



MSO5000HD Series High-Definition Oscilloscopes

Quick Start Guide

This manual applies to model:
MSO5000HD Series

V1.0

Jan 2025

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1. MSO5000HD Series

MSO5000HD series mixed signal oscilloscope has 3 models.

Model	Analog channel number	Analog bandwidth	Digital	Gen
MSO5104HD	4	1GHz	●	○
MSO5054HD	4	500MHz	●	○
MSO5034HD	4	350MHz	●	○

●: Standard ○: Option ×: Not support

2. Getting Started Manual

This chapter is to introduce on using the oscilloscope for the first time, the front and rear panels, the user interface, as well as touch screen function.

2.1. General Inspection

It is recommended to inspect the instrument follow the steps below before using the MSO5000HD series oscilloscope for the first time.

(1) Check for Damages caused by Transport

If the packaging carton or the foam plastic cushions are severely damaged, please contact the UNI-T distributor of this product immediately.

(2) Check Accessories

The details of the supplied accessories are described in the MSO5000HD Series High-Definition Oscilloscopes accessories section in this manual. Please refer to this section for the list of accessories. If any accessories are missing or damaged, contact UNI-T or the local distributors of this product.

(3) Machine Inspection

If the instrument appears to be damaged, not working properly, or has failed the functionality test, please contact UNI-T or local distributors of this product.

If the equipment is damaged due to shipping, please keep the packaging and notify both the transportation department and UNI-T distributors, UNI-T will arrange maintenance or replacement.

2.2. Before Use

To perform a quick verification of the instrument's normal operations, please follow the steps below.

(1) Connecting to the Power Supply

Connect the power supply according to the following table, use the assembled power line or other power line that meets the local country standards to connect the oscilloscope. When the power switch on the rear panel is not opened, the soft power indicator  in the left bottom on the rear panel is extinguished, which indicates this soft switch key is no-effect. When the power switch on the rear panel is opened, the soft power indicator  in the left bottom on the rear panel is illuminated with red, and then press the soft switch key to enable the oscilloscope.

Voltage Range	Frequency
100 V-240 VAC (fluctuant: $\pm 10\%$)	50 Hz/60 Hz
100 V-120 VAC (fluctuant: $\pm 10\%$)	400 Hz

(2) Boot Check

Press the power soft switch key and the indicator  should change from red to green. The oscilloscope will show a boot animation, and then enter the normal interface

(3) Connecting Probe

This oscilloscope provides 2 pieces of compensating signal probe. Connect the BNC of the probe to the BNC of oscilloscope's C1 and connect the probe to the "probe compensating signal connection clip" and then connect the ground alligator clip of the probe with the ground terminal of compensating signal connection clip. The output of compensating signal connection clip: amplitude is approximately 3 Vpp, with a default frequency of 1 kHz.

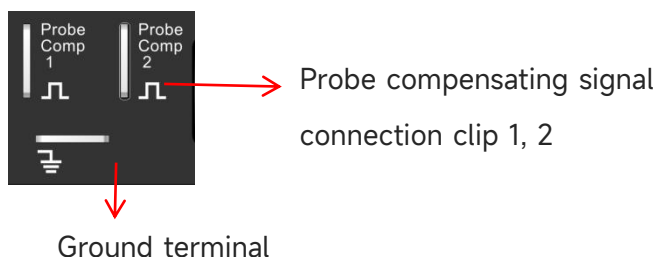


Figure 1 Probe Compensating Signal Connection Clip and Ground Terminal

(4) Function Check

Press the AUTO key, a square wave (amplitude 3 Vpp, frequency 1 kHz) should appear on the screen. Repeat step 3 to check all channels. If the square waveform display does not match the one shown above, please follow the 'Probe Compensation' procedure described in the next section.

(5) Probe Compensation

When the probe is connected to any input channel for the first time, this step might be adjusted to match the probe and the input channel. Probes that are not compensated may lead to measurement errors or mistakes. Please follow the following steps to adjust the probe compensation.

- Set the probe attenuation ratio in the probe menu to 10x. Connect the oscilloscope probe to C1. If using the probe's hook tip, ensure it makes stable contact. Connecting the probe to the "Probe Compensation Signal Connection Clip" of the oscilloscope and connect the ground alligator clip to the ground terminal of probe compensating signal connection clip. Open C1 and press the Autoset key.

- View the displayed waveform, as shown in the following figure 2.

