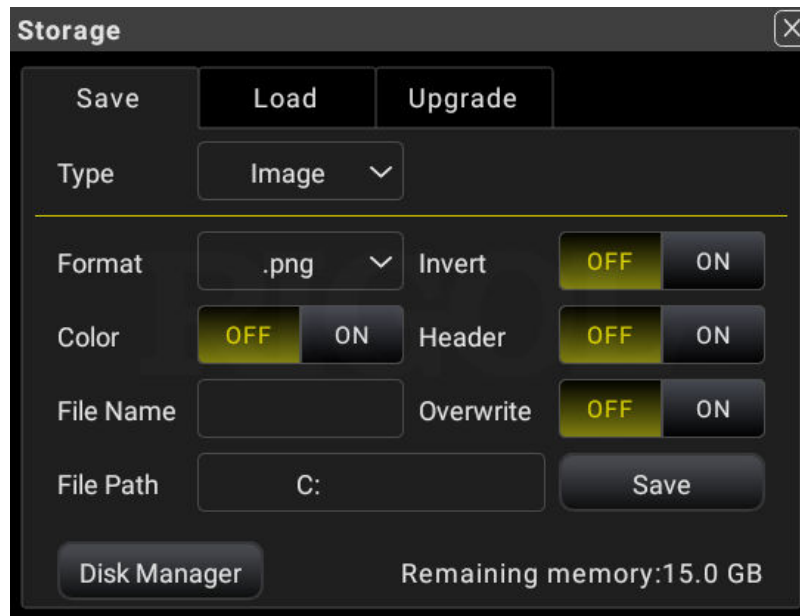
Figure 5.66 Storage Interface

As shown in the figure above, click or tap **Save** to save the current screen image based on the current settings. For details about the image saving settings, refer to *To Save a File*.

5.10   Customized Menu

The multimeter provides two customized menu labels at the bottom of the screen.

Operation Procedures:

1. To enter the customized menu setting interface, perform the following operations.

-   Click or tap [icon] **>** **Menu** to enter the customized menu setting interface.

-   You can also click or tap [icon] at the bottom of the screen to enter the customized menu setting interface.
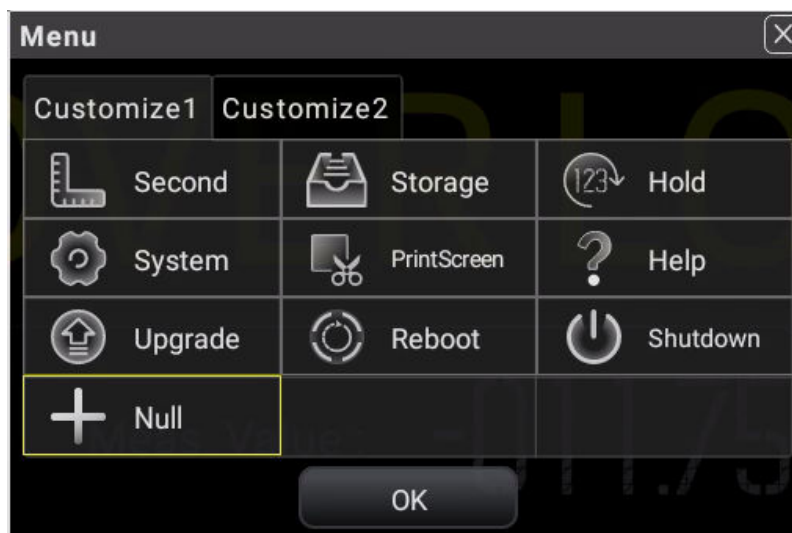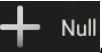
Figure 5.67 Customized Menu Setting Interface

2. The following section introduces how to add "Second" (2ND measurement) as the customized menu to the shortcut menu label display area and delete it from the shortcut menu label display area.

   Add "Second" (2ND measurement) as the customized menu to the shortcut menu label display area: Click or tap the **Customize1** tab, then select **Second**. Click or tap **OK** to add "Second" (2ND measurement) to the customized menu, then "Second" menu label is added to the shortcut menu label display area at the bottom of the screen.

3. Delete the customized menu "Second" (2ND measurement) from the shortcut menu label display area:

   In *Figure 5.67*, click or tap **Second** > , then the "Second" (2ND measurement) menu is removed from the shortcut menu label display area, as shown in .

5.11 System Utility Function Setting

In the system utility function setting, you can set the parameters for the remote interface and the system-related parameters.

Press to enter the system utility setting menu.
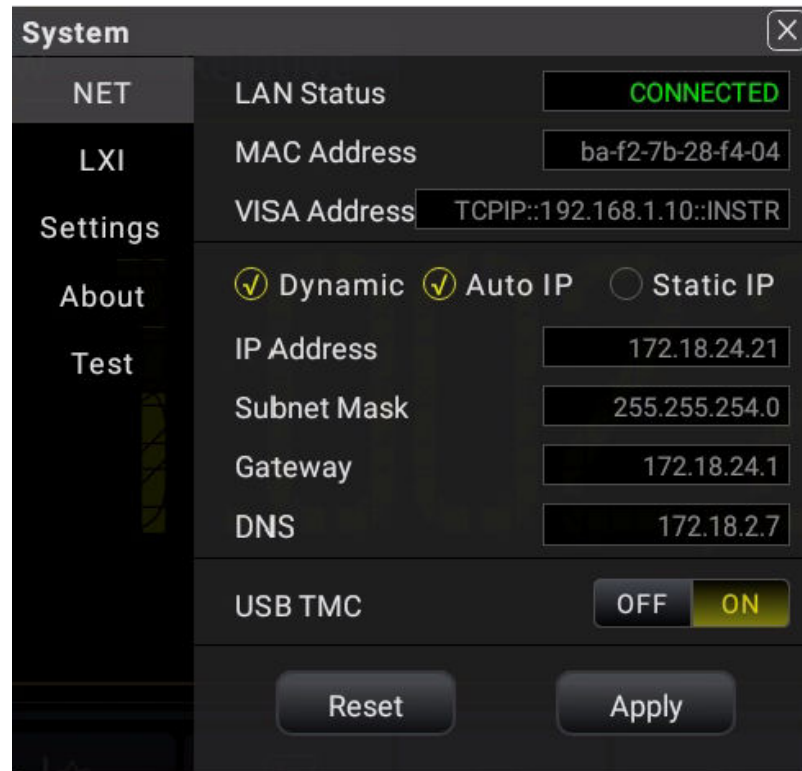
Figure 5.68 System Utility Function Setting Interface

5.11.1   NET Setting

Press [Utility] > **NET** to enter the LAN interface setting.
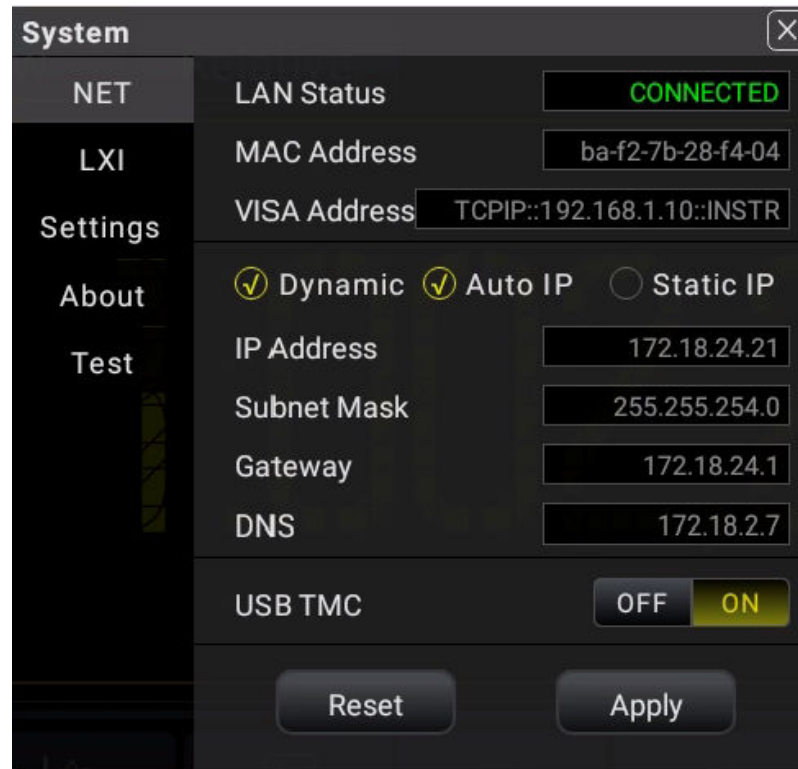
Figure 5.69 NET Setting