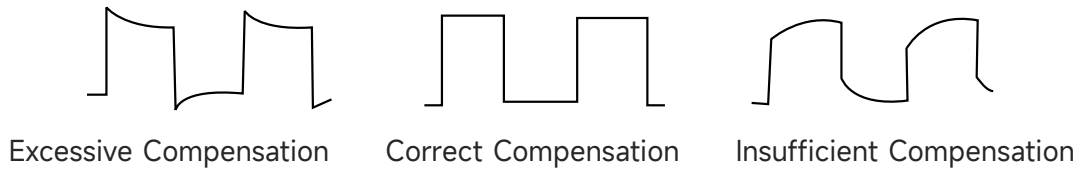


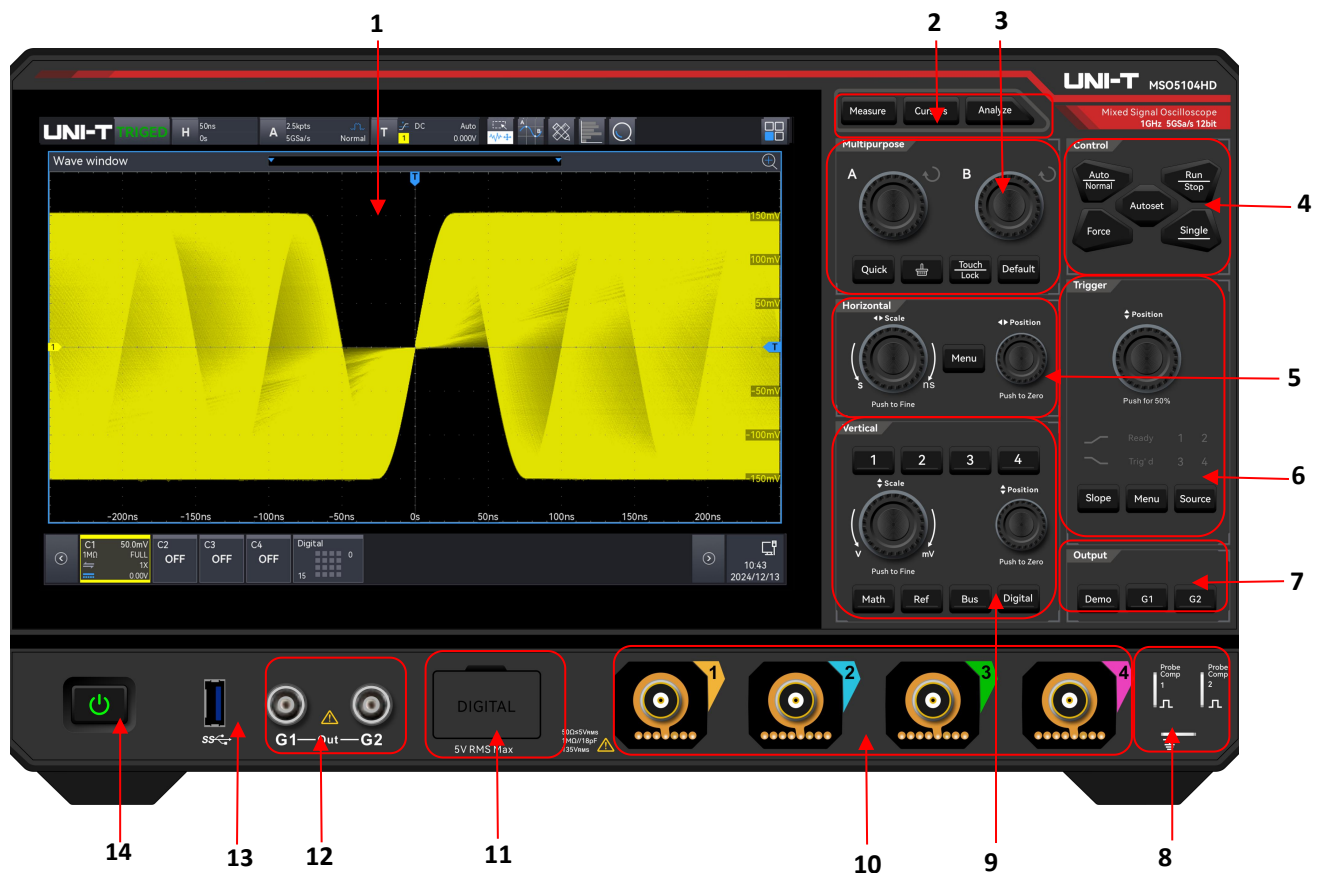
Figure 2 Probe Compensation Calibration

- If the displayed waveform resembles the above "Insufficient Compensation" or "Excessive Compensation", use a non-metallic screwdriver to adjust the probe's variable capacitance until the display matches the "Correct compensation" waveform.

Note: The probe type is UT-P07A and UT-P08A. When connected to the oscilloscope, the probe ratio will be automatically identified as X10.

Warning: To avoid electric shock when using the probe to measure high voltage, please ensure that the probe insulation is in good condition and avoid physical contact with any metallic part of the probe.

2.3.Front Panel



Front Panel

Table 1 Front Panel Description

No.	Description	No.	Description
1	Display area	8	Probe compensating signal connection clip and ground terminal ①
2	Measurement analysis area	9	Vertical control area
3	Multi-function area	10	Analog channel input terminal ②
4	Control area	11	Digital channel input terminal ③
5	Horizontal control area	12	Gen output port ④
6	Trigger control area (Vertical)	13	USB HOST port
7	Signal output area	14	Power soft switch key

- ① Probe compensation signal connection terminal and ground terminal: Connect the BNC end of the probe to the BNC connector on Channel 1 of the oscilloscope. Attach the probe tip to the "Probe Compensation Signal Terminal," and connect the probe's ground alligator clip to the "Ground Terminal" beneath the probe compensation signal terminal. This setup will output the oscilloscope's internal signal.
- ② Analog channel input terminal: Connect the oscilloscope probe or BNC cable to these BNC connectors to input a signal into the oscilloscope.
- ③ Digital channel input port: Use the UT-M15 logic probe, provided as an accessory, to connect the oscilloscope to the device under test for digital channel usage.
- ④ Signal Source Output Interface G1, G2: These BNC connections can output signals such as continuous wave, amplitude modulation, frequency modulation, amplitude-shift keying, frequency-shift keying, and sweep signals.