Table 5.26 NET Setting Menu

Parameter	Description
LAN Status	Displays the current LAN status and cannot be modified. If the instrument is properly connected to the network, it displays "CONNECTED"; if not, it displays "DISCONNECTED". The status includes CONNECTED, DISCONNECTED, IP CONFLICT, and IP INVALID.
MAC Address	Displays the MAC address of the instrument and cannot be modified.
VISA Address	Displays the VISA address of the instrument and cannot be modified.
IP Address	The configuration type of the address can be DHCP, Auto IP, or Static IP. In different IP configuration types, the configurations for IP address and other network parameters are different. The configuration type of the IP address can be DHCP, Auto IP, or Static IP. The detailed descriptions of the configurations are as follows: • Dynamic: The DHCP server from the current network assigns network parameters to the multimeter such as IP address, subnet mask, gateway address, and DNS address. • Auto IP: The "Auto IP" works only when "Dynamic" is not selected or connection is failed.
Subnet Mask	
Gateway	
DNS	

Parameter	Description
	• If "Static IP" is selected, the instrument is configured with static IP. When this type is valid, disable Dynamic and Auto IP manually, then you can configure "IP Address", "Subnet Mask", "Gateway", and "DNS". At this time, you can self-define the network parameters (e.g. IP address) of the oscilloscope.
USB TMC	Enables the USB TMC protocol. Reset restores the network configurations to its default settings. Apply Applies the current network configurations to the instrument.

5.11.2 LXI Setting

Press Utility > **LXI** to enter the LXI interface setting.
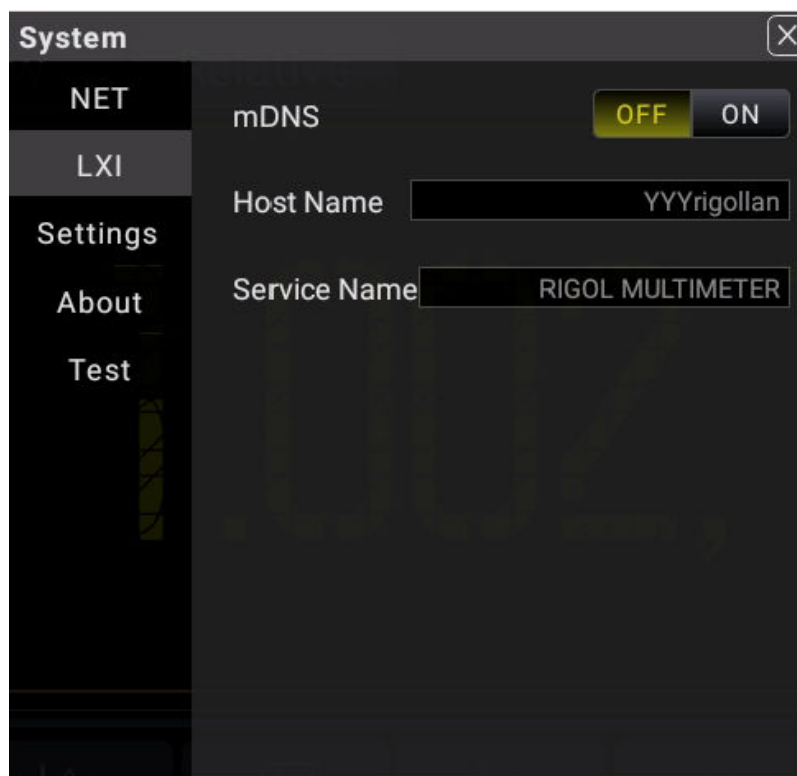
Figure 5.70 LXI Setting

Table 5.27 LXI Setting Menu

Parameter	Description
mDNS	Click or tap the ON/OFF tab for **mDNS** to enable or disable the multicast Domain Name System (mDNS). When enabled, you can use the cmd command to ping the "host name.local" to verify

EN

Parameter	Description
	whether the network has been successfully connected. For the "host name", refer to the host name specified in the LXI menu. This system is used to provide the function of DNS server for service discovery in a small network without a DNS server.
Host Name	If mDNS is enabled, you need to configure the host name. You are allowed to input a maximum of a string of 26 characters. Click or tap the input field of **Host Name** to input the name with the pop-up numeric keypad. Only when mDNS is enabled, can **Host Name** be modified.
Service Name	Inputs the service name (an instance name of the instrument). Click or tap the input field of **Service Name** to input the name with the pop-up numeric keypad. Only when mDNS is enabled, can **Service Name** be modified.

5.11.3   Basic System Settings

Press **Utility** > **Settings** to enter the system settings.
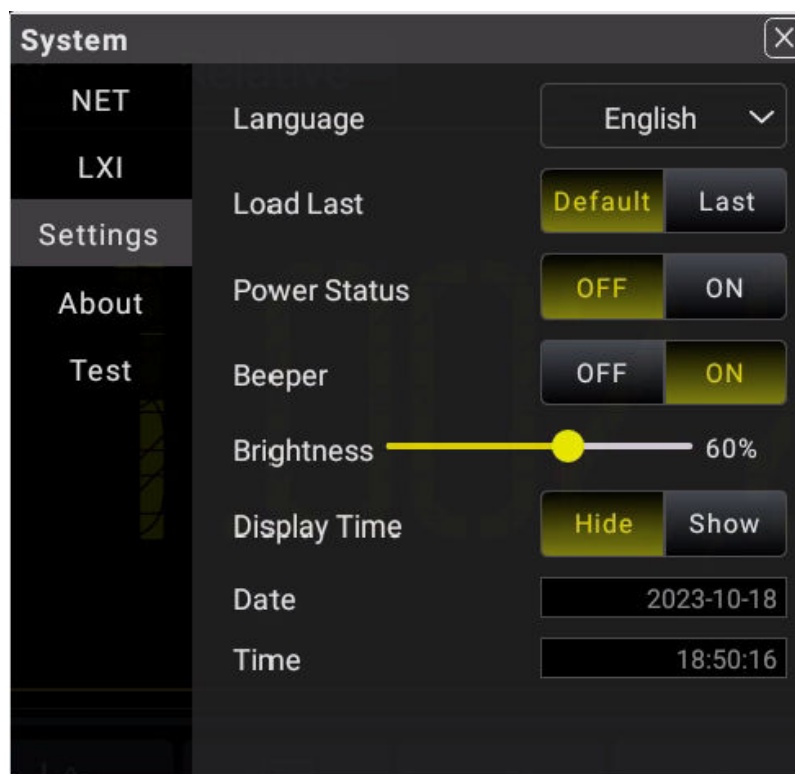
Figure 5.71 System Settings Interface

Table 5.28 System Setting Menu

Parameter	Description
Language	Sets the system language.
Load Last	Sets to load the default settings or last settings at power-on. Default: restores to the factory setting of the system at power-on. Last: restores to the last power-off setting of the system at power-on.
Power Status	Sets whether the instrument powers on automatically once the instrument is connected to the power source. OFF: After the instrument is connected to power, you need to press the Power key on the front panel to power on the instrument. ON: the instrument is powered on automatically once the instrument is connected to the power source.
Beeper	Enables or disables the beeper. When enabled, the beeper sounds during your operation on the instrument. When disabled, the beeper does not make a sound during your operation on the instrument.
Brightness	Sets the screen brightness. You can slide to adjust the brightness of the screen.
Display Time	Sets to hide or show the system time in the notification area. The system time (date and time) is displayed in the Notification Area at the lower-right corner of the screen. The date is displayed in "yyyy-mm-dd" format, and the time is displayed in "hh:mm:ss" format. Users can set the system time manually.
Date: sets the system date.	
Time: sets the system time.	