2.4. Rear Panel



Rear Panel

Table 2 Rear Panel Description

No.	Description	No.	Description
1	EXT Trig	6	USB Device
2	AUX Out	7	LAN port
3	10MHz REF	8	Power switch
4	USB HOST port	9	AC power input socket
5	HDMI port	10	Safety lock

2.5.Operation Panel

(1) Vertical Control



■ **1** , **2** , **3** , **4** : Analog channel setting key respectively represents C1, C2, C3, and C4. Four channel's tab are identified by different colors and it also corresponding to the colors of waveforms on the screen and the channel input connectors. Press any keys to enter the related channel menu (activate or disable the channel)

- **Math** : Press this key to open the mathematical operation menu to perform math operation (add, subtract, multiply, divide), digital filter and advanced operation.
- **Ref** : Loading the reference waveform from 'local or USB', so the measured waveform can compare with the reference waveform.
- **Bus**: Press this key to enter protocol decoding setting, to set the decoding of RS232, I²C, SPI, CAN, CAN-FD, LIN, FlexRay, Audio, 1553B, Manchester, SENT, ARINC429, CAN-XL, I3C, and 1-WIRE.
- **Digital**: Press this key to enter Digital setting, to set basics, grouping, threshold, bus and label.
- **Scale** : Vertical scale rotary knob is used to adjust the vertical scale in the current channel. Turn clockwise to decrease the scale, turn counterclockwise to increase the scale. The amplitude of waveform will increase or decrease with the adjustment and the scale at the



bottom of screen will change in real-time. The vertical scale is step with 1-2-5, press this rotary knob to adjust the vertical scale between coarse tuning and fine tuning.

- **Position**: Vertical position rotary knob is used to move the vertical position of the waveform in the current channel. Press this rotary knob to move the channel position back to the vertical midpoint.

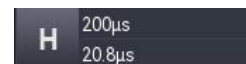
(2) Horizontal Control



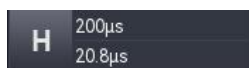
- **Menu** : Horizontal menu key is used to display the horizontal scale, time base mode (XY/YT), horizontal, auto roll, quick roll time base, horizontal position, time base extension and time base selection.

■ **Scale** : Horizontal scale rotary knob is used to adjust all channel time base. During the adjustment, the waveform is compressed or extended in

horizontal show on the screen and the horizontal scale value will change in real-time. The time base is step with 1-2-5, press this rotary knob to adjust the horizontal scale between coarse tuning and fine tuning.

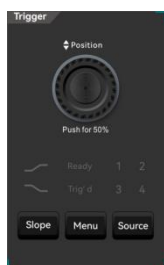


- **Position**: Horizontal position rotary knob is used to move the trigger point to left or right side that relative to the center of the screen. During the adjustment, all channel waveforms move to left or right side and the horizontal shift value on the top of the screen



will change in real-time. Press this rotary knob to move the current position back to the horizontal midpoint.

(3) Trigger Control



- **Slope**: Press the Slope key to switch the trigger edge: rising edge, falling edge, or any edge, The corresponding edge's indicator light will illuminate when switching the edge.
- **Menu**: Press the Menu key to enter the trigger menu.
- **Source**: Press the Source key to switch the trigger source. The panel numbers 1 to 4 correspond to channels C1 to C4. When switching the source, the corresponding number's indicator light will illuminate.
- **Position**: Trigger level rotary knob, turn clockwise to increase the level, turn counterclockwise to decrease the level. During the adjustment, the trigger level



on the top right will change in real-time. When the trigger is single level, press this rotary knob to turn the trigger level to the trigger signal and quickly turn to 50%.

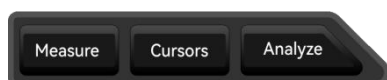
- When the trigger status is READY or TRIGED, the corresponding Ready or Trig'd indicator light in the trigger control area will illuminate.

(4) Control Area



- **Auto/Normal**: Press the Auto/Normal key to switch the oscilloscope trigger mode between Auto and Normal.
- **Run/Stop**: This key is used to set the operating mode of the oscilloscope to "Run" or "Stop".
In the "RUN" state, the key is illuminated in green.
In the "STOP" state, the key is illuminated in red.
- **Force**: When the trigger mode is Normal or Single, press the force trigger key to generate a trigger.
- **Autoset**: After pressing the Autoset key, the oscilloscope automatically adjusts the vertical scale, time base, and trigger mode based on the input signal to display the optimal waveform.
- **Single**: Press the Single key to set the oscilloscope's trigger mode to "Single"; the key will illuminate in orange.

(5) Measurement Analysis Area



- **Measure**: Press the Measure key to enter the measurement

menu, to set the counter, voltmeter, parameter snapshot, measurement statistics, add measurement, clear measurement, and global settings. Please refer to the section [Auto Measurement](#) for more details.

- **Cursor**: Press the Cursor key to enter the cursor measurement menu, to set time, voltage, and screen measurement for each source.
- **Analyze**: Press the Analyze to open the analysis module menu, where the user can access functions such as the voltmeter, counter, power analysis, waveform recording, and pass/fail test.

(6) Multi-function Area



- **Quick**: The quick operation buttons enable the quick saving of pictures, waveform files, and setting files. The format and path for saving will follow the settings configured in the save and load section.
- **Clear**: Press the Clear key to clear all recalled waveforms and parameter measurement statistics from the screen.
- **Touch/Lock**: Press the Touch/Lock key to disable the touchscreen function; the background light will illuminate. To enable the touchscreen again, press this key once more, and the background light will turn off.
- **Default**: Restore factory settings. Press the Default key to reset all oscilloscope settings to their default values.
- **Multipurpose A**: Multi-function knob A. When a numerical menu is selected in the function popup window, the LED on the multi-function knob will light up, allowing the user to adjust values using the knob.
- **Multipurpose B**: Multi-function knob B. When setting numerical parameters in a text box, the user can rotate this knob to shift the selected digit.

(7) Signal Output Area

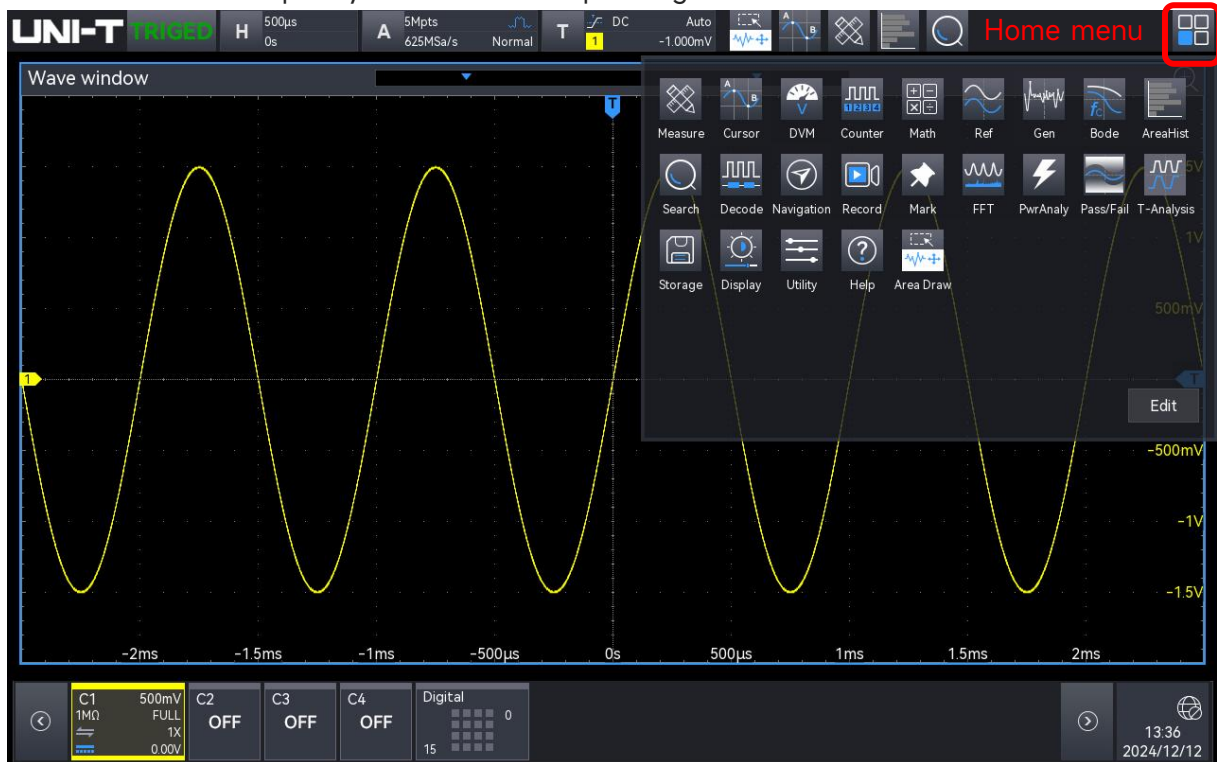


- **G1**: Press the G1 key to open the signal source Gen settings menu and select G1.
- **G2**: Press the G2 key to open the signal source Gen settings menu and select G2.

(8) Home Menu

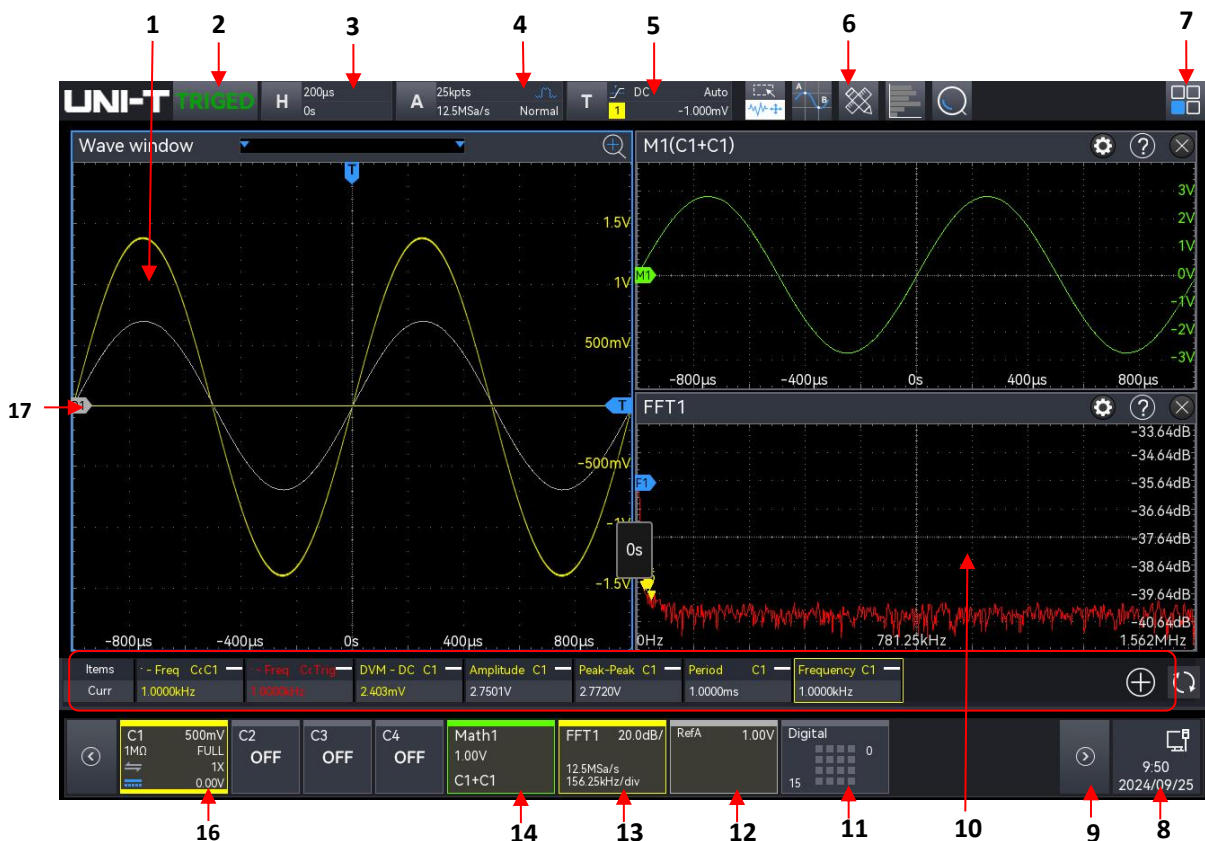
Press the Home icon on the top right corner to pop up "Home" quick menu, including measurement, cursor, voltmeter, counter, math, reference, signal source, Bode plot, regional histogram, search, decoding, navigation, recording, marker, FFT, power analysis, pass/fail test,