5.11.4   Instrument Information

Press [Utility] > **About** to display the basic information of the instrument.
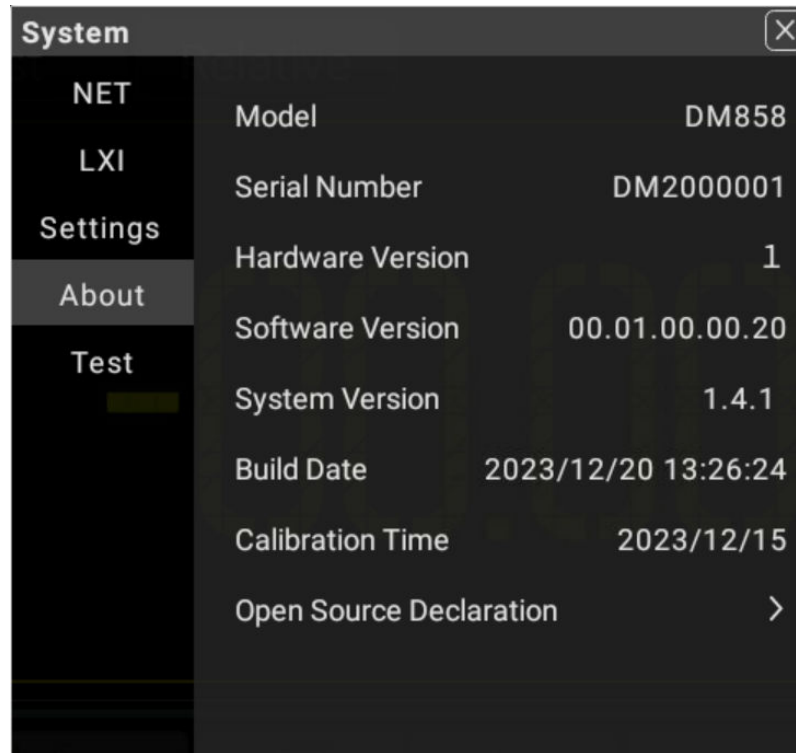
Figure 5.72 Basic Information of the Instrument

5.11.5   Self-check

Press **Utility** > **Test** to enter the self-check interface.
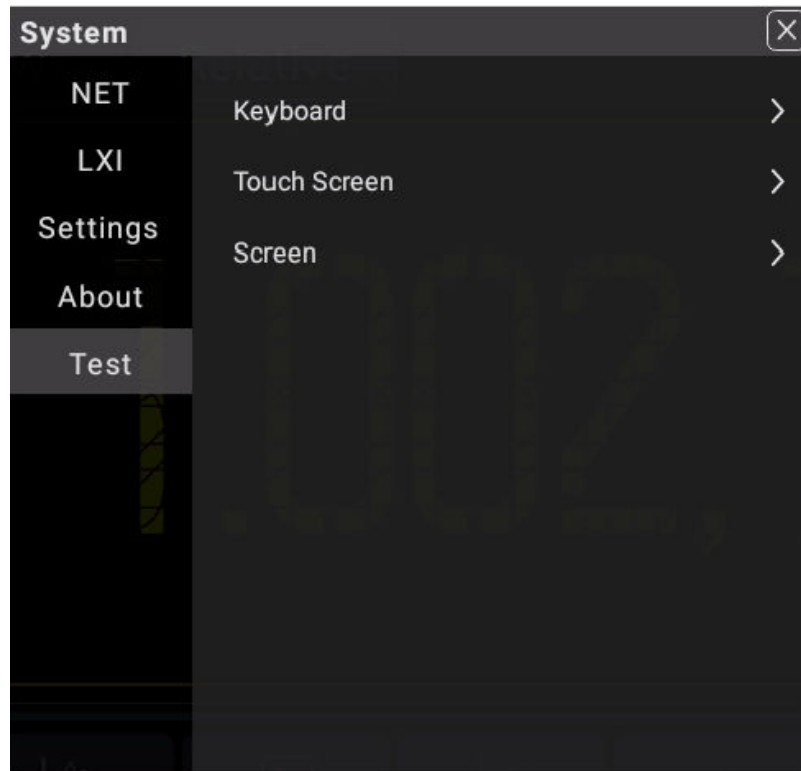
Figure 5.73 Self-check Interface

The self-check items include keyboard test, touch screen test, and screen test.

Click or tap **Keyboard** to enter the keyboard test interface (virtual front panel key), as shown in the figure below.
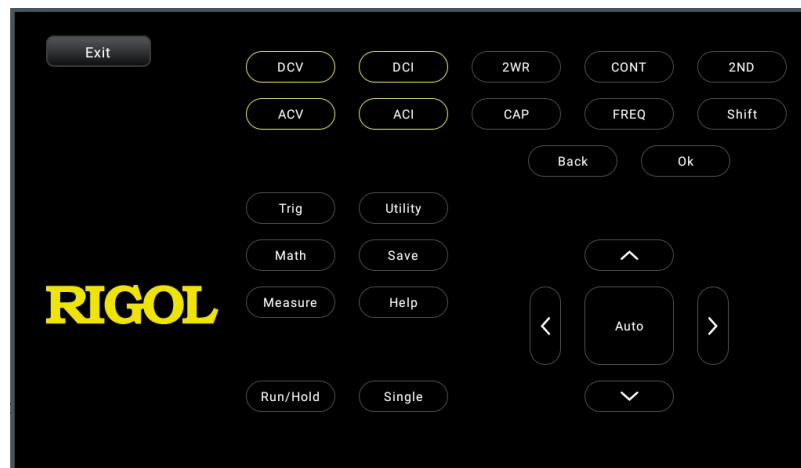
Figure 5.74 Keyboard Test

Press the specified front panel key and then the corresponding key in the keyboard test interface is circled in yellow, indicating that this key works normally. Click or tap **Exit** to exit the keyboard test interface.

Click or tap **Touch Screen** to enter the touch screen test interface.

EN
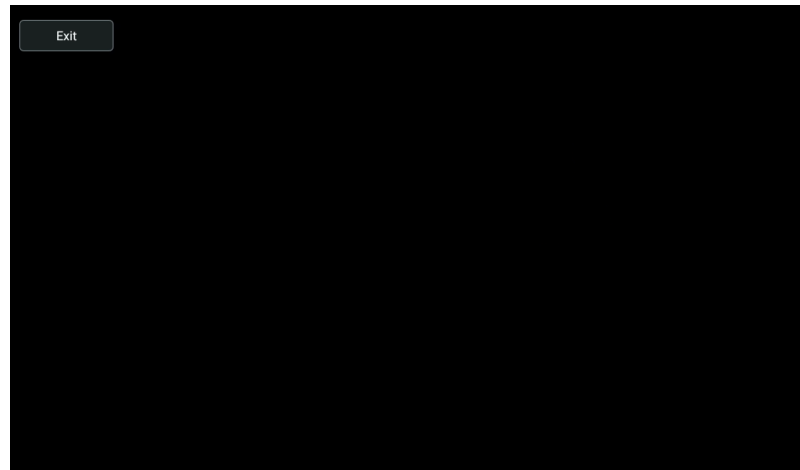
Figure 5.75 Touch Screen Test

Move your fingers along the grids on the screen, if they turn green, it indicates that the touch screen works normally. Click or tap **Exit** to exit the touch screen test interface.

Click or tap **Screen** to enter the screen test interface to check whether the defective pixel exists.
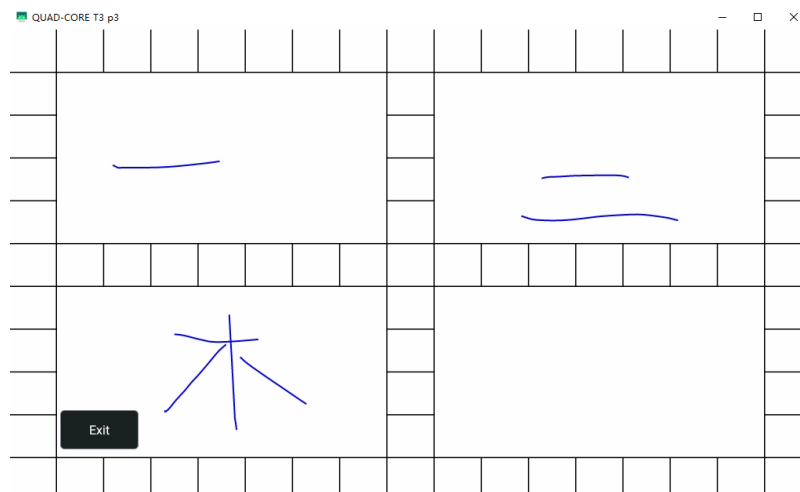
Figure 5.76 Screen Test

Tap any place on the screen and the screen color changes. Each time you tap on the screen, the color changes. In thsi way, you can test whether the screen has a dot defect. Click or tap **Exit** to exit the screen test interface.

5.12 To Store and Load

You can save the image and data to the internal memory or external USB storage device (such as USB storage device) in various formats and load the stored files when needed. Also you can load the upgrade software to the system and perform the upgrade operation for the instrument.

You can also copy, delete, or rename the specified type of file from the internal memory or external USB storage device via the disk management menu.

The instrument provides one USB HOST interface on the front panel which can connect the USB storage device for external storage.

TIP

It only supports the flash memory USB storage device of FAT32 format.

To enter the Storage interface, perform the following operation.

- Press [**Save**] on the front panel;

- Click or tap the function navigation icon ⚙ to enter the function navigation menu. Then click or tap **Storage**.