time sequence analysis, save, display, auxiliary, help, and regional draw. The quick menu key allows the user to quickly enter the corresponding function menu.



Home Menu

2.6. User Interface



User Interface

Table 3 User Interface Description

No.	Description	No.	Description
1	Waveform display window	10	Multi-window display area
2	Trigger state	11	Digital label
3	Horizontal base label	12	Ref label
4	Sampling rate and memory depth label	13	FFT label
5	Trigger info label	14	Math label
6	Function toolbar	15	Measured result display window
7	Home menu	16	Channel label
8	Notification	17	Analog channel label
9	Volts/div signal bar		

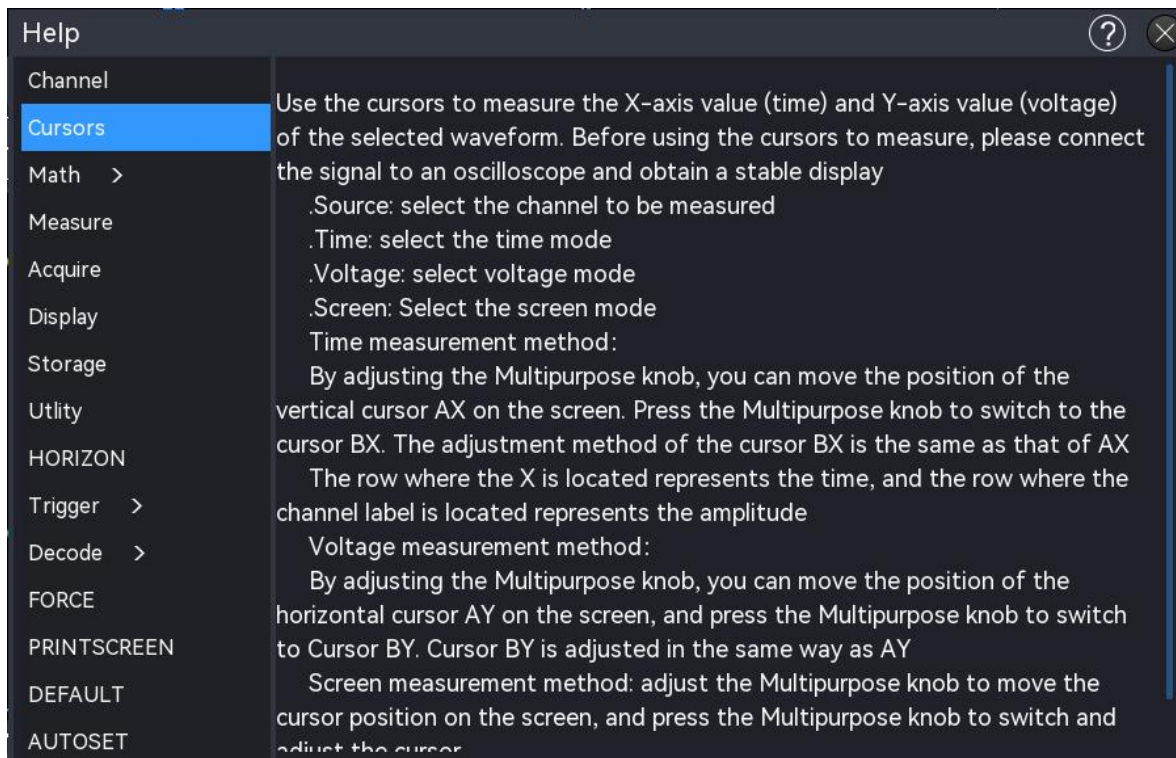
2.7.Help System

The help system provides information about the function keys (including menu keys) on the front panel.

The user can access the help system by following these steps.

- In Home menu, click on the help icon “” to open the help menu.
- In each function menu popup, click on the help icon “” on the top right to open the relevant help menu.

The help screen is divided into two parts, the left side is “Help Options”, and the right side is “Help Display Area”. By selecting a help option, the user can view all related help content on the right.



3. Parameter Setting

MSO5000HD series supports the Multipurpose rotary knob and touch screen to set the parameter, the setting steps as follows.

(1) Multipurpose rotary knob

For the parameter of time and voltage, once the parameter is selected, rotate the Multipurpose rotary knob on the front panel to enter the parameter value.

(2) Touch screen

Once the parameter or text field has been selected, double-click to pop up the virtual keyboard to enter the parameter value, label name, or file name.

a. Enter character string

When naming a file or folder, use the character keyboard to enter a string.

b. Text field

Enter text: input letters, numbers, and special characters, with a maximum length of 16 characters.

c. Clear key

Press the "Clear" key to delete all contents in the text field.

d. Caps key

Press the "Caps" key to switch between upper and lower case.

e. Tab key

Press the "Tab" key to enter 2 spaces at a time.

f. Shift key

Press the "Shift" key to switch among number, special character, upper and lower case.

g. Arrow keys (left, right)

If part of the content needs to be changed, press the "←, →" key to move the cursor to left or right and then to edit the content.

h. Space key

Press the "Space" key to enter one space in the text field.

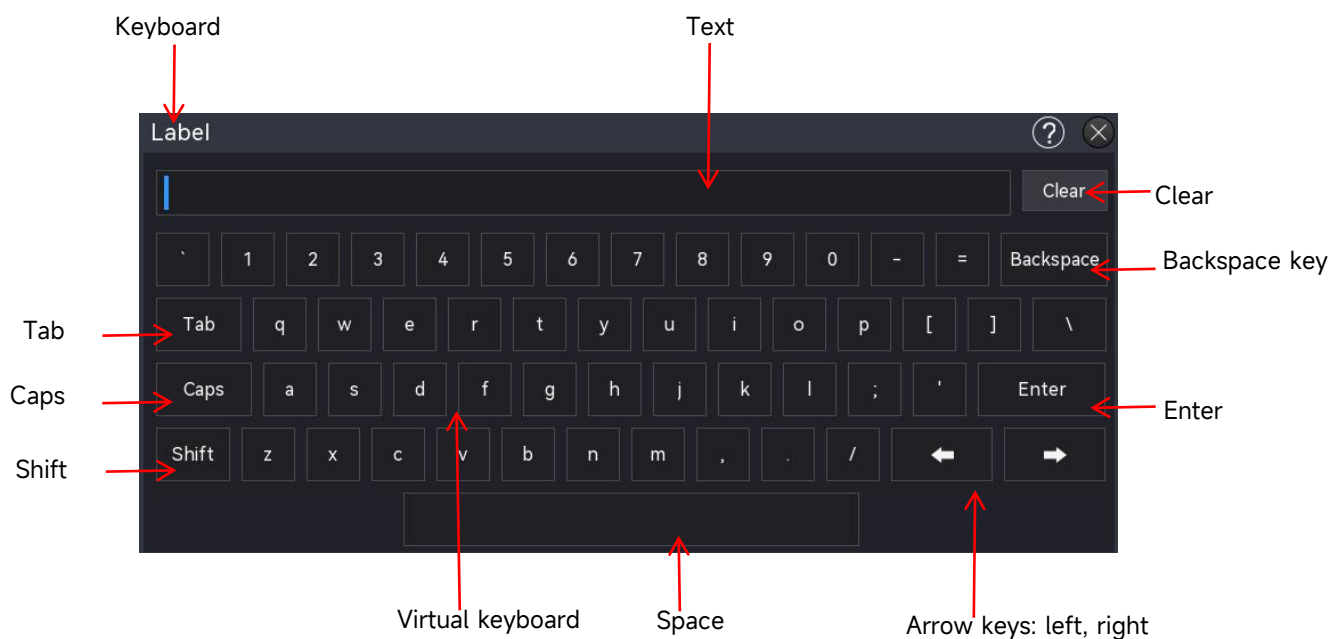
i. Backspace key

Press the "Backspace" key to delete a single character. This key is used to delete a character when the input field contains a large amount of content.

j. Enter key

Once the content has been entered, press the "Enter" key to confirm the setting and close

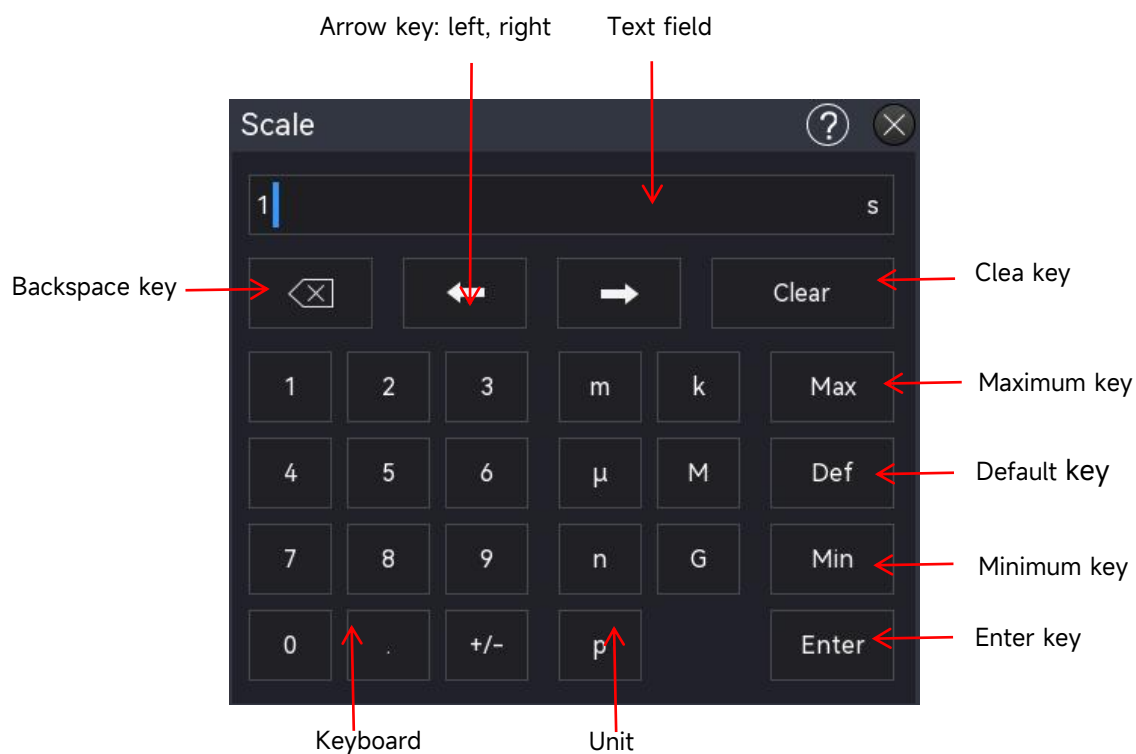
the virtual keyboard.