5.12.1   To Save a File

Press Save on the front panel to enter the Storage interface. Click or tap the **Save** tab to set the parameters.
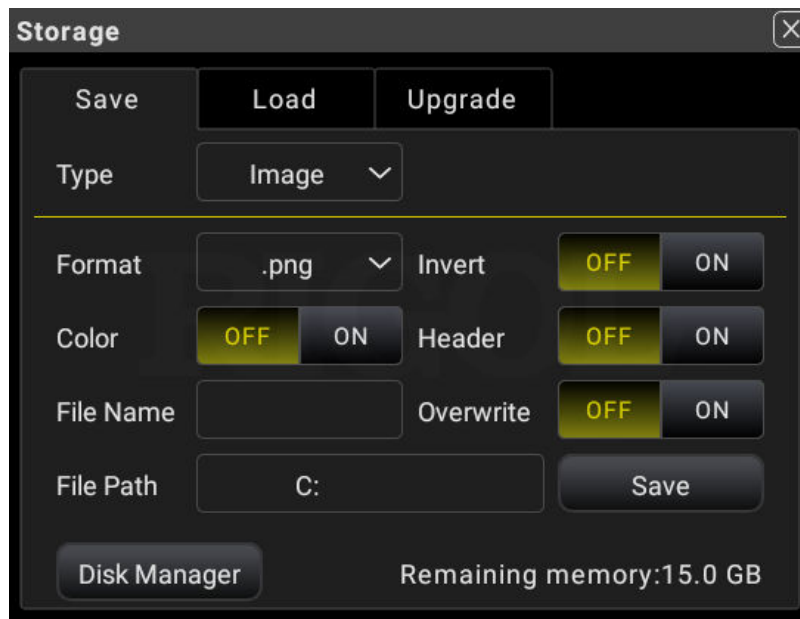
Figure 5.77 Storage Interface

Save Type: Image, Data, and Setup. The following table lists all the file types supported.

Table 5.29 Types of Files to be Saved

File Type	Description	Suffix Name
Image File	Saves the image.	*.bmp; *.jpg; and *.png
State File	A file that saves the current function	*.sta

File Type	Description	Suffix Name
	configurations of the instrument.	
Preferences File	A file that saves the current system configurations.	*.prf
Measurement Data File	A file that saves the current measurement data.	*.dat
Table with Separator	An Excel file that saves the current measurement data in the form of a table.	*.csv

Image Saving

In *Figure 5.77* , click or tap the drop-down button of **Type** to select **"Image"**. The image parameter setting is displayed, as shown in *Figure 5.77* .

- **Format**

  Click or tap the drop-down button of **Format** to select **"*.png"**, **"*.bmp"**, or **"*.jpg"** from the drop-down list. Then the image will be saved to the internal or external memory in the specified format.

- **Invert:**

  Click or tap the ON/OFF button for the **Invert** menu to enable or disable the image color invert.

- **Color**

  Click or tap the ON/OFF button for the **Color** menu to select whether to save the image in color. When you click or tap to select **ON**, the image is saved in color format. If you select **OFF**, the image is saved in black-and-white format.

- **Header**

  Click or tap the ON/OFF tab for the **Header** menu to enable or disable the display of the header. If you select "ON", the image creation date and relevant information will be displayed in the header of the image when you save the image file.

- **Set the file name**

  Click or tap the input field of **File Name** to input the file name to be saved with the pop-up virtual keypad. The length of the file name shall not exceed 8 characters.

- **Set the file path**

  Click or tap the input field of **File Path**, then the disk management interface is displayed. Select the desired destination storage directory, then click or tap **OK** to set the storage path.

- **Overwrite**

Click or tap the ON/OFF button for the **Overwrite** menu to enable or disable the overwriting function. When enabled, the existing file in the specified file path will be overwritten by the newly saved file that has the same filename as the existing one.

- **Save**

Click or tap **Save** to save the current image. Then the image is saved based on the current settings and the current saving interface exits automatically.

Data Saving

In *Figure 5.77*, click or tap the drop-down button of **Type** to select **"Data"**. The data parameter setting is displayed, as shown in the figure below.
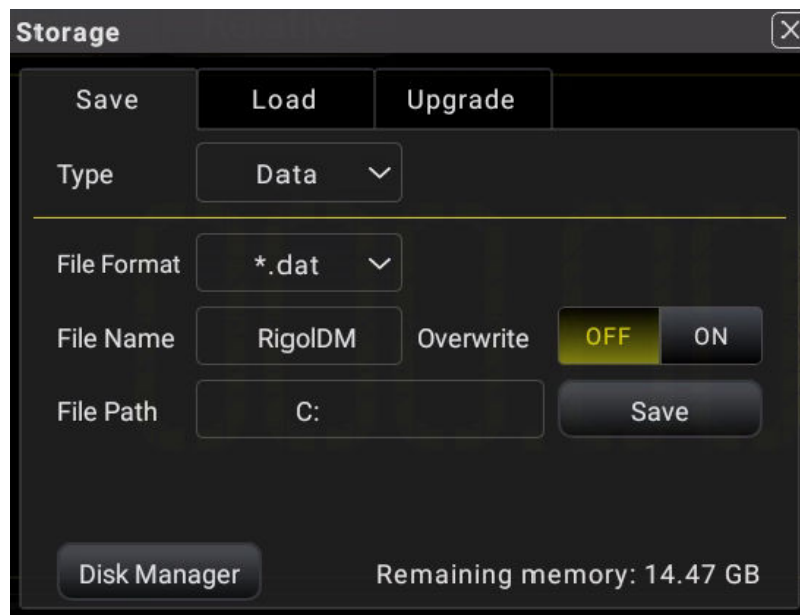
Figure 5.78 Data Saving

It is used to save the current measurement data.

- **Format**

Click or tap the drop-down button of **Format** to select **"*.dat"** or **"*.csv"** from the drop-down list. Then the data will be saved to the internal or external memory in the specified format.

- **Set the file name**

Click or tap the input field of **File Name** to input the file name to be saved with the pop-up virtual keypad. The length of the file name shall not exceed 8 characters.

- **Set the file path**

EN

Click or tap the input field of **File Path**, then the disk management interface is displayed. Select the desired destination storage directory, then click or tap **OK** to set the storage path.

- **Overlay**

  Click or tap the ON/OFF button for the **Overlay** menu to enable or disable the overwriting function. When enabled, the existing file in the specified file path will be overwritten by the newly saved file that has the same filename as the existing one.

- **Save**

  Click or tap **Save** to save the current data file. Then the current data are saved and the current saving interface exits automatically.

Setup Saving

In *Figure 5.77*, click or tap the drop-down button of **Type** to select **"Setup"**. The setup parameter setting is displayed, as shown in the figure below.
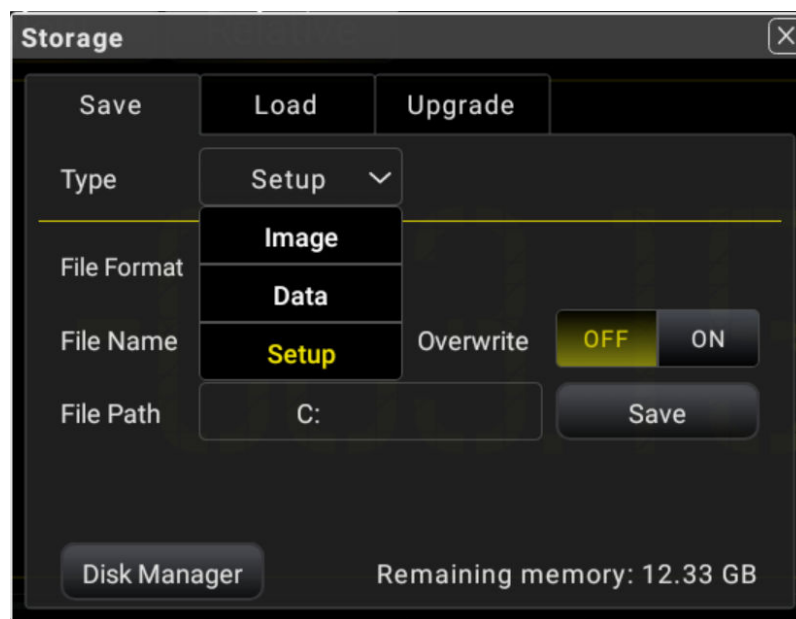
Figure 5.79 Setup Saving

Saves the current system configurations.

- **Format**

  Click or tap the drop-down button of **Format** to select **"*.sta"** or **"*.prf"** from the drop-down list. Then the system configurations will be saved to the internal or external memory in the specified format.

  The state file suffixed with "*.sta" stores the settings such as the current measurement mode, measurement rate, range, math operation, and trigger mode. The preferences file suffixed with "*.prf" stores the settings related to the

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system of the instrument such as system language, beeper, power-on status, and etc.

- • **Set the file name**

  Click or tap the input field of **File Name** to input the file name to be saved with the pop-up virtual keypad. The length of the file name shall not exceed 8 characters.

- • **Set the file path**

  Click or tap the input field of **File Path**, then the disk management interface is displayed. Select the desired destination storage directory, then click or tap **OK** to set the storage path.

- • **Overlay**

  Click or tap the ON/OFF button for the **Overlay** menu to enable or disable the overwriting function. When enabled, the existing file in the specified file path will be overwritten by the newly saved file that has the same filename as the existing one.

- • **Save**

  Click or tap **Save** to save the current setup file. Then the current system setup settings are saved and the current saving interface exits automatically.

5.12.2   To Load a File

In the storage setting menu, click or tap the **Load** tab to switch to the load menu. In this menu, you can load the specified file to the instrument.
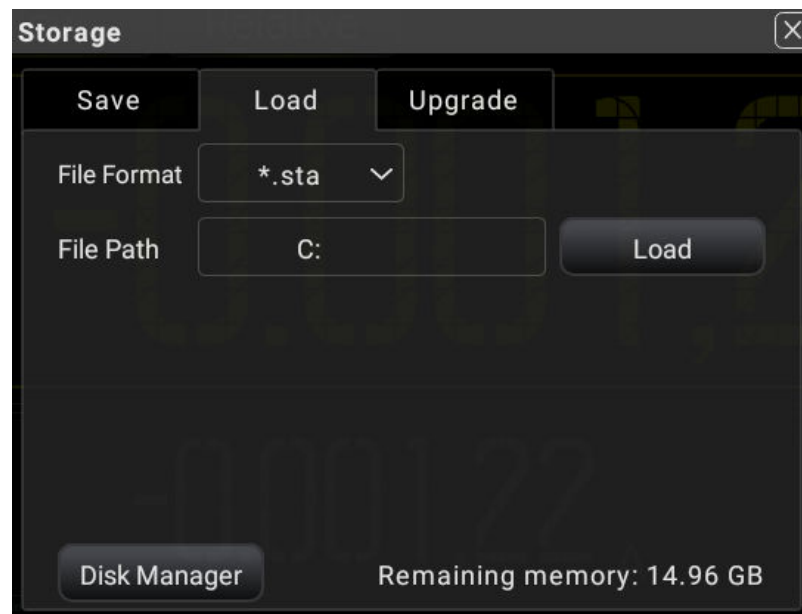
Figure 5.80 Load Setting Menu

EN

1. Select the file format

Click or tap **File Format** to select the desired file format to be loaded. The available formats are "*.prf", "*.sta", "*.dat", and "*.csv".

By default, it is "*.sta".

2. Select the file path

Click or tap the input field of **File Path** to select the file path where the file is located.

Select the desired file in the file path. Then click or tap **Load** to load the file.

After loading the file suffixed with "*.sta" or "*.prf" successfully, the instrument will perform the measurement based on the loaded file settings.

After loading the file suffxied with "*.dat" or "*.csv" successfully, the saved data in the file will be displayed on the screen in Histogram graph, as shown in the figure below.

Figure 5.81 Histogram Display of the Loaded Data File

5.12.3   Upgrade

This instrument supports local upgrade.

Local Upgrade

1. In the storage setting menu, click or tap **Upgrade** to enter the local upgrade setting menu.
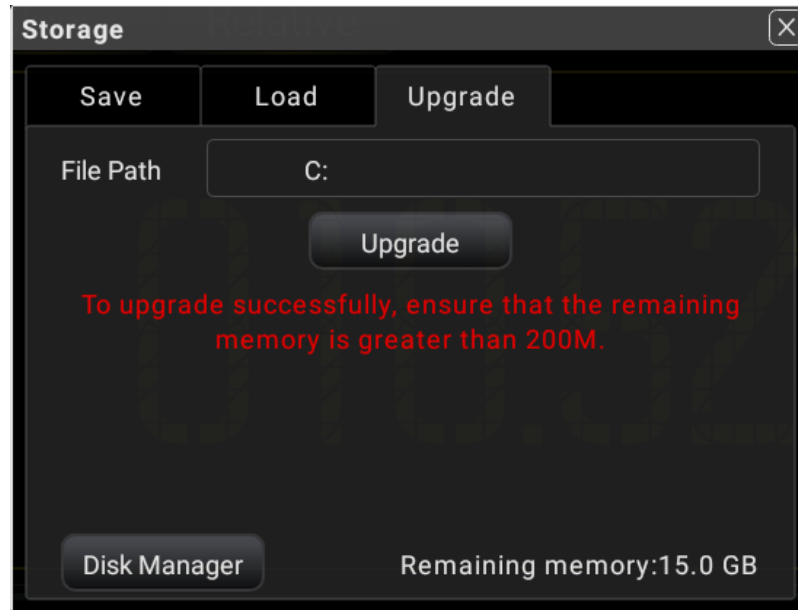
Figure 5.82 Upgrade Menu

2. Click or tap the input field of **File Path**, then the disk management interface is displayed. Select the upgrade file. For detailed operations, refer to the descriptions in *Disk Management*.

3. Click or tap **Upgrade** to complete the local upgrade.

5.12.4 Disk Management

Press Save on the front panel to enter the save and load interface. Click or tap **Disk Manager** to enter the disk management interface.
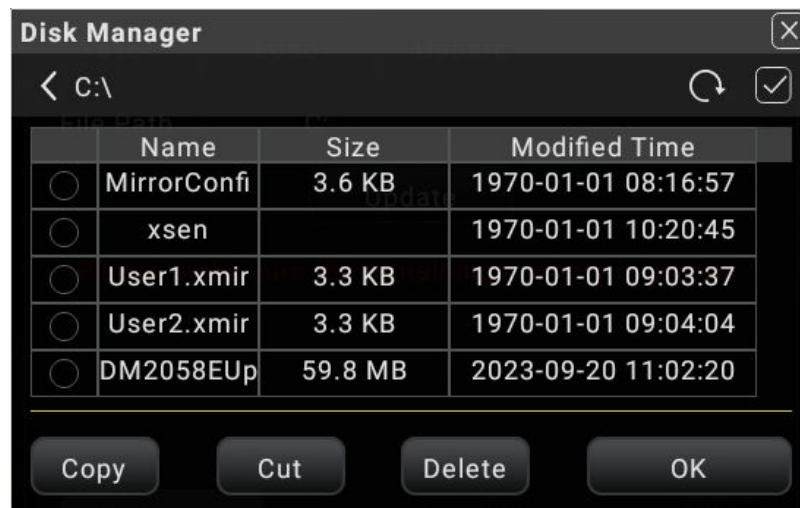
Figure 5.83 Disk Management Interface

Execute the following operations through the disk management menu:

Select a Disk

Before using the external storage device, make sure that a USB storage device (FAT32 format, flash memory) is connected correctly.

By default, the contents in "**<C:**" are displayed. If an external storage device is inserted, in the "Disk Manager" interface, two available storage disks can be selected in the disk selection area: "**<C:**" and "Removable USB Disk (D)". If you select an external storage device, for example, if you select "Removable USB Disk (D)", the contents in USB Disk (D) will be displayed.

Select a File

Before operating on the file or folder, first select the desired file or folder.

Click or tap the check box at the left side of the folder, if checked, it is selected, with an icon being displayed. Click or tap the check box again to deselect it. The check box restores its original state.

This instrument supports selecting multiple files or folders to operate on. You can also click or tap the square icon with a tick in it at the upper-right corner of the interface to select all the files and folders under the current disk. Click or tap it again to deselect all the files and folders.

Cut, Copy, or Paste a File or a Folder

- **Cut a File or Folder to a Specified Directory**

    Select a specified file or folder. Click or tap **Cut** and then open the destination path. Then click or tap **Paste** to complete the operation.

- **Copy a File or Folder to a Specified Directory**

    Select a specified file or folder. Click or tap **Copy** and open the destination path. Then click or tap **Paste** to complete the operation.

To Delete a File or Folder

In the current directory, select the file or folder to be deleted. Click or tap **Delete**, then a prompt message "Are you sure to delete?" is displayed. Click or tap **OK** to delete the file. Click or tap **Cancel** to cancel the deletion operation.