(3) Enter numeric value

When setting or editing a parameter, use the numeric keyboard to enter the numeric value.

1. Click the number or unit to enter



After entering all the values and selecting the desired units, the numeric keypad will automatically close, completing the parameter setting. Additionally, the user can manually close the numeric keypad by clicking the confirm key, in which case the unit will default to the preset unit. On the

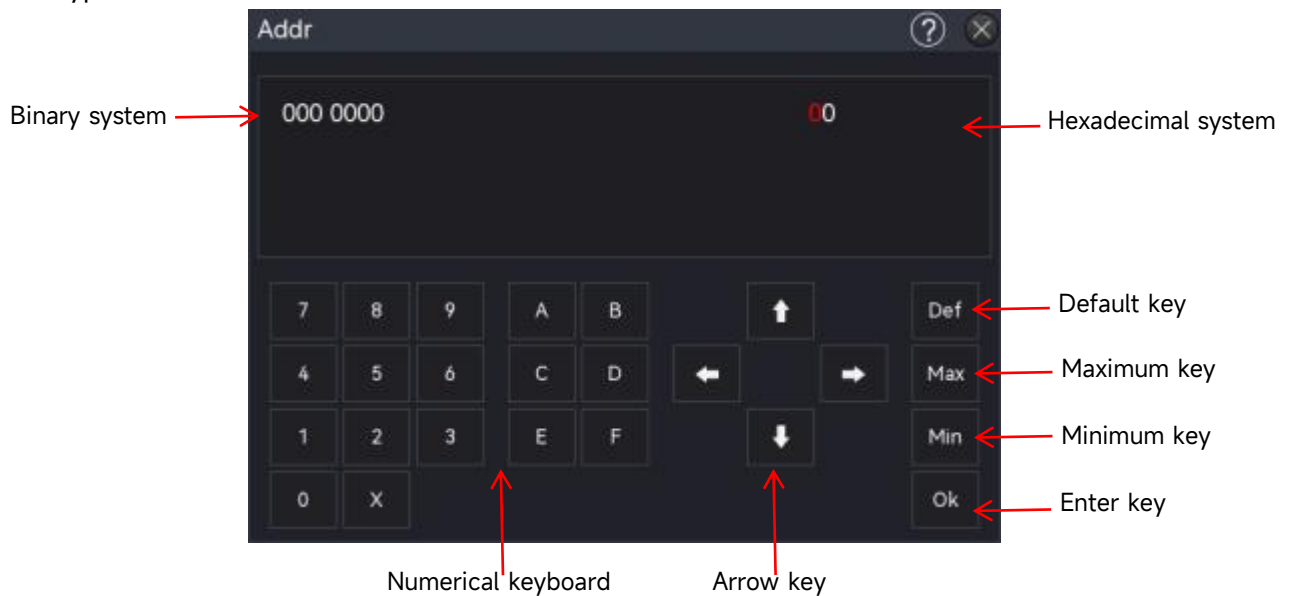
numeric keypad, the user can also perform the following operations:

- Delete the entered parameter value.
- Set the parameter to the maximum or minimum value (sometimes specifically the maximum or minimum value for the current state).
- Set the parameter to the default value.
- Clear the parameter input field.
- Move the cursor to modify the parameter value.

2. Enter binary, hexadecimal system value

During the decoding trigger, use the numeric keypad to enter binary or hexadecimal values for data and address settings.

Enter Method: Tap to select the number or text field to be edited, and then use the numeric keypad to enter the desired numeric or letter values.



(4) After entering all the values and pressing the “Ok” button, the numeric keypad will automatically close, completing the parameter setting. Additionally, on the numeric keypad, the user can perform the following operations:

- Move the cursor to modify the parameter value.
- Set the parameter to the maximum or minimum value (sometimes specifically for the current state).
- Set the parameter to the default value.
- Clear the parameter input field.
- Delete the entered parameter value.

4. Touch Screen

MSO5000HD series provides 10.1-inch super capacitive touch screen, multiple point touch control and gesture control. MSO5000HD has an easy operating system with flexible and high-sensitive touch screen features for great waveform display and excellent user experience.

Touch control function includes tap, squeeze, drag, and rectangle drawing.

Note: The menu displayed on the screen of the oscilloscope can all use the touch control function.

(1) Tap

Use one finger to slightly tap on an icon or a word on the screen as shown in the following figure.

Tap gestures can be used for:

- Tap the menu display on the screen and then to setup.
- Tap the function icon on the top right corner to open the corresponding function.
- Tap the pop-up numeric keyboard to set the parameter.
- Tap the virtual keyboard to set the label name and file name.
- Tap a message to open a close button on the top right corner to close the pop-up window
- Tap another window displayed on the screen and then to setup.



Tap Gesture

(2) Pinch

Squeeze two fingers together or separate. Pinch gestures can zoom out or zoom in the waveform. To zoom out the waveform, pinch two fingers together and then slide them apart; to zoom in, spread two fingers apart and then pinch them together, as shown in the following figure.

Pinch gestures can be used for:

- Adjust the horizontal time base of waveform by squeezing in the horizontal direction.
- Adjust the vertical time base of waveform by squeezing in the vertical direction.