To Rename a File or Folder

Select a specified file or folder, then click or tap **Rename** to input a new filename or folder name with the pop-up numeric keypad. Then, the rename operation is completed.

5.13   To Use the Built-in Help System

This instrument provides the built-in help documentation. To access the help documentation, perform the following operations:

- Press $\boxed{\text{Help}}$ on the front panel;

- Click or tap 🔧 > **Help**.

In the help system, you can get its help information by clicking on or tapping the link for the specified function.

6   Troubleshooting

1. When I power on the instrument, the instrument stays black and does not display anything.

    a. Check whether the power is correctly connected.

    b. Check whether the fuse is blown out. If yes, please replace the specified fuse.

    c. Restart the instrument after finishing the above inspections.

    d. If the problem still persists, please contact **RIGOL**.

2. The reading does not change when a current signal is input.

    a. Check whether the test lead is correctly inserted into the HI and LO terminals of current measurement.

    b. Check whether the current fuse on the front panel is blown out.

    c. Check whether the DCI or ACI measurement is enabled.

    d. Check whether you select the proper measurement item.

3. The reading is abnormal when a DC signal is input.

    a. Check whether the test lead is correctly inserted into the HI and LO terminals of current measurement.

    b. Check whether the current fuse on the front panel is blown out.

    c. Check whether the DCI or DCV measurement is enabled.

    d. Check whether you select the proper measurement item.

7   Remote Control

The following ways of remote control are supported:

- **User-defined Programming**

  Users can program and control the instrument by using the SCPI (Standard Commands for Programmable Instruments) commands. For details about the SCPI commands and programming, refer to *Programming Guide* of this product series.

- **PC Software**

  You can use the PC software to send SCPI commands to control the instrument remotely. RIGOL Ultra Sigma is recommended. You can download the software from RIGOL official website (*http://www.rigol.com*).

  Operation Procedures:

  - Set up communication between the instrument and PC.

  - Run Ultra Sigma and search for the instrument resource.

  - Open the remote command control panel to send commands.

- **Web Control**

  This instrument supports Web Control. Connect the instrument to the network, then input the IP address of the instrument into the address bar of the browser of your computer. The web control interface is displayed. Click Web Control to enter the web control page. Then you can view the display of the real-time interface of the instrument. Through the Web Control method, you can migrant the device control to the control terminals (e.g. PC, Mobile, iPad, and other smart terminals) to realize remote control of the instrument. You have to log in before using the Web Control to modify network settings. When you first log in to the Web Control, the user name is "admin" and password is "rigol".

This instrument can be connected to the PC via the USB and LAN interface to set up communication and realize remote control through the PC.

This chapter will illustrate how to use the RIGOL Ultra Sigma software to remotely control the instrument via various interfaces.

CAUTION

Before connecting the communication cable, please turn off the instrument to avoid causing damage to the communication interfaces.
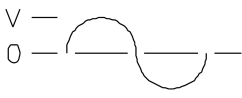
8   Measurement Tutorial

8.1   True RMS AC Measurements

The AC measurement of DM858 series has true RMS response. The power dissipated in a resistor within a time is proportional to the square of the measured true RMS voltage, independent of wave shape. This multimeter can accurately measure true RMS voltage or current, as long as the wave shape contains negligible energy above the multimeter's effective bandwidth. The effective AC voltage bandwidth of DM858 series is 8 kHz and the effective AC current bandwidth is 8 kHz.

The multimeter's AC voltage and AC current functions measure the "AC coupled" true RMS value, that 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, as shown in *Table 8.1 True RMS AC Measurement of Sine, Triangle and Square Waves* .

Table 8.1 True RMS AC Measurement of Sine, Triangle and Square Waves

Waveform	Crest Factor	AC RMS
	$\sqrt{2}$	$\dfrac{V}{\sqrt{2}}$

8.2   Crest Factor Errors (non-sinusoidal inputs)

A common misconception is that "since a multimeter can measure the true RMS of a signal, its sine wave accuracy specifications apply to all waveforms."

Actually, the waveform shape of the input signal can affect the measurement accuracy. Generally, "crest factor" is used to describe the signal wave shape. The crest factor is the ratio of the peak value to RMS value of a waveform.

In general, the greater the crest factor is, the greater the energy contained in high frequency harmonics will be. All of the multimeters have errors that are relevant to the crest factor. Please note that the crest factor errors do not apply to input signals below 100 Hz.

You can estimate the measurement error resulting from the 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 calculated according to the following formula.

$$\text{Bandwidth Error} = \frac{-\text{C.F.}^2 \times \text{F}}{4\pi \times \text{BW}} \times 100\% \quad \text{(\% reading)}$$

$C.F.$: indicates the signal crest factor.

F : indicates the fundamental frequency of pulse

BW : indicates the 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. Assume the multimeter's 1-year accuracy specifications: ± (0.05% of reading + 0.03% of range).

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

= 0.85% of reading + 0.08% of range

8.3 Loading Errors (AC Volts)

In the AC Voltage function, the input of DM858/DM858E appears as a 1MΩ 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. *Table 8.2 Input Resistance at Various Frequencies* shows the multimeter's approximate input resistance at various frequencies.

Table 8.2 Input Resistance at Various Frequencies

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

For low frequencies:

$$\frac{-R_s}{Rs + 1M\Omega} \times 100\%$$

At high frequencies, the additional loading error is:

$$\left[\frac{1}{\sqrt{1 + (2\pi \times F \times R_s \times C_{in})}} - 1\right] \times 100\%$$

R_s : source resistance

F : input frequency

C_{in} : input capacitance (100pF) plus test lead capacitance

8.4 Application of the Analog Filter

The analog filter of DM858/DM858E can be used to reduce the impact of the AC component in DC measurement. For most measurements, the filter is not necessary, but sometimes it can be used to improve the DC measurement. For example, if the DC source under test has a big AC ripple, the analog filter can be used to reduce it.

The analog filter cannot be used to filter the internal noise of the multimeter. It does not work for open-circuit in DCI measurement, short-circuit in DCV measurement or in measurement of the output from a precise DC calibrator. If used, it may result in extra noise and large reading offset. To reduce the offset, the multimeter should be cleared under the selected range and reading speed when using the analog filter. If you cannot clear the multimeter, additional errors may occur in the measured results, as shown in the following tables. For ranges and reading speeds not specified in the table, the generated additional analog filter error can be omitted.

NOTE

By default, the analog filter of DM858/DM858E is enabled. You are not allowed to disable the filter.

Table 8.3 Analog Filter Error in DCV Measurement

Range	Reading Speed	Additional Analog Filter Error
100 mV	Slow	10 µV
	Medium	20 µV
	Fast	20 µV
1 V	Slow	15 µV
	Medium	20 µV
	Fast	20 µV
10 V	Slow	0.8 mV
	Medium	1 mV
	Fast	1 mV

Table 8.4 Analog Filter Error in DCI Measurement

Range	Reading Speed	Additional Analog Filter Error
100 µA	Slow	0.002% of range
	Medium	0.005% of range
	Fast	0.005% of range
10 mA, 1 A	Slow	0.040% of range
	Medium	0.060% of range
	Fast	0.080% of range
100 mA	Slow	0.004% of range
	Medium	0.010% of range
	Fast	0.010% of range
10A	Slow	0.008% of range
	Medium	0.010% of range

Range	Reading Speed	Additional Analog Filter Error
	Fast	0.010% of range

9 Specifications

9.1 Specifications

Unless otherwise noted, all the technical specifications can be guaranteed for 30-minute warm-up, slow measurement mode, and calibration temperature within 18℃ and 28℃.

DC Characteristics

Accuracy ± (% of reading + % of range)

Function	Range[1]	Test Current or Load Voltage	1 year 23℃ ± 5℃
DC Voltage (DCV)	100.000 mV	-	0.03 + 0.004 (DM858) 0.06 + 0.004 (DM858E)
	1.00000 V	-	0.03 + 0.003 (DM858) 0.06 + 0.003 (DM858E)
	10.0000 V	-	0.03 + 0.004 (DM858) 0.06 + 0.004 (DM858E)
	100.000 V	-	0.03 + 0.003 (DM858) 0.06 + 0.003 (DM858E)
	1000.00 V[2]	-	0.03 + 0.003 (DM858) 0.06 + 0.003 (DM858E)
DC Current[3] (DCI)	100.000 µA	<0.05 V	0.055 + 0.005
	1.00000 mA	<0.5 V	0.055 + 0.005
	10.0000 mA	<0.05 V	0.095 + 0.020
	100.000 mA	<0.5 V	0.070 + 0.008
	1.00000 A	<0.01 V	0.170 + 0.020
	3.00000 A (for DM858E)	<0.1 V	0.250 + 0.010
	10.0000 A (for DM858)[4]	<0.1 V	0.250 + 0.010
Resistance (R)[5]	100.000 Ω	1 mA	0.050 + 0.020
	1.00000 kΩ	100 µA	0.050 + 0.020
	10.0000 kΩ	10 µA	0.050 + 0.020
	100.000 kΩ	1 µA	0.10 + 0.05
	1.00000 MΩ	1 µA	1.00 + 0.05
	10.0000 MΩ	100 nA	1.50 + 0.05
	100.000 MΩ	10 nA	3.00 + 0.05

Function	Range[1]	Test Current or Load Voltage	1 year 23℃ ± 5℃
Diode Test	2.0000 V[6]	350 μA	0.050 + 0.15
Short-circuit Test	1000 Ω	100 μA	0.3 + 0.15

DC Voltage

Input Resistance	100 mV, 1 V: 11.2 MΩ or >10 GΩ (selectable) (Input signals that exceed ± 2.5 V in these ranges will pass the 1 MΩ (typical) clamp resistance.) 10 V, 100 V, and 1000 V: 11.2 MΩ ± 5%
Input Bias Current	<300 pA, 25℃
Input Protection	1000 V on all ranges
CMRR (Common Mode Rejection Ratio)	120 dB (for the 1 kΩ unbalanced resistance in LO lead, max. ± 500 VDC)
NMRR (Normal Mode Rejection Ratio)	60 dB at "slow" rate

Resistance

Measurement Method	4-wire resistance or 2-wire resistance Current source referenced to LO input
Open Circuit Voltage	Limited to <5 V
Max. Lead Resistance (4-wire)	10% of range per lead for 100 Ω and 1 kΩ ranges 1 kΩ per lead on all other ranges
Input Protection	1000 V on all ranges

DC Current

Shunt Resistor	100 μA: <0.05 V 1 mA: <0.05 V 100 μA, 1 mA: 330 Ω 10 mA, 100 mA: 3.3 Ω 1 A, 3 A, 10 A: 0.008 Ω (3 A only available for DM858E and 10 A only available for DM858)

DC Current

Input Protection	DM858: replaceable 10 A, 250 V fast-blow fuse on the front panel; 12 A, 1000 V fast-blow fuse internal
	DM858E: replaceable 3.15 A, 250 V fast-blow fuse on the front panel; 3.15 A, 1000 V fast-blow fuse internal

Short Circuit/Diode Test

Measurement Method	Short circuit test: 100 µA ± 5% constant current source, <5 V open-circuit voltage
	Diode test: 350 µA ± 5% constant current source, <5 V open-circuit voltage
Response Time	DM858: 125 samples/s; DM858E: 80 samples/s, with beeper setting
Short Circuit Resistance	Adjustable from 1 Ω to 1000 Ω
Input Protection	1000 V

Setup Time Attentions

The setup time about voltage measurement is affected by source impedance, dielectric characteristics of test cable, and input signal changes.

NOTE

[1]: 20% over range on all ranges except DCV 1000 V, ACV 750 V, DCI 10 A, 3 A, and ACI 10 A, 3 A.

[2]: 0.02 mV additional error per 1 V over the first ±500 VDC.

[3]: For 100 µA, 1 mA, 10 mA, and 100 mA ranges, the internal current sensing resistor needs to be cooled when measuring >1 A current for more than 15 minutes.

[4]: 10 A is only available for DM858. The max. current range for DM858E is 3 A. For continuous current greater than DC 7 A or AC RMS 7 A, 30 seconds ON and 30 seconds OFF.

[5]: Specifications are for 4-wire resistance measurement or 2-wire resistance measurement using the "Relative" operation. ±0.2 Ω additional errors will be added in performing 2-wire resistance measurement without using the "Relative" operation.

[6]: The accuracy specifications are for the voltage measured at the input terminals only. The typical value of the test current is 350 µA. Variation in the current source will cause some variation in the voltage drop across a diode junction.

AC Characteristics

Accuracy ± (% of reading + % of range)

Function	Range[1]	Frequency Range	1 year 23℃ ± 5℃
True-RMS AC Voltage (ACV)[2]	100.000 mV	20 Hz to 45 Hz	1.5 + 0.2
		45 Hz to 1 kHz	0.2 + 0.1
		1 kHz to 5 kHz	1.0 + 0.1
		5 kHz to 8 kHz	3.0 + 0.1
	1.00000 V	20 Hz to 45 Hz	1.5 + 0.2
		45 Hz to 1 kHz	0.2 + 0.1
		1 kHz to 5 kHz	1.0 + 0.1
		5 kHz to 8 kHz	3.0 + 0.1
	10.0000 V	20 Hz to 45 Hz	1.5 + 0.2
		45 Hz to 1 kHz	0.2 + 0.1
		1 kHz to 5 kHz	1.0 + 0.1
		5 kHz to 8 kHz	3.0 + 0.1
	100.000 V	20 Hz to 45 Hz	1.5 + 0.2
		45 Hz to 1 kHz	0.2 + 0.1
		1 kHz to 5 kHz	1.0 + 0.1
		5 kHz to 8 kHz	3.0 + 0.1
	750.00 V	20 Hz to 45 Hz	1.5 + 0.2
		45 Hz to 1 kHz	0.2 + 0.1
		1 kHz to 5 kHz	1.0 + 0.1
		5 kHz to 8 kHz	3.0 + 0.1
True-RMS AC Current (ACI)[3]	100.000 μA	20 Hz to 45 Hz	1.50 + 0.10
		45 Hz to 1 kHz	0.50 + 0.10
		1 kHz to 8 kHz	2.50 + 0.20
	1.00000 mA	20 Hz to 45 Hz	1.50 + 0.10
		45 Hz to 1 kHz	0.50 + 0.10
		1 kHz to 8 kHz	2.50 + 0.20
	10.0000 mA	20 Hz to 45 Hz	1.50 + 0.10
		45 Hz to 1 kHz	0.50 + 0.10
		1 kHz to 8 kHz	2.50 + 0.20
	100.000 mA	20 Hz to 45 Hz	1.50 + 0.10
		45 Hz to 1 kHz	0.30 + 0.10
		1 kHz to 8 kHz	2.50 + 0.20
	1.00000 A	20 Hz to 45 Hz	1.50 + 0.20
		45 Hz to 1 kHz	0.50 + 0.20
		1 kHz to 8 kHz	2.50 + 0.20
	3.00000 A (for DM858E)	20 Hz to 45 Hz	1.50 + 0.15
		45 Hz to 1 kHz	0.50 + 0.15
		1 kHz to 8 kHz	2.50 + 0.20

Function	Range[1]	Frequency Range	1 year 23℃ ± 5℃
	10.0000 A (for DM858)[4]	20 Hz to 45 Hz	1.50 + 0.15
		45 Hz to 1 kHz	0.50 + 0.15
		1 kHz to 8 kHz	2.50 + 0.20

Additional Crest Factor Error (non-sinusoidal waveforms)[5]	
Crest Factor	Error (% of range)
1 to 2	0.05
2 to 3	0.2

True RMS AC Voltage (ACV)	
Measurement Method	AC-coupled True-RMS - measure the AC component of input with up to 1000 V DC bias on any range
Crest Factor	≤3 at full scale
Input Impedance	11.2 MΩ ± 5%, in parallel with <100 pF capacitance on any range
AC Filter Bandwidth	20 Hz to 8 kHz
CMRR (Common Mode Rejection Ratio)	60 dB (for the 1 kΩ imbalance resistance in LO lead and <60 Hz, max. ±500 VDC)

True RMS AC Current (ACI)	
Measurement Method	Direct coupled to the fuse and shunt; AC-coupled True RMS measurement (measure the AC component)
Crest Factor	≤3 at full scale
Max. Input	DC + AC current peak value <300% of range; RMS current with DC current component: DM858: <10 A; DM858E: <3 A
Shunt Resistor	100 µA, 1 mA: 330 Ω 10 mA, 100 mA: 3.3 Ω 1 A, 3 A, 10 A: 0.008 Ω (3 A only available for DM858E and 10 A only available for DM858)
Input Protection	DM858: replaceable 10 A, 250 V fast-blow fuse on the front panel; 12 A, 1000 V fast-blow fuse internal DM858E: replaceable 3.15 A, 250 V fast-blow fuse on the front panel; 3.15 A, 1000 V fast-blow fuse internal

Setup Time Attentions

Make sure that the RC return at input terminal has been in a stable state completely (higher than 3 s) before accurate measurement.