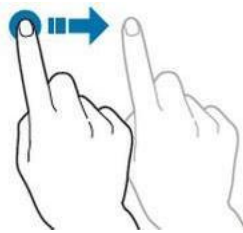
Pinch Gesture

(3) Drag

Use one finger to press and drag the selected item to the aimed position as shown in the following figure.

Drag gestures can be used for:

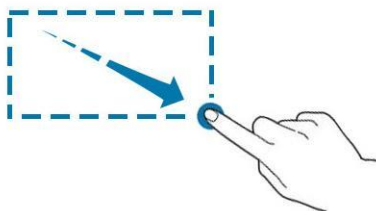
- Drag the waveform to change the waveform position.
- Drag the window to change the window position.
- Drag the cursor to change the cursor position.



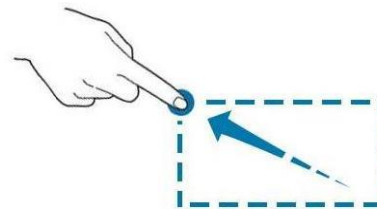
Drag Gesture

(4) Rectangle Drawing

Open the HOME menu and click the icon “Rectangle Drawing” to enable the function, drag your finger to draw a rectangle on the screen as shown in Figure (a), (b), move the finger, a menu will appear on the screen, at this point, “Zone A”, “Zone B”, “Intersection”, “Non-intersect” can be selected. Drag your finger from bottom right to the top left on the screen to draw the trigger area.



(a)



(b)

Rectangle Drawing Gesture

Select “Zone A”:

- Draw zone A.
- Open zone A.
- Open “Zone Trigger” menu.

Select “Zone B”:

- Draw zone B.
- Open zone B.
- Open “Zone Trigger” menu

Note: Click on “Rectangle Drawing” to step through rectangle drawing and operating waveform mode. Click on “Rectangle Drawing”, if the icon shows , it means that “Rectangle Drawing” mode is enabled; if the icon shows , it means that “Operating Waveform” mode is enabled.

5. Remote Control

MSO5000HD series mixed signal oscilloscopes can communicate with a PC via USB and LAN port for remote control. Remote control is implemented using SCPI (Standard Commands for Programmable Instruments).

MSO5000HD series has three methods for remote control.

(1) Custom Programming

The user can perform the programming control on the oscilloscope through SCPI (Standard Commands for Programmable Instruments). For detailed descriptions on command and programming, please refer to *MSO5000HD Series Mixed Signal Oscilloscope-Programming Manual*.

(2) PC Software Control (Instrument manager)

The user can use a PC software to remotely control the oscilloscope. The instrument manager can display the oscilloscope screen in real time and control the operation with the mouse. It is recommended to use the PC software provided by UNI-T. It can be downloaded from UNI-T official website (<https://www.uni-trend.com>).

Operating steps:

- Setup the communication between the instrument and a PC
- Open the instrument manager software and search the instrument source
- Right-click to open the oscilloscope, operate the instrument manager to remotely control the oscilloscope (refer to *Instrument Manager-User's Manual* for more details)

(3) Web Control

Once the network is connected, users can access a web page via the IP address. After logging in with the username and password, they can control the device. The Web Control feature displays the instrument's screen interface in real-time. It supports web access from PCs, smartphones, and iPads, and allows for both internal and external remote control of the device.

6. Troubleshooting

- (1) If the oscilloscope remains on a black screen without any display when pressing the power soft key.
 - a. Check if the power plug is properly connected and the power supply is normal.
 - b. Check if the power switch is turned on. If the power switch is turned on, the power soft key on the front panel should be green. When the power soft key is enabled, the power soft key should be blue, and the oscilloscope will make an active sound. There should be a normal relay rattle when the soft switch key is pressed.
 - c. If the relay has sound, it indicates that the oscilloscope is normal boot-up. Press the Default key and press the “Yes” key, if the oscilloscope returns to normal, indicating that the backlight brightness is set too low.
 - d. Restart the oscilloscope after completing the above steps.
 - e. If the product still does not work properly, contact the UNI-T Service Center for assistance.
- (2) After signal acquisition, the waveform of the signal does not appear on the screen.
 - a. Check whether probe and DUT are connected properly.
 - b. Check whether the signal output channel is open.
 - c. Check whether the signal connecting line is connected to analog channel.
 - d. Check whether the signal source has DC offset.
 - e. Plug out the connected signal, to check whether the base line is within the screen range (If not, please perform self-calibration).
 - f. If the product still does not work properly, contact the UNI-T Service Center for assistance.
- (3) The measured voltage amplitude value is 10 times larger or 10 times smaller than the actual value.

Check whether the channel probe attenuation ratio settings are consistent with the used probe attenuation rate.
- (4) There is a waveform display but not stable.
 - a. Check the trigger settings in trigger menu whether is consistent with the actual signal input channel.
 - b. Check the trigger type: the general signals should use “Edge” trigger. The waveform can only be displayed stably if the trigger mode is set correctly.
 - c. Try to change trigger coupling to HF rejection or LF rejection, to filter out the high-frequency or low-frequency noise that interfere the trigger.
- (5) No waveform display after pressing the Run/Stop key.

- a. Check whether the trigger mode is set to "Normal" or "Single" and verify if the trigger level exceeds the waveform range.
 - b. If the trigger mode is normal or single and the trigger level is in the center, set the trigger mode to AUTO.
 - c. Press the Autoset key to automatically complete the above settings.
- (6) Waveform refresh is very slow.
- a. Check whether the acquisition method is set to "Average" and if the average times are large.
 - b. Check whether the memory depth is maximum.
 - c. Check whether the trigger holdoff is large.
 - d. Check whether it is normal trigger and is slow time base.
 - e. All the above will lead to slow waveform refresh, it is recommended to restore the factory settings, then the waveform can be refreshed normally.

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