Input >300 Vrms (or >5 Arms) will cause the self-heating of the signal conditioning component to generate error which is included in the characteristics of the instrument. Internal temperature variation due to the self-heating will cause an additional error on the lower AC range. The error is smaller than 0.03% of readings and will disappear after a few minutes.

NOTE

[1]: 20% over range on all ranges except DCV 1000 V, ACV 750 V, DCI 10 A, 3 A, and ACI 10 A, 3 A.

[2]: Specifications are for sine-wave inputs >5% of the range. For the 750 VAC range, it is limited to 8 x 10^7 Volts-Hz. For 5 kHz to 8 kHz, add 0.13% of range additional error.

[3]: Specifications are for sine-wave inputs >5% of the range. For 100 µA, 1 mA, 10 mA, and 100 mA ranges, the internal current sensing resistor needs to be cooled if >1 A current is applied for more than 15 minutes.

[4]: 10 A is only available for DM858. The max. current range for DM858E is 3 A. For continuous current greater than DC 7 A or AC RMS 7 A, 30 seconds ON and 30 seconds OFF.

[5]: For frequency <100 Hz.

Frequency and Period Characteristics

Accuracy ± (% of reading + % of range)

Function	Range	Frequency Range	1 year 23℃ ± 5℃
Frequency/ Period	100 mV to 750 V[1]	20 Hz to 2 kHz	0.01 + 0.003
		2 kHz to 20 kHz	0.01 + 0.003
		20 kHz to 50 kHz	0.01 + 0.003
		50 kHz to 100 kHz	0.01 + 0.006
	DM858: 100 µA to 10 A[2]	20 Hz to 2 kHz	0.01 + 0.003
	DM858E: 100 µA to 3 A[3]	2 kHz to 10 kHz	0.01 + 0.003

Measurement Attentions

All frequency counters are susceptible to error when measuring low-voltage, low-frequency signals. Shielding inputs is critical for minimizing measurement errors from external noise.

Setup Time Attentions

Errors will occur when attempting to measure the frequency or period of the signal with a DC offset voltage change. Make sure that the RC return at input terminal has been in a stable state completely (higher than 3 s) before accurate measurement.

NOTE

[1]: 100 mV: the specifications are for AC input voltage of 35% to 120% of range in <20 kHz frequency; 1 V, 10 V, 100 V, 750 V: the specifications are for AC input voltage of 35% to 120% of range (750 V range is limited to 750 Vrms).

[2]: 100 μA to 10 A: the specifications are for AC input current of 20% to 120% of range (10 A range is limited to 10 Arms).

[3]: 100 μA to 3 A: the specifications are for AC input current of 20% to 120% of range (3 A range is limited to 3 Arms).

Capacitance Characteristics

Accuracy ± (% of reading + % of range)[1]

Function	Range[2]	Max. Testing Current	1 year 23℃ ± 5℃
Capacitance	1.000 nF	200 nA	5 + 1.5
	10.00 nF	200 nA	5 + 1.5
	100.0 nF	2 μA	1 + 0.5
	1.000 μF	10 μA	1 + 0.5
	10.00 μF	10 μA	1 + 0.5
	100.0 μF	100 μA	1 + 0.5
	1.000 mF	0.5 mA	2 + 0.5
	10.00 mF (for DM858)[3]	1 mA	2 + 0.5

Capacitance Measurement

Testing Method	Measure the rate of voltage change generated during the current flowing into the capacitance
Connection Type	2-wire
Input Protection	1000 V on all ranges

Measurement Attentions

Due to external noise, measurement errors can occur when measuring small capacitance. Shielding inputs is critical for minimizing such errors.

NOTE

[1]: Specifications are guaranteed when the "Relative" operation is enabled. Additional errors may be caused by non-film capacitors.

[2]: Specifications are guaranteed when the capacitance range is between 10% and 120%.

[3]: 10 mF is only available for DM858. The max. measurement range for DM858E is 1 mF.

Trigger Characteristics

Trigger Characteristics		
Trigger Source	Auto, Single, External	
Samples Per Single Trigger	1 to 2000	
Auto Trigger Interval	Slow: 400 ms to 2000 ms Medium: 50 ms to 2000 ms Fast: 8 ms to 2000 ms (DM858); 12 ms to 2000 ms (DM858E)	
Reading Hold Sensitivity	0.01%, 0.1%, 1%, or 10% of the reading	
External Trigger Input	Input Level	5 V TTL-compatible
	Trigger Condition	Rising edge/falling edge/high level/low level
	Input Impedance	>20 kΩ, in parallel with 400 pF, DC-coupled
	Min. Pulse Width	500 µs
VMC Out	Level	5 V TTL-compatible
	Output Polarity	Positive/negative
	Output Impedance	200 Ω, typical
	Output Pulse Width	Slow: 1 ms to 399 ms Medium: 1 ms to 49 ms Fast: 1 ms to 7 ms (DM858); 1 ms to 11 ms (DM858E)

Other Measurement Characteristics

Any Sensor	
Temperature Sensor	TC: B, E, J, K, N, R, S, T
	RTD: 385 (0.00385), 389 (0.00389), 391 (0.00391), 392 (0.00392) temperature coefficient
	Thermal: 2.2 kΩ, 3 kΩ, 5 kΩ, 10 kΩ, 30 kΩ resistance coefficient

Any Sensor

User-defined Sensor	Supports DCV, DCI, 2-wire resistance, 4-wire resistance, and frequency sensors

History and Storage

Volatile Memory	DM858: 500,000 readings
	DM858E: 20,000 readings
Non-volatile Memory	10 groups of history data storage (DM858: 500,000 readings/group; DM858E: 20,000 readings/group)
	10 groups of any sensor setup storage (DM858: 500,000 readings/ group; DM858E: 20,000 readings/group)
	10 groups of instrument setting storage
	Supports USB external storage extension

Math Operation

dBm, dB, Relative, Statistics (Maximum/Minimum/Average/Standard Deviation), Limit, Histogram, Bar Chart, and Trend

General Specifications

Power Supply

Power Interface	Type-C interface
Power Voltage	DC, 12 V, 3 A
Consumption	10 W (max.)

Mechanical Characteristics

Dimensions	266 mm (W) x 165 mm (H) x 80 mm (D)
Weight	Package excluded: <2 kg
	Package included: <3 kg

Remote Interface

USB Host	1 on the front panel
USB Device	1 on the rear panel
LAN Port	1 on the rear panel, 10/100 Base-T, supporting LXI-C

Others

LCD	7-Inch color touch screen
Operating Environment	Full accuracy: 0°C to 50°C, 80% RH, 40°C, without condensation
	Storage temperature: -20°C to 60°C
	Shock and vibration: conforming to MIL-T-28800E, III, 5 level (only for sine)
	Altitude: up to 3,000 meters

Others	
Safety	Conforming to IEC61010-1: 2001. Measure CAT I 1000 V/CAT II 300 V. Class of pollution: 2
Programming Language	Standard SCPI commands
Warm-up Time	30 minutes

Warranty and Calibration Interval

Warranty and Calibration Interval	
Warranty	3 years (excluding the accessories)
Recommended Calibration Interval	12 months

10 Appendix

10.1 Appendix A: Options and Accessories

Order Information	Order No.
Model	
DM858 (5½ Digital Multimeter)	DM858
DM858E (5½ Digital Multimeter)	DM858E
Standard Accessories	
Power Adaptor Conforming to the Standard of the Destination Country	— —
Two Alligator Clips (Black and Red)	ALLIGATORCLIP-DMM
Two Digital Multimeter Test Pens (Black and Red)	LD-DM
Two Backup Fuses: DM858: AC, 250 V, F10 A DM858E: AC, 250 V, F3.15 A	— —
Optional Accessories	
Kelvin Test Clip	KELVINTESTCLIP-DMM
USB Cable (150 cm)	CB-USBA-USBB-FF-150

NOTE

For all the mainframes, accessories, and options, please contact the local office of RIGOL.

10.2 Appendix B: Warranty

RIGOL TECHNOLOGIES CO., LTD. (hereinafter referred to as RIGOL) warrants that the product mainframe and product accessories will be free from defects in materials and workmanship within the warranty period. If a product proves defective within the warranty period, RIGOL guarantees free replacement or repair for the defective product.

To get repair service, please contact your nearest RIGOL sales or service office.

There is no other warranty, expressed or implied, except such as is expressly set forth herein or other applicable warranty card. There is no implied warranty of merchantability or fitness for a particular purpose. Under no circumstances shall RIGOL be liable for any consequential, indirect, ensuing, or special damages for any breach of warranty in any case.